Bord na Móna

Cloncreen Bog

Cutaway Bog Decommissioning and Rehabilitation Plan 2022

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. PO503-01:

> "*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 Cloncreen 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 Cloncreen Bog.

In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. PO503-01, due regard was also given to the Peatlands Climate Action Scheme (PCAS) announced by the Minster. This Scheme will see the Minister support, via the Climate Action Fund and Ireland's National Recovery and Resilience Plan*, Bord na Móna in developing a package of measures, 'the Scheme', for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme'. However, only the additional costs associated with the additional and enhanced rehabilitation, i.e, measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support. The additional costs of the Scheme will be supported by Government, 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 Cloncreen 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 Cloncreen Bog as environmental stabilisation, re-wetting and setting the bog on a trajectory towards development of naturally functioning peatland, wetland and woodland habitats.

Bord na Móna have developed a wind energy project at Cloncreen Bog. This project is in construction. Rehabilitation will take account of the windfarm infrastructure and current land-uses on site and will seek to integrate peatland re-wetting with the current infrastructure and land-uses.

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Non-technical summary

- Cloncreen Bog is situated approximately 5 km south west of Edenderry, Co Offaly. Cloncreen bog is part of the within the Allen - Clonsast bog group (Ref. PO503-01).
- Peat harvesting is now finished at Cloncreen Bog.
- Bord na Móna is planning to rehabilitate Cloncreen Bog.
- This is happening as Bord na Móna are obliged to carry out peatland rehabilitation via an IPC License issued by the Environmental protection Agency. In addition, the Government has agreed to support peatland rehabilitation via the establishment of the Peatland Climate Action Scheme (PCAS). This is funded via the government and by Bord na Móna.
- The key objective of peatland rehabilitation is environmental stabilisation. This means developing habitats and vegetation back onto the bare peat, and minimising impacts to downstream. The bog was drained in the past to allow peat production. Better results for water quality improvements, climate action, the reduction of carbon emissions and biodiversity are achieved when the remaining peat is re-wetted. This means drain-blocking and other measures to raise water levels to the surface of the bog and to encourage the natural colonisation of vegetation.
- In general, soggy ground conditions are preferred. This means the remaining peat is wet and that plants that prefer wetter conditions, like bog cotton and reeds will thrive.
- Many Bord na Móna bogs can not be restored back to raised bog, as so much peat has been removed and the environmental conditions have been modified. However, other natural habitats will develop like shallow wetlands with reedbeds and birch woodland, and in time a naturalised peatland can be restored.
- The development of a range of habitats in Cloncreen 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 and peatland habitats in the wider landscape have been reclaimed for agriculture and other uses and peatland rehabilitation is an opportunity to create new wetland and peatland habitats.
- Cloncreen Bog was drained and developed for industrial peat production in 1956. Peat production ceased in 2018. Therefore, much of the former production bog is dominated by bare peat. Some areas within the north of the site that have been out of production for some years and has some pioneering vegetation established.
- Measures proposed for Cloncreen Bog include drain blocking and other measures required to raise water levels to the surface of the peat.
- Bord na Mona plan to carry out this work in 2022.
- These rehabilitation measures will be planned by a team consisting of ecologists, hydrologists and engineers. It is a principle of Bord na Móna rehabilitation planning that no actions will be taken that would negatively impact on adjacent land. No boundary drains will be blocked. Water will still leave the site via the existing outlets.
- It will take some time for vegetation and habitats to fully develop at Cloncreen, and a peatland ecosystem to be restored. However, it is expected that most of the site where bare peat exists will be developing pioneer habitats after 10 years.
- Cloncreen Windfarm (21 turbines and associated infrastructure) is currently in construction. An energy storage facility to be developed on site has also recently be given planning permission. Rehabilitation will be integrated with Cloncreen Windfarm infrastructure, which is currently being constructed. It is planned to re-wet residual peat between the windfarm infrastructure, where possible.

- This is a peatland rehabilitation plan. Bord na Móna continually reviews its land-bank to consider future commercial or industrial developments. Any other proposed development will be planned in adherence to relevant planning guidelines and will consider the rehabilitation and the condition of the site.
- The pipeline for the proposed Water Supply Project - Eastern and Midlands Region is anticipated to pass through a section of Cloncreen Bog in the north-eastern part 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: Cloncreen **Area:** 1,009 ha

Site description:

- Cloncreen Bog was drained and developed for industrial peat production in the 1970's. Cloncreen Bog formerly supplied milled peat. Industrial peat production ceased in 2018.
- The former peat production footprint now comprises bare peat, mosaics of pioneer vegetation and some emergent scrub habitats. Active drainage channels are present on site.
- Cloncreen Bog is a shallow peat cutaway bog as the majority of the peat has been cutaway.
- Planning Permission was granted in 2017 for Cloncreen wind farm (ABP REF PL19.PA0047). Construction has started (summer 2020) on 21 turbines (approximately 75 MW) at various locations around the site in association with linking road infrastructure, a sub-station and underground power cables. This plan takes account of this infrastructure and all associated mitigation measures described in the planning documentation.
- Planning Permission was granted in 2021 for an electrical battery storage facility (< 1 ha footprint) in Cloncreen Bog (Planning reference number PL2152), within the previously consented Cloncreen wind farm (ABP REF PL19.PA0047). This facility is located within the east of the site and is connected to the Cloncreen wind farm electrical substation. The battery storage facility will consist of up to 28 no. battery storage modules. This plan takes account of this infrastructure and all associated mitigation measures described in the planning documentation.
- A small former BnM gravel pit (Rathvilla) is located in the northern section of the site. This gravel pit was located on a large glacial mound that was originally overlain by the bog. This is currently in use again for the construction of Cloncreen wind farm and will be reinstated following completion of the windfarm.
- An Ash repository facility in the south of the site is used to store ash from the nearby Edenderry power station. This ash repository facility is still in active use.
- The pipeline for the proposed Water Supply Project - Eastern and Midlands Region is anticipated to pass through a section of Cloncreen Bog in the north-eastern part of the site.
- Some extant stock is still present at Cloncreen (September 2021). This peat stock will be retained on site, reprofiled and to infill and to block drains during the planned rehabilitation and decommissioning.
- The drainage of Cloncreen is partially pumped.
- Cloncreen bog is drained by the Figile River to the east and the Daingean River (EPA)/ Philipstown River (OSI) to the west and south. The Figile River joins the Daingean River which in turn forms part of the River Barrow located further to the south.

Rehabilitation goals and outcomes

Bord na Móna is committed to discharging the obligations arising from Condition 10 of the IPC licence. The primary goals and outcomes of this plan are:

- Meeting conditions of the IPC License.
- Stabilisation or improvement in water quality parameters (e.g. suspended solids).
- Environmental stabilisation.

- The site has already developed a mosaic of pioneer cutaway habitats, notably wetland, Birch woodland, grassland and fen habitats and is largely stabilised (windfarm footprint). These areas will be assessed for potential for targeted actions to enhance existing wetland habitats and create small wetland features.
- Optimising hydrological conditions for **climate action benefits as part of PCAS** in the areas recently out of peat extraction. This will be achieved via **deep peat re-wetting** and the **development of wetlands, fen, Reed Swamp and wet woodland on shallow cutaway peat**, and eventually naturally functioning wetland/peatland habitats.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities in suitable deep residual peat areas.
- Integrating rehabilitation measures with current infrastructure and land-uses.
- Rehabilitation will support the National Policies on Climate Action and GHG mitigation by maintaining and enhancing the current condition peat storage capacity of the bog (locking the carbon into the ground). In time, it is expected that the bog will be become a reduced Carbon source as the bog re-wets and compatible cutaway vegetation spreads across the bog. It will also support Ireland's commitments towards Water Framework Directive and the National River Basin Management Plan 2018-2021 and future National River Basin Management Plans.

Scope of rehabilitation

The principal scope of this rehabilitation plan is defined by:

- The area of Cloncreen Bog.
- EPA IPC Licence - Ref. PO503-01. 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 rehabilitation measures defined in the Scheme (PCAS), which are designed to exceed/meet the standard stabilisation requirements as defined by the IPC Licence and to enhance the ecosystem services of Cloncreen Bog, in particular, optimising **climate action benefits**.
- The local environmental conditions of this bog. Cloncreen Bog has variable environmental characteristics with a range of residual peat depths, and variable hydrology and topography. Cloncreen is suited to cutaway wetland development, particularly where low lying areas occur.
- The key goals and outcomes of rehabilitation at this bog outlined above in the preceding paragraph.
- Minimising potential impacts on neighbouring land. Some boundary drains around Cloncreen Bog will be left unblocked as blocking boundary drains could affect adjacent land.
- Current Land-uses. Cloncreen is being partially developed for renewable energy. The footprint of this renewable energy infrastructure is expected to be less than approximately 4% of the site area. It is planned to re-wet the cutaway areas between the windfarm infrastructure. It is not proposed to carry out any intensive rehabilitation actions to change or negatively affect any renewable energy infrastructure or existing land-uses.
- Other constraints including the proposed Water Supply Project- Eastern and Midlands Region route.

Criteria for successful rehabilitation:

The Criteria for successful rehabilitation for IPC Licence validation and for climate action verification 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, accelerating the development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat (IPC Licence validation) through the creation of compatible fen, reed swamp, wet woodland and other wetland and peatland habitats.
- Stabilising or reducing key emissions to water (e.g. potential run-off of suspended solids).
- Reducing pressure from peat production on the local river catchment (WFD) (IPC Licence validation).
- Optimising the extent of suitable hydrological conditions to optimise climate action (Climate action verification).
- Reduction in carbon emissions (Climate action verification).
- Setting the site on a trajectory towards establishment of a mosaic of compatible habitats including fen, reed swamp, wet woodland, heath, scrub and birch woodland habitats, where conditions are suitable, and eventually towards a reduced carbon source (Climate action verification). These habitats will generally establish initially as pioneer vegetation. It will take some time for stable naturally functioning peatland habitats to fully develop at Cloncreen 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 drainage management assessment.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation.
- Carry out proposed measures, which will be a combination of targeted drain blocking, peat field re-profiling, and water level management.
- Phase 2 measures may include fertiliser application targeting bare peat areas on headlands, high fields and other areas, and further water level management.
- Silt ponds will continue to be maintained during the rehabilitation and decommissioning schedule.
- 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.
- 2022-2024. Long term practical actions. Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.
- 2024. Decommission silt-ponds, if necessary.

Monitoring, after-care and maintenance

The monitoring, after-care and maintenance programme for Cloncreen Bog, as required to meet Condition 10 of the IPC Licence, 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, 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 any additional rehabilitation.
- **Water quality monitoring** will be established. Monitoring of key water quality parameters will include: Ammonia, Phosphorous, Suspended solids (silt), pH and conductivity.
- 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.
- 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 PCAS 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 of discharge is stabilising or improving.
- The site has been environmentally stabilised.

1. INTRODUCTION

Cloncreen bog is situated approximately 4.5 km south west of Edenderry, Co. Offaly, see Drawing no. *BnM_DR23_13_01 'Site Location'*, included in the accompanying Mapbook. The Edenderry Power Station is located immediately to the east of the bog. Cloncreen bog is located within a group of BnM bogs with Ballycon situated to the west and Ballydermot to the east of the site. This area was originally part of The Bog of Allen.

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Allen - Clonsast bog group (Ref. PO503-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the cutaway boglands within the licensed area. The bog is part of the Allen - Clonsast bog group (see Appendix II for details of the bog areas within the Allen - Clonsast bog group.

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. PO503-01:

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

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

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

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 Climate Action Fund and Ireland's National Recovery and Resilience Plan, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator. Bord na Móna have 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.

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

- more intensive management of water levels through outfall management, drain-blocking and management of water levels within the bog;
- re-profiling/re-wetting of extant deep peat 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.

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

1.1 Constraints and Limitations

This document only covers the area of Cloncreen Bog, see Drawing no. *BnM_DR23_13_01 'Bog Site Location'*, included in the accompanying Mapbook.

Industrial peat extraction at Cloncreen Bog permanently ceased in 2018. Currently the former peat production area comprises both bare peat and some re-vegetated areas comprising pioneering poor fen, scrub, Birch woodland and small wetlands. The combination of active rehabilitation measures and natural colonisation will quickly establish and/or increase the extent of pioneer vegetation and will be planned to accelerate environmental stabilisation. Nevertheless, it will take some time (30-50 years) for naturally functioning peatland ecosystems to fully re-establish.

Areas of cutover bog, i.e. remnant high bog areas at the site margins have also been identified for rehabilitation measures.

A windfarm is in construction on the site i.e. Cloncreen windfarm. This is expected to be in operation 2022/2023. Much of the cutaway between the windfarm infrastructure has been left to develop naturally functioning pioneer cutaway habitats. A modular Battery Energy Storage System (BESS) facility, within the footprint of a previously consented construction compound (ABP REF. PL19.PA0047), has also been consented within the east of the site (< 1 ha footprint). The facility will consist of up to 28 no. battery storage modules. This infrastructure and associated drainage infrastructure has been constrained from the rehabilitation plan.

An Ash repository facility in the south of the site is used to store ash from the nearby Edenderry power station and is still in active use.

The pipeline for the proposed Water Supply Project - Eastern and Midlands Region is anticipated to pass through a section of Cloncreen Bog in the north-eastern part of the site.

2. METHODOLOGY

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

The ecological information and site information collected during the Bord na Móna ecological baseline survey, additional confirmatory site visits and monitoring and desktop analysis forms the basis for the development of the rehabilitation plan for the bog, along with:

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

2.1 Desk Study

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

- Anderson *et al*. (2017). An overview of the progress and challenges of peatland restoration in Western Europe.
- Bonn *et al*. (2017). Peatland restoration and ecosystem services- science, policy and practice.
- Carroll *et al*. (2009). *Sphagnum* in the Peak District. Current Status and Potential for Restoration. Moors for the Future Report No 16.
- Clark & Rieley (2010). Strategy for responsible peatland management.
- Eades *et al*. (2003). The Wetland Restoration Manual.
- Farrell & Doyle (2003). Rehabilitation of Industrial Cutaway Atlantic Blanket Bog, NW Mayo, Ireland.
- Gann *et al*. (2019). International Principles and Standards for the practice of Ecological Restoration.
- Hinde *et al*. (2010). *Sphagnum* re-introduction project: A report on research into the re-introduction of *Sphagnum* mosses to degraded moorland. Moors for the Future Research Report 18.
- Joosten & Clarke (2002). Wise Use of mires and peatlands – Background and Principles including a framework for Decision-making.

- Lindsay (2010). Peatbogs and Carbon: a Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change.
- Mackin *et al*. (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al*. (2011). The Fen Management Handbook, (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised Bog Special Areas of Conservation management plan. Department of Arts, Heritage and the Gaeltacht.
- Quinty & Rochefort (2003). Peatland Restoration Guide, second edition. Canadian *Sphagnum* Peat Moss Association and New Brunswick Department of Natural Resources and Energy.
- Regan*, et. al.* (2020). Ecohydrology, Greenhouse Gas Dynamics and Restoration Guidelines for Degraded Raised Bogs. EPA Research Report. Prepared for the Environmental Protection Agency by Trinity College Dublin.
- Renou-Wilson *et al*. (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.
- Pschenyckyj et al., 2021, *Optimising Water Quality Returns from Peatland Management while Delivering Co-Benefits for Climate and Biodiversity*, Report produced for An Fóram Uisce, Online, Available at: https://thewaterforum.ie/app/uploads/2021/04/Peatlands_Full_Report_Final_March2021b.pdf, Accessed 17.08.2021.
- 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:

- Allen - Clonsast Integrated Pollution Control Licence;
- Allen - Clonsast 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);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);

- National Parks & Wildlife Services Article 17[1] and Article 12[2] data;
- 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 2021;
- Spatial data in respect of Article 17 reporting, available online at https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17.

2.2 Consultation

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

2.3 Field Surveys

Bord na Móna carried out a baseline ecological survey of all of its properties in 2009-2012 and developed habitat maps. Additional ecological walk-over surveys and visits have taken place at Cloncreen Bog in 2021 to inform rehabilitation planning and habitat maps have been updated, where required. In addition, dedicated ecological surveys were undertaken at the site in 2016 to inform the Environmental Impact Assessment Report (EIAR) for the Cloncreen Windfarm that is now in construction. This rehabilitation plan is informed by the original baseline survey, the Cloncreen Windfarm EIAR surveys and subsequent site walk-over surveys by the Bord na Mona ecology team that have informed all updates to the baseline data of the site.

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). Habitats that form the margins/ boundary of the site, that have not been modified significantly by industrial peat extraction, have been 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, Atherton et al. (2010). A more detailed Bord na Móna classification system was developed for classifying pioneer cutaway habitats as Fossitt categories were deemed not to be detailed enough for cutaway bog (much of cutaway bog could be classified as Cutover Bog - PB4). Much of the pioneer cutaway vegetation is still at an early stage of its development and cannot be assigned to Fossitt Level 3 categories until habitat establishment is more advanced.

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

[1] https://www.npws.ie/publications/article-17-reports

[2] https://www.npws.ie/status-and-trends-ireland%E2%80%99s-bird-species-%E2%80%93-article-12-reporting

3. SITE DESCRIPTION

Cloncreen bog is situated approximately 4.5 km south west of Edenderry, Co. Offaly, see Drawing no. BnM_DR23_13_01 *'Bog Site Location'*, included in the accompanying Mapbook. The location of Cloncreen bog is provided in Drawing no. BnM_DR23_13_24 *'Bog group map'*. Cloncreen bog is located within a group of BnM bogs with Ballycon situated to the west and Ballydermot to the east of the site. Minor public roads pass along the eastern (R401), northern (R402), western and southern (L1003) sides of the bog. A number of small, unpaved, bog roads allow access to the site at various points around the site. The bog is divided into several different sections by the Bord na Móna railway network that connected the bog with Edenderry Power Station to the east.

The surrounding landscape comprises of a mosaic of low-lying agricultural land (pasture) interspersed with other raised bogs, many of which have also been managed by Bord na Móna for peat production. Forestry also occurs to the southeast and south of the site boundary. Several sections of remnant raised bog are located along the margins of the site, notably to the southeast and west, see Drawing no. DR23_13_17 '*Current habitat map*', which illustrates the current habitats at Cloncreen bog. Small areas within the west of the site have also been used for the production of domestic turf.

The majority of the former production bog is now becoming vegetated with pioneer cutaway habitats. There are some sections of older cutaway with Birch scrub (WS1), minor Birch woodland (WN7) and pioneer poor fen (PF2) habitats. The margins around the production bog contain various habitats including active cutover bog (PB1), birch scrub and woodland (WN7), and small remnant patches of high bog (PB1).

The drainage of Cloncreen is partially pumped at two discharge points, see Drawing no. BnM-DR23_13_02 "Structures and Sampling". These will be retained post rehabilitation to facilitate operations at the Ash repository site and Cloncreen renewable energy infrastructure.

A BnM railway line runs through Cloncreen for trains carrying peat from other bogs in the Allen bog group towards the power station at Edenderry. This railway is expected to be decommissioned after the power station closes in 2024. A windfarm (21 turbines) is in construction on the site and the development footprint is shown in drawing number BNM-DR-23-13-31: Windfarm Infrastructure. The overall footprint of the new renewable energy infrastructure is relatively small (4% of the overall area of Cloncreen Bog). A modular Battery Energy Storage System (BESS) facility, within the footprint of a previously consented construction compound (ABP REF. PL19.PA0047), has also been consented within the east of the site.

3.1 Status and Situation

3.1.1 Site history

- Cloncreen Bog was first developed for industrial peat production in the 1970's. Peat production ceased in 2018 and the majority of peat has been cutaway. Cloncreen Bog is a shallow peat cutaway bog.
- Part of the site was used as a gravel pit in the past by Bord na Móna, for use in industrial railway construction and maintenance. This gravel pit was closed in 2013 and measures to rehabilitate this area were carried out in 2014 (Appendix II). The gravel pit has now been reused again to support the construction of the Cloncreen windfarm and this use has been consented via overall planning permission for the windfarm.

3.1.2 Current land-use

- Industrial peat production has now permanently ceased at Cloncreen Bog.
- Some small areas of turbary also occur within the site boundary.
- An ash waste facility (Cloncreen Ash Repository) is located in the south east corner of the site and this facility is used to store ash from the Edenderry Power Station. A Waste licence was granted to Bord na Móna by EPA for this facility.
- The consented Cloncreen windfarm (PA19.PA0047), consisting of 21 turbines, is currently in construction within the site. The overall footprint of this infrastructure is relatively small (4% of the overall area of Cloncreen Bog).
- The consented Cloncreen electrical energy battery storage facility (PL 2152) is located in the east of the site and is due commence construction in late 2022-2023. The overall footprint of this battery storage facility is < 1 ha and is located entirely within the already consented Cloncreen wind farm footprint (PA19.PA0047).
- The pipeline for the proposed Water Supply Project - Eastern and Midlands Region is anticipated to pass through a section of Cloncreen Bog in the north-eastern part of the site. This project is in the pre-planning stage.

3.1.3 Cloncreen windfarm

Cloncreen windfarm is located 4km east of Bord na Móna's 84 MW Mountlucas Wind Farm. The wind farm will consist of 21 no. V136-3.45 MW (megawatt) Vestas turbines. Turbine delivery is expected to begin in the first quarter of 2022, while commissioning is planned for the fourth quarter of 2022. When completed it will have an installed generating capacity of 75MW which will power approximately 55,000 homes per annum*[3]. The maximum permanent footprint of the development measures 40.1 hectares, which represents approximately 4% of the site. (See Drawing number *BNM-DR-23-13-31: Windfarm Infrastructure*, in the accompanying Mapbook).

As described in the Chapter 5 Flora and Fauna of the Cloncreen windfarm EIAR, '*the proposed development has been designed to avoid ecologically sensitive areas and has been constraint led from the initial design phase'*. The Cloncreen windfarm has been designed to avoid any areas of remnant bog habitat, significant areas of mature woodland and is largely restricted to cutover bog and associated pioneering habitats. A suit of mitigation measures in relation to the protection of protected flora are outlined in section 5.5.3 of the EIAR.

As described in the EIAR, the proposed development footprint traverses populations of basil thyme and blue fleabane (See Figure 5.5-b, Chapter 5 of the EIAR). Both construction and post construction mitigation measures have been incorporated into the windfarm development in order to avoid, minimise and compensate for any potential impacts on both floral species. This included the transplanting of individual plants prior to construction. The development will result in the creation of additional suitable habitat for both basil thyme and blue fleabane along the site infrastructure. As such, the wind farm development has the potential to actually enhance the conservation status of both species, as it will mean that more gravel and sub-soil is exposed and disturbed, providing new habitat for these rare plant species. The active gravel pit will also be rehabilitated as part of this Construction Environmental Management Plan.

[3] Based on average household electricity consumption of 4,200kWh.

The Construction Environmental Management Plan (CEMP)[4] also provides for the protection of other faunal species including a nesting Sand martin colony (occurring within the Rathvilla gravel pit), badger and otter. In addition, the CEMP provides a suite of mitigation measures for the protection of water quality that have been incorporated into the project design, as well as those to be implemented during construction. These include the storage of fuels, re-fuelling activities and use of portable toilets. Some scrub and woodland has been removed as part of the construction of the windfarm and new replacement woodland habitat has been planted as part of the Construction Environmental Management Plan.

This plan takes account of the above infrastructure and all associated mitigation measures described in the relevant planning documentation and associated conditions, the Cloncreen windfarm Construction Environmental Management Plan, Cloncreen Draft Rehabilitation Plan 2017 (submitted as part of the Cloncreen windfarm EIAR), the Cloncreen windfarm schedule of mitigation submitted to the planning authority (as per Condition 6 of planning permission), and all associated documentation. The rehabilitation measures described in this plan takes account of, and builds upon, the measures described in the Draft Rehabilitation Plan 2017 submitted as part of the planning application.

3.1.4. Socio-Economic conditions

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

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

In respect of Cloncreen 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). In addition, the construction of the windfarm has provided significant employment (mainly to contractors) and operational staff will also be required for the lifetime of the wind farm.

[4] Farrans, 2020, CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN - 36032 CLONCREEN WIND FARM

3.2 Geology and Peat Depths

3.2.1 Sub-soil geology

The underlying geology at Cloncreen Bog is limestone (Oolitic limestone)[5]. The underlying soils and sub-soils are classed as 'Raised Bog Cutover Peat'. The peat is underlain by glacial deposits, lacustrine clays, sandy green plastic clays, gritty plastic clays, green plastic clay and marl. The glacial deposits generally consist of grey gravelly clay/silt, see Drawing reference no. BnM DR23_13_04 '*Peat depth'*. Some glacial ridges and mounds with shallow residual peat or no peat are developing Birch woodland (WN7).

3.2.2 Peat type and depths

Cloncreen Bog has had significant peat extraction and the majority of peat has been cutaway. The majority of the bog has 0-1 m peat depths with all the peat cutaway in places. There are small pockets of 1-3 m. The main peat type exposed at this site is fen peat and sub-soils have been exposed in places. Peat depths have been mapped across the site and are provided in Drawing reference no. BnM DR23_13_04 '*Peat depth'*.

3.3 Key Biodiversity Features of Interest

The below description of the bog is based on dedicated ecological surveys of the site undertaken by the Bord na Mona ecology team as well as detailed ecological surveys undertaken at the site in 2016 as part of the Cloncreen Windfarm Environmental Impact Assessment Report (EIAR), reviewed as part of this plan. The below text provides a summary of the habitats and species occurring on site, with additional detailed ecological baseline descriptions of the site provided in Appendix II of this plan.

Much of the site has been out of production for several years prior to the cessation of peat production in this site in 2018. Therefore, such areas have begun to naturally recolonise. Large areas within the west of the site have not been actively used for peat production in recent years and are rapidly colonising with vegetation and habitats such as scrub, Birch woodland and pioneer poor fen. In some areas these habitats are well established. Poor fen within the site is generally dominated by soft rush (*Juncus effusus*) or bog cotton (*Eriophorum angustifolium*), in association with bare peat. Some small patches of poor fen are dominated by marsh arrowgrass (*Triglochin palustris*) in association with the other plant communities and some minor cover of reedmace (*Typha latifolia*). The majority of the south-eastern section of the site is also largely re-vegetated with scrub and poor fen vegetation. A small section of the south eastern corner had been planted with a mixture of broad-leaved and conifer trees. However, a section of this had been recently cleared to make way for a power line.

The boundary of Cloncreen is typically surrounded by a narrow fringe of birch woodland (WN7), birch scrub (WS1) and remnant patches of high bog (PB1). There are also some sections of intact high bog remnants dominated by heather along the margins that are now quite narrow and being dried out and colonised by trees and scrub. Pockets of established Birch woodland (WN7) occur along the western boundary of the site. The largest of these is located in the north west corner of the site. These sections of woodland were well developed and were dominated by Scot's pine, along with birch, oak, Rowan (*Sorbus aucuparia*) and holly.

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

An Ash repository facility in the south of the site is used to store ash from the nearby Edenderry power station. This facility is still in active use. This facility contains several cells of varying age. Two of these cells have now been capped and have re-vegetated with grassland and scrub. A mixture of habitats occur around the repository such as scrub and grassland.

A small former BnM gravel pit (Rathvilla) is located in the northern section of the site. Rehabilitation works were carried out in the quarry in 2015. The gravel pit was located on a large glacial mound that was originally overlain by the bog. A large depression has now been created, partially filled with water, and is developing as a lake with a fringe of emergent vegetation (FS1) dominated by Reedmace. This is surrounded by banks of scrub (WS1), patches of bracken (*Pteridium aquilinum*) (HH1), disturbed vegetation (ED3) and exposed gravel (ED2). Rehabilitation of the gravel pit focused on retaining features of biodiversity value (e.g. sand martin (*Riparia riparia*) nesting areas), contouring peat over-burden that was originally moved off the area back into part of the gravel pit basin, levelling spoil heaps and increasing site safety by creating berms around the lake and steep slopes (Bord na Móna 2014). These key biodiversity features have been retained during the use of the gravel pit to support the windfarm construction.

Much of the site can be rated as of local importance (lower value) (NRA, 2009), due to the extent of pioneer habitats (poor fen & birch scrub) and bare, associated with industrial peat production which ceased in 2018. Re-vegetation of the site has occurred in much of the formerly active production areas. Small areas of the marginal lands within the site boundary, containing remnant bog, cutover bog, Birch woodland or heather-covered areas. These, and areas of established Birch woodland within the site, have been assessed as of local importance (higher value) in a local context (NRA, 2009). It is expected that the overall ecological value of this site will increase in the future as the site re-vegetates, matures and forms semi-natural habitats, such as more extensive areas of fen and reed swamp.

A habitat map of Cloncreen Bog is shown in Drawing reference no. BnM_DR23_13_17 '*Current habitat map' in the accompanying Mapbook*.

Plate 3.1 Example of cutaway bare peat occurring within the northeast of the site.

Plate 3.2 Example of developing pioneering dry cutaway vegetation on former cutaway production bog.

Plate 3.3 Example of developing birch dominated woodland (WN7) within the northwest of the site.

Plate 3.4 Example of developing pioneering poor fen vegetation on former wet cutaway production bog.

Plate 3.5 Example of basil thyme occurring within the site (October 2021)

Plate 3.6 Example of blue fleabane occurring within the site (October 2021)

3.3.2 Species of conservation interest

There are records of blue fleabane (*Erigeron acer*) and basil thyme (*Clinopodium acinos*) along the railway track and in the old gravel pit. Both species are nationally rare plant species listed in the Irish Red Data list (Wyse-Jackson *et al.* 2016) and basil thyme is also listed on the Flora Protection Order (FPO) (part of Wildlife Act). Both species are esker plants (i.e. not typical bog plants) and are likely to have colonised Cloncreen during Bord na Móna operations via the railway and from adjacent eskers and gravel pits. THE CEMP for the windfarm construction has mitigation measures in place to minimise impacts to Basil Thyme.

Another rare plant species, round-leaved wintergreen (*Pyrola rotundifolia*), has recently been found at Cloncreen. This species is a nationally rare plant species listed in the Irish Red Data list (Wyse-Jackson *et al.* 2016) and was not recorded on Co. Offaly until recently, but is now appearing on several BnM cutaway bog sites. It is found at several locations on the established cutaway at Cloncreen.

Evidence of badger (*Meles meles*), fox (*Vulpes Vulpes*), hare (*Lepus timidus hibernicus*), pine marten (*Martes martes*), otter (*Lutra lutra*), red squirrel (*Sciurus vulgaris*), fallow deer (*Dama dama*), wood mouse (*Apodemus*

sylvaticus) and common frog (*Rana temporaria*) were observed on site during BnM walkover surveys and those associated with the Cloncreen windfarm EIAR.

Lepidopteran (butterfly) and Odonata (dragonflies and damselflies) species recorded on site included; large white butterfly (*Pieris brassicae*), small white (*Pieris rapae*), small heath (*Coenonympha pamphilus*), small copper (*Lycaena phlaeas*), peacock butterfly (*Aglais io*), common blue butterfly (*Polyommatus icarus*), speckled wood butterfly (*Pararge aegeria*), ringlet (*Aphantopus hyperantus*), common darter (*Sympetrum striolatum*), brown hawker (*Aeshna grandis*), common hawker (*Aeshna juncea*) and four-spotted chaser (*Libellula quadrimaculata*).

Common bird species include; willow warbler (*Phylloscopus trochilus*), snipe (*Gallinago gallinago*), mallard (*Anas platyrhynchos*), wood pigeon (*Columba palumbus*), swallow (*Hirundo rustica*), hooded crow (*Corvus cornix*), chiffchaff (*Phylloscopus collybita*), blue tit (*Cyanistes caeruleus*), skylark (*Alauda arvensis*), lesser redpoll (*Carduelis flammea cabaret*), grey heron (*Ardea cinerea*), meadow pipit (*Anthus pratensis*), coal tit (*Periparus ater*), magpie (*Pica pica*), robin (*Erithacus rubecula*), buzzard (*Buteo buteo*), yellowhammer (*Emberiza citrinella*), stonechat (*Saxicola torquata*), chaffinch (*Fringilla coelebs*), blackbird (*Turdus merula*), sand martin (*Riparia riparia*) and swallow (*Hirundo rustica*).

The site has previously attracted some breeding Lapwing (2 pairs in 2015) recorded during surveys to inform the Cloncreen Windfarm EIAR. A flock of Whooper Swans spent part of winter 2013/14 at Cloncreen, using a wetland area for roosting, but did not use the site in 2014/15.

3.3.3 Invasive Alien Species

The invasive species giant hogweed (*Heracleum mantegazzianum*), listed on the Third Schedule of the EC Birds and Natural Habitats Regulations, had been recorded within the south of the site near the ash repository during Bord na Mona site. However, following recent surveys undertaken in 2021, no evidence of the species was recorded. Ongoing surveillance will check for the presence of giant hogweed.

3.4 Statutory Nature Conservation Designations

Cloncreen bog is not located within or adjacent to any EU Designated sites i.e. Special Areas of Conservation (SAC) or Special Protection Area (SPA). The nearest EU Designated sites in the wider area include:

- Long Derries - Edenderry SAC (over 5km to the northeast),
- Raheenmore Bog SAC (located over 12km to the south of the site),
- River Barrow and River Nore SAC (located over 12km to the south of the site),
- Mouds Bog SAC (located over 17km to the south of the site),
- Pollardstown fen SAC (over 17km to the southeast of the site)
- Ballynafeagh Lake SAC (over 18km to the north of the site),
- Ballynafeagh Bog SAC (over 19km to the east of the site),
- Slieve Bloom Mountains SPA (over 23km to the east of the site).

There are no Natural Heritage Areas (NHAs) in close proximity to Cloncreen bog. The nearest NHA include:

- Black Castle Bog NHA (located over 6km to the north of the site),
- Carbury Bog NHA (located over 11km to the northeast of the site),
- Daingean Bog NHA (located over 10km to the west of the site),

- Hodgerstown Bog NHA (located over 18km to the east of the site).

The nearest non-statutory designated sites i.e. proposed Natural Heritage Areas (pNHAs) in the wider area around Cloncreen bog are the Grand Canal pNHA (located over 3.4 km from the site). All other pNHAs are located over 10 km from the site.

3.5 Hydrology and Hydrogeology

Cloncreen forms part of the Barrow Catchment (Catchment ID : 14) as defined by the EPA under the Water Framework Directive (WFD) and is situated within the Figile_SC_020 and Figile_SC_010 Sub-Catchments. The bog is located approximately 6.5km South-West of the village of Edenderry and 3km East of Mount Lucas Wind Farm. The bog contains several drainage pathways which primarily drain in a westerly direction towards the southerly flowing Figile River.

The drainage of Cloncreen is partially pumped. There are a series of drains through the bog at regular intervals that form part of the main drainage system. There are 11 no. silt ponds located at the site boundary to the west, south and east, see Drawing number BNM-23-13-02 “Structures and sampling” in the accompanying map book. Pumping will be retained at this site to support the drainage requirements of the Ash repository and the renewable energy infrastructure.

Regional hydrological data suggest that Cloncreen receives average precipitation of 845mm/yr (1981-2010), with an estimated evapotranspiration rate of c. 516mm/yr, leaving an average effective precipitation of 329mm/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 329mm/yr, which equates to an annual runoff rate of c. 3,290m3/ha.

GSI data indicates that Cloncreen is primarily underlain by the Edenderry Oolite Limestone formation. A small portion of the site is underlain by the Allenwood Formation, Waulsortian Limestones and the Lucan Formation. The Edenderry Oolite limestone is classed as a locally important aquifer which is generally moderately productive. The Allenwood Formation is classified as a Locally Important Aquifer (Karstified). Both the Walusortian Limestones and Lucan Formation are classified as a Locally Important Aquifers which are only moderately productive only in local zones. There are no mapped karst features within the immediate vicinity of the bog, although there are a number of karst features to the south of the site.

Quaternary Sediment maps show Cloncreen underlain by peat, yet surrounded by inorganic deposits, primarily Till derived from Limestone, with some basic esker sands and gravels towards the north-west. GSI groundwater vulnerability mapping indicates that there is generally low-moderate vulnerability in the area surrounding the bog however, there are areas of high vulnerability surrounding the bog. 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.

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

Cloncreen bog has 6 treated surface water outlets to the receiving waters. Three to the River Figile and 3 to the Philipstown River, above it confluence with the Figile.

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-23-13-02 titled **Cloncreen Bog: Structures and Sampling**, along with Drawing number BNM-DR-23-13-WQ01 titled **Cloncreen Bog Water Quality Map** included in the accompanying Mapbook, which illustrate the various drainage and water quality infrastructure present at Cloncreen Bog.

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 values associated with this bog is 35mg/l suspended solids, with trigger levels for ammonia of 3.00mg/l and COD 100mg/l.

Initial monthly results are included in appendix XIII. These results are for 16 months from September 2020 to Dec 2021 (Table 3.1) and indicate the baseline water quality from a minimum of 70% of the bogs catchment. Peat extraction ceased in 2018 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, with one exception at SW35. During this period ammonia indicating a mixed trend across the three locations, again linked to a bog where peat extraction did not take place for number of years. All other parameters fluctuated slightly, most likely influenced by normal weather patterns, especially rainfall.

Monthly ammonia concentrations from November 2020 to December 2021 had a range of 0.028 to 0.757 mg/l with an average of 0.291 mg/l.

Results for suspended solids for the same period indicate a range of 2 to 74mg/l with an average of 7.7 mg/l.

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

Bog	SW	Monitoring	pH	SS	TS	Ammonia	TP	COD	Colour
Cloncreen	SW-32	Q1 20	7.2	2	191	0.175	0.05	68	292
Cloncreen	SW-33	Q1 20	7.5	2	366	0.052	0.05	49	128
Cloncreen	SW-34	Q1 20	7.2	2	243	0.226	0.05	56	261
Cloncreen	SW-35	Q1 20	7.7	2	505	0.059	0.05	36	86.4
Cloncreen	SW-37	Q1 20	7.2	5	454	0.248	0.05	66	217
Cloncreen	SW-37A	Q1 20	7.6	2	321	0.165	0.05	39	156
Cloncreen	SW-32	Q4 18	7.8	5	234	0.06	0.05	72	80
Cloncreen	SW-33	Q4 18	7.7	5	422	0.05	0.05	33	124
Cloncreen	SW-34	Q4 18	7.7	5	394	0.13	0.05	35	107
Cloncreen	SW-35	Q4 18	7.6	5	438	0.4	0.05	61	60
Cloncreen	SW-37	Q4 18	7.9	5	440	0.06	0.05	31	81
Cloncreen	SW-37A	Q4 18	7.7	5	380	0.25	0.05	21	26
Cloncreen	SW-32	Q3 14	8	5	284	0.02	0.05	41	86
Cloncreen	SW-33	Q3 14	7.8	5	400	0.1	0.05	17	34
Cloncreen	SW-34	Q3 14	7.8	5	426	0.41	0.05	27	64
Cloncreen	SW-35	Q3 14	8	10	796	0.05	0.05	103	124
Cloncreen	SW-37	Q3 14	7.9	5	424	0.09	0.05	18	46
Cloncreen	SW-37A	Q3 14	7.7	5	344	1.4	0.05	10	17

Table 3.1 Surface water monitoring results for Cloncreen

Rehabilitation of cutaway peatland is closely linked with control of emissions. One of the criteria for successful rehabilitation is stabilisation through re-vegetation, which will stabilise all substrates and in turn remove the need for further silt control measures. Re-wetted peat also aid the primary objective of stabilizing peat, as when peat is re-wetted it minimises risk to wind erosion. Re-wetted peat and the development of wet peatland habitats can also act as sinks for 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/rehabilitated peatlands normally improves as a result of bog rehabilitation and restoration measures and the restoration of natural peatland processes (Bonn *et al*., 20017). Peatland rehabilitation is also expected to improve water attenuation of the site as the drains are blocked, slowing water movement and water release from the site. Restored peatlands help slow the release of water and aid the natural regulation of floods downstream (Minayeva *et al*., 2017). The National River Basin Management Plan (NRBMP) 2018-2021 (DHPCLG, 2017) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD). The NRBMP outlines how key actions such as the Bord na Móna Raised Bog Restoration Project and ongoing Bord na Móna 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 Cloncreen Bog has been completed. The existing silt the silt pond will continue to be maintained and operated as long as required, or such point as they can be decommissioned, with no change in outfall type 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 downstream water body receptors, and is expected to support the improvement of the current and future status of the Figile River and Philipstown River, currently assessed as being at risk.

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

None

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 currently active drainage, which facilitates the oxidation of peat. Peat extraction generally transforms a natural raised bog 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.

It is expected that Cloncreen Bog can become a reduced carbon source following rehabilitation. The potential of any cutaway site to develop as a reduced carbon source/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. The windfarm infrastructure is likely to have a small impact on cutaway habitats that develop on the site. Much of the site is expected to develop fen, Reedbed and wet woodland habitats, with only small portions having capacity to develop *Sphagnum*-rich vegetation. Birch woodland has already developed and is expected to expand on the drier Cloncreen cutaway and peripheral headlands.

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 can be emailed a copy of this 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 Cloncreen Bog.

There has been ongoing consultation about rehabilitation, biodiversity and other general issues over the years about the Allen-Clonsast bog group including Cloncreen 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).
- Rathvilla Gravel Pit rehabilitation with Offaly County Council, 2014.
- Consultation with several individuals around biodiversity on the site (2018).
- Consultation between Bord na Móna and stakeholders as part of the planning and construction of Cloncreen Windfarm is part of a different process and is not listed here.
- General consultation with the proposed Water Supply Project - Eastern and Midlands Region.

There has been ongoing consultation about the planning and construction of Cloncreen Windfarm over the years (see Bord na Móna Wind Farm | Cloncreen Wind Farm[6]) as part of that particular development. This website describes the project and has up to date project newsletters. This development is now in construction. It is planned to provide amenity access at this site when the windfarm is constructed (as per condition 5 of the windfarm Planning Permission).

Local stakeholders will continue to be identified through ongoing engagement with neighbours whose land adjoins Cloncreen Bog. Additionally, local representatives of national bodies (such as regional National Parks and Wildlife Service staff) and relevant offices in County Councils (such as the Heritage or Environmental Offices) will be contacted. Any identified local interest groups will also be informed of the opportunity to engage with this rehabilitation plan, and will be invited to submit their comments or observations in relation to the proposed rehabilitation at Cloncreen Bog.

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

4.2 Issues raised by Consultees

N/A. Not issued to consultees yet.

[6] https://www.cloncreenwindfarm.ie/

4.3 Bord na Móna response to issues raised during consultation

N/A

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**. Optimising hydrology for the development of embryonic *Sphagnum*-rich vegetation communities on deep peat, where possible, and eventually naturally functioning and peatland habitats.
- Optimising hydrological conditions for the development of reed swamp and fen on shallow more alkaline peat and other subsoils.
- Supporting ongoing renewable energy and other land-uses. Integrating rehabilitation measures with current renewable energy and any amenity infrastructure (current and proposed) on site. It is not proposed to carry out any rehabilitation actions to change or negatively affect renewable energy infrastructure.
- Optimising hydrological conditions for the protection of 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 at Cloncreen Bog. This will happen over a longer time-frame than the implementation of this rehabilitation plan. A significant part of the site has already vegetating and stabilising. The aerial photo demonstrates the contrast between the condition of the bog in 2000 when the bog mostly in peat extraction and the condition of the bog in 2020, when there are indications of significant colonisation.
- 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. The bog has the potential to develop as a reduced carbon source in the longer-term. 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). However, small pockets of deep *Sphagnum* peat do remain within the southern and most northern parcels of the bog and do have potential to develop *Sphagnum*-rich habitats in this timeframe. Areas within the centre of the site have been largely cur away with shallow peat. In addition, areas of shell marl and fen peat remain

in this area and as such, are likely to develop more fen and reedbed type habitats in the future. Nevertheless, re-wetting across the entire bog, as part of the Scheme, will improve habitat conditions of the whole bog, making the overall bog wetter. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.

- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as such the development of new habitat to support biodiversity and local attenuation of water flows from the bog.
- WFD status in receiving water bodies can be affected by peatlands and peat extraction but is also affected by other sources such as agriculture. In addition, receiving water bodies that are assessed as At Risk from peatlands and from peat extraction are likely to have several contributary sources of impacts (private peat extraction and Bord na Móna).
- Bord na Móna are also planning rehabilitation measures in some adjacent bogs (e.g. Clonad) in 2021. There are expected to be cumulative water quality and other ecosystem service benefits to receiving water bodies such as the Philipstown River from rehabilitation more than one bog in the same catchment.
- Re-wetting in general will benefit the future preservation of most known and unknown archaeological features.
- Existing land uses, such as renewable energy generation and energy storage infrastructure.

6. SCOPE OF REHABILITATION

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

- The area of Cloncreen Bog (Drawing reference no. DR23_13_01 '*Bog site location*).
- EPA IPC Licence - Ref. PO503-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the cutaway boglands within the licensed area. Cloncreen bog is part of the Allen - Clonsast 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 Cloncreen Bog, in particular, optimising **climate action benefits**. The proposed interventions will mean that environmental stabilisation is achieved (meaning IPC obligations are met) and, in addition, significant other ecosystem service benefits particularly for climate action will be accrued.
- The local environmental conditions of Cloncreen Bog identify cutaway re-wetting as the most suitable rehabilitation approach for the residual peat areas within the site. In some parts of the site, where shallow peat depths remain, there is an alkaline influence on the water chemistry. This means that re-wetting will lead to the development of fen, reed swamp and other associated wetland/peatland habitats.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog. Bord na Móna have defined the key goal and outcome of rehabilitation at Cloncreen Bog as **environmental stabilisation** and **optimising suitable hydrological conditions, and setting the site on a trajectory towards the development of naturally functioning peatland habitats.**
- Land-use**.** It is planned to rehabilitate and re-wet cutaway bog between windfarm infrastructure while taking account of the planned renewable energy infrastructure and other land-uses including the proposed Water Supply Project - Eastern and Midlands Region.
- Rehabilitation of Cloncreen 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.
- Some rehabilitation measures are proposed on the marginal cutover bog zone at the peripheries of the bog, notably the southeast and north. However, these areas are small in area and will not affect adjacent lands.

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 bogs where there has not been significant industrial peat extraction and the peat body is largely intact (deep peat sites that are drained). At other bogs, 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), and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and birch woodland).
- At Cloncreen Bog, much of the bog has been cutaway and it is now considered a shallow peat bog. There is already significant natural colonisation and environmental stabilisation is ongoing.

- There are local factors that will influence the future trajectory of this site (the site is partially pumped to manage water levels, initially to facilitate industrial peat extraction, and will be maintained in order to not impact on the Cloncreen wind farm infrastructure or the Ash repository site) which need to be considered as part of the wider rehabilitation work.
- **Land-use.** Rehabilitation will be integrated with the Cloncreen wind farm and battery storage infrastructure within the site and with this land-use. As described in Section 5 of the Cloncreen Wind Farm EIAR, the site draft 2017 rehabilitation plan submitted as part of the planning application incorporates the development of the wind farm. It also states that the required rehabilitation will commence once construction activities have been completed. This revised rehabilitation plan takes account of all measures, and builds upon those, previously submitted. It is planned to re-wet cutaway areas between wind farm infrastructure while not impacting on the infrastructure. It is expected that the overall footprint of this infrastructure is less than 4% of the overall site. There will be a setback distance (30 m) applied to avoid negative impacts on this infrastructure. For example, there are health and safety issues around re-wetting in close proximity to this infrastructure/high voltage cabling. A number of existing drainage flow paths through the cutaway are to be maintained through the bog to facilitate the infrastructure. Following an extensive engineering survey of the bog, the number of open or piped drains required to achieve this has been minimised. Pumps will also be retained to facilitate this renewable energy infrastructure. Rehabilitation measures will also take account of the future wind farm post-construction reinstatement work.
- Retaining pumping of drainage water is also required to support the operation of the Cloncreen ash repository.
- The internal Bord na Mona rail line will be in operational use until 2023. For this reason, the rail line will be excluded from the initial rehabilitation works. Following cessation of railway activities, the railway will then be decommissioned as part of this rehabilitation plan.
- **Protected/threatened species:** Both basil thyme and blue fleabane have been recorded along the rail line within the site. Both species are not typical peatland species but have colonised the rail line as the rail bed has been constructed from calcareous material sourced from the borrow pit within the north of the site. Prior to the decommissioning and rehabilitation of the railway as part of the rehabilitation plan, targeted protected species surveys will be undertaken and appropriate mitigation measures incorporated for the minimisation of minimisation of impact.
- **Surrounding landscape and neighbours.** Another key constraint is the interaction between the Bord na Móna sites and the surrounding landscape. Care must be taken that no active rehabilitation management is carried out that could negatively and knowingly impact on surrounding land. This includes any hydrological management on neighbouring farmland. It is anticipated that the work proposed here (blocking drains and re-wetting cutaway peatlands) will not have any flooding impacts on adjacent land. For example, agricultural grassland occurs outside of, but adjacent to, Cloncreen bog. In addition, the rehabilitation measures will also take account of the Cloncreen windfarm infrastructure in order to protect the infrastructure.
- **Archaeology**. The discovery of monuments or archaeological objects during peatland rehabilitation may potentially constrain the rehabilitation measures proposed for a particular area. If this occurs, rehabilitation measures will be reviewed and adapted. An archaeological impact assessment of the proposed rehabilitation at Cloncreen Bog will be carried out (see Appendix XII).
- **Public Rights of Way**. There is no public right of way on Cloncreen bog.

- **Proposed Water Supply Project – Eastern and Midlands Region (Irish Water).** The pipeline for the proposed Water Supply Project - Eastern and Midlands Region is anticipated to pass through a section of Cloncreen Bog in the north-eastern part of the site. It is expected that the enhanced rehabilitation measures planned for Cloncreen will be carried out in advance of the construction of the pipeline, which is still subject to planning consent. Bord na Móna do not propose to carry out any rehabilitation works within the footprint of the proposed Water Supply Project – Eastern and Midlands Region until a decision has been made by the relevant authorities in relation to the statutory consent applications for the project. It is expected that the footprint of the corridor will be rehabilitated post the construction of the proposed Water Supply Project – Eastern and Midlands Region. This zone is expected to recolonise naturally during this period. As the proposed route of this pipeline is along the margin of the site, it will not significantly constrain rehabilitation measures or goals and objectives planned for the main part of the bog.
- The route of the proposed Water Supply Project - Eastern and Midlands Region is at a relatively high elevation close to the edge of the bog. This route will not significantly alter any re-wetting objectives or outcomes at a site scale as it is located close the margin of the site.

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 practical rehabilitation.

6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- The longer-term raised bog restoration trajectory of the site. The plan covers the short-term rehabilitation **actions** and **an additional monitoring and after-care programme** to monitor the rehabilitation during the Scheme and to respond to any needs (failure of environmental stabilisation for example). It is expected that this rehabilitation plan will set the site on an enhanced and accelerated trajectory towards environmental stabilisation and wetland creation. The plan does not set any goals or outcomes, for example, the extent (specific area) of active raised bog habitat (ARB) that may develop at this site in the long-term. This is beyond the scope of this rehabilitation plan.
- The windfarm and energy storage infrastructure footprint and any reinstatement works associated with the construction of the windfarm.
- This plan is not intended to be an after-use or future land-use plan for Cloncreen Bog.
- The longer-term management of this site. Any other future land uses will require further engagement with stakeholders.

7. CRITERIA FOR SUCCESSFUL REHABILITATION

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

A key objective of this 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. run-off of suspended solids).

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

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

- Rewetting of residual peat in the former area of industrial peat production to offset potential silt run off and to encourage development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat. Table 7.1 provides a summary of the criteria for successful rehabilitation and associated monitoring. The target will be the delivery of measures and this will be measured by an aerial survey after rehabilitation is completed.
- That there is a stabilising/improving concentration of suspended solids and ammonia 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) 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. This will be measured by the EPA Water Framework Directive monitoring programme.

With regard to predicting and estimating likely trends that might materialise 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, see Plate 7.1.

Similarly monitoring of surface water ammonia emissions from a Corlea bog in Mountdillon over 3 yrs. post cessation of peat extraction with ongoing rehabilitation, indicate downward trends, see Plate 7.2.

As the monthly monitoring program at Cloncreen 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.

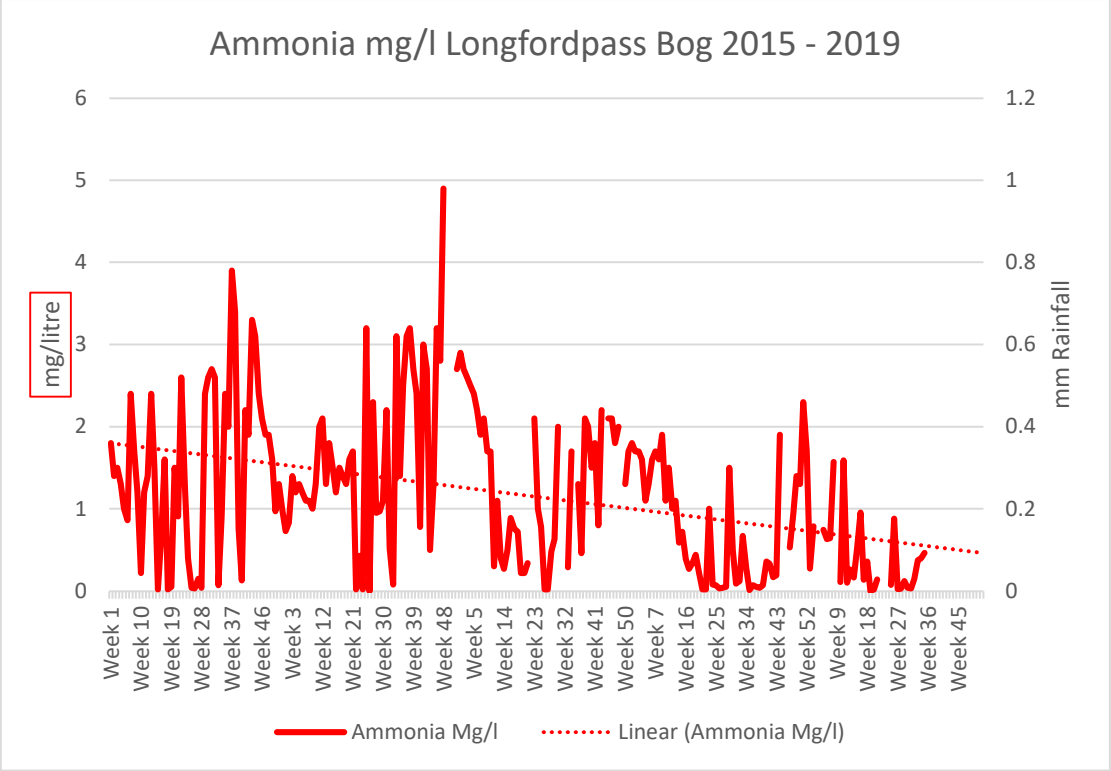

Plate 7.1 Example of decreasing ammonia emissions at Longfordpass bog following cessation of peat extraction and commencement of rehabilitation.

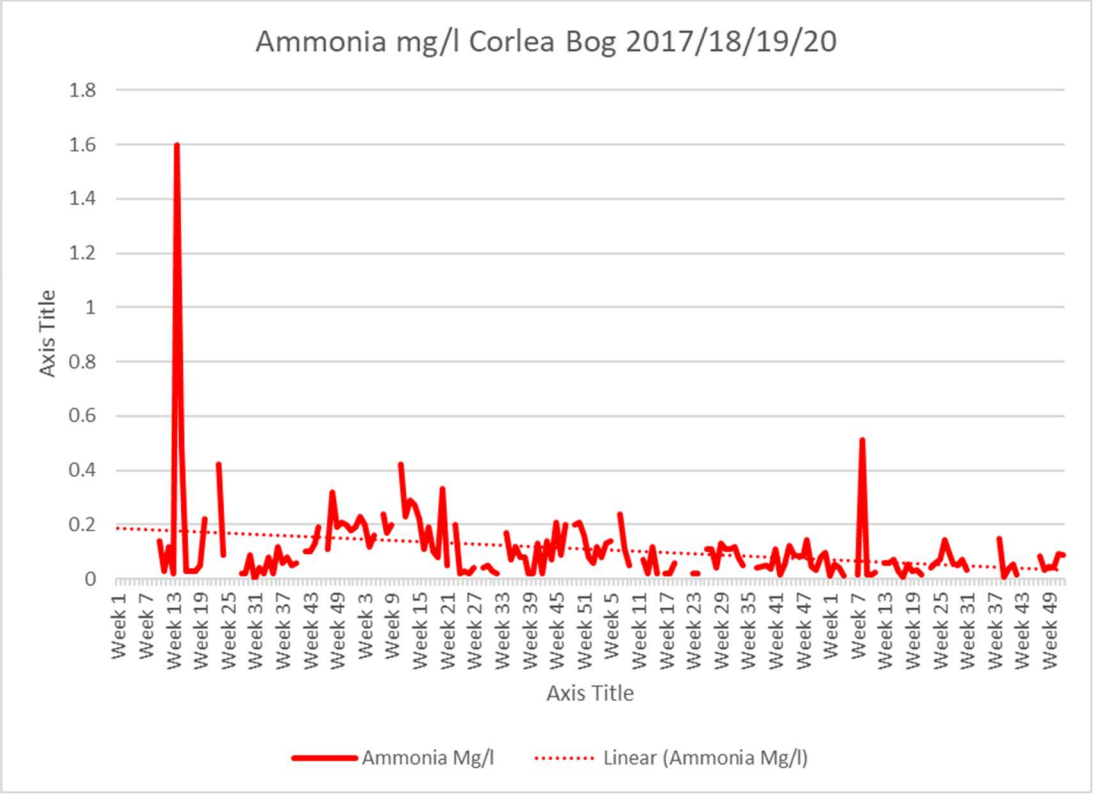

Plate 7.2 Example of decreasing ammonia emissions at Corlea bog following cessation of peat extraction and commencement of rehabilitation.

7.1.1 Additional criteria for successful rehabilitation for the optimisation of climate action and other ecosystem service benefits:

- Optimising the extent of suitable hydrological conditions to optimise climate action and other ecosystem service benefits (optimising residual peat re-wetting). This will be measured and demonstrated by site monitoring (updated aerial photography) to measure the extent of suitable hydrological conditions.
- Accelerating the trajectory of the site towards becoming reduced carbon source. 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.
- 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, fen, reed swamp, wet woodland, heath, scrub, birch woodland, and embryonic *Sphagnum*-rich peatland communities, where conditions are suitable. These habitats will generally establish initially as pioneer vegetation. It will take some time for stable naturally functioning habitats to fully develop at Cloncreen Bog. This will be demonstrated by the reduction in bare peat and the establishment of further pioneering habitats. This will be measured via aerial photography, habitat mapping and cutaway/habitat condition assessment.
- 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 etc). 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. These metrics will be defined in the context of the overall Scheme resources and after consultation with stakeholders.

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 (silt), pH and conductivity	Reduction or stabilisation of key water quality parameters	Water quality monitoring. Started in advance of the proposed rehabilitation.	2020-2023
IPC validation	Reducing pressure from peat production on the local river catchment (WFD)	No decline in the WFD status of the local river catchment	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 high bog condition assessment and appropriate carbon emission factors.	2022-2025

Criteria type	Criteria	Target	Measured by	Expected Time-frame
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 (to be defined). Presence of key species – Sphagnum – Walkover survey 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

Meeting climate action verification criteria and monitoring of these criteria after the Scheme has been completed is dependent on support from PCAS 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.

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 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 affective at other sites. Bord na Móna will apply a flexible and adaptable approach to the more innovative rehabilitation measures proposed in this plan**.** If measures are not initially effective, Bord na Móna will review any requirement for additional practical rehabilitation.
- **Natural colonisation of vegetation to develop semi-natural habitats at a rate within the normal limits.** The development of naturally functioning semi-natural habitats on cutaway peatland takes time. Pioneer vegetation can develop relatively quickly (3-10 years) and wetland habitats can develop relatively quickly. Birch woodland make take 20-30 years to develop. However, it may take 50 years for active raised bog vegetation to re-develop on ground that was previously cutaway. Different environmental conditions will have a significant impact on the rate of natural colonisation, and as a result of the combination of different environmental conditions and the application of different rehabilitation measures, there will be a variety of habitat outcomes.
- Rehabilitation measures have been designed to accelerate and work with natural colonisation and other natural processes. Bord na Móna experience of rehabilitation 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 measures to optimise climate action. This will focus on a collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services.

8. REHABILITATION ACTIONS AND TIME FRAME

Peatland rehabilitation requires detailed planning and the use of data from desktop surveys and field surveys. This data in association with topographical and hydrological modelling (depression analysis) 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_13_22 titled **Cloncreen Bog: Aerial Imagery 2020**

BNM- DR-23_13_04 titled **Cloncreen Bog: Peat Depths**

BNM- DR-23_13_03 titled **Cloncreen Bog: LiDAR Map**

BNM-DR-23-13-09 titled **Cloncreen Bog: Depression Analysis**

The rehabilitation actions will be a combination of PCAS measures to re-wet peat. The distribution of these measures is provisionally outlined in Drawing no. BNM-DR-23-13-05: “Enhanced Rehab Measures”. (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 Cloncreen Bog will include**:**

- Assessment of the current pumping regime to manage pumping on site in order to achieve wet soggy conditions across the site, while also avoiding impacts on the Cloncreen wind farm and energy storage infrastructure.
- Initial hydrological modelling (depression analysis) indicates that a significant part of the site between windfarm infrastructure has the potential to retain wet conditions. It is anticipated that this will develop a mosaic of wetland cutaway habitats. Hydrological management will look to optimise summer water levels to maximise the extent and development of emergent wetland vegetation (fen, reedswamp, wet grassland, wet woodland/scrub) and retain soggy conditions. Water-levels will be modified by drain-blocking and by adjusting piped drainage, where possible.
- Re-wetting the extensive areas of peat remaining on site within the former production area using berms and drain blocking.
- Undertaking intensive drain blocking (up to 7/100 metre) and managing overflows in areas where depression analysis predicts wet conditions will occur. Drain blocking will also occur across other areas in order to retain surface water locally.
- Some targeted drain blocking in marginal (degraded) remnant raised high bog areas is proposed as part of this plan, although they are small in size and degraded nature.
- The existing silt ponds will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase the silt ponds will be continually inspected and maintained, where appropriate. When it is deemed that the silt ponds are not required, as the bog has been successfully

stabilised and there is no run-off of suspended solids, the condition of the silt ponds will be reviewed. The silt ponds will either be de-watered (water levels lowered to a level where the silt pond will naturally develop as a small wetland feature), left in situ, or infilled (where discharges do not require silt control).

- Targeted fertiliser applications to accelerate vegetation establishment on areas of bare peat on headlands and high fields as required, see Drawing no. DR-23-13-28 '*Targeted fertiliser map*', in the accompanying Mapbook.

Table 8.1: Types of and areas for enhanced rehabilitation measures at Cloncreen Bog.

Type	Code	Enhanced Rehabilitation Measure	Extent (Ha)
Constraint	Constraint	Renewable energy development and associated buffers	223.7
Silt Ponds	Silt Ponds		2.7
Dry Cutaway	DCT1	Fertiliser treatment, where needed	47.6
	DCT2	Regular drain blocking (3/100 m), managing water levels with overflow pipes + targeted fertiliser treatment	223.3
	DCT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows + targeted fertiliser treatment	1.0
Marginal land	MLT1	No work required	51.3
	MLT2	More intensive drain blocking (max 7/100 m)	3.4
Wetland cutaway	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	0
	WLT2	Manage pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site	2.6
	WLT4	Turn off or reduce pumping to re-wet cutaway + managing water levels with overflow pipes + + constructing larger berms to re-wet cutaway +	4454.0
Grand total			**1,009.5**

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

- Seek formal approval of the enhanced plan, noting the alternative adapted 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 detailed site drawings outlining how the various rehabilitation methodologies (with the Scheme) will be applied to Cloncreen Bog. This will take account of peat depths, topography, drainage, hydrological modelling and windfarm infrastructure. (See map for an indicative view of the application of different rehabilitation methodologies). Rehabilitation measures will also take account of the wind farm construction, future post-construction reinstatement work and associated site infrastructure drainage.
- Carry out a hydrology and drainage management assessment of the proposed enhanced rehabilitation measures.

- An Archaeological Impact Appraisal (AIA) will be undertaken. This will carry out a review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation. Incorporate the results of this appraisal into the rehabilitation plan to minimise known archaeological disturbance, where possible.
- Carry out a review of issues that may constrain rehabilitation such as known rights of way, turbary, existing land agreements and the proposed Water Supply Project - Eastern and Midlands Region There are no known rights of way at Cloncreen bog.
- Carry out a review of remaining milled peat stocks. There are several old peat stock piles on site that will not be removed and be decommissioned. Appendix XIII provides details of the proposed decommissioning and reinstatement procedure for remaining peat stock on site.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation, such as the presence of sensitive ground-nesting bird breeding species (e.g. ringed plover or lapwing) or marsh fritillary butterfly larval webs, etc. The scheduling of rehabilitation operations will be adapted, if needed. Surveys will be scoped and carried out based on the baseline ecological survey and previous knowledge of sites.
- Ensure all activities comply with the environmental protection requirements of the IPC Licence.
- An Appropriate Assessment (AA) of the Rehabilitation Plan will be undertaken. The rehabilitation plan considered and has incorporated any required mitigation measures from the AA documentation prepared for the permitted energy developments and for the delivery of the rehabilitation and decommissioning across the site.
- Track implementation and enforcement of the relevant IPC Licence conditions, the mitigation measures (AA) and other environmental control measures during the implantation of the rehabilitation plan.

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

- Carry out proposed measures as per the detailed site plan. This will include a combination of hydrological management, drain blocking, peat field re-profiling and cell-bunding. All rehabilitation will be carried out with regard to best practice environmental control measures (Appendix IV).
- Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions.
- Carry out the proposed monitoring, as outlined in Section 9 of this report and accompanying documents.
- 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 will include fertiliser application on high fields and headlands (where there is bare peat).
- Silt-ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent run-off of suspended solids from the site during the rehabilitation phase.
- Submit an *ex post* report to the Scheme regulator to verify the eligible measures to be carried out in year 1 of the Scheme, and an *ex ante* estimate for year 2 of the Scheme; and so on for each year of the Scheme.

8.3 Long-term (>3 years)

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

8.4 Timeframe

- 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, 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 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 be allocated to the site based on the area of deep peat habitats, wetland habitats, shallow cutaway areas, drier areas, and regenerating bog communities across the bog (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 twice annually. This will further reduce to a single visit each year after 5 years. These monitoring visits will consider any further requirements for 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. The extent of bare peat will be assessed using this baseline data, and habitat maps will be updated.
- **Water quality monitoring** at the bog will be established. This will start in advance of the proposed rehabilitation. 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.
- Water quality monitoring will aim to include up to 70% of a bog's drainage catchments.
- Monitoring results will be maintained, trended and reported on each year as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, which will be available in April each year at www.epa.ie.
- The parameters to be included (as per condition 6.2 of the IPC Licence) include monthly monitoring for pH, Flow, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour, and COD.
- This monthly sampling regime on a selected number of silt ponds will be carried out over a three-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 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 targets for successful rehabilitation are being achieved, then the water quality monitoring programme will be reviewed, with consideration of potential ongoing scientific 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 targets for successful rehabilitation have **not** been achieved, then the rehabilitation measures and status of the site will be evaluated and enhanced, where needed. This evaluation may indicate no requirement for additional enhancement of rehabilitation measures, but may demonstrate that more time is required before key targets for successful 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, 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 rehabilitation. These proposed monitoring measures will be funded by the Scheme or additional other funding. Monitoring of climate action and other ecosystem service benefits will be designed to take account of the requirements of monitoring benefits of the overall Scheme and will be stratified; that is not all monitoring will be carried out in each site. These are defined as:

- Vegetation and habitat monitoring after rehabilitation is completed using a cutaway bog condition assessment. This assessment will include assessment of on environmental and ecological indicators such as vegetation cover, vegetation communities, presence of key species, *Sphagnum* cover, bare peat cover and water levels.
- 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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11. 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:

- EPA IPC Licence - Ref. PO503-01. 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. Cloncreen bog is part of the Allen - Clonsast bog group).
- A key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog.
- Rehabilitation will be integrated with the current renewable energy infrastructure i.e. Cloncreen windfarm.
- Rehabilitation will be integrated with the pipeline for the proposed Water Supply Project - Eastern and Midlands Region.
- The area of former industrial peat production at Cloncreen Bog as defined by Drawing no. BnM_DR23_13_01 titled '*Bog Site Location*', provided in the accompanying Mapbook. Industrial peat production has now permanently ceased at Cloncreen Bog.
- Minimising potential impacts on neighbouring land. Some boundary drains around Cloncreen Bog will be left unblocked as blocking boundary drains could affect adjacent land.

Rehabilitation goals and outcomes

The key rehabilitation goal and outcome for Cloncreen Bog is environmental stabilisation of the site via re-wetting. This is defined as:

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

- Supporting ongoing renewable energy, amenity and other land-uses. Integrating rehabilitation measures with Cloncreen windfarm on site. It is not proposed to carry out any rehabilitation actions to change or negatively affect any infrastructure.

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

Criteria for successful rehabilitation:

- Rewetting of residual peat in the former area of industrial peat production to offset potential silt run off and to encourage development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat.
- That there is a 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).
- 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 barriers, elevated water levels and re-wetting).
  Stabilising potential emissions from the site (run-off of 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: (see Figure Ap-1)

- Blocking field drains in the former industrial production area and creating regular peat barriers (three barriers per 100 m) along each field drain.
- Re-alignment of piped drainage.
- Fertiliser treatment of high fields and headlands (typically slow to naturally re-colonise) to encourage natural colonisation, if needed.
- No measures are planned for the surrounding marginal peatland habitats.
- Silt ponds will continue to be maintained during the rehabilitation and decommissioning.
- 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 with dozer/excavator.

- 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.
- 2024-2025. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- 2024-2025. Decommission silt-ponds, if necessary.

Budget and Costing

- Bord na Móna maintains a Provision on its balance sheet to pay for the future costs of 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 has been allocated to the site based on the area of different cutaway types across the bog.

Table AP-1. Rehabilitation measures and target area.

Type	Code	Rehabilitation Measure	Extent (Ha)
Additional lands	AW1	Additional lands with some minimal works required	0
Constraint		Areas constrained	223.7
Dry cutaway	DCT1	Field drain blocking	281.8
Marginal land	MLT1	No work required	54.6
Silt Ponds			2.7
Wetland cutaway	WLT1	Field drain blocking	446.6
Grand Total			**1,009.5**

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, asses 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 any 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 Chemical Oxygen Demand (COD).
- This sampling regime on a selected number of silt ponds will be carried out over a two-year cycle. The original (licence) requirement was for a quarterly sampling regime.
- Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the required assessment and planning procedures.

Validation and IPC Licence surrender

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

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

12. APPENDIX II: BOG GROUP CONTEXT

The Allen - Clonsast Bog Group is located mainly in counties Offaly and Westmeath. Garrymore Bog is located in Co. Laois. All the associated bogs are located in the River Barrow Catchment area except Clonad Bog which is located in the Lower Shannon River Catchment.

The Allen - Clonsast Bog Group is one of the first developed bog groups in Ireland. Bord na Móna was set up in 1946 and it commenced the development of bogs to fuel power station and supply peat for the horticultural industry. The Allen - Clonsast bogs were developed for the supply of milled peat to the Edenderry Power Station, Croghan Power Station (now decommissioned) and the Croghan Briquette factory (now decommissioned).

Much of the Allen - Clonsast Bog complex became cutaway as long term peat production activity reduced the peat reserves on individual bogs. Rehabilitation measures comprising naturalisation and development of alternative after-uses have been already explored at the Allen - Clonsast Bog Group, including coniferous forestry, biomass, agricultural grassland, amenity use, rare species conservation management and wetland creation. Some of this was carried out in the 1980s While agricultural fields and coniferous forestry have been developed successfully on the cutaway bogs at Allen - Clonsast, it was found that these require financial investment that exceeds any potential commercial output value. A windfarm has been constructed at Mountlucas Bog and another windfarm project is currently in construction at Cloncreen Bog.

The Long Derries SAC is located south of Ticknevin Bog. Ticknevin also contains a relatively large area of remnant raised bog that was never developed by Bord na Móna. This area, called Cloncannon bog, was assessed by consultants for NPWS as part of the review of the raised bog Natural Heritage Area network (NPWS 2014).

A breakdown of the component bog areas for the Allen - Clonsast Bog Group IPC License Ref. PO503-01, and current, indicative Peat Production Status, is outlined in Table Ap-2.

Table Ap-2: Allen - Clonsast Bog Group names, area and indicative status

Bog	Area (Ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Ballycon	281	Cutaway Bog Ballycon was first developed for industrial peat harvesting in the 1960's and the majority of peat has been removed. Ballycon is considered a shallow peat cutaway bog.	Rehabilitation works were carried out in 2006 that consisted of drain blocking and bund construction. Some headlands were fertilised in 2015 to encourage the development of pioneer dry cutaway habitats and there was follow-up drain blocking in 2018. The site is now a mosaic of cutaway wetland and woodland habitats and is a Biodiversity Area. BnM has also operated a workshop on site. Part of the site was developed for conifer forestry in the 1980s and is leased to Coillte. There is a rail transport link along the southern boundary of the site.	2001	To be finalised 2021
Ballykeane	451	Cutaway Bog	Part of the site is cutaway and has started to develop pioneer vegetation. The majority of the bog is still bare peat.	2020	Draft 2017

		Ballykeane Bog was developed for industrial peat production in the 1970's. Ballykeane is a shallow peat cutaway bog.	Part of Ballykeane Bog is being used as a herb production trial.		
Cavemount	499	Cutaway Bog Cavemount Bog was first developed for industrial peat production in the 1970's. Peat production ceased in 2015. Cavemount is a shallow peat cutaway bog.	Ongoing rehabilitation has been carried out across the site which is now developing as a wetland, holding nationally important numbers of wintering and breeding wetland birds. A portion of the site still has bare peat but is vegetating. Part of the site was developed for conifer forestry in the 1980s and is leased to Coillte. Flux tower and GHG monitoring onsite as part of the SmartBOG project. The site is a location for the CarePeat InterReg Project, of which BnM is an associated partner. There is a rail transport link through the site.	2015	Finalised 2021
Clonad	447	Cutaway Bog Clonad Bog was first developed for industrial peat production in the 1970's.	The majority of the former production area is bare peat with some establishing cutaway habitats at various stages of development. There is a rail transport link through the site. The proposed Water Supply Project - Eastern and Midlands Region is anticipated to cross this bog.	2020	Finalised 2021
Cloncreen	1,009	Cutaway Bog Cloncreen Bog was first developed for industrial peat production in the 1970's. Peat production ceased in 2018 and the majority of peat has been cutaway. Cloncreen Bog is a shallow peat cutaway bog.	The site has developed a mosaic of pioneer cutaway habitats with some bare peat mosaics. Planning Permissions was granted in 2018 for Cloncreen Windfarm. Construction has started (summer 2020) on 21 turbines (Approx. 75 MW) at various locations around the site in association with linking road infrastructure, a sub-station and power-lines. A energy storage facility on site has also been granted planning permission. There is a rail transport link through the site. The proposed Water Supply Project - Eastern and Midlands Region is anticipated to cross this bog.	2018	To be finalised 2022
Clonsast	1,534	Cutover Bog Clonsast Bog was first developed for industrial peat production in the 1950's and was used for sod peat. Peat production ceased in 1980's. The majority of the bog was never converted to milled peat production and some relatively deep peat remains. Clonsast Bog is considered a deep peat cutover bog.	Clonsast has now established a mosaic of mature cutaway habitats. BnM formerly operated a farm at Clonsast. Farmland was developed on rehabilitated cutaway bog. The farm venture ceased in the 1980's and the farmland was sold. A significant portion of the site has been leased to Coillte and planted with conifer forestry in the 1980s. Some of the original research on establishing forestry on cutaway was established at Clonsast (Trench 14). BnM carried out a re-wetting trial in 2018. This site is largely stabilised. There is a rail transport link through the site.	1980's	Draft 2017

Clonsast Bulge	379	Cutover Bog Clonsast Bulge was first developed by BnM in the 1950's.	The majority of Clonsast Bulge used for peat extraction has been developed by Coillte for conifer forestry in the 1980's. Part of the site is undeveloped (Clonavoe Bog remnant). This site is largely stabilised.	1960's	Draft 2017
Clonsast North	191	Cutaway Bog Clonsast North was first developed by BnM in the 1930's. The remaining peat deposits at Clonsast North are generally shallow and so the bog is considered a shallow peat cutaway bog.	The cutaway is naturally colonising with a mosaic of Birch woodland and wetland. The site was partially re-wetted in 2018. There is a rail transport link through the site.	2000's	Draft 2017
Daingean Derries	277	Cutover Bog Daingean Derries was first developed in the late 1980's. Deep peat reserves remain. Daingean Derries is considered a deep peat cutover bog.	Daingean Derries Bog formerly supplied both horticultural peat and fuel peat. The majority of former production area is bare peat. Some bog restoration on part of the site completed in 2017-2018. There is a rail transport link through the site.	2020	Draft 2017
Daingean Rathdrum	367	Cutover Bog Daingean Rathdrum was first developed in the late 1980's. Deep peat reserves remain. Daingean Rathdrum is considered a deep peat cutover bog.	Daingean Rathdrum Bog formerly supplied both horticultural peat and fuel peat. The majority of former production area is bare peat. There is a rail transport link through the site. A small area of development bog (32 ha) has been restored.	2020	Draft 2017
Daingean Townparks	90	This bog was never drained or developed but there is a transport link along the margin of the site	Daingean Bog NHA (intact raised bog) There is a rail transport link through the site. No rehabilitation required.	N/A	N/A
Daingean Raillink	5	N/A	N/A	N/A	N/A
Derrycricket	190	Derrycricket was originally developed for peat production in the 1950's-1960's. Peat production at Derrycricket ceased in the 1980's.	Coilte developed approximately 80% of the former production area for conifer forestry in the 1980's. This site is largely stabilised. Transport link.	N/A	Draft 2017
Derrylea	665	Cutover Bog Derrylea bog was first developed for commercial peat production in the 1940's. However, peat production at Derrylea predates BnM and is believed to have commenced in the 19th century. Despite a long history of production, deep peat reserves on much of the site with some shallow pockets of peat on the western half of the former production area. Derrylea Bog is considered a deep peat cutover bog.	Some rehabilitation has been completed around the margins of the bog. There is a rail transport link through the site.	2020	Draft 2017
Derryounce	389	Cutover Bog Derryounce Bog was first developed prior to 1975. Derryounce is considered a deep peat cutover bog. Peat production at Derrycricket ceased in the 1980's.	Coilte have developed 80% of the former production area as conifer forestry. Rehabilitation was carried out to create a lake and wetland habitats in the 1990s. Derryounce Lake Amenity area is leased to Portarlington Community Development Association. This site is now largely stabilised.	1980's	Draft 2017

			There is a rail transport link through the site.		
Esker	567	Cutover Bog Esker Bog was first developed in 1975. Peat production at Esker ceased in the 2020. There is deep peat remaining on the western side of the former production area but the eastern area is considered cutaway. Esker Bog is a deep peat cutover bog.	The majority of the site is bare peat. The eastern portion is establishing cutaway habitats. There is a rail transport link through the site. The proposed Water Supply Project - Eastern and Midlands Region is anticipated to cross this bog.	2020	Finalised 2021
Garryhinch	814	Cutover Bog Garryhinch Bog was first developed in 1950's. Peat production ceased at Garryhinch in 2020. There is some deep peat remaining on much of the former production area. Garryhinch Bog is considered a deep peat cutover bog.	The majority of the site is re-vegetated with a range of wetland and woodland habitats. Extensive sod peat production (private and licenced by BnM) has occurred across the site in the past few years and these areas are bare peat.	2020	Draft 2017
Garrymore	307	Cutover Bog Garrymore Bog was first developed in the 1980's. Peat production at Garrymore ceased in the 2020. There is deep peat remaining. Garrymore Bog is considered a deep peat cutover bog.	Garrymore Bog formerly supplied horticultural peat. Part of the site is used for sod turf. The former production area is bare peat.	2020	Draft 2017
Mount Lucas	1225	Cutover Bog Peat Production at Mount Lucas commenced in the mid-1970's and ceased in 2020. Most of Mount Lucas is cutaway with shallow residual peat depths. The north-west corner of the former production area retains some pockets of deep peat. Mount Lucas is considered a shallow peat cutover bog.	Peat production ceased across a significant part of the site before 2005 with ongoing peat extraction in the western side up to 2020. The cutaway area has developed a mosaic of cutaway habitats with Birch woodland dominant. The recently ceased production area is bare peat. Mountlucas windfarm is now operational (since 2014). Some rehabilitation was carried out in association with windfarm construction, specifically the creation of small wetland features. A public amenity walking route was developed on the existing windfarm. This was opened in 2015. BnM have developed an aquaculture project in partnership with Bord Iascaigh Mhara and have developed herb production trials on site. There is a rail transport link through the site. The proposed Water Supply Project - Eastern and Midlands Region is anticipated to cross this bog.	2020	Finalised 2021

13. 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:	**Cloncreen**	**Area (ha):**	1028 Hectares
Works Name:	Derrygreenagh	**County:**	Offaly
Recorder(s):	MMC & DF	**Survey Date(s):**	5 & 11th August 2010, 2015

Habitats present (in order of dominance)

The most common habitats present on the production bog and cutaway at this site include:

- Bare peat (BP) (Codes refer BnM classification of pioneer habitats of production bog.
- Pioneer poor fen communities dominated by Soft Rush, Marsh Arrowgrass or Bog Cotton (pJeff, pTrig pEang) frequently in mosaic with Birch scrub.
- Emerging, open and closed Birch scrub (eBir, oBir, cBir)
- Dry Heath (dheath)
- Dry grassland dominated by Purple Moorgrass (gMol)
- Disturbed vegetation (DisWill, DisCF)
- Access routes (rail lines and tracks including gravel embankments and associated habitats such as dry grassland communities (GS2) and scrub)
- Silt-pond areas (Silt) with silt ponds and associated spoil heaps and access tracks
- Reedbeds dominated by Reedmace (pTyp) and Common Reed (pPhrag)

The most common habitats found around the margins and in other parts of the site include:

- Birch woodland (WN7) (Codes refer to Heritage Council habitat classification, Fossitt 2000)
- Scrub (WS1) – Gorse and Birch scrub
- Mixed broad-leaved/conifer woodland (WD2)
- Conifer plantation (WD4)
- Recently felled woodland (WS5)
- Wet grassland (GS4) and improved grassland (GA1)
- Raised bog remnants (PB1)
- Cutover bog (PB4) (industrially harvested area adjacent to the BnM property)
- Refuse and other waste (ED5) – Ash repository site
- Active gravel quarry (ED4) and associated lake (FL8) spoil heaps (ED2) and recolonised areas (ED3, WS1)

Description of site

Cloncreen bog is situated approximately 4.5 km south west of Edenderry, Co. Offaly along the R401. The Edenderry Power Station is located immediately to the east of the site. Cloncreen bog is located within a group of BnM bogs with Ballycon situated to the west and Ballydermot to the east of the site. This area was originally part of The Bog of Allen. Much of Cloncreen bog was in active peat production with some production related areas also marked on the BnM land-use maps. An ash waste facility is located in the south east corner of the site and this facility is used to store ash from the nearby power station. An active BnM quarry is also present in the northern section of the site and gravel is being quarried for use along railway lines etc. For ease of description, Cloncreen can be divided into four main sections that are clearly divided by the BnM rail network.

North-western section

The majority of this area is now cutaway. Towards the north-west some groups of fields have been out of production for some time. The oldest patches have developed open Birch scrub, generally in mosaic with poor fen dominated by Soft Rush. There are also some small patches of denser closed scrub and one small low mound where drier grassland was developing in association with the Birch-dominated scrub. Sitka Spruce is also present in the scrub but is quite rare and other species present include Raspberry. One notable feature of this scrub was an exceptionally tall Popular tree about 20 m high. The Birch scrub is surrounded by several fields that have been out of production for a shorter period of time and these generally have poor fen dominated by Soft Rush (pJeff) or by Bog Cotton (pEang), in association with bare peat. Towards the western boundary there is a slight fall in ground level and the wetter fields generally have poor fen dominated by Bog Cotton developing. There were also some small patches of poor fen dominated by Marsh Arrowgrass (pTrig) in association with the other plant communities and some minor cover of Reedmace (pTyph).

This area is surrounded by a narrow fringe of habitats along the bog margins. There is some active peat cutting by private individuals along the western border and adjacent to the road. Birch woodland and scrub developed on high bog are quite common. There is a small patch of mature Birch woodland (WN7) along the northern boundary of this section that has a tall Birch-dominated canopy and contains Holly and Bilberry. The woodland is quite open and the ground cover is dominated by Bramble, Purple Moorgrass and Bracken. Other species present include Broad Buckler Fern, Heather and Gorse. There are also some sections of intact high bog dominated by Heather along the margins that are now quite narrow and being dried out and colonised by trees and scrub.

North-eastern section

The majority of this section was in production until recently and dominated by bare peat. One of the main features in this area is the quarry located at the western side. This area is located on a large glacial mound that was originally overlain by the bog. Peat has now been cleared from this area and the quarry is now surrounded by tall spoil heaps. The oldest heaps towards the east are developing scrub (WS1) in association with Bracken (HD1) and patches of disturbed vegetation (ED3) dominated by Rosebay Willowherb. The active inner part of the quarry is dominated by bare gravel and sand with some vegetation colonisation in places (ED2/3). There are some patches of calcareous grassland (GS1) in places. A small gravel pit has filled with water and (FL8) and surrounded by a narrow band of emergent vegetation (FS1) dominated by Reedmace. The north-west section of the quarry is much younger and the spoil heaps are covered with disturbed vegetation that is quite diverse.

The north-west section of this area is also out of production and is covered with open Birch scrub and poor fen dominated by Soft Rush. There are also a band of several fields along the northern boundary that were not harvested to the same extent and are at a higher position in comparison with the rest of the section. These fields are developing some dry heath dominated by Heather in places and there is also some open Birch and some dry grassland dominated by Purple Moorgrass. Another dry grassland community dominated by Cocksfoot, Creeping Bent and Yorkshire Fog is also present and has developed over an old stockpile that marks the boundary of this small area.

The eastern part of this section contains two groups of silt ponds. These silt ponds are surrounded by tall banks of peat spoil and spoil made up of glacial sub-soil and silt-blue clay. Some of the ponds are filled with riparian and

emergent aquatic vegetation with species like Pondweed, Reedmace, Water Horsetail, Bur-weed and Reedmace present. These banks are being colonised with disturbed vegetation while older banks are covered by rank grassland (GS2), dry grassland dominated by Purple Moorgrass (gMol), dry grassland (gAn-H-Eq) and some Bracken (HD1).

This section of Cloncreen is also surrounded by a narrow fringe of Birch woodland (WN7), Birch scrub (WS1) and remnant patches of high bog (PB1). The western side is located adjacent to active cutover bog that is being industrially harvested by a private company. The glacial mound also extends into this area and this has also been quarried for gravel, which has left some deep gravel pits.

South-eastern section

The majority of this section had re-vegetated with only small areas still in peat production until recently. In the northern part of this section a raised area of exposed marl is a result of constant peat harvesting, this area of exposed marl is almost entirely revegetated with scrub and poor fen vegetation (oBir and pJeff). Large sections of bare peat area located to the eastern and western sides of this mound and are still in active peat production.

Along the eastern edge of the site an area of pioneer dry heath (dHeath) exists on an old section of cutaway. This area was dominated by Heather with scattered trees. The old drainage ditches had begun to fill in with *Sphagnum* in some sections.

An old disused rail line is located approximately half way down this section and is completely revegetated with a mixture of scrub (eBir), Heather (dHeath) and dry grassland dominated by Purple Moorgrass (gMol). This old railway line was higher than the surrounding areas and contained some small areas of gravel where Basil Thyme was located.

The southern half of the south eastern section was largely revegetated with a mixture of scrub (eBir, oBir and cBir) and poor fen vegetation (pTrig, pJeff and pTyp) apart from some areas that were still in active peat production and an ash repository.

The ash facility in the south of the site was used to store ash from the nearby Edenderry power station. This ash facility was active at the time of the ecological survey and had recently been expanded. A mixture of habitats are found around the ash facility such as scrub (eBir, oBir and cBir), and grassland (gMol and gCal). Immediately to the south of the ash facility a large section of Birch woodland (WN7) was located. This woodland was mature and was dominated by Birch with an understorey of Bramble and Purple Moorgrass.

A small section of this site in the south eastern corner had been planted with a mixture of broad-leaved and conifer trees. However a section of this had been recently cleared to make way for a power line.

South-western section

This area is the smallest section on the site, the majority of this section has not been actively used for peat production in recent years and as such become colonised by vegetation. The northern half of this section is rapidly colonising with vegetation and habitats such as scrub (oBir, eBir) and pioneer poor fen (pJeff, pEang and pTrig) are well established

A relatively large section of the southern section of this area is in active peat production with plant species such as Soft Rush, Bulrush and Birch becoming established in many of the drainage ditches. Occasional high fields are still in active peat production throughout the site.

A series of silt ponds are located close to the western boundary of the site, these areas consist of a series of interconnected channels of water. Very few aquatic plants were present owing to the fact that these silt ponds appeared to have been cleared out regularly. The higher ground that surrounds the silt ponds had been colonised with emerging Birch scrub (eBir) and patches of Common Reed (pPhrag).

All along the western boundary of the site pockets of Birch woodland (WN7) were located, the largest of which was located in the north west corner of the site. These sections of Birch woodland were well developed and were dominated by Scot's Pine along with Birch, Oak, Rowan and Holly with a ground flora of Bramble, Male Fern, Bilberry, Purple Moorgrass and Herb Robert. These areas of woodland were rich in fungus which included Plums and Custard, Slippery Jack, Saffron Milkcap and Birch Webcap.

The south of the site contained a small silt pond and the most southerly production fields were becoming colonised by poor fen (pEang), dry heath (dHeath), Birch scrub (oBir) and dry calcareous grassland (gCal).

Small sections of remnant raised bog are located along margins of the south of the site along with one section in the south west corner of the site. These areas of degraded raised bog are dry and were dominated by tall leggy Heather. Trees such as Scot's Pine, Lodgepole Pine and Birch were also becoming established in these areas in large numbers.

A new power line had been constructed close to the southern border of the site and a small section of conifer plantation (WD4) had been clear felled to make way for it.

Rail Lines

Rail lines run in east west and north south directions on the site, these lines connected Cloncreen Bog with other bogs and with Edenderry Power Station. At the time of the ecological survey more rail lines were being installed. The foundations for these rail lines are constructed of gravel from nearby quarries. These lines are providing habitat for plant species such as Blue Fleabane, Basil Thyme and Wild Mignonette, which are naturally suited to sandy, gravely habitats such as eskers.

Overall rail lines on the site were in varying states ranging from brand new rail lines to lines that have not been used for a number of years and were over grown with vegetation such as Bracken and grasses.

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

None

Adjacent habitats and land-use

The surrounding landscape is typically low-lying and is dominated by farmland with improved grassland. Adjacent habitats include those of reclaimed cutover bog such as conifer plantation (WD4), improved grassland (GA1), wet grassland (GS4) and conifer plantation (WD4). There are also some drying high bog (PB1) remnants and active cutover bog (PB4) around the margins that are not in ownership by BnM. The margins around the production bog are typically dominated by scrub (WS1) and Birch woodland (WN7) developing on peat remnants. There is a large area of bog along the northern BnM boundary that is being industrially harvested for peat. This area also has a gravel pit (ED4) that is also not owned by BnM.

Watercourses (major water features on/off site)

- Tributaries of the Philipstown River start in the north western corner of the site and in the south western corner of the site.
- The Figile River flows along the eastern boundary of the site.
- All watercourses on the site are part of the South Eastern Barrow catchment.

Peat type and sub-soils

Shell-marl and grey marl were exposed in places around the site.

Basil Thyme

Basil Thyme is a rare plant that is typically found on esker and arable habitats, on sandy and gravel soils. Its distribution is midlands-based. It has only been recorded in 18 10 km gird squares in Ireland in the past 20 years. It is only previously known from 3 sites in Offaly. It is listed on the Flora Protection Order (part of Wildlife Act) and in the Red Data Book (Curtis and McGough 1988). Its status in the Red Data Book is listed as 'vulnerable'. As part of the FPO, this species and its habitat have legal protection.

Basil Thyme was noted on a gravel bank and along the central railway embankment at numerous locations and seemed to have a widespread distribution across the site, although there were large sections of the track where it was absent. The overall population was estimated at > 1000 plants. This is a very significant population and adds significantly to the rare flora of Co. Offaly.

Basil Thyme was found in association with other dry grassland plant species in a patch of habitat that would generally be classified as dry calcareous grassland. Species present include Wild Mignonette (another rare and notable species), Purple Moorgrass, Knapweed, Glaucous Sedge, Ox-eye Daisy, Wild Carrot, Colt's-foot, London Rocket, Heather, Mouse-ear Hawkweed, Common Horsetail, Spotted orchid, Yarrow, Wild Strawberry, Catsear, Bracken, Yellow Sedge, Creeping bent, Long-leaved Plantain, Quaking Grass, Ragwort, Hogweed, Weld, Bird's-foot, Square-stemmed St John's-wort and Woodrush. Wild Mignonette (*Reseda lutea*) is described as being rare in Ireland apart from coastal areas in the East (Webb, Parnell and Doogue 1996).

Basil Thyme has not been recorded at this site before and would not be a typical species of cutaway bog. This species was probably unlikely to have been present on the site prior to the development of the cutaway. The exposed gravel along the railway embankments is a perfect habitat for this species. One of its main known populations in Co. Offaly is located close by at the Long Derries cSAC, Edenderry. This site was a BnM gravel pit and material from this site was used to make railway embankments. The spread of Basil Thyme from the Long Derries along the BNM railway network has been recorded in the past (Feehan pers. comm. 2011). A gravel pit is present on this site and would be a suitable location for this species. However, after extensive searching, this species was not recorded.

In the long-term, it could be expected that these railway embankments will re-vegetate with grassland and scrub as they go out of use, which will not favour this species. Occasional track maintenance is likely to be beneficial for this species as it will keep the gravel embankments exposed and prevent development of dense vegetation, which would be unsuitable for this species. Other BnM operations are not likely to have a significant impact on the status of this species. One possible solution is to develop some of the main railway line as an amenity walkway when production ceases. A suitable management regime to maintain the habitat of these rare plant species could easily be developed in association with the development and maintenance of these walkways. This will be considered within the wider context of the Derrygreenagh and Ballydermot Bogs, which are viewed as strongholds for the species in east Offaly. Consultation and licensing will be required with NPWS.

Blue Fleabane

This rare species (whose status is listed as endangered) was recorded at several locations around the site. It has not been recorded at this site before. Blue Fleabane (*Erigeron acer*) is an annual species that is found in dry pastures and sandy or gravely places such as eskers and its distribution is mainly confined to the central and south-eastern parts of Ireland (Webb et al 1992). It has been recorded in several 10 km grid squares in Offaly in the past.

Several populations were recorded on the site, mainly along the central railway (see Habitat Map). The largest population was noted in the south-eastern cutaway area around the silt pond area.

This species is not likely to have been present on the site prior to the development of the cutaway. Subsequent development of the site, including construction of railways on gravel embankments, have created suitable exposed gravel banks made up of calcareous rich material that this species prefers. In the long-term, it could be expected that these railways will re-vegetate with grassland and scrub, which may not favour this species.

Fauna biodiversity

Birds

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

- Kestrel
- Heron
- Skylark
- Raven,
- Other more common birds included Blackbird, Wren, Redpoll, Rook, Wood Pigeon, Meadow Pipit and Swallow.

Mammals

- Signs of Fox, Deer, Rabbit and Badger were noted on the site.
- A Hare was observed on the site and there are frequent signs of Hares around the site.

Other species

- Small heath butterfly
- Peacock butterfly
- Large White butterfly
- Common Blue butterfly
- Speckled Wood butterfly
- Dragonfly activity around site including Brown Hawker

Fungal biodiversity

Plums and Custard, Slippery Jack, Saffron Milkcap and Birch Webcap

References

European Commission (1996). Interpretation manual of European Union habitats. Brussels. European Commission, DGXI.

Fossitt, J. (2000). A guide to habitats in Ireland. Kilkenny. The Heritage Council.

14. 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.
- The proposed activities will be restricted to daylight hours and there will be no requirement for artificial lighting.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- Silt ponds will be inspected and maintained as per the IPC Licence.
- During periods of heavy precipitation and run-off, activities will be halted.
- Measures will be carried out using a suitably sized machine and in all circumstances, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.
- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
- Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Vehicles will never be left unattended during refuelling.
- No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
- All plant refuelling will take place using mobile fuel bowsers. Only dedicated trained and competent personnel will carry out refuelling operations.
- Mobile storage such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked. All pumps using fuel or containing oil will be locally and securely bunded where there is the possibility of discharge to waters.
- Potential impacts caused by spillages etc. during rehabilitation will be reduced by keeping spill kits and other appropriate equipment on-site.
- Site activities will be carried out in accordance with 'best practice'. In order to ensure compliance and implementation of 'best practice', these measures will be communicated to relevant Bord na Móna staff and updated as required.

15. APPENDIX V: BIOSECURITY

No species listed under Regulations 49 and 50 of the EC Birds and Natural Habitats Regulations occur within the site.

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.

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 inspecting and washing vehicles prior to entering sites.

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 plague[7] and Zebra Mussel will be adhered with throughout all rehabilitation measures and activities.

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

16. APPENDIX VI: POLICY AND REGULATORY FRAMEWORK

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

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

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

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

1 EPA IPC Licence

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Boora bog group (PO500-01). As part of Condition 10.2 of this licence, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The bog is part of the Boora bog group (Ref. PO500-01). 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 (a subset of the BnM estate that has been used for energy production). 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 be 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 principal future land use.
- Generally, Bord na Móna cutaway bogs that flood naturally will be permitted to flood unless there is a clear environmental and/or economic case to maintain pumped drainage.
- In deciding on the most appropriate afteruse of cutaway peatlands, consideration shall be given to encouraging, where possible, the return to a natural functioning peatland ecosystem.
- This will require re-wetting of the cutaway peatlands which may lead in time to the restoration of the peatland ecosystem.
- Environmentally, socially and economically viable options should be analysed to plan the future use of industrial cutaway peatlands, in conjunction with limiting factors as outlined in Bord na Móna's Strategic Framework for the Future Use of Peatlands.

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

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

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

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

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

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

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

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

6 National Biodiversity Action Plan 2016-2021

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

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

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.

Noggusboy Bog is located in an area zoned by Offaly County Council as open countryside.

11 National Archaeology Code of Practice

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

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

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

12 Bord na Móna Biodiversity Action Plan 2016-2021

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

One example of a key CBD target is:

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

The EUs headline target for progress by 2020 is to:

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

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

13 Bord na Móna commitments

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

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

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

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

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

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

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

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

17. APPENDIX VII. DECOMMISSIONING

1. Condition 10 Decommissioning

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

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

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

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

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

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

Item	Description	Cloncreen 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 via Levelling
4	Decommissioning or Removal of Buildings and Compounds	Decommission and Removal of Porto-cabin tea centre and materials store
5	Decommissioning Fuel Tanks and associated facilities	Decommissioning and De-Gassing Mobile Fuel Tanks
6	Decommissioning and Removal of Bog Pump Sites	Not proposed to remove pumps in Cloncreen
7	Decommissioning or Removal of Septic Tanks	De-sludge Septic Tank

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.

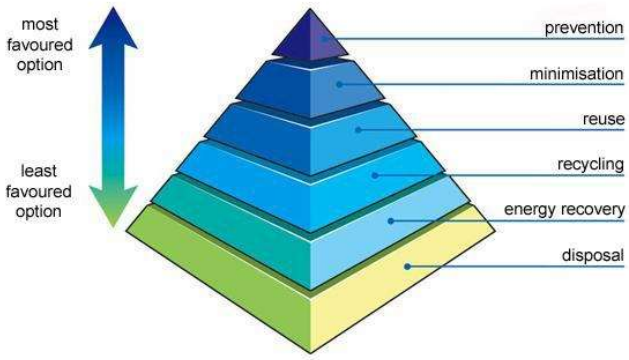
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

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	Cloncreen Decommissioning Plan
1	Removal of Railway Lines	Removal of Railway Lines
2	Decommissioning Bridges and Underpasses	Not Applicable
3	Decommissioning Railway Level Crossing	Decommissioning Railway Level Crossing
4	Restricting Access (bogs and silt ponds)	Restricting Access to Bog.
5	Removal of High Voltage Power Lines	Not Applicable

18. APPENDIX VIII. GLOSSARY

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

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

Dry cutaway bog: Cutaway bog is categorised as dry cutaway where it is not practical or feasible to re-wet these areas completely. It is inevitable that some areas of cutaway will remain relatively dry due to the heterogenous topography of the cutaway, as well as requirements for continued drainage on site for identified after-uses, or off site in relation to neighbouring lands or other infrastructure. Ridges and Cloncreen 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 Cloncreen have been exposed. The exposed sub-soils are a mix of glacial gravels, muds and tills that can be quite free-draining. Dry cutaway may also have deeper residual peat but in a location (i.e. at the margin) where the peat can not be re-wetted due to boundary constraints. Dry cutaway may also develop in situations where there a relatively steep slope that inhibits re-wetting. The majority of dry cutaway will develop towards grassland, heath, scrub and dry woodland habitats.

Enhanced decommissioning: This is defined as decommissioning carried out under Scheme, which is proposed to 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 Lisence. This is achieved by a combination of re-wetting, where possible, and natural colonisation of the former cutaway, with or without intervention**.** Habitats will develop that reflect the underlying environmental conditions. Other after-use development may also serve to act as environmental 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 to defined as the process of re-establishing to the extent possible the structure, function and integrity of indigenous ecosystems and the sustaining habitats they provide" (SER 2004). Defined in this way, restoration encompasses the repair of ecosystems (Whisenant 1999) and the **improvement of ecological conditions in damaged wildlands** through the **reinstatement of ecological processes**. In general, Bord na Móna cutaway peatlands cannot be restored back to raised bog in a reasonable timeframe as their environmental conditions has changed so radically (with the removal of the acrotelem – the living layer and much of the peat mass). However, they can be returned to a **trajectory** towards a naturally functioning peatland system (Renou-Wilson 2012). **Raised bog restoration** is an objective of some BnM sites where there is residual natural raised bog vegetation and where the majority of the peat is still intact.

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

Standard decommissioning: This is defined as decommissioning that is designed to meet the conditions of the EPA IPC Licence. This is defined as to render safe or remove for disposal/recovery, any soil, subsoils, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution.

Wetland cutaway bog. Wetland cutaway bog is defined as former raised bogs that have been in industrial peat production, where production has ceased and the majority of peat has been cutaway, and where this cutaway has the potential to be re-wetted. A significant number of Bord na Móna sites have pumped drainage and these sites are likely to develop a mosaic of wetland habitats when pumping is reduced or stopped. In the case of Cloncreen, pumps will be retained to manage water levels within the site for the protection of renewable energy infrastructure, while also optimising the extent of rewetting. 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.

19.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. PO503, Allen - Clonsast bog group.

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

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

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

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

2.0 P0503 IPPC Licence Extractive Waste Conditions

2.1 Condition 7.5 Extractive Waste Management
The licensee shall draw up a Waste Management Plan (to be known as an Extractive Waste Management Plan) for the minimisation, treatment, recovery and disposal of extractive waste. This Plan shall meet the requirements of regulation 5 of the Waste Management (Management of Waste from the Extractive Industries) Regulations, 2009. The Plan shall be submitted for agreement by the Agency by the 31' December2012. The Plan shall be reviewed at least once every five years thereafter in a manner agreeable to the Agency and amended in the event of substantial changes to the operation of a waste facility or to the waste deposited. Any amendments shall be notified to the Agency.
All extractive waste shall be managed in accordance with the Extractive Waste Management Plan. A report on the implementation of the Extractive Waste Management Plan shall be provided in the AER.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7.0 Extractive Waste Management Plan

5 (2a)(i)
The vast majority of peat extraction bogs were all designed and drained for production prior to the 1960's and as such the production fields layout cannot' be altered. Under our Cleaner Reduction Procedures, various design changes have been implemented to the production machines and process to reduce lost peat which eventually is captured in the silt ponds and requires removal as waste peat silt. This along with training and ongoing research and development will continuously reduce waste peat and subsequently waste silt pond cleanings. Bog timbers are present naturally in various volumes and quantities in different bogs and as peat production involves stripping peat in layers, the exposure, generation and removal of these timbers is unavoidable. Work has been undertaken recently into project looking at grinding of these bog timbers in situ using a timber miller, and if this project becomes viable it will contribute to the reduction of bog timbers.

5 (2a)(ii)
Given the nature and expanse of peat bogs, the stockpiling and storage of these waste materials do not present a visual, storage or stability problem. As required under Condition 10 of the IPPC Licence, the silt pond excavations and screenings will be utilised to backfill the silt pond voids once the bogs have finished and stabilised in accordance with out Bog Rehabilitation Plan. Storage of these wastes in the interim, open to the elements does not present a change on the nature of these wastes that will threaten the environment or prevent their reuse during the bog rehabilitation process.

5 (2a)(iii)
Under Condition 10 of the IPPC Licence, all silt ponds will be decommissioned once the bog surface has stabilised, in agreement with the Agency. This will involve the removal of weirs and flow controls, returning the silt pond back to its original drain or removing the silt pond from the drainage system. Both of these activities will involve placing the silt pond extraction and cleaning material back into the excavation void.

5 (2a)(iv)
The peat bogs do not contain any topsoil, so this is not required.

5 (2a)(v)
Peat mineral resources do not undergo any treatment.

5 (2b)
These three extractive waste are all being reused and recovered back to their original extraction points and have not undergone any physical, chemical, or biological change.

5 (2c)(i, ii & iii)
These three extractive wastes, stored on the bog for reuse or recovery during the bog rehabilitation phase, do not require any management or monitoring during the operation of these bogs. Silt pond excavations and cleanings are stored adjacent to the silt pond and quickly revegetated and stabilise, the screenings are graded back into the bog at the agreed locations upon disposal and the bog timbers do not prevent any water or airborne danger to the environment.

5 (3)
The three extractive wastes arising from peat extraction operations at this site are classified wastes from mineral non-metalliferous excavation, with an EWC code of 0101 02. The materials are not classified as hazardous under Directive 91/689/EEC20, and do not contain substances or preparations classified as dangerous under Directives 67/548/EEC5 or 1999/45/EC6 above a certain threshold.
The peat excavations and cleanings are stored in locations and in a manner that they could not collapse and are remote in their nature. The stockpiles are located adjacent to silt ponds that are cleaned regularly and as such these stockpiles are managed and levelled to facilitate further cleanings.
Therefore, the material stored at these waste facilities would not be considered to be a Category A waste facility.

Classification in accordance Annex II.

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

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

Closure plan. (Bog Rehabilitation Plan).
Condition 10.1 – 10.3 of the IPPC Licence requires the following:

- 10.1 Following termination of use or involvement of all or part of the site in the licensed activity, the licensee shall:
- 10.1.1 Decommission, render safe or remove for disposal/recovery, any soil, subsoils, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution.
- 10.1.2 Implement the agreed cutaway bog rehabilitation plan (refer Condition 10.2).

10.2 Cutaway Bog Rehabilitation Plan:

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

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

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

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

Review.
This plan will be reviewed every five years, the first review to take place in September 2017. This review will entail an inspection of these waste facilities to ensure their placing, management, maintenance and stability comply with the requirements of the Extractive Waste Management requirements and condition 7.5, 7.6 and 7.7 of the IPPC Licence Ref. PO503.

20. 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*

An map of the areas identified for targeted fertiliser application is provided in Figure APX 1 below.

21. APPENDIX XI. CONSULTATION SUMMARIES

Table APXI -1 Consultees contacted

Bog Name	Contact Organisation	Contact Name	Date of Issue	Communication Format	Date Response Received	Response format

22.APPENDIX XII. ARCHAEOLOGY

Role of the Archaeological Liaison Officer

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

Code of Practice

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Code of Practice

5. To arrange for the delivery or collection of the stray find, as directed by the Duty Officer of the National Museum of Ireland.

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

7. To maintain a file of all stray finds and associated documentation and provide copies to the Project Archaeologist.

8. To provide assistance, where required, to the Department during archaeological surveys.

9. To provide assistance, where required, to Bord na Móna's Consultant Archaeologists, during investigation and mitigation of monuments.

10. To report to the Bord na Móna members on the Archaeology Management Liaison Committee any planned developments or new activities on cutaway peatland areas within his/her group of bogs.

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

1) Purpose

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

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

2) Procedure

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

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

Your Archaeological Liaison Officer is ……

3) Records

Revision Index			
Revision	Date	Description of change	Approved
1	13/10/2020	First release	EMcD

Archaeological Impact Assessment of Proposed Bog Rehabilitation at Cloncreen Bog, Co. Offaly. Dr. Charles Mount.

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

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.1009.5 hectares at Cloncreen Bog, Co. Offaly on the known archaeological heritage of the bog. The proposed rehabilitation actions will be a combination of measures to create wetlands and re-wet deep peat as outlined in the draft Methodology Paper for the proposed Bord na Móna Decommissioning, Rehabilitation and Restoration Scheme. These enhanced measures for Cloncreen Bog will include:

- Re-assessment of the pumping regime; managing pumping on site in order to achieve wet conditions across the site, while also avoiding impacts on the Cloncreen windfarm infrastructure.
- Initial hydrological modelling (depression analysis) indicates that a significant part of the site between windfarm infrastructure has the potential to retain wet conditions. It is anticipated that this will develop a mosaic of wetland and peatland habitats. Hydrological management will look to optimise summer water levels to maximise the extent and development of wetland vegetation. Water-levels will be adjusted at outfalls and by adjusting piped drainage.
- Re-wetting the extensive areas of peat remaining on site within the former production area using berms and drain blocking.
- Undertaking intensive drain blocking (up to 7/100 metre), blocking outfalls and managing overflows in areas where depression analysis predicts wet conditions will occur. Drain blocking will also occur across other areas in order to retain surface water locally.
- Modifying water levels at outfalls, as it may be desirable to change and control water levels at the site over time, e.g. to increase water levels as the site becomes increasingly vegetated. This will further slow the movement of water through and out of Cloncreen Bog.
- Some targeted drain blocking in marginal (degraded) remnant raised high bog areas is proposed as part of this plan, although they are small in size and degraded nature.
- The existing silt ponds will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase the silt ponds will be continually inspected and maintained, where appropriate. When it is deemed that the silt ponds are not required, as the bog has been successfully stabilised and there is no run-off of suspended solids, the condition of the silt ponds will be reviewed. The silt ponds will either be de-watered (water levels lowered to a level where the silt pond will naturally develop as a small wetland feature), left in situ, or infilled (where discharges do not require silt control).
- Targeted fertiliser applications to accelerate vegetation establishment on areas of bare peat on headlands and high fields as required, see Drawing no. DR-23-13-28 'Targeted fertiliser map', in the accompanying Mapbook.

Cloncreen Bog is located 1c.3.6km southwest of the Edenderry Co. Offaly, and west of the R401 road. The overall rehabilitation area occupies the townlands of Ballinrath, Ballykilleen, Ballynakill, Cloncreen, Clongarret, Colgagh, Eskermore and Rathvilla or Rathclonbrackan on OS 6 inch sheets Offaly No. 19.

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

- The Record of Monuments and Places
- The IAWU Peatland Survey 2001
- Peatland Archaeological Excavations 2003
- 2013 Bord na Móna Re-assessment Survey
- Peatland Archaeological Excavations 2014
- 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 Co. Offaly which was established under Section 12 of the National Monuments (Amendment) Act, 1994 was examined as part of the assessment (DAHGI 1995). This record was published by the Minister in 1995 and includes sites and monuments that were known in Cloncreen Bog before that date. This review established that there are no RMPs located in the proposed rehabilitation area (Fig. 1).

IAWU Survey 2001

In 2001 the Irish Archaeological Wetland Unit (IAWU) did a complete survey of the rehabilitation area as part of the Archaeological Survey of Ireland Peatland Survey (Unlicensed). 120 sightings of archaeological material were made (see Table 1). 109 of these sightings were on the surface and the remainder were at depths ranging from 0.05mm – 0.40mm. 59 of the sightings were described as Toghers, 31 as worked wood and 27 as unworked wood. These archaeological sightings were notified to the Archaeological Survey of Ireland.

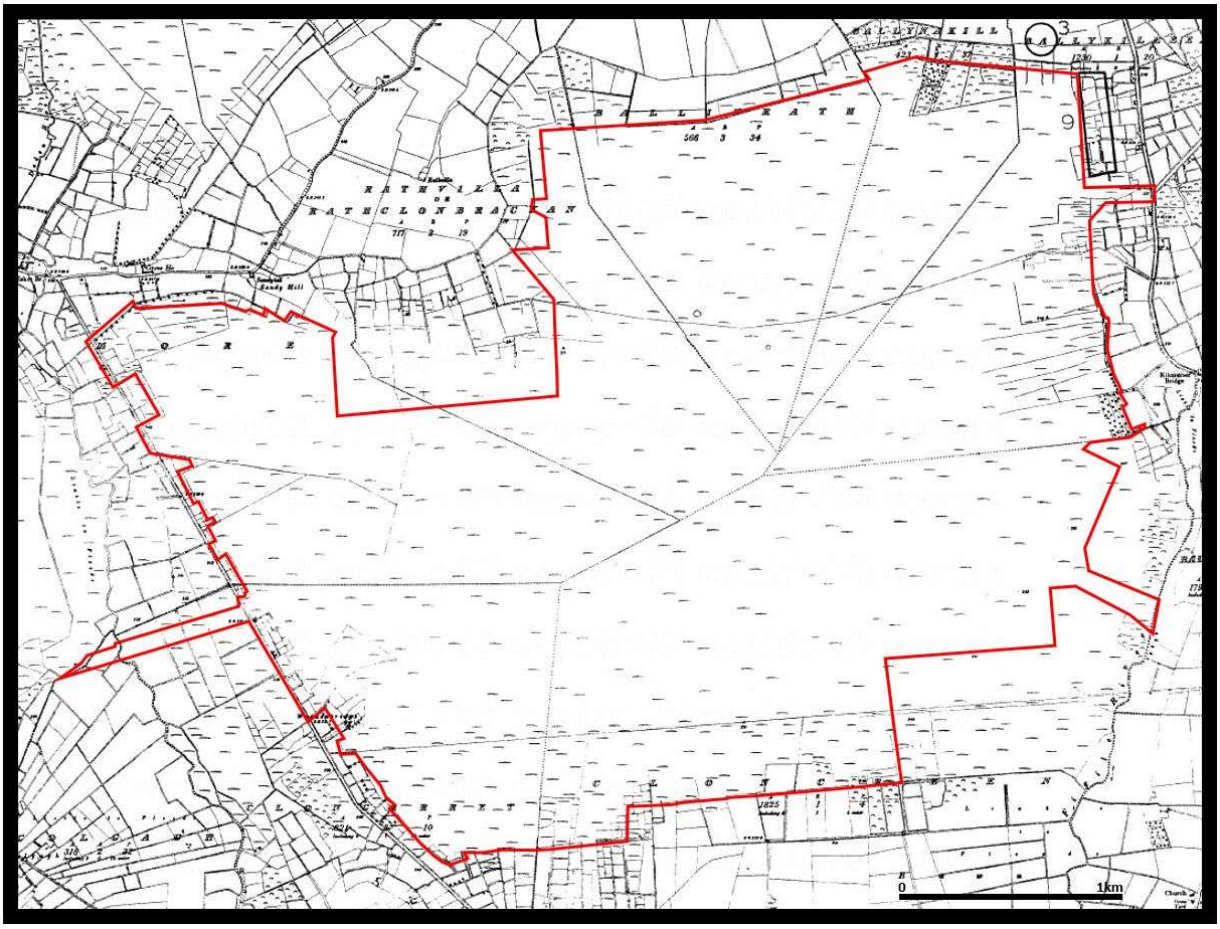

Fig. 1. Cloncreen Bog, Co. Offaly, detail of the Record of Monuments and Places map sheet No. 19. The proposed rehabilitation area is outlined with the red line. There are no Recorded Monuments in the rehabilitation area.

SMR No.	Class	Townland	ITM E	ITM N	IAWU Cat No.	Class	Depth BS
OF019-020----	Road - class 3 togher	Ballykilleen	660256	727511	OF-BKL 0095	Togher	0
OF019-021----	Road - class 3 togher	Ballykilleen	660294	727544	OF-BKL 0094	Togher	0
OF019-022----	Redundant record	Ballykilleen	660271	727547	OF-BKL 0093	WOWO	0
OF019-023----	Redundant record	Ballykilleen	660408	727702	OF-BKL 0082	UWW	0
OF019-024----	Redundant record	Ballykilleen	660403	727702	OF-BKL 0083	WOWO	0
OF019-025----	Redundant record	Ballykilleen	660364	727699	OF-BKL 0086	UWW	0
OF019-026----	Road - class 3 togher	Ballykilleen	660362	727700	OF-BKL 0085	Togher	0
OF019-027----	Redundant record	Ballykilleen	660359	727699	OF-BKL 0088	UWW	0
OF019-028----	Road - class 3 togher	Ballykilleen	660354	727699	OF-BKL 0087	Togher	0
OF019-029----	Redundant record	Ballykilleen	660350	727700	OF-BKL 0084	WOWO	0
OF019-030----	Redundant record	Ballykilleen	660334	727698	OF-BKL 0089	UWW	0
OF019-031----	Redundant record	Ballykilleen	660246	727690	OF-BKL 0091	WOWO	0
OF019-032----	Road - class 2 togher	Ballykilleen	660126	727674	OF-BKL 0092	Togher	0.26
OF019-033----	Redundant record	Ballynakill	660193	727963	OF-BYK 0012	WOWO	0
OF019-034----	Redundant record	Ballynakill	660192	728004	OF-BYK 0009	UWW	0
OF019-035----	Road - class 3 togher	Ballynakill	660188	728000	OF-BYK 0008	Togher	0
OF019-036----	Redundant record	Ballynakill	660184	728001	OF-BYK 0007	UWW	0
OF019-037----	Road - class 3 togher	Ballykilleen	660281	728010	OF-BKL 0039	Togher	0
OF019-038----	Redundant record	Ballykilleen	660392	727976	OF-BKL 0017	UWW	0
OF019-039----	Road - class 3 togher	Ballykilleen	660326	727980	OF-BKL 0036	Togher	0
OF019-040----	Redundant record	Ballykilleen	660401	727977	OF-BKL 0041	WOWO	0
OF019-041----	Road - class 1 togher	Ballykilleen	660384	727990	OF-BKL 0009	Togher	0

OF019-041----	Road - class 1 togher	Ballykilleen			OF-BKL 0009	Togher	0
OF019-041----	Road - class 1 togher	Ballykilleen			OF-BKL 0009	Togher	0
OF019-041----	Road - class 1 togher	Ballykilleen			OF-BKL 0009d	Togher	0
OF019-041----	Road - class 1 togher	Ballykilleen			OF-BKL 0009	Togher	0
OF019-041----	Road - class 1 togher	Ballykilleen			OF-BKL 0009e	Togher	0
OF019-041----	Road - class 1 togher	Ballykilleen			OF-BKL 0009h	Togher	0
OF019-041----	Road - class 1 togher	Ballykilleen			OF-BKL 0009	Togher	0
OF019-041----	Road - class 1 togher	Ballykilleen			OF-BKL 0009j	Togher	0
OF019-042----	Road - class 3 togher	Ballykilleen	660380	728005	OF-BKL 0020	Togher	0
OF019-043----	Road - class 3 togher	Ballykilleen	660376	728005	OF-BKL 0021	Togher	0
OF019-044----	Redundant record	Ballykilleen	660371	728005	OF-BKL 0023	UWW	0
OF019-045----	Redundant record	Ballykilleen	660390	728019	OF-BKL 0011	UWW	0
OF019-046----	Road - class 3 togher	Ballykilleen	660358	728005	OF-BKL 0022	Togher	0
OF019-047----	Redundant record	Ballykilleen	660329	727994	OF-BKL 0030	WOWO	0
OF019-048----	Road - class 2 togher	Ballykilleen	660297	727980	OF-BKL 0037	Togher	0
OF019-049----	Redundant record	Ballykilleen	660285	727973	OF-BKL 0038	UWW	0
OF019-050----	Road - class 3 togher	Ballynakill	659714	728107	OF-BYK 0001	Togher	0
OF019-051----	Road - class 3 togher	Ballykilleen	660244	728110	OF-BKL 0003	Togher	0
OF019-052----	Redundant record	Ballynakill	660181	728046	OF-BYK 0004	WOWO	0
OF019-053----	Redundant record	Ballykilleen, Ballynakill	660207	727986	OF-BKL 0032	COMP	0
OF019-054----	Road - class 3 togher	Ballykilleen	660204	727953	OF-BKL 0045	Togher	0
OF019-055----	Redundant record	Ballykilleen	660292	728000	OF-BKL 0024	WOWO	0
OF019-056----	Redundant record	Ballykilleen	660284	728022	OF-BKL 0010	UWW	0
OF019-057----	Redundant record	Ballykilleen	660312	728011	OF-BKL 0013	UWW	0
OF019-058----	Redundant record	Ballykilleen	660289	727969	OF-BKL 0043	WOWO	0
OF019-059----	Road - class 3 togher	Ballykilleen	660212	727982	OF-BKL 0034	Togher	0.17
OF019-060----	Redundant record	Ballykilleen	660276	727949	OF-BKL 0049	WOWO	0
OF019-061----	Redundant record	Ballynakill	660117	727998	OF-BYK 0006	UWW	0.18
OF019-062----	Road - class 1 togher	Ballynakill	660105	727950	OF-BYK 0010	Togher	0
OF019-062----	Road - class 1 togher	Ballynakill	-	-	OF-BYK 0010d	Togher	0
OF019-062----	Road - class 1 togher	Ballynakill	-	-	OF-BYK 0010	Togher	0
OF019-062----	Road - class 1 togher	Ballynakill	-	-	OF-BYK 0010	Togher	0
OF019-062----	Road - class 1 togher	Ballynakill	-	-	OF-BYK 0010e	Togher	0
OF019-063----	Road - class 3 togher	Ballynakill	660095	727972	OF-BYK 0011	Togher	0
OF019-064----	Road - class 3 togher	Ballynakill	660156	727928	OF-BYK 0015	Togher	0
OF019-065----	Road - class 3 togher	Ballynakill	660164	727939	OF-BYK 0014	Togher	0
OF019-066----	Road - class 3 togher	Ballynakill	660194	727943	OF-BYK 0013	Togher	0
OF019-067----	Road - class 3 togher	Ballykilleen	660279	727998	OF-BKL 0025	Togher	0
OF019-068----	Redundant record	Ballykilleen	660274	727998	OF-BKL 0026	UWW	0
OF019-069----	Road - class 3 togher	Ballykilleen	660271	728009	OF-BKL 0015	Togher	0
OF019-070----	Redundant record	Ballykilleen	660288	728010	OF-BKL 0014	WOWO	0
OF019-071----	Redundant record	Ballykilleen	660264	727985	OF-BKL 0033	WOWO	0
OF019-072----	Redundant record	Ballykilleen	660263	727978	OF-BKL 0016	WOWO	0
OF019-073----	Road - class 3 togher	Ballynakill	660206	727943	OF-BKL 0053	Togher	0
OF019-074----	Road - class 3 togher	Ballykilleen	660216	727944	OF-BKL 0052	Togher	0
OF019-075----	Redundant record	Ballykilleen	660223	727909	OF-BKL 0059	WOWO	0
OF019-076----	Road - class 3 togher	Ballykilleen	660224	727932	OF-BKL 0058	Togher	0.31
OF019-077----	Road - class 3 togher	Ballykilleen	660231	727946	OF-BKL 0051	Togher	0
OF019-078----	Redundant record	Ballykilleen	660240	727946	OF-BKL 0050	WOWO	0
OF019-079----	Road - class 3 togher	Ballykilleen	660283	727949	OF-BKL 0048	Togher	0
OF019-080----	Redundant record	Ballykilleen	660271	727936	OF-BKL 0057	WOWO	0
OF019-081----	Redundant record	Ballykilleen	660274	727937	OF-BKL 0056	WOWO	0
OF019-082----	Redundant record	Ballykilleen	660311	727950	OF-BKL 0047	WOWO	0
OF019-083----	Redundant record	Ballykilleen	660215	727849	OF-BKL 0063	WOWO	0
OF019-084----	Redundant record	Ballykilleen	660219	727850	OF-BKL 0062	WOWO	0
OF019-085----	Redundant record	Ballykilleen	660224	727846	OF-BKL 0065	UWW	0
OF019-086----	Redundant record	Ballykilleen	660234	727848	OF-BKL 0064	UWW	0
OF019-087----	Redundant record	Ballykilleen	660128	727766	OF-BKL 0077	WOWO	0
OF019-088----	Road - class 3 togher	Ballykilleen	660242	727783	OF-BKL 0075	Togher	0
OF019-089----	Road - class 3 togher	Ballykilleen	660275	727787	OF-BKL 0072	Togher	0
OF019-090----	Redundant record	Ballykilleen	660302	727788	OF-BKL 0071	UWW	0
OF019-091----	Road - class 3 togher	Ballykilleen	660335	727780	OF-BKL 0076	Togher	0

OF019-092----	Road - class 3 togher	Ballykilleen	660357	727782	OF-BKL 0079	Togher	0
OF019-093----	Redundant record	Ballykilleen	660368	727784	OF-BKL 0078	UWW	0
OF019-094----	Road - class 3 togher	Cloncreen	659001	725722	OF-CCR 0001	Togher	0
OF019-095----	Redundant record	Ballykilleen	660245	727975	OF-BKL 0042	WOWO	0
OF019-096----	Redundant record	Ballykilleen	660273	727981	OF-BKL 0035	UWW	0
OF019-097----	Redundant record	Ballykilleen	660274	727978	OF-BKL 0040	WOWO	0
OF019-098----	Road - class 3 togher	Ballykilleen	660329	727798	OF-BKL 0067	WOWO	0
OF019-099----	Road - class 3 togher	Ballykilleen	660281	727787	OF-BKL 0073	Togher	0
OF019-100----	Redundant record	Ballykilleen	660289	727786	OF-BKL 0074	UWW	0
OF019-101----	Redundant record	Ballykilleen	660386	727803	OF-BKL 0066	UWW	0
OF019-102----	Road - class 3 togher	Ballykilleen	660110	727692	OF-BKL 0081	Togher	0
OF019-103----	Redundant record	Ballykilleen	660362	727792	OF-BKL 0070	WOWO	0
OF019-104----	Redundant record	Ballykilleen	660342	727798	OF-BKL 0068	UWW	0
OF019-105----	Redundant record	Ballykilleen	660389	727779	OF-BKL 0080	UWW	0
OF019-106----	Redundant record	Ballykilleen	660438	727797	OF-BKL 0069	WOWO	0.05
OF019-107----	Road - class 3 togher	Ballykilleen	660374	727954	OF-BKL 0046	Togher	0
OF019-108----	Road - class 3 togher	Ballykilleen	660405	727947	OF-BKL 0054	Togher	0
OF019-109----	Road - class 2 togher	Ballykilleen	660433	727878	OF-BKL 0061	Togher	0.4
OF019-110----	Road - class 3 togher	Ballykilleen	660257	728104	OF-BKL 0008	Togher	0
OF019-111----	Road - class 3 togher	Ballykilleen	660315	728117	OF-BKL 0002	Togher	0
OF019-112----	Redundant record	Ballykilleen	660369	728118	OF-BKL 0004	WOWO	0
OF019-113----	Road - class 3 togher	Ballykilleen	660375	728113	OF-BKL 0006a	Togher	0
OF019-114----	Redundant record	Ballykilleen	660376	728125	OF-BKL 0001	WOWO	0
OF019-115----	Redundant record	Ballykilleen	660334	728116	OF-BKL 0005	UWW	0
OF019-116----	Redundant record	Ballynakill	660091	728095	OF-BYK 0003	UWW	0
OF019-117----	Post row - peatland	Ballynakill	660167	728102	OF-BYK 0002	PORO	0
OF019-118----	Redundant record	Ballykilleen	660400	727946	OF-BKL 0055	UWW	0
OF019-119----	Redundant record	Ballykilleen	660430	727885	OF-BKL 0060	UWW	0.07
OF019-120----	Road - class 2 togher	Ballykilleen	660227	727994	OF-BKL 0027	Togher	0.2
OF019-120----		Ballykilleen	660227	727994	OF-BKL 0027	Togher	0.2
OF019-120----		Ballykilleen	660227	727994	OF-BKL 0027	Togher	0.2
OF019-121----	Redundant record	Ballynakill	660189	728002	OF-BYK 0005	WOWO	0
OF019-122----	Redundant record	Ballykilleen	660401	727991	OF-BKL 0031	WOWO	0
OF019-123----	Road - class 3 togher	Ballykilleen	660209	727992	OF-BKL 0028	Togher	0
OF019-124----	Road - class 3 togher	Ballykilleen	660199	727992	OF-BKL 0029	Togher	0

Table 1. List of sites recorded by the IAWU in the rehabilitation area in Cloncreen Bog in 2001.

Peatland Archaeological Excavations 2003

Following the 2001 Peatland Survey of Cloncreen Bog 43 sightings (of 31 toghers and 12 redundant records) were chosen for excavation by the National Monuments Service and the National Museum and the work was carried out by Jane Whitaker and Eoin Corcoran of ADS Ltd, see Table 2 (Whitaker 2017). In the course of this work three additional structures were identified making a total of 46 sightings investigated.

SMR No.	2002 Cat No.	NGR E	NGR N	Townland	Classification	License No.
OF019-025----	OF-BKL 0086	660364	727699	Ballykilleen	Redundant record	03e1117
OF019-026----	OF-BKL 0085	660362	727700	Ballykilleen	Road - class 3 togher	03e1117
OF019-028----	OF-BKL 0087	660354	727699	Ballykilleen	Road - class 3 togher	03e1117
OF019-029----	OF-BKL 0084	660350	727700	Ballykilleen	Redundant record	03e1117
OF019-032----	OF-BKL 0092	660126	727674	Ballykilleen	Road - class 2 togher	0£E1222
OF019-035----	OF-BYK 0008	660188	728000	Ballynakill	Road - class 3 togher	03e0999
OF019-039----	OF-BKL 0036	660326	727980	Ballykilleen	Road - class 3 togher	03e1001
OF019-041----	OF-BKL 0009d			Ballykilleen	Road - class 1 togher	03E0984
OF019-041----	OF-BKL 0009e			Ballykilleen	Road - class 1 togher	03E0984
OF019-041----	OF-BKL 0009h			Ballykilleen	Road - class 1 togher	03E0984
OF019-041----	OF-BKL 0009j			Ballykilleen	Road - class 1 togher	03E0984
OF019-042----	OF-BKL 0020	660380	728005	Ballykilleen	Road - class 3 togher	03e0984
OF019-043----	OF-BKL 0021	660376	728005	Ballykilleen	Road - class 3 togher	03e0984
OF019-044----	OF-BKL 0023	660371	728005	Ballykilleen	Redundant record	03e0984
OF019-047----	OF-BKL 0030	660329	727994	Ballykilleen	Redundant record	03e1001

OF019-048----	OF-BKL 0037	660297	727980	Ballykilleen	Road - class 2 togher	03E1001
OF019-053----	OF-BKL 0032	660207	727986	Ballykilleen, Ballynakill	Redundant record	03E0869
OF019-055----	OF-BKL 0024	660292	728000	Ballykilleen	Redundant record	03e0906
OF019-057----	OF-BKL 0013	660312	728011	Ballykilleen	Redundant record	03e1143
OF019-059----	OF-BKL 0034	660212	727982	Ballykilleen	Road - class 3 togher	03e0869
OF019-062----	OF-BYK 0010d	-	-	Ballynakill	Road - class 1 togher	03E0926
OF019-062----	OF-BYK 0010e	-	-	Ballynakill	Road - class 1 togher	03E0926
OF019-065----	OF-BYK 0014	660164	727939	Ballynakill	Road - class 3 togher	03e1143
OF019-067----	OF-BKL 0025	660279	727998	Ballykilleen	Road - class 3 togher	03e0906
OF019-069----	OF-BKL 0015	660271	728009	Ballykilleen	Road - class 3 togher	03e0906
OF019-073----	OF-BKL 0053	660206	727943	Ballynakill	Road - class 3 togher	03E1121
OF019-077----	OF-BKL 0051	660231	727946	Ballykilleen	Road - class 3 togher	03E1121
OF019-078----	OF-BKL 0050	660240	727946	Ballykilleen	Redundant record	03E1121
OF019-083----	OF-BKL 0063	660215	727849	Ballykilleen	Redundant record	03E1120
OF019-084----	OF-BKL 0062	660219	727850	Ballykilleen	Redundant record	03E1120
OF019-085----	OF-BKL 0065	660224	727846	Ballykilleen	Redundant record	03E1120
OF019-088----	OF-BKL 0075	660242	727783	Ballykilleen	Road - class 3 togher	03e1119
OF019-089----	OF-BKL 0072	660275	727787	Ballykilleen	Road - class 3 togher	03e1119
OF019-091----	OF-BKL 0076	660335	727780	Ballykilleen	Road - class 3 togher	0£e1223
OF019-092----	OF-BKL 0079	660357	727782	Ballykilleen	Road - class 3 togher	03e1223
OF019-099----	OF-BKL 0073	660281	727787	Ballykilleen	Road - class 3 togher	03e1119
OF019-107----	OF-BKL 0046	660374	727954	Ballykilleen	Road - class 3 togher	03e0984
OF019-108----	OF-BKL 0054	660405	727947	Ballykilleen	Road - class 3 togher	03E0983
OF019-109----	OF-BKL 0061	660433	727878	Ballykilleen	Road - class 2 togher	03E0983
OF019-120----	OF-BKL 0027	660227	727994	Ballykilleen	Road - class 2 togher	03e0869
OF019-121----	OF-BYK 0005	660189	728002	Ballynakill	Redundant record	03e0999
OF019-123----	OF-BKL 0028	660209	727992	Ballykilleen	Road - class 3 togher	03e0869
OF019-124----	OF-BKL 0029	660199	727992	Ballykilleen	Road - class 3 togher	03e0869
-	2003 OF-BYK0101	260249	227671	Ballykilleen	Structure - peatland	03e0999
-	2003 OF-BYK0102	260409	227754	Ballykilleen	Structure - peatland	03e1223
-	2003 OF-BYK0103	260336	227758	Ballykilleen	Structure - peatland	03e1119

Table 2. Licensed excavations carried out in Cloncreen Bog.

2013 Bord na Móna Re-assessment Survey

Cloncreen Bog was surveyed (Licence No. 13E0228) by ADS Ltd in 2013 as part of the Bord na Móna Re-assessment Survey (Whitaker 2014). None of the sightings made by the 2002 Peatland Survey were found to have survived except for OF-BKL0054. The survey work identified three sightings of archaeological material that were recorded as two monuments (see Table 3). Two of the sightings (OF-CCN001a-b) were identified as the remains of OF-BKL0054 originally identified in the 2002 Peatland Survey. The third sighting OF-CCN002 has been included in the SMR (see Table 5).

SMR_NO	SMR Class	Townland	ITME	ITM. N	Depth BS m	Survey Ref
OF019-108----	Road - class 3 togher	Ballykilleen	660407	727953	**0.00**	OF-CCN001a
OF019-108----	Road - class 3 togher	Ballykilleen	660417	727969	**0.00**	OF-CCN001b
OF019-125----	Structure - peatland	Ballykilleen	660399	728010	0.00	OF-CCN002

Table 3. Sightings identified by the 1999 Bord na Móna Re-assessment Survey.

Peatland Archaeological Excavations 2014

Following the 2013 Bord na Móna Re-assessment Survey of Cloncreen Bog one sighting was chosen for excavation and the work was carried out by Jane Whitaker of IAC Ltd, (see Table 4) (Whitaker 2017).

SMR_NO	SMR Class	Townland	IG. E	IG. N	Depth BS m	Survey Ref	Licence
OF019-125----	Structure - peatland	Ballykilleen	2260461	227982	0.00	OF-CCN002	14E0255

Table 4. Sighting from the 2013 Bord na Móna Re-assessment Survey excavated in 2014.

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 26th 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 109 entries in the SMR in the proposed rehabilitation area (see Table 5).

SMR No.	Class	Townland	ITM E	ITM N	IAWU Cat No.	Class	Depth BS
OF019-020----	Road - class 3 togher	Ballykilleen	660256	727511	OF-BKL 0095	Togher	0
OF019-021----	Road - class 3 togher	Ballykilleen	660294	727544	OF-BKL 0094	Togher	0
OF019-022----	Redundant record	Ballykilleen	660271	727547	OF-BKL 0093	WOWO	0
OF019-023----	Redundant record	Ballykilleen	660408	727702	OF-BKL 0082	UWW	0
OF019-024----	Redundant record	Ballykilleen	660403	727702	OF-BKL 0083	WOWO	0
OF019-025----	Redundant record	Ballykilleen	660364	727699	OF-BKL 0086	UWW	0
OF019-026----	Road - class 3 togher	Ballykilleen	660362	727700	OF-BKL 0085	Togher	0
OF019-027----	Redundant record	Ballykilleen	660359	727699	OF-BKL 0088	UWW	0
OF019-028----	Road - class 3 togher	Ballykilleen	660354	727699	OF-BKL 0087	Togher	0
OF019-029----	Redundant record	Ballykilleen	660350	727700	OF-BKL 0084	WOWO	0
OF019-030----	Redundant record	Ballykilleen	660334	727698	OF-BKL 0089	UWW	0
OF019-031----	Redundant record	Ballykilleen	660246	727690	OF-BKL 0091	WOWO	0
OF019-032----	Road - class 2 togher	Ballykilleen	660126	727674	OF-BKL 0092	Togher	0.26
OF019-033----	Redundant record	Ballynakill	660193	727963	OF-BYK 0012	WOWO	0
OF019-034----	Redundant record	Ballynakill	660192	728004	OF-BYK 0009	UWW	0
OF019-035----	Road - class 3 togher	Ballynakill	660188	728000	OF-BYK 0008	Togher	0
OF019-036----	Redundant record	Ballynakill	660184	728001	OF-BYK 0007	UWW	0
OF019-037----	Road - class 3 togher	Ballykilleen	660281	728010	OF-BKL 0039	Togher	0
OF019-038----	Redundant record	Ballykilleen	660392	727976	OF-BKL 0017	UWW	0
OF019-039----	Road - class 3 togher	Ballykilleen	660326	727980	OF-BKL 0036	Togher	0
OF019-040----	Redundant record	Ballykilleen	660401	727977	OF-BKL 0041	WOWO	0
OF019-041----	Road - class 1 togher	Ballykilleen	660384	727990	OF-BKL 0009	Togher	0
OF019-042----	Road - class 3 togher	Ballykilleen	660380	728005	OF-BKL 0020	Togher	0
OF019-043----	Road - class 3 togher	Ballykilleen	660376	728005	OF-BKL 0021	Togher	0
OF019-044----	Redundant record	Ballykilleen	660371	728005	OF-BKL 0023	UWW	0
OF019-045----	Redundant record	Ballykilleen	660390	728019	OF-BKL 0011	UWW	0
OF019-046----	Road - class 3 togher	Ballykilleen	660358	728005	OF-BKL 0022	Togher	0
OF019-047----	Redundant record	Ballykilleen	660329	727994	OF-BKL 0030	WOWO	0
OF019-048----	Road - class 2 togher	Ballykilleen	660297	727980	OF-BKL 0037	Togher	0
OF019-049----	Redundant record	Ballykilleen	660285	727973	OF-BKL 0038	UWW	0
OF019-050----	Road - class 3 togher	Ballynakill	659714	728107	OF-BYK 0001	Togher	0
OF019-051----	Road - class 3 togher	Ballykilleen	660244	728110	OF-BKL 0003	Togher	0
OF019-052----	Redundant record	Ballynakill	660181	728046	OF-BYK 0004	WOWO	0
OF019-053----	Redundant record	Ballykilleen, Ballynakill	660207	727986	OF-BKL 0032	COMP	0
OF019-054----	Road - class 3 togher	Ballykilleen	660204	727953	OF-BKL 0045	Togher	0
OF019-055----	Redundant record	Ballykilleen	660292	728000	OF-BKL 0024	WOWO	0
OF019-056----	Redundant record	Ballykilleen	660284	728022	OF-BKL 0010	UWW	0
OF019-057----	Redundant record	Ballykilleen	660312	728011	OF-BKL 0013	UWW	0
OF019-058----	Redundant record	Ballykilleen	660289	727969	OF-BKL 0043	WOWO	0
OF019-059----	Road - class 3 togher	Ballykilleen	660212	727982	OF-BKL 0034	Togher	0.17
OF019-060----	Redundant record	Ballykilleen	660276	727949	OF-BKL 0049	WOWO	0
OF019-061----	Redundant record	Ballynakill	660117	727998	OF-BYK 0006	UWW	0.18
OF019-062----	Road - class 1 togher	Ballynakill	660105	727950	OF-BYK 0010	Togher	0
OF019-063----	Road - class 3 togher	Ballynakill	660095	727972	OF-BYK 0011	Togher	0
OF019-064----	Road - class 3 togher	Ballynakill	660156	727928	OF-BYK 0015	Togher	0
OF019-065----	Road - class 3 togher	Ballynakill	660164	727939	OF-BYK 0014	Togher	0

OF019-066----	Road - class 3 togher	Ballynakill	660194	727943	OF-BYK 0013	Togher	0
OF019-067----	Road - class 3 togher	Ballykilleen	660279	727998	OF-BKL 0025	Togher	0
OF019-068----	Redundant record	Ballykilleen	660274	727998	OF-BKL 0026	UWW	0
OF019-069----	Road - class 3 togher	Ballykilleen	660271	728009	OF-BKL 0015	Togher	0
OF019-070----	Redundant record	Ballykilleen	660288	728010	OF-BKL 0014	WOWO	0
OF019-071----	Redundant record	Ballykilleen	660264	727985	OF-BKL 0033	WOWO	0
OF019-072----	Redundant record	Ballykilleen	660263	727978	OF-BKL 0016	WOWO	0
OF019-073----	Road - class 3 togher	Ballynakill	660206	727943	OF-BKL 0053	Togher	0
OF019-074----	Road - class 3 togher	Ballykilleen	660216	727944	OF-BKL 0052	Togher	0
OF019-075----	Redundant record	Ballykilleen	660223	727909	OF-BKL 0059	WOWO	0
OF019-076----	Road - class 3 togher	Ballykilleen	660224	727932	OF-BKL 0058	Togher	0.31
OF019-077----	Road - class 3 togher	Ballykilleen	660231	727946	OF-BKL 0051	Togher	0
OF019-078----	Redundant record	Ballykilleen	660240	727946	OF-BKL 0050	WOWO	0
OF019-079----	Road - class 3 togher	Ballykilleen	660283	727949	OF-BKL 0048	Togher	0
OF019-080----	Redundant record	Ballykilleen	660271	727936	OF-BKL 0057	WOWO	0
OF019-081----	Redundant record	Ballykilleen	660274	727937	OF-BKL 0056	WOWO	0
OF019-082----	Redundant record	Ballykilleen	660311	727950	OF-BKL 0047	WOWO	0
OF019-083----	Redundant record	Ballykilleen	660215	727849	OF-BKL 0063	WOWO	0
OF019-084----	Redundant record	Ballykilleen	660219	727850	OF-BKL 0062	WOWO	0
OF019-085----	Redundant record	Ballykilleen	660224	727846	OF-BKL 0065	UWW	0
OF019-086----	Redundant record	Ballykilleen	660234	727848	OF-BKL 0064	UWW	0
OF019-087----	Redundant record	Ballykilleen	660128	727766	OF-BKL 0077	WOWO	0
OF019-088----	Road - class 3 togher	Ballykilleen	660242	727783	OF-BKL 0075	Togher	0
OF019-089----	Road - class 3 togher	Ballykilleen	660275	727787	OF-BKL 0072	Togher	0
OF019-090----	Redundant record	Ballykilleen	660302	727788	OF-BKL 0071	UWW	0
OF019-091----	Road - class 3 togher	Ballykilleen	660335	727780	OF-BKL 0076	Togher	0
OF019-092----	Road - class 3 togher	Ballykilleen	660357	727782	OF-BKL 0079	Togher	0
OF019-093----	Redundant record	Ballykilleen	660368	727784	OF-BKL 0078	UWW	0
OF019-094----	Road - class 3 togher	Cloncreen	659001	725722	OF-CCR 0001	Togher	0
OF019-095----	Redundant record	Ballykilleen	660245	727975	OF-BKL 0042	WOWO	0
OF019-096----	Redundant record	Ballykilleen	660273	727981	OF-BKL 0035	UWW	0
OF019-097----	Redundant record	Ballykilleen	660274	727978	OF-BKL 0040	WOWO	0
OF019-098----	Road - class 3 togher	Ballykilleen	660329	727798	OF-BKL 0067	WOWO	0
OF019-099----	Road - class 3 togher	Ballykilleen	660281	727787	OF-BKL 0073	Togher	0
OF019-100----	Redundant record	Ballykilleen	660289	727786	OF-BKL 0074	UWW	0
OF019-101----	Redundant record	Ballykilleen	660386	727803	OF-BKL 0066	UWW	0
OF019-102----	Road - class 3 togher	Ballykilleen	660110	727692	OF-BKL 0081	Togher	0
OF019-103----	Redundant record	Ballykilleen	660362	727792	OF-BKL 0070	WOWO	0
OF019-104----	Redundant record	Ballykilleen	660342	727798	OF-BKL 0068	UWW	0
OF019-105----	Redundant record	Ballykilleen	660389	727779	OF-BKL 0080	UWW	0
OF019-106----	Redundant record	Ballykilleen	660438	727797	OF-BKL 0069	WOWO	0.05
OF019-107----	Road - class 3 togher	Ballykilleen	660374	727954	OF-BKL 0046	Togher	0
OF019-108----	Road - class 3 togher	Ballykilleen	660405	727947	OF-BKL 0054	Togher	0
OF019-109----	Road - class 2 togher	Ballykilleen	660433	727878	OF-BKL 0061	Togher	0.4
OF019-110----	Road - class 3 togher	Ballykilleen	660257	728104	OF-BKL 0008	Togher	0
OF019-111----	Road - class 3 togher	Ballykilleen	660315	728117	OF-BKL 0002	Togher	0
OF019-112----	Redundant record	Ballykilleen	660369	728118	OF-BKL 0004	WOWO	0
OF019-113----	Road - class 3 togher	Ballykilleen	660375	728113	OF-BKL 0006a	Togher	0
OF019-114----	Redundant record	Ballykilleen	660376	728125	OF-BKL 0001	WOWO	0
OF019-115----	Redundant record	Ballykilleen	660334	728116	OF-BKL 0005	UWW	0
OF019-116----	Redundant record	Ballynakill	660091	728095	OF-BYK 0003	UWW	0
OF019-117----	Post row - peatland	Ballynakill	660167	728102	OF-BYK 0002	PORO	0
OF019-118----	Redundant record	Ballykilleen	660400	727946	OF-BKL 0055	UWW	0
OF019-119----	Redundant record	Ballykilleen	660430	727885	OF-BKL 0060	UWW	0.07
OF019-120----	Road - class 2 togher	Ballykilleen	660227	727994	OF-BKL 0027	Togher	0.2
OF019-120----		Ballykilleen	660227	727994	OF-BKL 0027	Togher	0.2
OF019-120----		Ballykilleen	660227	727994	OF-BKL 0027	Togher	0.2
OF019-121----	Redundant record	Ballynakill	660189	728002	OF-BYK 0005	WOWO	0
OF019-122----	Redundant record	Ballykilleen	660401	727991	OF-BKL 0031	WOWO	0
OF019-123----	Road - class 3 togher	Ballykilleen	660209	727992	OF-BKL 0028	Togher	0
OF019-124----	Road - class 3 togher	Ballykilleen	660199	727992	OF-BKL 0029	Togher	0
OF019-125----	Structure - peatland	Ballykilleen	660399	728010	OF-CCN002	Structure - Peatland	0

Table 5. Sightings in Cloncreen Bog listed in the SMR in 2021. Coordinates are ITM.

Reported finds

The topographical files of the National Museum of Ireland were searched for records of finds from the bog in April 2021 (thanks to Isabella Mulhall) and the finds are included below in Table 6.

Townland	Museum No.	Description
Ballykilleen	M.C.99.65	flint barbed and tanged arrowhead with part of its wooden shaft
Ballykilleen	M.C. 339	bone axe
Ballykilleen	MC 99.87	Ballyvalley Bronze axe
Ballykilleen	1933:2757	Tracked stone
Ballykilleen	1933:2758	Tool
Ballykilleen	1933:2759	Hammerstone
West side Cloncreen Bog	NMI	Elizabethan silver coins
Cloncreen	NMI 1982:16	Side loped spearhead
Cloncreen	02E0941:3	A flint plano-convex knife
Ballykilleen	02E0941:5	Round wood artifact
Cloncreen	02E0941:6	leaf-shaped flint arrowhead
Ballykilleen	02E0941:8	Withe
Ballykilleen	02E0941:9	Dressed brushwood
Cloncreen	02E0941:10	Neolithic leaf-shaped flint arrowhead
Cloncreen	02E0941:11	Neolithic chert arrowhead
Ballykilleen	02E0941:12	Dressed roundwood
Ballykilleen	02E0941:13	Root bole with grooves
Ballykilleen	02E0941:14	The tip of a degraded horn core
Ballykilleen	02E0941:16	Horn Core
Ballykilleen	02E0941:17a-b	Two degraded fragments of a horn core (
Ballykilleen	02E0941:19	Two small fragments of a horn core
Ballykilleen	02E0941:18	A fragmented portion of an animal jawbone with teeth

Table 6. List of archaeological finds from Cloncreen Bog reported to the National Museum of Ireland.

Archaeological investigations

Reports of archaeological excavations and licensed monitoring in the rehabilitation area listed in the excavations database at excvations.ie were examined as part of the assessment. In 2018 the development of a Wind farm in Cloncreen Bog was the subject of archaeological monitoring Licence No. 18E0634 (Whitaker and Coughlan 2019). A total of 260 trial pits were archaeologically monitored and nothing of archaeological significance was identified.

Previous assessments

Cloncreen Bog has been the subject of an Environmental Impact Assessment Report caried out by Tobar Archaeological Services in 2016 for a proposed windfarm development (Tobar Archaeological Services 2016). The assessment identified three sightings of archaeological material (see Table 7). The rehabilitation area has been the subject of an Environmental Impact Assessment Report caried out by Irish Archaeological Consultancy LTD in 2018 for Bord na Móna Energy Limited in relation to IPC Licence P0500-01. The assessment noted the material identified in the IAWU survey in 1991 and noted that there was a high potential for archaeological features to be uncovered during the course of any future development works in Cloncreen Bog.

Class	ITM E	ITM N	Townland	Depth BS mm
Unclassified Togher 1	659486	727355	Ballinakill	0.10
Possible Peatland Structure 1	659703	726116	Cloncreen	0.00
Possible Upright Posts	658946	726496	Rathvilla	0.00

Table 7. Archaeological sightings made in Cloncreen Bog in 2016 by Tobar Archaeological Services.

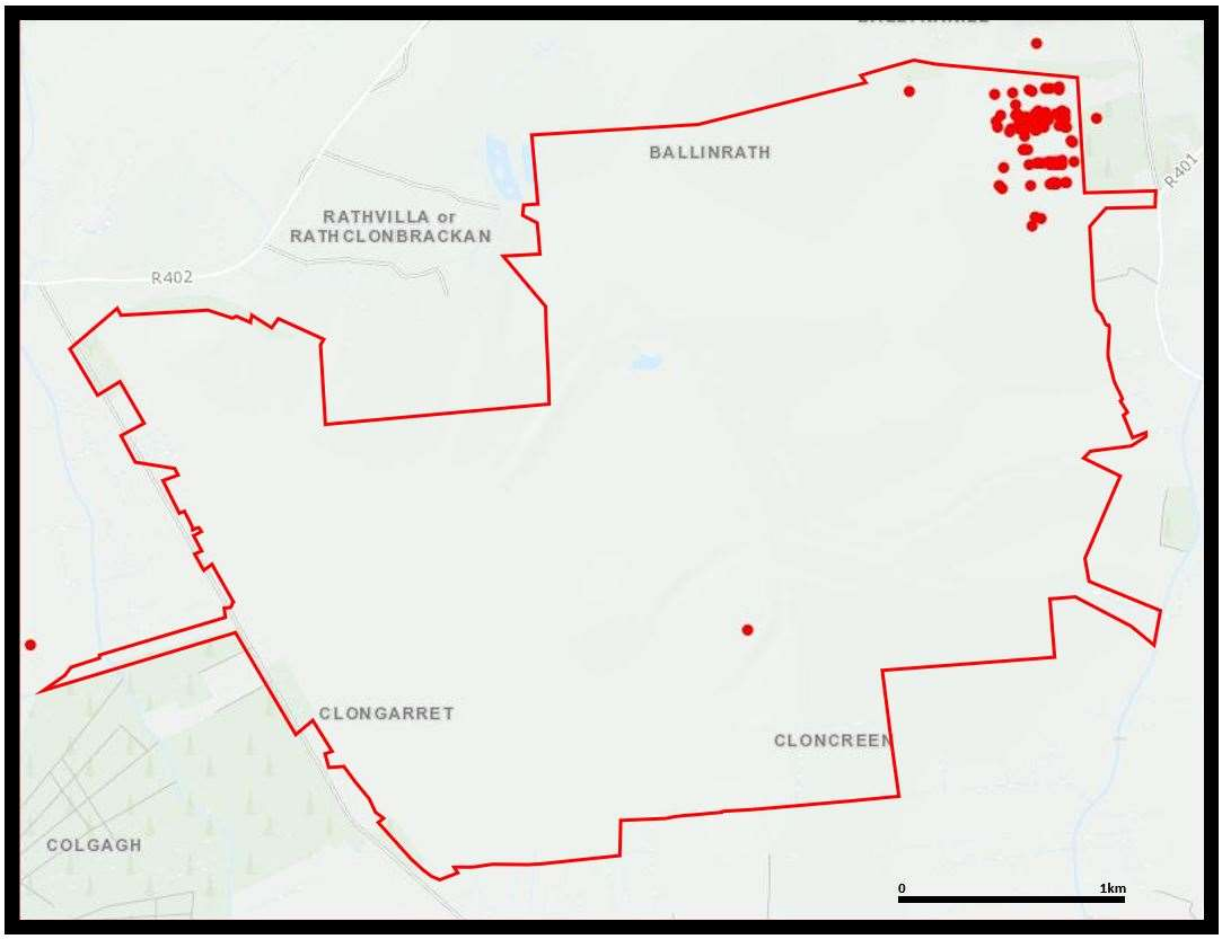

Fig. 2. Cloncreen Bog, Co. Offaly, detail of the Sites and Monuments Record. The proposed rehabilitation area is outlined with the red line. There are a large number of SMRs in the rehabilitation area mainly in the north-east corner in Ballynakill and Ballykilleen townlands.

Impact assessment

At least 126 sightings of archaeological material were identified and recorded in Cloncreen Bog between 2002 and 2016 by the IAWU, the Bord na Móna Re-assessment Survey, Tobar Archaeological Services and the resulting excavations. 109 of these sightings were included in the SMR. The 2013 Bord na Móna Re-assessment Survey found that all of the 2002 sightings had been removed except for OF-BKL0054 which was visible on the surface The additional sightings made by the 2013 Bord na Móna Re-assessment Survey and the 2016 wind farm assessment are included in Table 8 with the peat removed from each sighting between 2008 and 2018. Each of the sighting made in 2013-16 was a surface or near surface sighting. The LIDAR data indicates that from 0.017-0.15m peat was removed from the location of each surface sighting per year which would have led to the loss of each sighting. Tobar 1 was 0.10m below the surface and the LIDAR data indicates that an average of 0.127m of peat was removed from this location annually so that this sighting does not survive either.

SMR_NO	Class	Townland	ITME	ITM. N	Depth BS m	Survey Ref	Peat depth 2008	Peat depth 2018	Peat removed	Status
OF019-108----	Road - class 3 togher	Ballykilleen	660407	727953	**0.00**	OF-CCN001a	69.041	68.055	0.986	Gone
OF019-108----	Road - class 3 togher	Ballykilleen	660417	727969	**0.00**	OF-CCN001b	69.587	68.426	1.161	Gone
OF019-125----	Structure - peatland	Ballykilleen	660399	728010	0.00	OF-CCN002	69.298	67.756	1.541	Gone
-	Unclassified Togher 1	Ballinakill	659486	727355	0.10	Tobar 1	67.980	66.703	1.277	Gone
-	Possible Peatland Structure 1	Cloncreen	659703	726116	0.00	Tobar 2	69.603	69.432	0.170	Gone
-	Possible Upright Posts	Rathvilla	658946	726496	0.00	Tobar 3	68.152	67.011	1.140	Gone

Table 8 Sightings of archaeological material surviving in 2013-16 with LIDAR peat depth data.

Recommendations

There is no known surviving archaeological material in Cloncreen 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 surviving archaeological material in Cloncreen 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.

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Dr. Charles Mount
3 December 2021

23. APPENDIX XIII. STOCKPILE DECOMMISSIONING PROCEDURE

Scope: All IPC licensed peatlands requiring decommissioning and rehabilitation as required by Condition 10.

Condition 10:

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.

Procedure:

1. Ensure the silt pond servicing this pile field catchment has been cleaned within the last month, if not arrange for it to be cleaned prior to any pile decommissioning.
2. Block both pile field drains at the manholes and every 100 metres by dozing a peat blockage perpendicular to the drain, filling and compacting the blockage with the dozer until it is 300mm above the adjoining field.
3. Doze out any loose peat into the blocked drains either side ensuring an even spread.
4. Track back over each drain with the dozer to ensure good compaction.
5. Only doze out the stockpile in suitable weather and not when heavy rainfall is predicted.

24. APPENDIX XIII. WATER QUALITY MONITORING RESULTS FOR CLONCREEN BOG

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

PCAS SW Sampling Scheme					Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids
Bog Group	Licence No	Bog Name	Unique I.D No.	SW Code GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
Allen Group	P0503-01	Cloncreen	432	SW33	2	12	2	2	2	4	6	3	4	8	2	2	2	2	2	4
Allen Group	P0503-01	Cloncreen	434	SW35	5	4	2	2	25	9	15	7	12	11	10	21	7	74	5	15
Allen Group	P0503-01	Cloncreen	436	SW37A	3	2	2	2	5	9	8	5	9	19	11	2	4	2	2	2
PCAS SW Sampling Scheme					Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour
Bog Group	Licence No	Bog Name	Unique I.D No.	SW Code GIS	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co
					1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
Allen Group	P0503-01	Cloncreen	432	SW33	57.8	162	141	94.8	132	175	91.1	11.5	98.2	99.8	52.2	101	46.4	76.5	126	91.4
Allen Group	P0503-01	Cloncreen	434	SW35	120	185	140	80.2	253	157	175	157	175	185	155	337	112	396	169	203
Allen Group	P0503-01	Cloncreen	436	SW37A	34	75.1	106	87	157	115	165	114	173	147	168	119	60.1	138	103	67.3
PCAS SW Sampling Scheme					COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD
Bog Group	Licence No	Bog Name	Unique I.D No.	SW Code GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
Allen Group	P0503-01	Cloncreen	432	SW33	16	45	42	30	40	47	26	20	23	34	10	43	27	36	49	24
Allen Group	P0503-01	Cloncreen	434	SW35	32	53	47	35	28	43	29	26	45	30	39	52	38	43	86	41
Allen Group	P0503-01	Cloncreen	436	SW37A	10	28	39	16	59	31	34	31	32	27	26	47	30	40	39	17
PCAS SW Sampling Scheme					pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
Bog Group	Licence No	Bog Name	Unique I.D No.	SW Code GIS	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units
					1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
Allen Group	P0503-01	Cloncreen	432	SW33	8.1	7.5	7.7	7.7	7.5	7.7	8	8.1	8	8.1	8.1	7.9	8.1	7.8	7.6	7.9
Allen Group	P0503-01	Cloncreen	434	SW35	7.4	7.5	7.8	7.8	7.7	7.7	7.9	7.8	7.8	7.8	7.7	7.7	7.7	7.7	7.7	7.7
Allen Group	P0503-01	Cloncreen	436	SW37A	7.6	7.6	7.9	7.7	7.4	7.6	8.9	7.8	7.7	7.9	7.8	7.8	7.7	7.6	7.5	7.8
PCAS SW Sampling Scheme					TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P
Bog Group	Licence No	Bog Name	Unique I.D No.	SW Code GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
Allen Group	P0503-01	Cloncreen	432	SW33	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05
Allen Group	P0503-01	Cloncreen	434	SW35	0.05	0.05	0.05	0.06	0.05	0.06	0.05	0.05	0.05	0.06	0.05	0.07	0.08	0.14	0.05	0.07
Allen Group	P0503-01	Cloncreen	436	SW37A	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05
PCAS SW Sampling Scheme					TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS
Bog Group	Licence No	Bog Name	Unique I.D No.	SW Code GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
Allen Group	P0503-01	Cloncreen	432	SW33	392	351	352	314	284	270	323	356	333	443	364	365	385	378	288	385
Allen Group	P0503-01	Cloncreen	434	SW35	558	522	419	496	499	463	446	552	492	593	517	515	549	396	480	462
Allen Group	P0503-01	Cloncreen	436	SW37A	423	395	462	387	408	376	364	471	453	500	417	479	418	562	442	221
PCAS SW Sampling Scheme					Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N
Bog Group	Licence No	Bog Name	Unique I.D No.	SW Code GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/11
Allen Group	P0503-01	Cloncreen	432	SW33	0.043	0.064	0.117	0.179	0.165	0.117	0.087	0.043	0.028	0.045	0.047	0.038	0.587	0.09	0.157	0.202
Allen Group	P0503-01	Cloncreen	434	SW35	0.346	0.599	0.365	0.125	0.581	0.419	0.154	0.446	0.441	0.452	0.469	0.717	0.257	0.609	0.299	0.485
Allen Group	P0503-01	Cloncreen	436	SW37A	0.366	0.491	0.213	0.757	0.288	0.646	0.062	0.279	0.234	0.315	0.373	0.273	0.122	0.079	0.462	0.236
PCAS SW Sampling Scheme					DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC
Bog Group	Licence No	Bog Name	Unique I.D No.	SW Code GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
					1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
Allen Group	P0503-01	Cloncreen	432	SW33	9.68	17.3	18.4	13.8	14.4	16.9	9.99	8.43	12.6	11.4	6.26	56.1	59.6	13.5	19.1	10.6
Allen Group	P0503-01	Cloncreen	434	SW35	12.4	19.2	19.4	16.2	12.6	16	11.4	9.92	15.4	12.8	11.9	60.4	62.2	18.1	22.5	16.8
Allen Group	P0503-01	Cloncreen	436	SW37A	5.61	11.7	16.5	8.34	22	11.2	12.5	10.1	13.3	8.93	9.29	54.1	55.9	16.6	16.1	10