

Bord na Móna

Carranstown Bog

Cutaway Bog Decommissioning and Rehabilitation Plan 2022

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0501-01:

“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 Carranstown Bog upon cessation of peat production and compliments the licence requirement to decommission the site.

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

Industrial peat production has now fully ceased at Carranstown Bog.

In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. P0501-01, due regard was also given to the Peatlands Climate Action Scheme (PCAS) announced by the Minister. This Scheme will see the Minister support, via the Climate Action Fund and Ireland’s National Recovery and Resilience Plan, Bord na Móna in developing a package of measures, ‘the Scheme’, for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme’. However, only the additional costs associated with the additional and enhanced rehabilitation, i.e, measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support. The additional costs of the Scheme will be supported by Government, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator.

While this document outlines the enhanced rehabilitation measures planned for Carranstown bog, activities which goes 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 Carranstown Bog as environmental stabilisation, re-wetting and setting the bog on a trajectory towards development of naturally functioning peatland and wetland habitats.

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

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Note: This finalised version of the Rehabilitation Plan has been updated to take account that several planning actions listed in Section 8.1 have been completed and have been incorporated into the plan. This includes an Appropriate Assessment of the rehabilitation plan. See Carranstown Decommissioning and Rehabilitation Plan – Addendum 1 for more details.

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NON-TECHNICAL SUMMARY

- Bord na Móna is planning to rehabilitate Carranstown Bog, west of Ballivor, in Co. Meath/Westmeath.
- Peat harvesting is now finished at Carranstown Bog.
- This is happening as Bord na Móna are obliged to carry out peatland rehabilitation via an IPC License issued by the Environmental Protection Agency. In addition, the Government has agreed to support peatland rehabilitation via the establishment of the Peatland Climate Action Scheme (PCAS). This is funded via the Government and by Bord na Móna.
- The key objective of peatland rehabilitation is environmental stabilisation. This means developing habitats and vegetation back onto the bare peat (putting a “skin” back onto the peat), and minimising effects to downstream waterbodies. Carranstown was drained in the past to allow peat production. Better results for water quality improvements, climate action, the reduction of carbon emissions and biodiversity are achieved when the remaining peat is re-wetted. This means drain-blocking and other measures to raise water levels to the surface of the bog and to encourage the natural colonisation of vegetation.
- In general, soggy ground conditions are preferred. This means the remaining peat is wet and that plants that prefer wetter conditions, like Bog Cotton and Reeds will thrive.
- Many Bord na Móna bogs cannot be restored back to raised bog, as so much peat has been removed and the environmental conditions have been modified. However other natural habitats will develop like shallow wetlands with Reedbeds and Birch woodland, and in time a naturalised peatland can be restored.
- The development of a range of habitats in Carranstown Bog will support biodiversity including plants, insects, birds and mammals. This includes some species that are rare and protected in the wider landscape. It will increase the national area of native woodland. Many wetland habitats in the wider landscape have been reclaimed for agriculture and other uses and peatland rehabilitation is an opportunity to create new wetland habitats.
- While Carranstown Bog was utilised for industrial peat production from 1950 until 2020, the bog still has relatively deep residual peat. Much of the former production area currently comprises of bare peat. Within the former production area there are some already established pioneer peatland habitats.
- Measures proposed for Carranstown Bog include internal drain blocking and other measures required to raise water levels to the surface of the peat (changing levels of pipes for example). Some fertiliser will be spread on headlands and other areas (a small part of the overall area) to encourage vegetation growth.
- Bord na Móna plan to carry out this work in 2022.
- 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 Carranstown, and a peatland ecosystem to be restored. However, it is expected that most of the bog will be developing pioneer habitats after 10 years.
- This is a peatland rehabilitation plan. This plan does not consider future after-use or development. Bord na Móna continually reviews its land-bank to consider future commercial or industrial developments, such as renewable energy. Bord na Móna are currently developing a renewable energy project called Ballivor Windfarm. This proposed project is in the pre-planning stage, but the planning application layout design has informed the constraints (see drawing number BNM-DR-23-20-05: Enhanced Rehab Measures

and BNM-DR-23-20-20: Standard Rehab Measures). The proposed renewable energy project is expected to have a small footprint on Carranstown Bog. In advance of this proposed planning submission, it is planned to rehabilitate **part** of Carranstown Bog in 2023 (eastern part). The remaining area will be rehabilitated after the renewable energy construction is complete, or at a later date.

- Any other proposed development will be planned in adherence to relevant planning guidelines and will consider the rehabilitation and the condition of the site.
- Peatland rehabilitation of these bogs will bring a range of benefits to the local community via improvements to the local landscape and is also important for supporting national policies and strategies in relation to reduction of carbon emissions from these peatlands, supporting biodiversity and improvements to water quality.

SUMMARY

Name of bog: Carranstown Bog **Area:** 306 ha

Site description:

- Industrial peat production at Carranstown bog commenced in 1950 and ceased in 2020. The peat was formerly used as horticultural and fuel peat;
- Carranstown Bog has a gravity-based drainage system;
- Active drainage channels are still present;
- The majority of the site is bare peat;
- Residual peat depths at Carranstown are deep (>2.6m) for the most part but some small areas have shallow peat <1m and some <0.5m.

Rehabilitation goals and outcomes

Bord na Móna is committed to discharging the obligations arising from Condition 10 of the IPC licence.

This is defined as:

- Meeting conditions of the IPC licence;
- Stabilisation or improvement in water quality parameters (e.g. suspended solids);
- Environmental stabilisation;
- Optimising hydrological conditions for the further development of embryonic *Sphagnum*-rich peat forming communities, wetland, Reed swamp, wet woodland and fen habitats on shallow cutaway peats, along with management of existing habitats;
- Optimising hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future;
- Rehabilitation will support the National Policies on Climate Action Fund and Ireland's National Recovery and Resilience Plan and GHG mitigation by maintaining and enhancing the current residual peat storage capacity of the bog (locking the carbon into the ground). It is expected that the bog will have reduced emissions (reduced source) as it develops naturally functioning wetland and peatland habitats. It will also support Ireland's commitments towards Water Framework Directive and the National River Basin Management Plan 2018-2021.

Scope of rehabilitation

The principal scope of this rehabilitation plan is defined by:

- The area of Carranstown Bog.
- EPA IPC Licence - Ref. P0501-01. 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 key objective of 'rehabilitation', as required by this licence, is achieved by the **environmental stabilisation** of the bog.
- **The Scheme (PCAS)** includes enhanced measures which are designed to exceed/meet the standard stabilisation requirements as defined by the IPC Licence and to enhance the ecosystem services of Carranstown Bog, principally optimising **climate action benefits**.
- The key goals and outcomes of rehabilitation at this bog outlined above.
- To minimise potential impacts on neighbouring land, some boundary drains around Carranstown Bog will be left unblocked, as blocking boundary drains could affect adjacent land.
- Other constraints include access routes and Turbary rights.

- Proposed land-use. Bord na Móna are currently developing a renewable energy project called Ballivor Windfarm. This proposed project is in the pre-planning stage. The proposed renewable energy project will have a small footprint on Carranstown Bog. In advance of this proposed planning submission, it is planned to rehabilitate **part** of Carranstown Bog in 2023 (eastern part). The remaining area will be rehabilitated after the renewable energy construction is complete, or at a later date. Bord na Móna remain committed to rehabilitating all of Carranstown Bog and meeting conditions of the IPC Licence for this bog.

Criteria for successful rehabilitation:

The Criteria for successful rehabilitation to meet Condition 10 of the IPC Licence have been defined as:

- Rewetting of residual peat in the former area of industrial peat production to slow water movement across the site to retain silt, encouraging development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat through management of existing wetlands, and the creation of further wetland or fen habitat (IPC Licence validation) along with embryonic *Sphagnum*-rich peat forming communities. The target will be the delivery of measures and this will be measured by an aerial survey after rehabilitation is completed. (IPC Licence validation).
- Stabilising/improving potential emissions to water (e.g. suspended solids). This will be measured via water quality monitoring (suspended solids and ammonia) for at least 2 years after the rehabilitation has been completed. (IPC Licence validation).
- Reducing pressure from peat production on the local river catchment (WFD) (IPC Licence validation). This will be measured by the EPA WFD monitoring programme.
- Optimising the extent of suitable hydrological conditions for climate action (Climate action verification). This will be measured by an aerial survey after rehabilitation has been completed.
- Reduction in carbon emissions (Climate action verification). 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.
- Setting the site on a trajectory towards establishment of a mosaic of compatible habitats including embryonic *Sphagnum*-rich peat forming communities, fen, Reed swamp, wet woodland, heath, scrub and Birch woodland, where conditions are suitable, and eventually towards a reduced Carbon source/part Carbon sink. Some areas will naturally be dry and develop Birch woodland and other drier habitats. It will take some time for stable naturally functioning habitats to fully develop at Carranstown Bog.
- Improvement in biodiversity and ecosystem services (Climate action verification).

Summary of measures:

The below section is a summary of measures proposed for rehabilitation.

- Planning actions, including developing a detailed site plan and carrying out a hydrology and drainage appraisal.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation.
- Carry out proposed measures, which will be a combination of hydrological management, drain blocking, peat field re-profiling, wetland creation and fertiliser applications targeting bare peat sections of headlands, high fields and other areas.
- Silt ponds will continue to be maintained during the rehabilitation and decommissioning phase.
- Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.
- Decommissioning of silt-ponds will be assessed and carried out, where required.

Timeframe:

- 2021-2022: Short-term planning actions.
- 2022: Short-term practical actions.

- 2022-2025: Any long-term practical actions; Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.
- 2025: Decommission silt-ponds, if necessary.

Budget and Costing

- The rehabilitation plan outlined in this document is predicated on the understanding that it is the Minister's intention to 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.*
- In relation to the pre-existing Condition 10 IPC Licence requirement to carry out what can be termed the 'standard' decommissioning and rehabilitation, Bord na Móna maintains a Provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. This is updated every year. For more information see the Bord na Móna Annual Report (Bord na Móna 2021). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.

Monitoring, after-care and maintenance

The monitoring, after-care and maintenance programme for Carranstown Bog, as required to meet Condition 10 of the IPC Licence, is defined as:

- Quarterly monitoring assessments of the site to determine the general status of the site, 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, if needed.
- **Water quality monitoring** will be established. Monitoring of key water quality parameters for 2 years after rehabilitation will include: Ammonia, Phosphorous, Suspended solids (silt) & pH.
- 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.

Additional Monitoring:

- The monitoring and validation of re-vegetation via natural colonisation and changes in bog condition will be carried out using an aerial survey, after rehabilitation measures are implemented. It is proposed that sites can be monitored against this baseline in the future.
- Biodiversity Ecosystem services will be monitored using specific indicators.
- Carbon emissions monitoring only be carried out on a small proportion of BnM sites to develop better understanding of carbon emissions and GHG emission factors from different types of BnM sites and will be developed on association with other established research programmes. Reduction in carbon emissions will be modelled by 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.
- Monitoring as part of Climate Action Verification is dependent on support from the Climate Action Fund and Ireland's National Recovery and Resilience Plan or other external funding.

Validation and IPC Licence surrender

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

- The planned rehabilitation has been completed.
- Water quality monitoring demonstrates that water quality indicators are stabilising/improving.
- The site has been environmentally stabilised.

1. INTRODUCTION

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Ballivor-Derrygreenagh bog group (Ref. P0501-01). 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. Carranstown bog is part of the Ballivor-Derrygreenagh bog group (see Appendix II for details of the bog areas within the Ballivor-Derrygreenagh bog group). Carranstown Bog is located in Co. Meath/Westmeath.

This plan is a specific rehabilitation plan for the bog and outlines:

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

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

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, 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 have now announced the complete cessation of industrial peat production across its estate (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 <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. 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.

Carranstown Bog is proposed to be part of this Scheme (PCAS), which commenced in 2021 and this rehabilitation plan outlines the approach to be taken.

1.1 Constraints and Limitations

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0501-01:

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

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

This document covers the area of **Carranstown Bog**.

Industrial peat extraction at Carranstown Bog permanently ceased in 2020 (having commenced bog development in 1950). Currently the former peat production area comprises a mosaic of largely bare peat along with pioneering cutaway habitats, in addition to marginal¹ habitats. There are some small areas to the east and west of the site that were initially developed for milled peat production but have never been put fully into production and now

¹ 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.

have re-vegetated or have some remnant vegetation. These areas are rapidly developing Birch and Pine scrub and Heather is also a dominant vegetation type. The south east of the site also contains a relatively large area of Birch woodland. Other habitats in the eastern boundary of the site include a small section of remnant raised bog, Birch woodland and old domestic cutover bog. Two small mineral islands are located on the site; these areas contain woodland that is dominated by Hazel, Birch and Oak.

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.

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

Rehabilitation in other areas of the bog may also be constrained due to other property issues or issues such as rights of way. Several Rights of Way exist at Carranstown, one of which leads to the known tubaries on the west side of the bog.

The rail line on site at Carranstown will be in operation in the short term until all peat stocks have been removed from the bog and adjacent bogs.

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 2012 to 2021 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-practise regarding peatland rehabilitation and after-use through the International Peat Society and the Society for Ecological Restoration (Joosten & Clarke, 2002; Clarke & Rieley, 2010; Gann *et al.*, 2019);
- Consultation and engagement with internal and external stakeholders;
- GIS Mapping;
- BNM drainage surveys;
- Bog topography and LIDAR data;
- Previous research studies on site;
- Hydrological modelling; and
- The development of a Methodology Paper (draft) 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 Carranstown Bog, in particular, optimising climate action benefits.

2.1 Desk Study

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

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- Renou-Wilson *et al.* (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.
- Schouten (2002). Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies. Dúchas - The Heritage Service of the Department of the Environment and Local Government, Ireland;
- Thom (2019). Conserving Bogs – Management Handbook.
- Wheeler & Shaw (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction.
- Wittram *et al.* (2015). A Practitioners Guide to *Sphagnum* Reintroduction. Moors for the Future Partnership.

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

- Ballivor Integrated Pollution Control Licence;
- Ballivor Annual Environmental Reports;
- Review of the National Biodiversity Data Centre (NBDC) webmapper;
- Inland Fisheries Ireland (IFI) Reports;
- Environmental Protection Agency database (www.epa.ie);
- EPA Guidance on Requests for Alterations to a Licensed Industrial or Waste Activity;
- BirdWatch Ireland online data (including I-WeBS and CBS datasets; www.birdwatchireland.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);

- Historic Environment Viewer at <https://webgis.archaeology.ie/historicenvironment/>
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive catchments.ie/maps/ Map Viewer (www.catchments.ie);
- OPW Indicative Flood Maps (www.floodmaps.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie);
- River Basin Management Plan for Ireland 2018 – 2021;
- Bord na Móna Annual Report 2020.
- Spatial data in respect of Article 17 reporting, available online at <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17>.

2.2 Consultation

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

2.3 Field Surveys

Bord na Móna carried out a baseline ecological survey of all of its properties in 2009-2012 and developed habitat maps. As part of this exercise, Carranstown Bog was surveyed in July of 2012. Additional ecological walk-over surveys and visits have taken place at Carranstown Bog between 2012-2021 (visited during winter 2016/17, but also a final confirmatory survey took place in September of 2021). Habitat maps have been updated, where required. This rehabilitation plan is informed by the original baseline survey as well as subsequent confirmatory site walk-over surveys and visits, and updates to baseline data.

Habitat mapping followed best-practise guidance from Smith *et al.* (2011). Map outputs including all habitat maps and target notes were produced using GIS software application packages (ArcGIS). General marginal habitats and other habitats that had not been modified significantly by industrial peat extraction were classified using Fossitt *et al.* (2000). Plant nomenclature for vascular plants follows Stace (2010), while mosses and liverworts nomenclature follows identification keys published by the British Bryological Society (2010). A more detailed Bord na Móna classification system was previously developed for classifying pioneer cutaway habitats as Fossitt categories were deemed not to be detailed enough for cutaway bog (much of cutaway bog could be classified as Cutover Bog - PB4). 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 site visit was used to categorise any changes in habitat extent at Carranstown in September 2021.

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

3. SITE DESCRIPTION

Carranstown Bog is located approximately 5 km east of Raharney in Co Westmeath along the R156 Raharney to Ballivor Road. It is part of the Ballivor-Derrygreenagh Bog group and a BnM railway links the site to Ballivor Bog to the south, with the road marking the southern boundary. There are further rail links to Bracklin bog to the north. Carranstown Bog was used to produce sod peat in the past. However, the majority of the bog has been re-developed for milled peat production for some time. The bog still retains a dome through much of this section and the peat that remains is “red” or “Sphagnum” peat.

Approximately three quarters of the site was in active peat production until recently and is bare peat. There are some small areas to the east and west of the site that were initially developed for milled peat production but have never been put fully into production and now have re-vegetated or have some remnant vegetation. These areas are rapidly developing Birch and Pine scrub and Heather is also a dominant vegetation type.

The south east of the site also contains a relatively large area of Birch woodland. Other habitats in the eastern boundary of the site include a small section of remnant raised bog, Birch woodland and old domestic cutover bog. Two small mineral islands are located on the site; these areas contain woodland that is dominated by Hazel, Birch and Oak. A tributary of the River Boyne flows along the southern boundary of the site.

See Drawing number BNM-DR-23_20_01 titled **Carranstown Bog: Bog Site Location**, included in the accompanying Mapbook², which illustrates the location of Carranstown Bog in context to the surrounding area.

3.1 Status and Situation

3.1.1 Site history

Carranstown bog was in production from 1950 until 2020. The eastern boundary of the site includes a small section of remnant raised bog, Birch woodland and old domestic cutover bog.

3.1.2 Current land-use

Industrial peat production has now permanently ceased at Carranstown Bog. The site has some remaining stock which is being removed. Approximately three quarters of the site is bare peat.

Site infrastructure and structures are mapped in the accompanying Mapbook. Some marginal areas to the east and west of the Bord na Móna boundary are used for private turbary.

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

² Cutaway Bog Decommissioning and Rehabilitation Plan - Carranstown Bog Map Book

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 Carranstown Bog, jobs included in the above study would have included those to facilitate extraction of peat at this site, and associated processing and transfer to the relevant power station.

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).

3.2 Geology and Peat Depths

3.2.1 Sub-soil geology

The underlying geology comprises Waulsortian limestone³. The site is underlain with both gravel and marl. Gravel sub-soil has been exposed in places within the production-related cutaway area, which was noted on the west side of the site when carrying out field surveys in September 2021.

3.2.2 Peat type and depths

Large sections of Carranstown still contain significant areas of “Sphagnum” peat. Peat depths range from less than half a meter to greater than 2.6m.

3.3 Key Biodiversity Features of Interest

There are some small areas to the east and west of the site that were initially developed for milled peat production but have never been put fully into production and now have re-vegetated or have some remnant vegetation. This section of the site is rapidly developing Birch and Pine scrub and Heather is also a dominant vegetation type. The drainage ditches have become blocked in many areas and contain *Sphagnum cuspidatum* and *Sphagnum papillosum*.

³ <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=de7012a99d2748ea9106e7ee1b6ab8d5&scale=0>

The south east of the site also contains a relatively large area of Birch woodland. The woodland is situated on an area of old domestic turf cutting. Birch and willow dominate with occasional Rowan and Oak, while Bramble, Bracken and Heather dominate the understory.

The margins of the BnM property include some remnant habitats including raised bog (PB1) and Birch woodland (WN7). The Birch woodland located along the south eastern margin is quite well-developed in places. Other habitats in the eastern boundary of the site include a small section of remnant raised bog, Birch woodland and old domestic cutover bog. The western boundary also contains an area of ditched raised bog that has never been in peat production. This area is dominated by Heather with Birch and Pine scrub encroaching.

Two small mineral islands are located on the site; these areas contain woodland that is dominated by Hazel, Birch and Oak.

The site is used occasionally by small groups of Golden Plover in the winter (Biosphere Environmental Services 2014).

3.3.1 Current habitats

The most common habitats present at Carranstown include (in order of dominance):

- Bare peat (BP).
- Birch woodland (WN7) (on cutover bog dominated by Birch and/or Scot's Pine)
- Birch *Betula spp.* -dominated scrub (WS1) (on drier higher old cutover bog that is not flooded))
- Raised bog (PB1)
- Cutover Bog (PB4)
- Degraded raised bog habitat (PB1)
- Access routes (BL3) (rail lines and tracks including gravel embankments and associated habitats such as dry grassland communities (GS2) and scrub)
- Scrub (WS1)
- Pioneering vegetation on cutaway including Scrub and Soft Rush dominated Poor fen (mainly in mosaic with Birch scrub but also Gorse (*Ulex europaeus*))
- Oak Ash Hazel woodland (WN2)
- Wet grassland (GS4)
- Mosaics of Willow-dominated scrub (WS1) along with open communities dominated by Soft rush (PF2) on cutaway
- Silt ponds (FL8)
- Improved grassland (GA1) around the boundary where the official boundary extends into adjacent fields
- Dense bracken (HD1).

See Drawing number BNM-DR-23-20-17 titled **Carranstown Bog: Current Habitat Map**, included in the accompanying Mapbook, which illustrates the habitats at Carranstown Bog.



Pioneering vegetation on cutaway including Scrub and Soft Rush dominated Poor fen (Sept 2021)



Bare Peat at Carranstown (Sept 2021)



Sphagnum recolonization within Dry Heath at Carranstown (Sept 2021)



Birch woodland (WN7) (on cutover bog dominated by Birch and/or Scot's Pine) at Carranstown Bog (Sept 2021)

Table 1: Photos of Habitats at Carranstown Bog

3.3.2 Species of conservation interest

A review of available Biodiversity records from the National Biodiversity Data Centre (hereafter NBDC) of flora and fauna recorded within a polygon including Carranstown Bog found 3 species of Butterfly, Green-veined White (*Pieris napi*), Marsh Fritillary (*Euphydryas aurinia*) and Small Tortoiseshell (*Aglais urticae*), and 4 species of terrestrial mammal (Eurasian Badger (*Meles meles*), Irish Hare (*Lepus timidus subsp. hibernicus*), Pine Marten (*Martes martes*), and Red Fox (*Vulpes vulpes*)).

Carranstown Bog is within a 10km square (N65) which has records of 78 species of birds (2007-2011 Bird Atlas period), 163 species of flowering plant, 2 species of Amphibian, 16 species of Butterfly, 43 species of Moth, 5 species of terrestrial mammal, 42 species of Mollusc, 51 species of Moss, and 16 species of Liverwort, along with records of Stoneworts (n=3), other insects (n=10).

On the most recent visit to Carranstown in September of 2021, species of bird were recorded utilising or associating with habitats onsite including Meadow pipit (*Anthus pratensis*) (Red-listed⁴), along with the Amber listed Common Kingfisher (*Alcedo atthis*). Additionally other species were noted such as Blue Tit (*Cyanistes caeruleus*), Sparrowhawk (*Accipiter nisus*), Goldfinch (*Carduelis carduelis*), Raven (*Corvus corax*), Lesser Redpoll (*Acanthis cabaret*), Wren (*Troglodytes aedon*), Hooded Crow (*Corvus cornix*), Long tailed tit (*Aegithalos caudatus*), Great Tit (*Parus major*) and Wheatear (*Oenanthe oenanthe*).

Golden Plover (*Pluvialis apricaria*) and Eurasian Curlew (*Numenius arquata*) (both Red-listed) have previously been recorded on or near Carranstown in the Autumn period (September 2012).

In September of 2021, 4 species of Butterfly and 2 species of Dragonfly were recorded. Butterflies included Small tortoiseshell, Ringlet (*Aphantopus hyperantus*), Speckled wood (*Maniola jurtina*) and Green Veined White (*Polyommatus icarus*), whilst Dragonfly species were Black Darter (*Sympetrum danae*).

3.3.3 Invasive species

Invasive alien species known to occur at the subject bog (or desktop review suggests presence is likely), and for which reasonably foreseeable source impact pathways for dispersal may result from the proposed PCAS described here. 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

Carranstown has no overlapping designated sites. Mount Hevey Bog SAC (Site Code 002342) (also a pNHA) is located to the south of Carranstown, whilst Molerick Bog NHA (Site Code 001582) is south east of Carranstown. Mount Hevey is designated for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes): Raised Bog (Active)* [7110], Degraded Raised Bog [7120] and Rhynchosporion Vegetation [7150]. Molerick Bog NHA is a site of conservation significance comprising as it does a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. This site is located in Co. Meath at the eastern extreme of raised bogs in Ireland and is

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

one of only four raised bogs in the county. Ireland has a high proportion of the total E.U. resource of this habitat type (over 50%) and so has a special responsibility for its conservation at an international level.

3.4.1 Other Nature Conservation Designations

The Ramsar Convention entered into force in Ireland on 15th March 1985. Ireland currently has 45 sites/wetlands designated as Wetlands of International Importance (Ramsar Sites). These cover a surface area of 66,994ha. There are no Ramsar Sites in the local vicinity of Carranstown Bog (i.e. within 3km). The closest Ramsar Sites to Carranstown Bog are Lough Derravarragh, Lough Ennell and Lough Owel, all of which are ca.25km west of the site.

3.5 Hydrology and Hydrogeology

Carranstown bog forms part of the Boyne Catchment (Catchment ID : HA 07) as defined by the EPA under the Water Framework Directive (WFD) and is situated within the Boyne_SC_050 Sub-Catchment. The bog is located along the floodplain of the river Boyne east of the town of Mullingar. Carranstown bog contains several drainage pathways which primarily drain in a westerly direction towards the River Boyne. Carranstown Bog has a gravity-based drainage system.

Regional hydrological data suggest that Carranstown receives average precipitation of 891mm/yr (1981-2010), with an estimated evapotranspiration rate of c. 512mm/yr, leaving an average effective precipitation of 379 mm/yr. Assuming no recharge to groundwater and no groundwater contribution to discharge from the bog, the available precipitation that may become runoff (assuming no change in storage) is 379mm/yr, which equates to an annual runoff rate of c. 3,790m³/ha.

GSI data indicates that Waulsortian Limestones underlie Carranstown Bog. This unit is classified as a Locally Important Aquifer (Bedrock which is Moderately Productive only in Local Zones). A south-west to north-east trending fault line crosses close to the south-eastern margin of the bog. No data exists concerning depth to bedrock, whilst no mapped bedrock outcrop could be identified in close proximity to the bogs. There are also no mapped karst features within the surrounding area.

Quaternary Sediment maps show Carranstown underlain by peat, yet surrounded by inorganic deposits, including Till derived from limestones to the south, east and west and Till derived from cherts to the north east. GSI Groundwater mapping indicates that there is generally moderate vulnerability in the surrounding area with some higher vulnerability areas to the north-east. While Groundwater Vulnerability is typically used to indicate the susceptibility to groundwater pollution, it can provide a useful proxy indication of likely groundwater flow rates in the surrounding area.

3.6 Emissions to surface-water and water-courses

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

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

Carranstown bog has four treated surface water outlets to the River Boyne catchment. There are two direct to the River Boyne (IE_EA_07B040900 BOYNE_060), one to the River Deel (IE_EA_07D010600 DEEL (RAHARNEY)_060) and one to the Stonyford River (IE_EA_07S020400 STONYFORD_040)

The Boyne and Stonyford rivers were listed as being under pressure from peat extraction in the 2nd cycle of the River Basin Management Plan for Ireland, but are not indicated as remaining so in the third cycle which is currently out for consultation. Peat extraction was not identified as a pressure in the second cycle of the river basin management plan and is not indicated as being so in the third cycle.

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-23-20-02 titled **Carranstown Bog: Structures and Sampling**, along with Drawing number BNM-DR-23-20-WQ01 titled **Carranstown Bog: Water Quality Map** included in the accompanying Mapbook, which illustrate the various drainage and water quality infrastructure present at Carranstown.

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 2.78 mg/l and COD 100mg/l.

Initial monthly results are included in appendix XIII. These results are for 12 months from November 2020 to Dec 2021 and indicate the baseline water quality from a minimum of 70% of the bogs catchment. This was the first full summer season without any peat extraction and as expected some of the key water quality parameters, that can impact water quality from peat extraction activities, such as suspended solids, remained relatively static. During this period, ammonia indicating a slight upward trend, linked to a season where peat extraction did not take place. Carranstown bog was a source of horticultural peat prior to peat extraction ceasing and from analysis of ammonia across a range of peat types and uses, horticultural peat bogs tend to have higher ammonia. All other parameters fluctuated slightly, most likely influenced by normal weather patterns, especially rainfall.

Monthly ammonia concentrations from August 2020 to December 2021 had a range of 0.041 to 0.458 mg/l with an average of 0.243 mg/l.

Results for suspended solids for the same period indicate a range of 2 to 15mg/l with an average of 4.5 mg/l.

From an analysis of any monitoring over the previous 5 yrs, during such time where peat extraction was undertaken each Summer, the IPC licence environmental monitoring of some of the discharges from this bog, indicate that results were under the ELV for SS and broadly under the trigger level for Ammonia, with COD regularly exceeding the trigger level, due to naturally occurring peat and subsoil interactions. (Table 3.1).

Bog	SW	Monitoring	pH	SS	TS	Ammonia	TP	COD	Colour
Carranstown	SW-31	Q3 19	6.8	3	213	0.149	0.05	106	620
Carranstown	SW-32	Q4 19	8	2	371	0.249	0.05	49	163
Carranstown	SW-33	Q4 19	8	2	438	0.129	0.05	52	169
Carranstown	SW-34	Q4 19	7.7	2	195	0.086	0.05	47	140
Carranstown	SW-31	Q2 18	7.6	5	171	0.03	0.05	126	230
Carranstown	SW-32	Q2 18	7.6	5	394	0.54	0.1	140	176
Carranstown	SW-33	Q2 18	7.1	35	414	2.8	0.65	124	178
Carranstown	SW-34	Q2 18	7.4	12	432	0.99	0.12	142	272
Carranstown	SW-33	Q4 16	7.1	5	192	1.8	0.24	100	314
Carranstown	SW-34	Q4 16	6.7	5	122	0.04	0.05	101	343
Carranstown	SW-31	Q3 15	6.9	5	168	0.16	0.05	60	146
Carranstown	SW-32	Q3 15	7.4	5	350	0.35	0.05	89	224

Decommissioning and Rehabilitation Programme Water Quality Monitoring.

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

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

Water will still discharge from designated emission points when rehabilitation at Carranstown 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 body receptor, the Shannon [Upper]_100, and is expected to support the future status of the waterbody as being of Good Status.

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 will not be sufficient to be able to appropriately track the changing water chemistry that will occur as part of this enhanced rehabilitation programme, so this sampling regime will occur on a monthly basis.

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

This new sampling programme commenced in November 2020 and is enabling a baseline to be established, with sampling to progress during the scheduled works, and for a period of up to 2 years post rehabilitation. Depending on the period required to confirm that the main two parameters, suspended solids and ammonia as remaining compliant with the licence emission and trigger limit values and there is an improving trajectory in these two parameters i.e. reduction in concentration, the monitoring programme and intensity will be periodically reviewed and amended.

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 2021 monitoring programme and these are included in the Water Quality Map.

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

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

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

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

3.7 Fugitive Emissions to air

The bog is no longer in industrial peat production. Rehabilitation of the cutaway 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

The bog is likely to be a carbon source as it is a drained (degraded) peatland with some active drainage, which facilitates the oxidation of peat. Peat extraction generally transforms a natural peatland which acts as a modest carbon sink into a cutaway ecosystem which is a large source of carbon dioxide (2–5 t C/ha/year) (Waddington & McNeil, 2002; Alm *et al.*, 2007; Wilson *et al.*, 2007, Wilson *et al.*, 2015). Furthermore, they are also a significant source of methane (Huttunen *et al.*, 2003; Laine *et al.*, 2007a) as a consequence of the conditions within the peat body that provide a suitable environment for the microbial breakdown of plant litter and root exudates. Degraded

peatlands also release carbon/GHG emissions via the fluvial/aquatic pathway (Dissolved Organic Carbon – DOC, Suspended Solids/Particulate Matter, degassing of GHGs from water).

The EPA-funded CarbonRestore Project (Renou-Wilson et. al. 2012) found that rewetting of drained peatlands can lead to restoration of functional peatland, such as the return of typical plant and animal species, which in turn may lead to the restoration of peat-formation and the C-sink function. The EPA NEROS project carried out GHG flux research at Moyarwood Bog and found that Moyarwood Bog was overall a Carbon sink (sink for CO₂ and a source for Methane) 6 years after bog restoration was carried out (Renou-Wilson et al. 2018).

It is expected that Carranstown Bog will become a reduced Carbon source/part carbon sink following rehabilitation. The potential of any cutaway site to develop as a carbon sink in the longer-term depends on the success of the rehabilitation measures, the extent of development of *Sphagnum*-rich or other peat-forming habitats, the balance of carbon fluxes from different cutaway habitats and future climatic conditions. Much of this site is expected to develop *Sphagnum*-rich habitats, poor fen, heath and Birch woodland along with some wetland habitats with open water, Reed Swamp and fen habitats. Birch woodland is expected to develop on the drier mounds and peripheral headlands.

3.9 Current ecological rating

(Following NRA (2009) Evaluation Criteria)

This site can be rated as having a **low local ecological value (E)** as it is dominated milled production bog and bare peat. Some sections of the site including re-vegetating areas, marginal habitats and the woodland on the mineral island have a higher local ecological value **(D)**

4. CONSULTATION

4.1 Consultation to date

Consultation will seek to engage an audience of relevant stakeholders at both a national and local level. National stakeholders have been identified from varied bog restoration and rehabilitation efforts undertaken by Bord na Móna over the past 40 years, with particular emphasis on engagement with stakeholders during their Biodiversity Action Plan programme since 2010. National Stakeholders includes relevant government departments and agencies, relevant semi-state bodies, NGOs and other environmentally-focused groups with a national remit. Stakeholders have been emailed a copy of the draft plan when it has been finalised internally by Bord na Móna and invited to make submissions on the objectives and content of this plan in relation to Carranstown Bog.

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

- General consultation with range of stakeholders at annual Bord na Mona Biodiversity Action Plan review days 2010-2018.
- Midlands & East Regional WFD Operational Committee (River Basin Management Plans).
- Archaeological Liaison Committee (National Museum of Ireland & Dept of Culture Heritage and the Gaeltacht).
- Consultation has taken place between BnM and the Meath/Westmeath Peatland Heritage Group since 2014 on various projects regarding BnM peatlands in Balivor bog group including a small area of bog restoration in Bracklin Bog.
- The proposed development of the nearby Balivor Windfarm in the Balivor Bog Group and potential further amenity linkage (walking and cycling tracks).
- Consultation between Bord na Móna and stakeholders as part of the proposed Balivor Windfarm is part of a different process and is not listed here.

To inform the current Plan, both national and local stakeholders, including neighbours whose land adjoins Carranstown 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) have been contacted. Any identified local interest groups have been sought and informed of the opportunity to engage with this rehabilitation plan, and when identified have been invited to submit their comments or observations in relation to the proposed rehabilitation at Carranstown Bog (see Appendix XI).

Phone correspondence was undertaken as either follow up to submissions received, or to instigate consultation. All correspondence received has been acknowledged and evaluated against the rehabilitation work proposed here; these are also summarised in Appendix XI.

Further to the above, as a means of further notification for those based near to any proposed PCAS activities, a leaflet detailing PCAS plans for Carranstown Bog, contact details and the PCAS website address was delivered to each house within a 1Km radius of the bog.

4.2 Issues raised by Consultees

To date, a number of issues have been raised by consultees during the consultation process for both the current and previous drafts of the rehabilitation plan for Carranstown Bog – these are summarised below.

4.2.1 Consultation

As part of general consultation in relation to PCAS plans in 2021, a number of consultees including: the IFA, the IMSCA and Trinity College Dublin have raised concerns regarding the duration and scope of consultation period. Stakeholders suggested that the consultation period should be extended to allow all potential stakeholders to make submissions where required.

4.2.2 Assessments of rehabilitation

Queries on pre-rehabilitation assessments were raised by NPWS and the National Museum of Ireland relating to the finalisation of several bog rehab plans in 2021 in relation to Appropriate Assessment, Environmental Impact Assessment and Strategic Environmental Assessment.

4.2.3 Restoration scope

Restoration/rehabilitation of marginal habitats was raised by IPCC and BCI relating to the finalisation of several bog rehab plans in 2021 as worthy of consideration within the rehabilitation measures to support carbon sequestration and biodiversity objectives.

4.2.4 Monitoring

Further details on monitoring of ecological metrics, and how and where reporting on this monitoring would take place, was raised the IPCC, University College Dublin and Trinity College researchers in their respective submissions relating to the finalisation of several bog rehab plans in 2021. Butterfly Conservation Ireland also suggested that monitoring of Large Heath butterfly be considered to assess the success of the proposed rehabilitation actions. Irish Water reiterated the requirement of a strong monitoring program with respect to water quality during and post rehabilitation.

4.2.5 Flooding and drainage

The IFA, The Department of Agriculture Food and the Marine, individual local residents and ICMSA queried likely impacts relating to the finalisation of several bog rehab plans in 2021 and the finalisation for this Carranstown Rehabilitation Plan arising from the proposed re-wetting associated with the rehabilitation in relation to flooding on adjoining lands and, specifically, with regards to the maintenance of drains. The IFA also raised the issue of Health and Safety in relation to raising water levels as well as possible impacts on land and property prices. The OPW expressed concerns regarding the potential impacts of rehabilitation of Carranstown Bog on OPW arterial drainage works.

4.2.6 Amenity

A local resident raised several issues regarding potential amenity development at Carranstown Bog post rehabilitation. Among the person's concerns were the potential nuisance impact arising from the development an amenity and the increased foot traffic using the area as a result of any such development.

4.2.7 *Water Quality*

Irish Water recognised potential for positive impacts arising from bog rehabilitation to drinking water quality in the local vicinity. IW expressed the desire that BnM clearly outline the potential benefits for water quality in the rehab plans.

4.2.8 *Future management*

The IFA expressed concerns regarding the future ownership of the BnM bogs subject to rehabilitation. They expressed a desire for contingency planning for potential future ownership of designated bogs so as to ensure no negative impacts arise on adjacent properties from any new ownership.

4.2.9 *Other issues*

Other issues (raised by IPCC) during the finalisation of several bog rehab plans in 2021 included after use of the bog and turf cutting on the margins of the bog (outside of the area owned by Bord na Móna).

Archaeological end of life survey of all the bogs were requested by National Museum of Ireland and National Monuments Unit, with due diligence be taken during works to protect any archaeologically significant findings or areas.

For a complete summary of submissions received and replies, see Appendix XI.

4.3 Bord na Móna response to issues raised during consultation

4.3.1. Consultation

BnM are carrying out ongoing consultation as part of the process of developing the rehabilitation plan for Carranstown Bog. This is ongoing with a dedicated Community Liaison Officer communicating to affected and interested parties. A website has been developed to make information available. This will be continually updated. It is expected that some PCAS Bogs will become demonstration sites so that interested stakeholders can come to visit and observe the measures on the ground.

4.3.2 Assessments of rehabilitation

AA screening will be undertaken on all the bogs as part of PCAS and this is currently being undertaken by external consultants for Carranstown Bog. Where required, Natura Impact Statements shall be completed and submitted to the Minister in accordance with 42(9) and 42(10) of the Habitats Regulation, noting that Bord na Móna is prescribed as a 'public authority' under this legislation. In relation to the SEA Directive and EIAR Directive, this has been considered and the legal advice to date is that the scheme does not come under these Directives.

4.3.3 Archaeology

An Archaeological Impact Assessment (AIA) has been undertaken on all the bogs in PCAS (Appendix XII). The aim for known archaeology on these bogs is to accomplish preservation in situ and we are taking steps to identify and avoid all known archaeology. Both archaeological sites RMP OF023-005--- Habitation Site and SMR OF023-026--- - Redundant Record should be avoided by the rehabilitation activities. Bord na Móna aim to achieve this through including all known archaeology in the planning process of rehabilitation works and implementing an exclusion or buffer zone around these features. These measures should sufficiently protect any archaeology in these areas, during any ground works in the final plan. It is anticipated that any archaeology will benefit from the ultimate remit of the rehabilitation, in that water tables will be raised thereby preserving in-situ. There is also an identified procedure for managing reports of stray finds that may arise during rehabilitation works (Appendix XII).

4.3.4 Restoration scope

As part of the PCAS, all restoration/rehabilitation options have been developed to support climate action and biodiversity objectives. Other issues such as existing amenity, social impacts, industrial history, archaeology were not part of the direct scope of PCAS but were considered when developing the rehabilitation plan. After use of the bog is outside the scope of PCAS. Rehabilitation will lead to the development of a stable diverse re-wetted cutaway landscape that will have added benefits for amenity in the future.

4.3.5 Monitoring

As part of the PCAS, a monitoring and verification plan has been developed to support climate action and biodiversity objectives. This will include stratified monitoring of bog condition, habitats and biodiversity at several different scales. Some fauna monitoring is proposed as part of the monitoring and verification at Carranstown Bog during the period of the scheme (2021-2025). However, note that fauna typically take longer to respond to

the changes in vegetation colonisation and habitats arising from the proposed rehabilitation measures identified for Carranstown Bog.

4.3.6 *Flooding, drainage or other impacts on adjacent land.*

It is the intention of Bord na Móna that the re-wetting of the bogs will be carried out in such a manner that does not impact on third party lands. Where it is deemed that blocking of a shared drain would cause any adjoining lands to be adversely affected, this will be avoided and alterations made to the rehabilitation plan. In general, drains around the margins of the bog will not be blocked.

External consultants have been appointed to carry a hydrological assessment to identify any potential impacts to neighbouring lands and to mitigate against any such impacts. No issues were identified. There is no potential for direct impacts on arterial drainage downstream.

The rehabilitation measures proposed at Carranstown Bog will generally result in reduced runoff and drainage from the existing peat fields through a mixture of techniques including drain blocking, cell bunding and re-profiling. It is intended that these measures will not significantly alter the existing topographical catchments and that the spine of the drainage networks, those which the upstream catchments drain through, will be retained by Bord na Móna. Based on evidence from other bogs, rehabilitation measures will reduce the run-off from the bog by returning the peatlands towards its natural water retention function.

4.3.7 *Amenity*

Creating amenity such as walking tracks is not part of the direct scope of PCAS. There is no current amenity planned for Carranstown by BnM. However, PCAS will enable and support any future amenity proposals by enhancing the landscape. There may be further opportunities to develop amenity at this site. Rehabilitation measures proposed for Carranstown Bog do not need to be amended to integrate any future amenity projects positioned along the margin of the former production bog or along the former bog railways.

4.3.8 *Water Quality*

Research on peatlands and ecosystem services (Pschenyckyj *et al.*, 2021) indicates that restoration and rehabilitation of peatlands can have positive impacts on catchment water quality, with indirect benefits to drinking water quality. It is the expectation of BnM that rehabilitation measures should positively impact the water quality in receiving water bodies through enhancing the water attenuation across rehabilitated sites. The robust water monitoring programme implemented as part of PCAS will be used to assess water quality leaving rehabilitated sites at designated point and demonstrate positive impacts on water quality.

4.3.9 *Future management*

Bord na Móna will continue to manage their land bank into the future. As peat production has now ceased on Bord na Móna lands and rehabilitation measures will be carried out, a regular drainage maintenance programme will not be required or carried out as would have been the case in the past. However, if issues arise with the Bord na Móna internal drainage system that affects upstream or downstream landowners, then these issues will be addressed by Bord na Móna.

Bord na Móna considers issues regarding estate security, fire risk, invasive species and water pollution of utmost importance. BnM intends to maintain security and manage fire risk over the entirety of the estate. Re-wetting peatlands will reduce the risk and impact of potential future fires. In this regard, PCAS activities, should have no detrimental impact on these issues. Regarding water pollution, BnM is regulated by the EPA and as such adheres to the strict water pollution measures laid out by the same.

4.3.10 Other issues

Other issues, including after-use and management issues outside the boundary of Carranstown Bog, are acknowledged but are specifically outside the scope of this rehabilitation plan.

Security: It is the intention of Bord na Móna to keep secure the estate and ensure that any anti-social behaviour that occurs within the estate is reported and dealt with by the appropriate authorities.

4.3.11 Concluding statement.

- Some parts of Carranstown bog is largely stabilised and developing a mosaic of habitats already. This will not be radically changed.
- No specific issues were raised during consultation that required significant changes to the substance of the rehabilitation plan.
- Issues raised by several consultees in relation to potential impacts on adjacent land had already been accounted for during the hydrological analysis and assessment, and corresponding adaptations to incorporate Drainage Management Plan mitigation measures.
- Several marginal drains will not be blocked to avoid impacts on adjacent lands, Coillte forestry, rights of way or turf-banks. This does not change the overall rehabilitation goals and outcomes and can be integrated with the other rehabilitation measures to allow cutaway re-wetting.
- No changes were required to the rehabilitation plan to enable any future potential amenity.

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 water-bodies that have been classified as At Risk from peatlands and from peat extraction, via stabilization or improving water-quality from this bog, and therefore, reducing pressures.
- Optimising hydrological conditions for **climate action benefits as part of PCAS**.
- Carrying out an intensive rehabilitation measures in the area that is recently out of peat extraction (including hydrological management, drain-blocking, re-profiling, wetland creation, fertiliser application, seeding of vegetation &, inoculation of *Sphagnum*, where appropriate).
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich raised bog vegetation communities on deep residual peat, where possible.
- Optimising or enhancing hydrological conditions for the development of Reed Swamp and fen on shallow more alkaline peat and other subsoils.
- Integrating rehabilitation measures with current land-use (e.g. turf-cutting).
- Optimising hydrological conditions for the protection of any exposed archaeological structures, their retention in situ and preservation into the future, where possible.
- 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 Carranstown Bog. This will happen over a longer time-frame 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 site has the potential to develop active raised bog (ARB) analogous to the priority EU Habitats Directive Annex I habitat within the foreseeable future (c.50 years). Furthermore, only a proportion of the bog has potential to develop *Sphagnum*-rich habitats in this timeframe. Nevertheless, re-wetting across the entire bog, as part of the Scheme, will improve habitat conditions of the whole bog. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.

- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as 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).
- Re-wetting in general will benefit the future preservation of most known and unknown archaeological features.

6. SCOPE OF REHABILITATION

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

- The area of Carranstown Bog.
- EPA IPC Licence - Ref. P0501-01. 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. Carranstown bog is part of the Ballivor-Derrygreenagh 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 Carranstown Bog, in particular, optimising **climate action benefits**. The proposed interventions will mean that environmental stabilization is achieved (meaning IPC obligations are met) and, in addition, significant other ecosystem service benefits particularly for climate action will be accrued.
- The local environmental conditions of Carranstown Bog mean that deep peat measures along with wetland creation is the most suitable rehabilitation approach for this site. Carranstown Bog does have residual deep peat along with shallower areas.
- The key goals and outcomes of rehabilitation set by Bord na Móna. Bord na Móna have defined the key goal and outcome of rehabilitation at Carranstown Bog as **environmental stabilisation, optimising residual peat re-wetting, and the development of embryonic raised bog on deep peat along with wetlands/Reed Swamp and fen on shallow more alkaline peat and other subsoils**.
- Proposed land-use. Bord na Móna are currently developing a renewable energy project called Ballivor Windfarm. This proposed project is in the pre-planning stage. The proposed renewable energy project will have a small footprint on Carranstown Bog. It is planned to integrate rehabilitation with the future proposed development.
- Rehabilitation of Carranstown Bog will support multiple national strategies of climate action, biodiversity action and other key environmental strategies such as the Water Framework Directive.
- The time frame for the delivery of the planned rehabilitation will be undertaken according to available resources and appropriate constraints.
- It is not proposed to carry out rehabilitation on all marginal or peripheral cutover bog zones. Generally, these bog remnants are narrow, or are subject to turbary, and do not have positive bog restoration prospects.

6.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, there is potential for raised bog restoration at some sites where there has not been significant industrial peat extraction and the peat body is largely intact (deep peat sites that are drained). At other sites, most of the peat mass has been removed, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status, etc.) and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland).
- Remaining **peat depths** are between 1m and 2.6m deep for the most part apart from a couple of small areas to the south and east where depths are less than 0.5m.
- **Current/future land-use.** Planned renewable energy development. It is expected that the site will be part of the proposed Ballivor Windfarm. This project is currently in pre-planning. Any proposed

rehabilitation measures will be integrated to enable any future renewable energy development and to facilitate any planned amenity. No turbines are planned for Carranstown. Infrastructure will include supporting access, cables and an electrical sub-station and works to the existing overhead transmission line. It is expected that the proposed development footprint associated with the renewable energy will be < 2% of the overall site. The potential impact of this infrastructure on the rehabilitated area is expected to be relatively minor and it does not change the overall goals and outcomes of the proposed rehabilitation (re-wetting residual peat) for the overall site, and where possible is a temporal constraint on the scope of rehabilitation. See Carranstown Bog: Mapbook, which outlines the proposed cutaway footprint to be rehabilitated with PCAS enhanced rehabilitation measures (drawing number BNM-DR-23-20-05: Enhanced Rehab Measures and BNM-DR-23-20-20: Standard Rehab Measures).

- It is planned to rehabilitate the area east of the railway in 2022. The remaining area (west of the railway) will be rehabilitated when the windfarm construction is complete. Phasing rehabilitation in this way has the potential to support additional climate action measures (integrating renewable energy). At this stage, it is not anticipated that any future potential land-use in areas to the west of the railway will impact on the proposed rehabilitation in the eastern side of the site.
- **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.
- **Turbary.** The small, isolated area (constraint) to the northeast of the main production bog. This area was never developed by BnM and is still being used for turf-cutting (turbary).
- **Archaeology.** 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) was carried out to mitigate against any impact on found archaeology at Carranstown Bog. It is noted that the Bord na Móna industrial railway is currently designated as a protected structure in the current Westmeath County Council County Development Plan. 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.** 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.

6.2 Key Assumptions

- It is assumed that Bord na Móna will have all resources required to deliver this project.

- It is expected that weather conditions will be within normal limits over the rehabilitation plan timeframe. Long periods of wet weather have the capacity to significantly affect ground conditions and constrain drain blocking and other ground activities.

6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- The longer-term development of stable naturally functioning habitats to fully develop at Carranstown Bog. The plan covers the short-term rehabilitation **actions** and **an additional monitoring and after-care programme** to monitor the rehabilitation and to respond to any needs.
- This plan is not intended to be an after-use or future land-use plan for Carranstown Bog.
- The longer-term management of this site, potentially as a nature conservation site, or for amenity, or for other uses in the future.

7. CRITERIA FOR SUCCESSFUL REHABILITATION

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

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

Rehabilitation is generally defined by Bord na Móna as

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

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

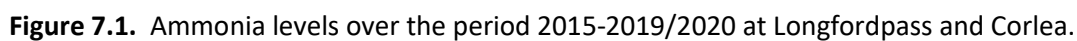
7.1. Criteria for successful rehabilitation to meet EPA IPC licence conditions:

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

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

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

Following commencement, and as the monthly monitoring program at Carranstown continues in 2022 during the rehabilitation works and data from the 2021 monitoring program is compiled, further trending will be produced to verify any ongoing trends.



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/part 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 peat forming communities, fen, Reed swamp, wet woodland, heath, scrub and Birch woodland, where conditions are suitable. Some of these habitats have already in part established as pioneer vegetation/wetlands. It will take some time for stable naturally functioning habitats to fully develop at Carranstown Bog. This will be demonstrated and measured via aerial photography, habitat mapping and cutaway/habitat condition assessment. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Improvement in biodiversity and ecosystem services. This will be demonstrated by metrics outlined in Section 9.1 that can be used to measure changes in ecosystem services (e.g. water quality parameters, development of pioneer habitats, breeding bird monitoring). This will be measured by collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.

Table 7.1. Summary of Success criteria, targets, how various success criteria will be measured and expected time-frames.

Criteria type	Criteria	Target	Measured by	Expected Time-frame
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.	2022-2025
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	2021-2024
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.	2022-2025
Climate action verification	Reduction in carbon emissions.	Reduction in carbon emissions	Carbon emissions – estimated using a bog condition assessment and appropriate carbon emission factors.	2022-2025
Climate action verification	Setting the site on a trajectory towards establishment of a mosaic of compatible habitats	Establishment of compatible cutaway habitats	Habitat map, Cutaway bog condition map 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.	2022-2025
Climate action verification	Biodiversity and ecosystem services. Habitat establishment Presence of key species – Sphagnum	Improvement in biodiversity and ecosystem services.	Metrics that relate to selected biodiversity and ecosystem services Presence of key species – Sphagnum – Walkover survey	2022-2025

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* and Ireland's National Recovery and Resilience Plan 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 practise 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 collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services.

8. REHABILITATION ACTIONS AND TIME FRAME

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

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

BNM-DR-23-20-22 titled **Carranstown Bog: Aerial Imagery2020**

BNM-DR-23-20-04 titled **Carranstown Bog: PeatDepths**

BNM-DR-23-20-03 titled **Carranstown Bog: LiDAR Map**

BNM-DR-23-20-09 titled **Carranstown Bog: Depression Analysis**

The rehabilitation actions themselves will be a combination of PCAS measures to re-wet peat. The distribution of these measures is provisionally outlined in drawing titled **BNM-DR-23-20-05 Carranstown Bog: Rehabilitation Measures** in the accompanying Mapbook (Note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.)

These enhanced measures for Carranstown bog will include (see Table 8.1):

- Deep Peat measures including field re-profiling, bunding and drain-blocking, resulting in bunded wetlands 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 (3/100) on dry cutaway along with the blocking of outfalls and management of water levels;
- Intensive drain blocking (7/100) in areas to develop wetlands in areas of shallow peat. Measures include the blocking of outfalls, management of water levels and transplanting reeds and other rhizomes;
- Berms and field re-profiling (45m x 60m cell) in deep peat areas, along with blocking outfalls and managing overflows with a controlled weir outfall, includes drainage channels for excess water and *Sphagnum* inoculation;
- 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.

Table 8.1: *Types of and areas for enhanced rehabilitation measures at Carranstown Bog.* Note that the types of rehab and areas of rehab may change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.

Type		Enhanced Rehabilitation Measure	Extent (Ha)
Deep Peat	DPT 2	More intensive drain blocking (max 7/100), blocking outfalls and Sphagnum inoculation	38.18
Deep Peat	DPT 4	Berms and field re-profiling (45x60m cell), blocking outfalls and managing overflows & drainage channels for excess water & Sphagnum Inoculation	121.54
Wetland	WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	4.28
Marginal land	MLT1	No work required	34.55
Silt ponds	Silt pond	Silt ponds	0.6
Dry Cutaway 2	DCT2	Regular drain blocking (3/100m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	17.57
Constraint	Constraint	Other Constraints (ROW)	89.52
Total			306.24

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 Carranstown Bog. This will take account of peat depths, topography, drainage and hydrological modelling. (See map for an indicative view of the application of different rehabilitation methodologies).
- A drainage management assessment of the proposed enhanced rehabilitation measures has been carried out, any issues identified resolved and the rehabilitation plan adapted.
- A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation has been carried out. The results of this assessment has been 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 has been carried out. There is some known turbary on this bog.
- A review of remaining milled peat stocks has been carried out. Remaining peat stocks on the bog will be removed prior to rehabilitation.
- An ecological appraisal of the potential impacts of the planned rehabilitation on the presence of sensitive ground-nesting bird breeding species (e.g. breeding waders) will be carried out. The scheduling of rehabilitation operations will be adapted, where required.
- Ensure all activities comply with the environmental protection requirements of the IPC Licence.

- An Appropriate Assessment of the Rehabilitation Plan has been carried out. (Note that the rehabilitation plan for Carranstown Bog screened out at the Stage I.) See Carranstown Decommissioning and Rehabilitation Plan – Addendum 1 for more details.
- Track implementation and enforcement of the relevant IPC Licence conditions, 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 drain blocking, and fertiliser applications 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 suspended solids run-off 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

- **2021-2022:** Short-term planning actions.
- **2022:** Short-term practical actions.
- **2022-2025:** 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 2021). 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.
- 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* and Ireland's National Recovery and Resilience Plan or additional other funding. Monitoring of climate action and other ecosystem service benefits will be designed to take account of the requirements of monitoring benefits of the overall Scheme and will be stratified; that is not all monitoring will be carried out in each site. These are defined as:

- Vegetation and habitat monitoring after rehabilitation is completed using a cutaway bog condition assessment (Similar to ecotope mapping). 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 has been achieved and key targets have been met;
- Water quality monitoring demonstrates that water quality of discharge is stabilising or improving; and
- The site has been environmentally stabilised.

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CARRANSTOWN DECOMMISSIONING AND REHABILITATION PLAN - ADDENDUM 1

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Ballivor-Derrygreenagh bog group (Ref. P0501-01). 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. Carranstown bog is part of the Ballivor-Derrygreenagh bog group (see Appendix II for details of the bog areas within the Ballivor-Derrygreenagh bog group). Carranstown Bog is located in Co. Meath/Westmeath.

This addendum outlines the findings of the Appropriate Assessment reporting carried out in respect of proposed PCAS activities at Carranstown Bog.

APPROPRIATE ASSESSMENT REPORTING FINDINGS

An Appropriate Assessment Stage 1 Screening Report ⁵was commissioned by Bord na Móna to inform whether the proposed PCAS activities at Carranstown Bog had the potential to result in Likely Significant Effects on European Sites. The concluding statement of this report reads as follows:

“Following this initial screening of the proposed rehabilitation measures on Carranstown Bog it can be concluded that the possibility of any likely significant effects on the European Sites listed below, whether arising from the project itself or in combination with other plans and projects, can be excluded beyond a reasonable scientific doubt on the basis of the best scientific knowledge available.

- River Boyne and River Blackwater SPA [004232]
- River Boyne and River Blackwater SAC [002299]

If any changes occur in the design of these rehabilitation measures, a new Screening for Appropriate Assessment is required.”

Therefore following screening, Appropriate Assessment is not required for the Project as it is not directly connected with or necessary to the management of any Site(s) as European Site(s) and as it can be concluded, on the basis of objective information, that the project, individually or in combination with other plans or projects is not likely to have a significant effect on any European Site(s).

⁵ JBA Consulting Engineers and Scientists Limited (2022). *Appropriate Assessment Screening Report Rehabilitation of Carranstown Bog, Co. Westmeath/Meath.*

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 Carranstown Bog.
- EPA IPC Licence - Ref. P0501-01. 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. Carranstown bog is part of the Ballivor-Derrygreenagh bog group.
- The current condition of Carranstown Bog.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog.
- To minimise potential impacts on neighbouring land. Some boundary drains around Carranstown Bog will be left unblocked as blocking boundary drains could affect adjacent land.
- Land-use: Bord na Móna are currently planning to build a windfarm on cutaway bog in the Ballivor area. This project is known as Ballivor Windfarm. Carranstown Bog will be part of this project. Rehabilitation will be integrated with this proposed renewable energy project.

Rehabilitation goals and outcomes

The key rehabilitation goal and outcome for Carranstown Bog is environmental stabilisation of the site via wetland creation. This is defined as:

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

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

Criteria for successful rehabilitation:

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

Rehabilitation targets

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

Rehabilitation measures:

- Blocking field drains in drier sections of the former industrial production area using a dozer to create regular peat blockages (three blockages per 100 m) along each field drain to re-wet peat.
- Re-alignment of piped drainage; and management of water levels to create/enhance existing wetlands and re-wet peat.
- 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:

- 2022. 1st phase of rehabilitation. Field drain blocking.
- 2022. 2nd phase. Further realignment of piped drainage and other re-wetting measures dependent on success of 1st phase re-wetting, as determined by ongoing monitoring of water levels and re-vegetation.
- Other enhancement measures such as fertiliser treatment will be carried out, if needed. These will be determined by ongoing monitoring.
- 2024-2026. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.

- 2024-2026. Decommission silt-ponds, if necessary.

Table AP-1. Rehabilitation measures and target area.

Type	Code	Description	Area (Ha)
Deep Peat	DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes	159.7
Dry Cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	17.6
Wetland	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	4.28
Marginal land	MLT1	No work required	34.5
Silt ponds	Silt pond	Silt ponds	0.6
Constraint	Constraint	Other Constraints (ROW)	89.5
Total			306.2

See Drawing number BNM-DR-23-20-20 titled **Carranstown Bog: Standard Rehab Measures** included in the accompanying Mapbook which illustrates the standard rehab measures to be applied.

Monitoring, after-care and maintenance

- There will be initial quarterly monitoring assessments of the site to determine the general status of the site, the condition of the silt-ponds, assess the condition of the rehabilitation work, assess the progress of natural colonisation, monitoring of any potential impacts on neighbouring land and general land security. The number of site visits will reduce after 2 years to bi-annually. These site visits will assess the need to additional rehabilitation.
- Water quality monitoring will be established.
- Monitoring results will be maintained, trended and reported on each year as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, which will be available in April each year at www.epa.ie.
- The parameters to be included (as per condition 6.2 of the IPC Licence) include monthly monitoring for pH, Flow, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour, and COD.
- This sampling regime on a selected number of silt ponds will be carried out over a two-year cycle. The original (licence) requirement was for a quarterly sampling regime.
- Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the required assessment and planning procedures.

Validation and IPC Licence surrender

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

- The planned rehabilitation has been completed;
- 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 Ballivor-Derrygreenagh Bog Group comprises 11 discrete and defined bog units within Cos. Offaly, Westmeath and Meath (and one site used for transport – Hill of Down Railway). There are two main sub-groups; Ballivor (7 sites) and Derrygreenagh (5 sites). Nearly all of the Derrygreenagh sub-group and all of the Ballivor sub-group is located within the River Boyne catchment. A small portion of the western side of Toar Bog is located in the River Shannon catchment. Each bog area further comprises a range of habitats from bare milled former peat extraction areas to re-colonising cutaway to workshops areas and transport infrastructure.

Industrial peat extraction in the Ballivor-Derrygreenagh Bog Group ceased in 2020.

The Ballivor Bogs sub-group is located close to Ballivor Town in Co. Meath and most of the bogs extend across the Meath and Westmeath border. The Bord na Móna Ballivor Peat Moss factory is located 4 km from Ballivor Village on the margin of Ballivor Bog. An industrial railway links Ballivor to Carranstown, Bracklin and Lisclogher East. Milled peat was supplied from Ballivor, Carranstown, and part of Bracklin to Ballivor peat moss factory for horticultural products, with milled fuel peat being transported via road to Lough Ree Power (Lanesborough Co. Longford). Kinnegad Bog is an isolated bog unit with no industrial railway link to the other bogs. Kinnegad Bog is located to the south of Kinnegad in Co. Meath. This bog supplied mainly milled horticultural peat via road to various customers.

The Derrygreenagh Bogs sub-group is located to the south and east of Rochfortbridge (Co. Westmeath), along the borders of Co. Westmeath, Offaly and Meath. Four bogs (Ballybeg, Derryhinch, Drumman, Toar) supplied milled fuel peat via industrial railway to Edenderry Power.

Lisclogher East was never developed for milled peat production but there was still some sod peat production on this site. A large section of Bracklin was formerly a sod peat production bog and was never converted to milled peat production. This area is now considered cutaway. Lisclogher West was drained in the 1980's but has never been put into industrial peat production. This site is not now required for industrial peat production and will be restored in the future. Bogs that have been in industrial peat production for decades (such as Ballybeg and Drumman) have become cutaway as peat is extracted from the sites and the industrial peat production area is shrinking. A large section of cutaway in Derryarkin and Drumman has been developed since 2001 for sand and gravel extraction by a joint venture between Roadstone and Bord na Móna (Derryarkin Sand & Gravel Ltd). A large section of Derryarkin was also rehabilitated in 2001-2002 with wetland development via outfall blocking.

There has already been significant rehabilitation work carried out within the Ballivor-Derrygreenagh Bog Group. Bord na Móna originally established a grassland research unit and farm at Derryarkin. This farm has now been closed for some time but grassland established from cutaway has been sold to local farmers. Older rehabilitation includes the establishment of conifer plantations in the 1980s and 1990s. Several rehabilitation trials (test programmes) have been developed more recently, where different techniques have been trailed and implemented.

One of the main outfalls of a large section of cutaway in Drumman (north) was blocked in 2005 creating a large wetland (~75 ha). Fertiliser and nursery crop trials were carried out on bare peat cutaway in Drumman (north) in 2010 over an area of 19 ha. Further applications of fertiliser were applied to an additional 22.6 ha of mostly bare peat cutaway in Drumman (north) in 2012. There have been further crop trials in Drumman in 2014 (grass-seed).

In Derryarkin, wetlands (143 ha) were created in 2001-2002 when main outfalls were blocked and cutaway was deliberately re-wetted.

A small area of cutaway at Derryarkin has been leased to DAMX Ltd for the development of an off-road moto-cross track at Derryarkin.

An area of cutaway (13 ha) with significant bare peat cover adjacent to the road in Derryarkin was treated with fertiliser to encourage natural colonisation in 2016.

During the 1980's/1990's about 176 ha of cutaway and marginal bog was developed for conifer forestry by Coillte at Drumman and Derryarkin in several different areas. There is ongoing management of these areas by Coillte.

Part of the cutaway at Ballybeg (76 ha) was planted with Alder (2008-2009) as a biomass trial (for fuel).

An area of marginal raised bog (19 ha) was restored at Bracklin Bog in 2016, as part of the Bord na Móna Raised Bog Restoration Programme. An extensive drain blocking programme was carried out to raise water levels and help re-wet the bog area, encouraging the development of embryonic *Sphagnum*-rich 'active' peat-forming raised bog. This area is of significant biodiversity and cultural interest to the Meath-Westmeath Bog Group and is likely to be part of a lease to this group in the future.

Some rehabilitation was carried out in a small area of cutaway in Balivor Bog (9 ha) in 2015. This involved drain-blocking to maintain and enhance re-wetting of an area of cutaway with *Sphagnum*-rich poor fen peat-forming vegetation.

Intensive decommissioning and rehabilitation for the Ballivor-Derrygreenagh Bog Group started in 2021 at a number of individual bogs.

Industrial peat extraction in the Ballivor-Derrygreenagh Bog Group ceased in 2020. Decommissioning for the Ballivor-Derrygreenagh Bog Group started in 2021 at a number of individual bogs and PCAS rehabilitation is expected to start in 2021. There is still some historical energy peat stock remaining on some bogs and these peat stock will be transferred via the BnM rail network to Edenderry Power Station up to 2024 when the power station is expected to have ceased using peat.

Bord na Móna is currently developing a wind energy project called Ballivor Windfarm. This proposed project is in the pre-planning stage. It is expected to be submitted to planning in 2022. Bord na Móna are also continuing to review its landbank for future potential renewable energy projects.

A breakdown of the component bog areas for the Ballivor-Derrygreenagh Bog Group IPC License Ref. PO-501-01 is outlined in Table Ap-2.

Table Ap-2: Ballivor-Derrygreenagh Bog Group names, area and indicative status (Derrygreenagh Energy Peat sub-group)

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Ballivor	654	Industrial peat production commenced at Ballivor in the 1940s. Some sections have been cutaway. Some sections still have relatively deep residual peat.	Ballivor Bog formerly supplied a range of commercial functions including the supply of horticultural peat, sod peat and latterly; fuel peat for Lough Ree Power. Some sections were never re-developed to milled peat and have revegetated as cutaway.. Some areas of cutaway are developing pioneer cutaway vegetation communities.	2020	Draft 2017

			Expected to be part of the proposed Ballivor Windfarm, which is currently in pre-planning.		
Bracklin	680	Industrial peat production commenced at Bracklin in the 1940s. Some sections have been cutaway. Some sections still have relatively deep residual peat.	<p>Bracklin Bog formerly supplied a range of commercial functions including the supply of horticultural peat, sod peat and latterly; fuel peat for Lough Ree Power.</p> <p>The main section was never re-developed to milled peat and has revegetated as mature cutaway habitats</p> <p>Bare peat is prevalent in the western section, which was in milled peat extraction.</p> <p>Expected to be part of the proposed Ballivor Windfarm, which is currently in pre-planning.</p>	2020	Draft 2017
Carranstown	306	Industrial peat production commenced at Carranstown in the 1980s. The majority of the site has relatively deep peat.	<p>Carranstown Bog formerly supplied a range of commercial functions including the supply of horticultural peat and latterly; fuel peat for Lough Ree Power.</p> <p>The majority of the site is bare peat. There are cutaway habitats developing on the eastern side.</p> <p>Expected to be part of the proposed Ballivor Windfarm, which is currently in pre-planning.</p>	2020	Finalised 2022
Lisclogher East	486	Industrial peat production commenced at Lisclogher East in the 1950s. Part of the site is cutaway while there is a mosaic of residual peat depths.	<p>Lisclogher East formerly supplied sod turf both for fuel and horticulture. This bog was never re-developed to supply milled peat.</p> <p>The majority of the bog is developing cutaway habitats and there is a mosaic of bare peat areas where there has been recent sod peat extraction.</p>	2020	Draft 2017
Lisclogher West	239	Lisclogher West was drained in 1980s. The bog is drained and still has residual vegetation in places.	<p>Lisclogher West was drained but never fully developed for industrial peat extraction.</p> <p>Expected to be part of the proposed Ballivor Windfarm, which is currently in pre-planning.</p>	N/A	Draft 2017
Kinnegad	352	Industrial peat production commenced at Kinnegad in the 1980s. The majority of the site still has relatively deep peat.	<p>Kinnegad Bog formerly supplied a range of commercial functions -mainly the supply of horticultural peat and latterly; fuel peat for Lough Ree Power.</p> <p>The majority of the site is bare peat.</p>	2020	Draft 2017
Hill of Down Railway	22		Rail link – not used for peat extraction	N/A	Draft 2017
Ballybeg	847	Industrial peat production commenced at Ballybeg in the 1950s. Most of the site is cutaway	<p>Ballybeg Bog formerly supplied a range of commercial functions including the supply of horticultural peat and fuel peat for Edenderry Power.</p> <p>Much of the site is bare peat. The northern half has been cutaway and is establishing cutaway habitats.</p>	2020	Draft 2017
Derryarkin	710	Industrial peat production commenced at Derryarkin in the 1950s. Most of the site is cutaway	<p>Derryarkin Bog formerly supplied a range of commercial functions including the supply of fuel peat for Rhode Power Station, Croghan Brickette Factory and Edenderry Power.</p> <p>Most of the site is developing cutaway habitats. Some re-wetting was carried out in the past.</p> <p>Part used for gravel extraction.</p>	2015	Draft 2017
Derryhinch	337	Industrial peat production commenced at Derryhinch in the 1950s.	Derryhinch Bog formerly supplied a range of commercial functions including the supply of fuel peat for Rhode Power Station, Croghan Brickette Factory and Edenderry Power.	2020	Draft 2017

		There is a mosaic of residual peat depths left	Most of the site is bare peat with emerging cutaway habitats. Part of the site was used to trial herb production		
Drumman	1,122	Industrial peat production commenced at Drumman in the 1950s. Most of the site is cutaway	Drumman Bog formerly supplied a range of commercial functions including the supply of fuel peat for Rhode Power Station, Croghan Brickette Factory and Edenderry Power. Most of the site is developing cutaway habitats. Some re-wetting was carried out in the past. Part used for gravel extraction. Part of the site was used to trial herb production. Part of the site is used for log storage (biomass)	2020	Draft 2017
Toar	445	Industrial peat production commenced at Toar in the 1980s. Most of the site has deep residual peat.	Toar Bog formerly supplied a range of commercial functions including the supply of horticultural peat and fuel peat for Edenderry Power. Most of the site is bare peat. Part of the site is used for log storage (biomass)	2020	Draft 2021

See Drawing number BNM-DR-23-20-24 titled Ballivor-Derrygreenagh Bog Group, included in the accompanying Mapbook which illustrates the location of Carranstown Bog and the Ballivor-Derrygreenagh Bog Group in context to the surrounding area.

APPENDIX III: ECOLOGICAL SURVEY REPORT

Ecological Survey Report

Note: This report outlines an ecological survey of the bog. This report should not be taken as a management plan for the site as other land-uses may still be considered. Information within this report may inform the development of other land-uses and identify areas with particular biodiversity value.

Bog Name:	<u>Carranstown</u>	Area (ha):	306 ha
Works Name:	Ballivor	County:	Meath/Westmeath
Recorder(s):	SC, DMN, JOS, SD	Survey Date(s):	15 th September 2021

Habitats present (in order of dominance)

The most common habitats present at this site include:

- Bare peat (BP) (Codes refer BnM classification of pioneer habitats of production bog).
- Birch woodland (WN7) (on cutover bog dominated by Birch and/or Scot's Pine)
- Birch *Betula spp.* -dominated scrub (WS1) (on drier higher old cutover bog that is not flooded))
- Raised bog (PB1) (Codes refer to Heritage Council habitat classification, (Fossitt 2000),)
- Cutover Bog (PB4)
- Dry Heath (dheath) – A number of *Sphagnum* species were noted during the survey, including *Sphagnum papillosum* in drains, on the west side of the site in this habitat (see also images in Table 1).
- Access routes (BL3) (rail lines and tracks including gravel embankments and associated habitats such as dry grassland communities (GS2) and scrub)
- Scrub (WS1) (eBir, oBir and cBir)
- Pioneering vegetation on cutaway including Scrub and Soft Rush dominated Poor fen (mainly in mosaic with Birch scrub but also Gorse (*Ulex europaeus*))
- Oak Ash Hazel woodland
- Wet grassland (GS4)
- Mosaics of Willow-dominated scrub (WS1) along with open communities dominated by Soft rush (PF2) on cutaway
- Silt ponds (FL8)
- Improved grassland (GA1) around the boundary where the official boundary extends into adjacent fields
- Dense bracken (HD1)

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

- Raised bog (PB1) (Codes refer to Heritage Council habitat classification, Fossitt 2000)
- Cutover Bog (PB4)
- Scrub (WS1)
- Improved grassland (GA1)
- Wet (callows-type) grassland (GS4)
- Conifer plantation (WD4)
- Birch woodland (WN7)

- Dense Bracken (HD1)

Description of site

Carranstown Bog is located approximately 5 km east of Raharney in Co Westmeath along the R156 Raharney to Ballivor Road. It is part of the Ballivor-Derrygreenagh Bog Group and a BnM railway links the site to Ballivor Bog to the south, with the road marking the southern boundary. There are further rail links to Bracklin bog to the north. Carranstown Bog was used to produce sod peat in the past. However, the majority of the bog has been re-developed for milled peat production for some time. The bog still retains a dome through much of this section and the peat that remains is “red” or “*Sphagnum*” peat. This site has been in industrial peat production since 1950 and there are still significant amounts (>2.6m) of “*Sphagnum*” peat remaining in the site.

Approximately three quarters of the site is currently in active peat production and is bare peat. There are some small areas to the east and west of the site that were initially developed for milled peat production but have never been put fully into production and now have re-vegetated or have some remnant vegetation. These areas are rapidly developing Birch and Pine scrub and Heather is also a dominant vegetation type. Some of these sections are currently being re-developed for milled peat production with vegetation clearance.

The south east of the site also contains a relatively large area of Birch woodland. Other habitats in the eastern boundary of the site include a small section of remnant raised bog, Birch woodland and old domestic cutover bog. Two small mineral islands are located on the site; these areas contain woodland that is dominated by Hazel, Birch and Oak.

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

None

Adjacent habitats and land-use

Adjacent habitats include lowland depositing river (FW2), wet grassland (GS4), improved agricultural grassland (GA1), cutaway bog (PB4), Conifer plantation and raised bog (PB1).

The surrounding landscape is dominated by farmland with improved grassland, with some of the improved grassland having been developed from peatland. Adjacent habitats include scrub (WS1), Birch woodland (WN7), improved grassland (GA1) and wet grassland (GS4). There are also some high bog (PB1) remnants and active cutover bog (PB4) around the margins that are not in ownership by BnM.

Watercourses (major water features on/off site)

- The Stonyfort River is located close to the north-eastern boundary of the bog.
- The Deel River is located to the west and south of the bog.
- The majority of the bog drains into streams that eventually feed into the Boyne River.

Peat type and sub-soils

Large sections of the site still contain significant areas of “*Sphagnum*” peat. The site is underlain with both gravel and marl. Gravel Sub-soil has been exposed in places within the production-related cutaway area.

Fauna biodiversity

Birds

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

- Meadow pipit (*Anthus pratensis*) (Red-listed)
- Common Kingfisher (*Alcedo atthis*) (Amber listed)
- Additionally other species were noted such as Blue Tit (*Cyanistes caeruleus*), Sparrowhawk (*Accipiter nisus*), Goldfinch (*Carduelis carduelis*), Raven (*Corvus corax*), Lesser Redpol (*Acanthis cabaret*), Wren (*Troglodytes aedon*), Hooded Crow (*Corvus cornix*), Long tailed tit (*Aegithalos caudatus*), Great Tit (*Parus major*) and Wheatear (*Oenanthe oenanthe*). Other species present included Blue Tit, Kingfisher (along the northern silt ponds), Sparrowhawk, Goldfinch, Raven, Lesser Redpol, Wren, Hooded Crow, Long tailed tit, Great Tit and Wheatear.
- Some of the younger cutaway vegetation surrounding the scrub in the production-related area may be suitable for breeding waders as there are unused bare peat fields and adjacent wet pools with emergent poor fen vegetation present.

Mammals

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

- Badger
- Fox
- Hare

Other species

Butterflies: Small tortoiseshell, Ringlet (*Aphantopus hyperantus*), Speckled wood (*Maniola jurtina*) and Green Veined White (*Polyommatus icarus*)

Dragonfly species: Black Darter (*Sympetrum danae*)

References

- Cross, J.R. 2006. The Potential Natural Vegetation of Ireland. Biology and Environment: Proceeding of the Royal Irish Academy, Vol. 106B, No. 2, 65-116 (2006).
- European Commission (2013). Interpretation manual of European Union Habitats. European Commission DG Environment Nature ENV B.3.
- Fossitt, J. (2000). A guide to habitats in Ireland. Kilkenny. The Heritage Council.
- 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

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

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

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

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

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

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

APPENDIX VI. POLICY AND REGULATORY FRAMEWORK

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

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

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

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

1 EPA IPC Licence

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Ballivor-Derrygreenagh Bog Group (Ref. PO-501-01). 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 Ballivor 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 Climate Policy

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

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

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

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

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 proposed future land use.
- Generally, Bord na Móna cutaway bogs that flood naturally will be permitted to flood unless there is a clear environmental and/or economic case to maintain pumped drainage.
- In deciding on the most appropriate afteruse of cutaway peatlands, consideration shall be given to encouraging, where possible, the return to a natural functioning peatland ecosystem.
- This will require re-wetting of the cutaway peatlands which may lead in time to the restoration of the peatland ecosystem.
- Environmentally, socially and economically viable options should be analysed to plan the future use of industrial cutaway peatlands, in conjunction with limiting factors as outlined in Bord na Móna's Strategic Framework for the Future Use of Peatlands.

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

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 are impacting on 106 water bodies across the country, with peat the single pressure on 28 of these water bodies. However, compared to the data in the second-cycle plan, the number of water bodies impacted by peat has decreased.

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

6 National Biodiversity Action Plan 2016-2021

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

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

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 Practise

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 Practise 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 license under section 95 of the EPA Acts. This is achieved by Bord na Móna identifying and quantifying any mechanical and infrastructural resources that were installed in the bog to enable the development and production operation at the site. This list is then refined to identify any items that would be deemed as possibly resulting in environmental pollution, should they not be removed.

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

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

Item	Description	Carranstown Decommissioning Plan
1	Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices	Clean-up of Bog
2	Cleaning Silt Ponds	Cleaning Silt Ponds
3	Decommissioning Peat Stockpiles	Peat Stockpile Management
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	Where required

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

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

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

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

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

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

7.3.3 The ultimate destination of the waste.

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

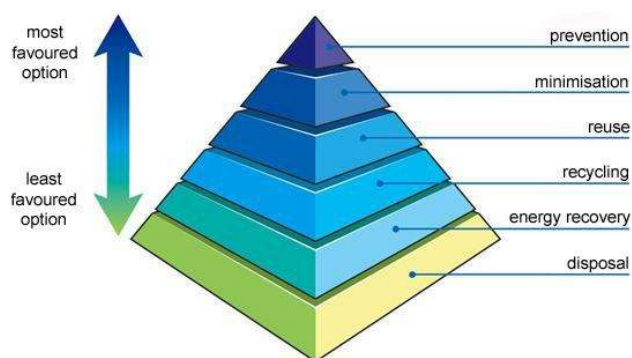
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

7.3.6 Details of any rejected consignments.

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

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

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



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

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 afteruse of the bog for amenity value, security against access for illegal and unsocial activities and general State and community benefit. In relation to this bog, this would include the infrastructure defined below:

Item	Enhanced Decommissioning Type	Carranstown Decommissioning Plan
1	Removal of Railway Lines	To be defined*
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	If feasible

* It is noted that the Bord na Móna industrial railway is currently designated as a protected structure in the current Westmeath County Council County Development Plan. This is currently being assessed by archaeological consultants for Bord na Móna.

APPENDIX VIII. GLOSSARY

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

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

Dry cutaway bog: Cutaway bog is categorised as dry cutaway where it is not practical or feasible to re-wet these areas completely. It is inevitable that some areas of cutaway will remain relatively dry due to the heterogenous topography of the cutaway, as well as requirements for continued drainage on site for identified after-uses, or off site in relation to neighbouring lands or other infrastructure. Ridges and mounds of glacial deposits can become exposed during peat extraction and form a heterogenous topographical mosaic separated by basins. Dry cutaway may have very thin or no residual peat where ridges and mounds have been exposed. The exposed sub-soils are a mix of glacial gravels, muds and tills that can be quite free-draining. Dry cutaway may also have deeper residual peat but in a location (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 turbary). The Scheme will consider potential rehabilitation and restoration actions (e.g. drain blocking) within marginal land zones, where appropriate.

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

Restoration: Ecological restoration 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 have 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 P0501-01, Derrygreenagh-Ballivor Group of Bogs in Counties Meath and Mestmeath.

1.0 Extractive Waste:

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

1.1 Silt Pond excavations and maintenance.

All peat extraction activities are serviced by a silt lagoons/ponds. During the excavation of these silt ponds, pre 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:

Lough Ree 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 P0501-01 IPPC Licence Extractive Waste Conditions

2.1 Condition 7.5 Extractive Waste Management

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

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

2.2 Condition 7.6 Waste Facility

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

2.3 Condition 7.7 Excavation Voids

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

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

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

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

3.0 Minimisation.

3.1 Silt pond excavation material and cleanings.

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

3.2 Power Station Screenings.

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

3.3 Bog Timbers.

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

4.0 Treatment**4.1 Silt pond excavation material and cleanings.**

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

4.2 Power Station Screenings.

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

4.3 Bog Timbers

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

5.0 Recovery**5.1 Silt pond excavation material and cleanings.**

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

5.2 Power Station Screenings.

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

5.3 Bog Timbers

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

6.0 Disposal**6.1 Silt pond excavation material and cleanings.**

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

6.2 Power Station Screenings.

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

6.3 Bog Timbers

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

7.0 Extractive Waste Management Plan**5 (2a)(i)**

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

5 (2a)(ii)

Given the nature and expanse of peat bogs, the stockpiling and storage of these waste materials do not present a visual, storage or stability problem. As required under Condition 10 of the IPPC Licence, the silt pond excavations and screenings will be utilised to backfill the silt pond voids once the bogs have finished and stabilised in accordance with 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 Ballivor 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 Ballivor IPPC Licence P0501-01.

APPENDIX X. MITIGATION MEASURES FOR THE APPLICATION OF FERTILISER

- Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
 1. The land is waterlogged;
 2. The land is flooded, or it is likely to flood;
 3. The land is frozen, or covered with snow;
 4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann).
 5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- No fertiliser will be spread on land within 2 metres of a surface watercourse.
- Buffer zones in respect of waterbodies, 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. Reproduced as follows:

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

APPENDIX XI. CONSULTATION SUMMARIES

Table APXI -1 Consultees contacted

Bog Name	Contact Organisation	Contact Name	Date of Issue	Format	Date Response Received	Response Format
Carranstown	Department of Housing, Local Government and Heritage NPWS	Multiple Staff Members	23/11/2021	Email	23/11/2021	Email
Carranstown	National Museum of Ireland	Multiple Staff Members	23/11/2021	Email	24/11/2021	Email
Carranstown	Department of Housing, Local Government and Heritage	General Email Contact	23/11/2021	Email		
Carranstown	Dept of Agriculture Food & the Marine	General Email Contact	23/11/2021	Email		
Carranstown	Department of Environment, Climate and Communications	Multiple Staff Members	23/11/2021	Email		
Carranstown	Dept of Rural and Community Development	General Email Contact	23/11/2021	Email		
Carranstown	Department of the Housing Local Government and Heritage	General Email Contact	23/11/2021			
Carranstown	Minister for Environment, Climate and Communications	Minister - Eamon Ryan	23/11/2021	Email		
Carranstown	Minister of state for Agriculture with responsibility for Land use and Biodiversity	Pippa Hackett Minister of State for Land Use and Biodiversity)	23/11/2021	Email		

Carranstown	Oireachtas	Danielle McDonnell (Minister Malcolm Noonan Secretary)	23/11/2021	Email	24/11/2021	Email
Carranstown	An Taisce	General Email Contact	23/11/2021	Email		
Carranstown	Environmental Protection Agency	Multiple Staff Members	23/11/2021	Email		
Carranstown	Inland Fisheries Ireland	General Email Contact	23/11/2021	Email		
Carranstown	Local Authority Waters Programme	Multiple Staff Members	23/11/2021	Email		
Carranstown	NWRA	General Email Contact	23/11/2021	Email		
Carranstown	Teagasc	General Email Contact	23/11/2021	Email		
Carranstown	The Heritage Council	General Email Contact	23/11/2021	Email		
Carranstown	Waterways Ireland	General Email Contact	23/11/2021	Email		
Carranstown	An Forum Uisce (The Water Forum)	General Email Contact	23/11/2021	Email		
Carranstown	Coillte	Multiple Staff Members	23/11/2021	Email		
Carranstown	Irish Water	General Email Contact	23/11/2021	Email	21/12/2021	Email
Carranstown	Office of Public Works	Multiple Staff Members	23/11/2021	Email	23/11/2021, 29/11/2021 & 10/12/2021	Email
Carranstown	NGOs	General Email Contact	23/11/2021	Email		
Carranstown	CARO (Climate Action Regional Office) Eastern and Midlands	General Email Contact	23/11/2021	Email		
Carranstown	Bat Conservation Ireland	General Email Contact	23/11/2021	Email		

Carranstown	Birdwatch Ireland	General Email Contact	23/11/2021	Email		
Carranstown	Butterfly Conservation Ireland	General Email Contact	23/11/2021	Email		
Carranstown	Eastern and Midland Regional Assembly	General Email Contact	23/11/2021	Email		
Carranstown	Fisheries Ireland	General Email Contact	23/11/2021	Email		
Carranstown	Friends of the Earth	General Email Contact	23/11/2021	Email		
Carranstown	Friends of the Irish Environment	General Email Contact	23/11/2021	Email		
Carranstown	ICMSA (Irish Creamery Milk Suppliers Association)	General Email Contact	23/11/2021	Email		
Carranstown	ICSA (Irish Cattle and Sheep Farmers Association)	General Email Contact	23/11/2021	Email		
Carranstown	Irish Farmers Association	General Email Contact	23/11/2021	Email	13/12/2021	Email
Carranstown	Irish Peatlands Conservation Council	General Email Contact	23/11/2021	Email		
Carranstown	Irish Raptor Study Group	General Email Contact	23/11/2021	Email		
Carranstown	Irish Rural Link (Community Wetlands Forum)	General Email Contact	23/11/2021	Email		
Carranstown	Irish Rural Link	General Email Contact	23/11/2021	Email		
Carranstown	Irish Wildlife Trust	General Email Contact	23/11/2021	Email		
Carranstown	National Association of Regional Game Councils	General Email Contact	23/11/2021	Email		
Carranstown	NPWS Rangers North East	General Email Contact	23/11/2021	Email		
Carranstown	NUIG Galway	General Email Contact	23/11/2021	Email		

Carranstown	PPN Westmeath Public Participation Network	General Email Contact	23/11/2021	Email		
Carranstown	Ranger Association Committee	General Email Contact	23/11/2021	Email		
Carranstown	Shannon Flood Risk State Agency Co-ordination Working Group	General Email Contact	23/11/2021	Email		
Carranstown	Sustainable Water Action Network (SWAN)	General Email Contact	23/11/2021	Email		
Carranstown	Trinity College Dublin	General Email Contact	23/11/2021	Email	23/11/2021	Email
Carranstown	Turf Cutters and Contractors Association	General Email Contact	23/11/2021	Email		
Carranstown	UCD / Irish Rural Link	General Email Contact	23/11/2021	Email		
Carranstown	University College Dublin	General Email Contact	23/11/2021	Email		
Carranstown	Waterways Ireland	General Email Contact	23/11/2021	Email		
Carranstown	Woodlands of Ireland	General Email Contact	23/11/2021	Email		
Carranstown	Westmeath Tidy Towns	General Email Contact	23/11/2021	Email		
Carranstown	TD/Longford	Peter Burke	23/11/2021	Email		
Carranstown	TD/Longford	Sorca Clarke	23/11/2021	Email		
Carranstown	TD/Longford	Joe Flaherty	23/11/2021	Email		
Carranstown	TD/Longford	Robert Troy	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Chief Exec	Pat Gallagher	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Director of Service	Barry Kehoe	23/11/2021	Email		

Carranstown	Westmeath County Councillors - Director of Service	Mark Keaveney	23/11/2021	Email		
Carranstown	Westmeath County Councillors -	Deirdre Reilly	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	John Shaw	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Emily Wallace	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Andrew Duncan	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Michael Dollard	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Aoife Davitt	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Denis Leonard	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Ken Glynn	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Hazel Smyth	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Billy Collentine	23/11/2021	Email		
Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Frank McDermott	23/11/2021	Email		

Carranstown	Westmeath County Councillors - Mullingar-Kinnegad	Paddy Hill	23/11/2021	Email		
Carranstown	Minister of State at the Department of Housing, Local Government and Heritage	Peter Burke (Longford-Westmeath)	23/11/2021	Email		
Carranstown	TD Longford-Westmeath	Sorca Clarke	23/11/2021	Email		
Carranstown	TD Longford-Westmeath	Joe Flaherty	23/11/2021	Email		
Carranstown	Minister of State at the Department of Enterprise, Trade and Employment	Robert Troy (Longford-Westmeath)	23/11/2021	Email		
Carranstown	TD Meath West	Damien English	23/11/2021	Email		
Carranstown	TD Meath West	Johnny Guirke	23/11/2021	Email		
Carranstown	TD Meath West	Peadar Toibin	23/11/2021	Email		
Carranstown	Meath County Councillors - Trim	Joe Fox	23/11/2021	Email		
Carranstown	Meath County Councillors - Trim	Niamh Souhan	23/11/2021	Email		
Carranstown	Meath County Councillors - Trim	Aisling Dempsey	23/11/2021	Email		
Carranstown	Meath County Councillors - Trim	Noel French	23/11/2021	Email		
Carranstown	Meath County Councillors - Trim	Trevor Golden	23/11/2021	Email		
Carranstown	Meath County Councillors - Trim	Ronan Moore	23/11/2021	Email		
Carranstown	All Land- owners in vicinity of bog	Leaflet Drop		Leaflet		
Carranstown	All stakeholders with turbary rights	Leaflet Drop		Leaflet		

Table APXI -2 Response summary from Consultees contacted

Organisation	Summary of Response by Stakeholder	BnM Response
Irish Water	<p>Irish Water made submissions on multiple PCAS bogs including Carranstown Bog, raising the following points:</p> <ol style="list-style-type: none"> 1) IW wished to express support for PCAS 2) IW recognised the potential for beneficial impacts of bog rehabilitation on drinking water supplies 3) IW expressed the need to list the potential benefits of PCAS to regional drinking water supplies within the rehabilitation plans 4) IW expressed need for strong monitoring protocols initially and post restoration 5) IW advised protection of drinking water sources be afforded special consideration, welcomed the planned maintenance of silt-ponds and requested they be consulted if decommissioning of silt-ponds proves necessary 	<p>BnM acknowledged the submission from IW and responded to the queries raised within the same.</p> <p>Dialogue is ongoing</p>
Irish Farmers Association	<p>The IFA made a submission on Carranstown Bog 13/12/2021 raising the following points:</p> <ol style="list-style-type: none"> 1) Acknowledging need to protect the environment and manage national peatlands 2) Expressing concern about possible impact of peatland rehabilitation on surrounding farmlands, specifically around the following: <ol style="list-style-type: none"> (a) Flooding/waterlogging of surrounding areas and development of new flood plains. (b) Health and Safety risks if water levels in drains and depressions rise then these could become a hazard for livestock, machinery operation and farmer access. (c) Negative impact on Property Values due to accumulation of risks outlined above. (d) Contingency Planning for potential future ownership of designated bogs in ensuring no negative impacts on property from any new ownership. 	<p>BnM responded on 16/12/2021 to address the concerns of raised by the IFA.</p> <p>Site visit to Pollagh Bog in July 2021 to demonstrate rehab measures and discuss PCAS.</p> <p>Dialogue is ongoing between BnM and the IFA.</p>

	<p>(e) Protection of existing Turf Cutting rights and resolution of any issues around same.</p> <p>The IFA made a number of proposals to be considered as potential solutions to queries raised.</p>	
Office of Public Works	<p>Submission received from OPW on 10/12/2021 that was supportive of the measures being undertaken and the benefits arising but also requested clarification on the following:</p> <p>1) Clarification on any potential impacts or constraints on the OPW carrying out normal Arterial Drainage maintenance activities on the OPW scheme channels, adjacent to the south, west and north boundary of Carranstown Bog as a result of PCAS activities.</p> <p>2) The OPW reiterated that Carranstown Bog is within the “Benefited Bog lands” of the Boyne Arterial Drainage Scheme.</p> <p>3) The OPW also wished to clarify if BnM envisaged that the OPW might be required to offer drainage maintenance support to Carranstown Bog and the associated drainage infrastructure post rehabilitation.</p>	<p>BnM responded on 15/12/2021 acknowledging the submission by OPW.</p> <p>BnM advised that as part of Carranstown Bog rehabilitation, BnM do not envisage any impacts or constraints which would restrict OPW from carrying out its ADM activities.</p> <p>BnM also advised that no requirement for OPW drain maintenance activities to support the hydrological requirements of Bord na Mona’s lands at Carranstown Bog is envisaged.</p>
Office of Public Works	<p>Submission received 26/11/2021 providing locations of channels OPW are responsible for maintain and outlining statutory obligation to maintain. The submission states that the OPW require an access route to be provided for maintenance work. They also advise that new culverts/bridges on any watercourse or changes to existing structures or drainage channels require Section 50 consent from the Office of Public Works.</p>	<p>Acknowledged via e-mail by BnM on 03/12/2021.</p> <p>Dialogue is ongoing.</p>

National Museum of Ireland	Response received 24/11/2021 acknowledging receipt of email and thanking us for making the opportunity to respond. Responded through e-mail throughout 2020/21 in relation to all PCAS bogs. Issues raised were; 1) The request that due diligence be taken during works to protect any archaeologically significant findings or areas 2) The NMI reiterated the importance of peatlands for the preservation of archaeology and requested they be consulted as part of any EIA undertaken	BnM acknowledged on 25/11/2021. Dialogue is ongoing.
Department of Housing, Local Government and Heritage	Acknowledgement e-mail from department received 24/11/2021 to inform BnM of receipt of consultation.	Dialogue is ongoing
Trinity College Dublin	TCD contacted BnM on 23/11/2021 thanking BnM for information on the PCAS scheme and expressing interest in examining the documents in more detail. TCD also requested further information on separate PCAS project bogs.	BnM responded on 23/11/2021 providing internet address resources and instructions on how to access the desired information.
Private Individual/Local resident A	Stakeholder expressed concerns regarding; potential impacts of rising water levels on nearby property, fire risk the impact of heavier footfall and traffic that might arise if the amenity development was considered on the bog post rehabilitation.	BnM responded by telephone on 31/12/2021 to address these concerns. Individual was happy with response but asked to be kept updated when works progress.

Private Individual/Local resident B	Response received 23/11/2021 asking for clarification on location of proposed wind farm in Carranstown.	BnM responded on 24/11/2021 to provide website addresses to the wind turbine locations on the Ballivor Windfarm website along with contact details for the BnM Ballivor Community Liaison Officer.
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APPENDIX XII. ARCHAEOLOGY

Role of the Archaeological Liaison Officer

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



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



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

1) Purpose

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

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

2) Procedure

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

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

Your Archaeological Liaison Officer is

3) Records

Revision Index			
Revision	Date	Description of change	Approved
1			
2			



**Archaeological Impact Assessment of Proposed Bog
Decommissioning and Rehabilitation at Carranstown Bog,
Cos. Meath and Westmeath**

Draft

Report For

Bord Na Móna Energy Ltd.

Author

Dr. Charles Mount

Bord Na Móna Project Archaeologist



Introduction

The EPA (2020) *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 of c.305 hectares at Carranstown Bog, Cos. Meath and Westmeath 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 Carranstown Bog will include:

- Deep Peat measures including field re-profiling, bunding and drain-blocking, resulting in banded wetlands 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 (3/100) on dry cutaway along with the blocking of outfalls and management of water levels;
- Intensive drain blocking (7/100) in areas to develop wetlands in areas of shallow peat. Measures include the blocking of outfalls, management of water levels and transplanting reeds and other rhizomes;
- Berms and field re-profiling (45m x 60m cell) in deep peat areas, along with blocking outfalls and managing overflows with a controlled weir outfall, includes drainage channels for excess water and Sphagnum inoculation;
- 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.

Carranstown Bog is located c.1.7km northwest of Ballivor, Co. Meath, and north of the R156 road. The overall rehabilitation area occupies the townlands of Grangemore, Co. Westmeath and Carranstown Great and Little and Killaconnigan, Co. Meath on OS 6 inch sheets Meath No. 35 and Westmeath No. 21.

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 Carranstown Bog. The overall extent of the rehabilitation is indicated in Fig. 1. This area was examined using information from:

- Archaeological Survey of Ireland Peatland 2005
- The Sites and Monuments Record that is maintained by the Dept of Housing, Local Government and Heritage
- The topographical files of the National Museum of Ireland.
- The Excavations database
- Previous assessments



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

Desktop assessment

Recorded Monuments

The Record of Monuments and Places (RMP) for Cos. Meath and Westmeath which was established under Section 12 of the National Monuments (Amendment) Act, 1994 was examined as part of the assessment (DAHGI 1996 and 1997). These records were published by the Minister in 1996 and 1997 and includes sites and monuments that were known in Carranstown Bog before that date. This review established that there are no RMPs located in the proposed rehabilitation area (see Fig. 1).

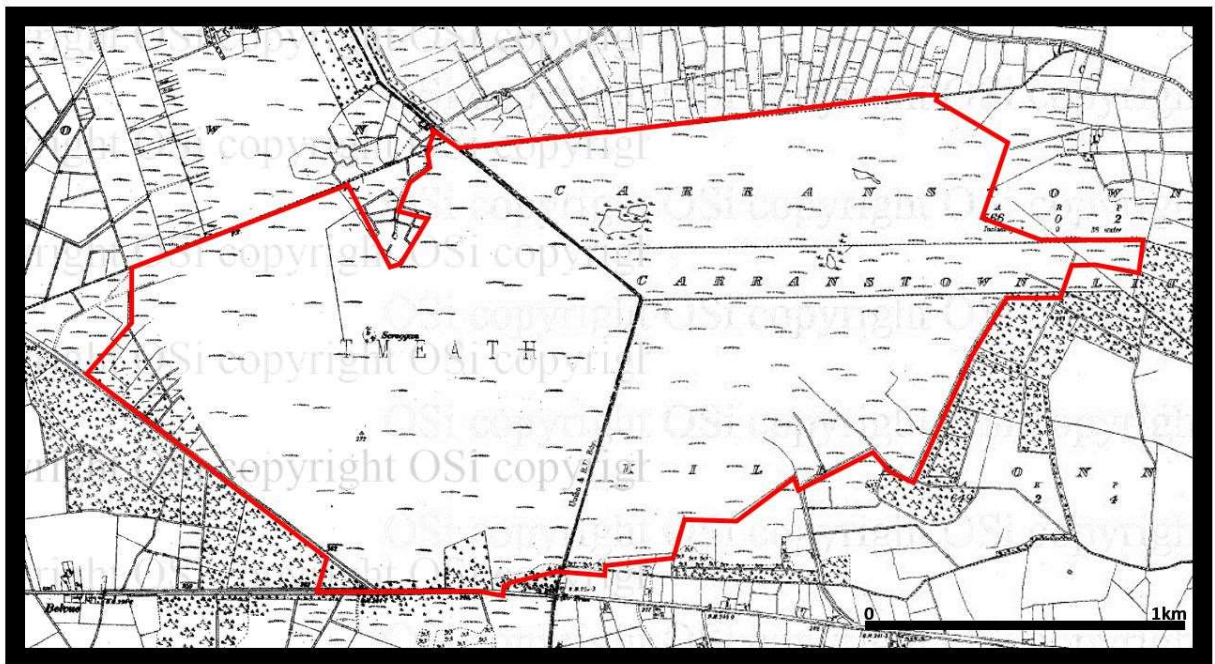


Fig. 1. Carranstown Bog, Co. Offaly, detail of the Record of Monuments and Places map sheets Meath No. 35 and Westmeath No. 21. The proposed rehabilitation area is outlined with the red line. There are no Recorded Monuments in the rehabilitation area.

Archaeological Survey of Ireland Peatland 2005

In 2005 Carranstown Bog was the subject of a peatland survey (Licence No. 05E0794). The bog was field walked by ADS Ltd at two drain intervals with the exception of the overgrown area which was walked at roughly 30m intervals. No archaeological material was recorded during this survey (Whitaker 2005, 12).

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 16th of November 2021. The SMR consists of records included in the RMP and sites and monuments notified to the Dept. since the publication of the RMP. This review established that there are no entries in the SMR in the proposed rehabilitation area (see Fig. 2).



Reported finds

The topographical files of the National Museum of Ireland were searched for records of finds from the bog in x 2021. There have been no finds reported to the Museum from the rehabilitation area.



Fig. 2. Carranstown Bog, Cos Meath and Westmeath, detail of the Sites and Monuments Record. The proposed rehabilitation area is outlined with the red line. There are no SMRs in the rehabilitation area.

Archaeological investigations

Reports of archaeological excavations and licensed monitoring in the study area listed in the excavations database at excavations.ie were examined as part of the assessment. There are no additional reports of archaeological investigation carried out in the rehabilitation area.

Previous assessments

Carranstown Bog has been the subject of an Environmental Impact Assessment Report carried out by Irish Archaeological Consultancy LTD in 2018 for Bord na Móna Energy Limited in relation to IPC Licence P0500-01. The assessment noted that no archaeological material has been identified in Carranstown Bog and noted that there was a potential for archaeological features to be uncovered during the course of any future development works in the bog.

Impact assessment

There is no known archaeological material in Carranstown Bog.

Recommendations

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



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 is no known archaeological material in Carranstown Bog. Should any previously unknown archaeological material be uncovered during the rehabilitation works, it should be avoided and reported to the Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

References

DAHGI 1996. Recorded Monuments Protected under Section 12 of the National Monuments (Amendment) Act, 1994. County Meath.

DAHGI 1997. Recorded Monuments Protected under Section 12 of the National Monuments (Amendment) Act, 1994. County Westmeath.

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

Whitaker, J. 2006. Peatland Survey 2005 Allen, Kilberry & Coolnamóna Bogs Counties Kildare, Laois, Meath, Offaly, & Westmeath. Unpublished report for the Department of the Environment, Heritage and Local Government.

Dr. Charles Mount
18 November 2021

APPENDIX XIII. INITIAL WATER QUALITY DATA FROM CARRANSTOWN

Table AP13.1. Water quality data for 12 months from November 2020 to Dec 2021 at Carranstown.

PCAS SW Sampling Scheme					Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids
Bog Group	Licence No	Bog Name	Unique I.D No.	SW Code -	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Derrygreenagh	P0501-01	Carranstown	236	SW32	1/11/20	1/1/21	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
					3	15	2	2	2	4	5	2	2	2	13	2
					35	35	35	35	35	35	35	35	35	35	35	35
					Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour
	Licence No	Bog Name	Unique I.D No.	SW Code -	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co
					1/11/20	1/1/21	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
	P0501-01	Carranstown	236	SW32	312	433	131	352	469	396	301	329	185	318	364	312
					COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD
	Licence No	Bog Name	Unique I.D No.	SW Code -	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/11/20	1/1/21	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
	P0501-01	Carranstown	236	SW32	56	74	35	90	95	90	84	99	46	88	83	82
					pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
	Licence No	Bog Name	Unique I.D No.	SW Code -	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units
					1/11/20	1/1/21	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
	P0501-01	Carranstown	236	SW32	6.5	6.6	7.6	7.6	7.2	6	7.6	7.5	7.6	7.5	7.3	7.3
					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
	Licence No	Bog Name	Unique I.D No.	SW Code -	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/11/20	1/1/21	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
	P0501-01	Carranstown	236	SW32	0.05	0.05	0.05	0.05	0.05	0.09	0.06	0.05	0.07	0.05	0.05	0.05
					TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS
	Licence No	Bog Name	Unique I.D No.	SW Code -	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/11/20	1/1/21	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
	P0501-01	Carranstown	236	SW32	156	105	132	345	182	127	326	337	350	293	224	269
					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
	Licence No	Bog Name	Unique I.D No.	SW Code -	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/11/20	1/1/21	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
	P0501-01	Carranstown	236	SW32	0.041	0.396	0.064	0.375	0.458	0.051	0.182	0.166	0.137	0.258	0.324	0.468
					DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC
	Licence No	Bog Name	Unique I.D No.	SW Code -	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/11/20	1/1/21	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
	P0501-01	Carranstown	236	SW32	28.2	23	14.2	33.4	34.3	29.9	31.2	66.9	31.1	30.3	33.5	32.8

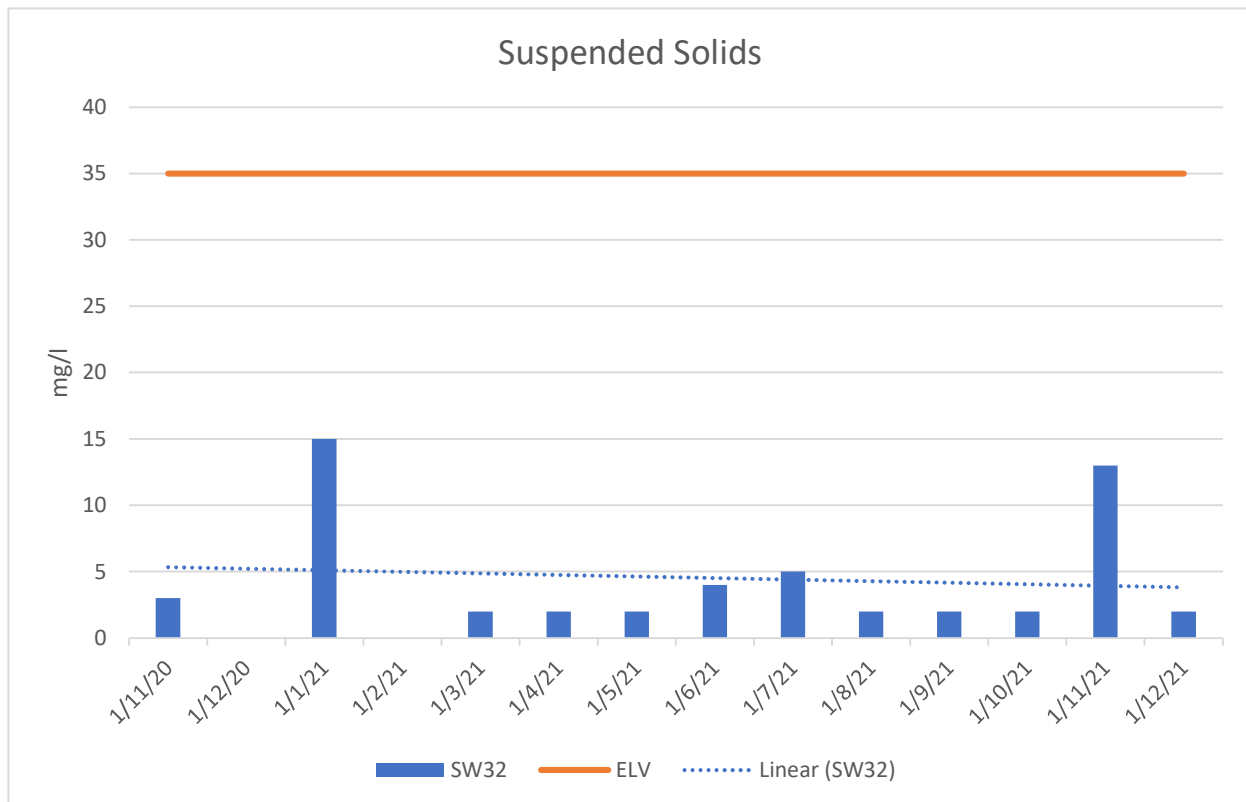


Figure AP13.1. Suspended solids in water sampling at Carranstown from different discharge points. 35 mg/l is the emission limit value.

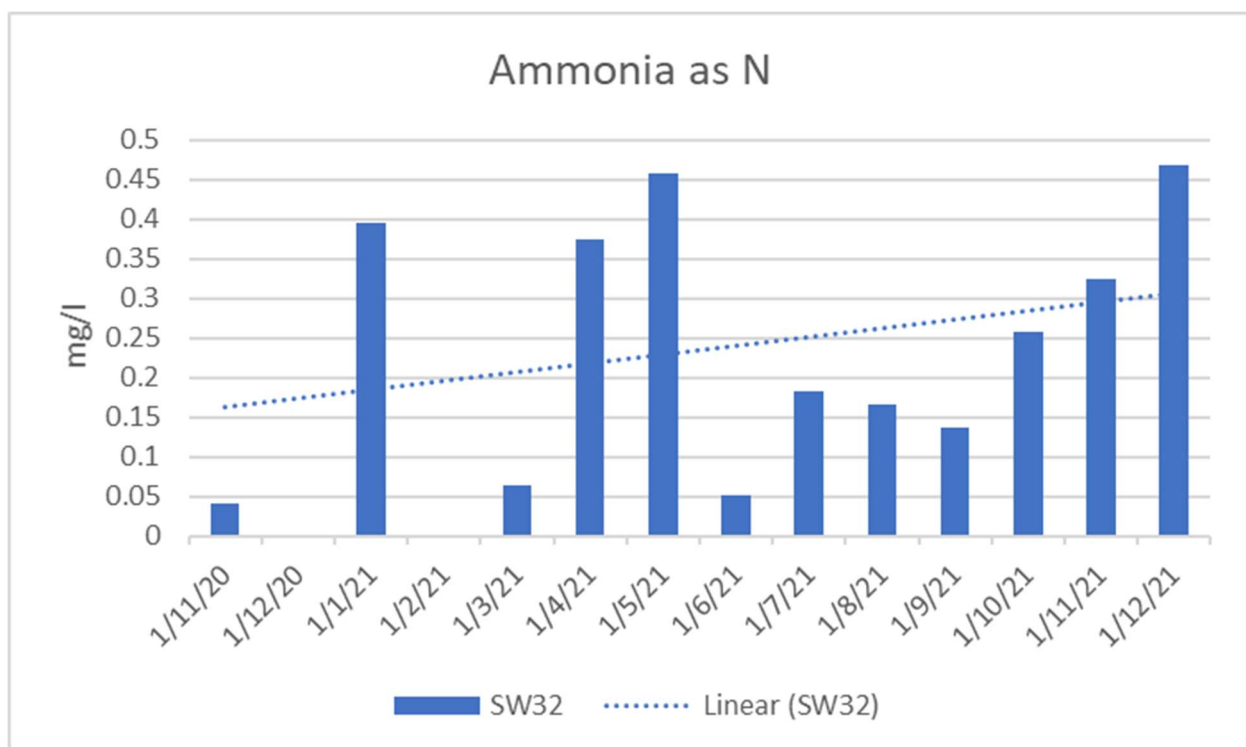


Figure AP13.2. Ammonia concentrations in water sampling from Carranstown from different discharge points. The main trigger level for ammonia is 1.42mg/l for reporting to EPA.