

Bord na Móna

Timahoe South Bog

Cutaway Bog Decommissioning and Rehabilitation Plan 2022

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0503-01:

“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 Timahoe South 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 Timahoe South Bog.

In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. P0503-01, due regard was also given to the Peatlands Climate Action Scheme (PCAS) announced by the Minister. This Scheme will see the Minister support, via the Climate Action Fund and Ireland’s National Recovery and Resilience Plan, Bord na Móna in developing a package of measures, ‘the Scheme’, for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme’. However, only the additional costs associated with the additional and enhanced rehabilitation, i.e, measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support. The additional costs of the Scheme will be supported by Government, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator.

While this document outlines the enhanced rehabilitation measures planned for Timahoe South 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 Timahoe South Bog as environmental stabilisation, re-wetting and setting the bog on a trajectory towards development of naturally functioning peatland and wetland habitats. Rehabilitation will be integrated with current and potential future land-uses.

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NON-TECHNICAL SUMMARY

- Bord na Móna is planning to rehabilitate Timahoe South Bog, north of Allenwood town, in Co. Kildare.
- Peat harvesting is now finished at Timahoe South 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 effects to downstream waterbodies. Timahoe South was drained in the past to allow peat extraction. Better results for water quality improvements, climate action, the reduction of carbon emissions and biodiversity are achieved when the remaining peat is re-wetted. This means drain-blocking and other measures to raise water levels to the surface of the bog and to encourage the natural colonisation of vegetation.
- In general soggy ground conditions are preferred. This means the remaining peat is wet and that plants that prefer wetter conditions, like Bog Cotton, will thrive.
- This will also reduce the risk and impact of bog-fires, which have been issues at Timahoe South in 2020.
- Many Bord na Móna bogs cannot be restored back to raised bog immediately, as so much peat has been removed and the environmental conditions have been modified. However other peatland habitats with Heather, Bog Cotton, Rushes, Purple Moor-grass, Bog-mosses and scattered trees will develop, and in time a naturalised peatland can be restored.
- The development of a range of habitats in Timahoe South Bog will support biodiversity including plants, insects, birds and mammals. This includes some species that are rare and protected in the wider landscape. It will increase the national area of native woodland. Many wetland habitats in the wider landscape have been reclaimed for agriculture and other uses and peatland rehabilitation is an opportunity to create new wetland and peatland habitats.
- Production of sod peat by Bord na Móna commenced in Timahoe South in the 1940's and ceased in the 1980's. Much of the former industrial production area currently comprises establishing secondary peatland vegetation such as Birch woodland, heather, scrub and some wetter areas.
- Some sections around the margins had been licensed to 3rd parties for sod turf cutting by Bord na Móna in recent years. This activity is now ceased. Ongoing issues with trespass (burning and some turf-cutting) at the site are currently being managed.
- A portion of Timahoe South has been re-developed in recent years to build the Drehid Waste Management Facility and has been excluded from the IPC license accordingly. There have been ongoing proposals to extend this facility and this extension is in a pre-planning stage.
- In addition, a consented (2013) Mechanical Biological Treatment (MBT) Facility (Drehid MBT Facility) is to be located ca.1km to the south of the waste facility, and is presently (2021) under construction.
- A further portion of the bog is currently under consideration for a renewable energy development. In advance of this proposed planning submission, it is planned to rehabilitate the area around this proposed project in 2022-2023. The remaining area will be rehabilitated after the renewable energy construction is complete, or at a later date.
- Measures proposed for Timahoe South Bog include drain blocking, bunding and other measures required to raise water levels to the surface of the peat (changing levels of pipes for example). Some fertiliser

may be spread on headlands and other areas (a small part of the overall area) to encourage vegetation growth.

- Bord na Mona plan to carry out this work in 2022.
- These rehabilitation measures will be planned by a team consisting of expert ecologists, hydrologists and engineers. It is a guiding principle of Bord na Móna rehabilitation planning that no actions or activities will be undertaken that would negatively impact on adjacent land. No boundary drains will be blocked, in general, without specific agreements with neighbours. Water will still leave the bog via the existing outlets. Existing fire breaks are to be retained.
- Vegetation and habitats have already developed at Timahoe South, but it will take some time for a peatland ecosystem to be restored. However, it is expected that most of the bare peat areas will be developing pioneer habitats after 5-10 years.
- This is a peatland rehabilitation plan. This plan does not consider future after-use or development. Bord na Móna continually reviews its land-bank to consider future commercial or industrial developments, such as renewable energy. Bord na Móna are currently reviewing Timahoe South for its renewable energy potential. A potential area is being considered for a proposed project. This proposed project has not gone into pre-planning stage yet. Any other proposed development will be planned in adherence to relevant planning guidelines and will consider the rehabilitation and the condition of the site.
- Peatland rehabilitation of these bogs will bring a range of benefits to the local community via improvements to the local landscape and is also important for supporting national policies and strategies in relation to reduction of carbon emissions from these peatlands, supporting biodiversity and improvements to water quality.

SUMMARY

Name of bog: Timahoe South Bog

Area: 1707 ha

Site description:

- Industrial peat extraction at Timahoe South commenced in the 1940's and ceased in the 1980's. The peat was formerly used as fuel peat including for the Allenwood Power Station.
- Timahoe South has a gravity drainage regime.
- The majority of the former peat production footprint is pioneering bare peat and some areas have substantive cover of scrub and developing woodland. Active drainage channels are still present.
- Residual peat depths at Timahoe South are deep (up to 2.5m) for the most part but reach deeper depths in places.
- There are a number of depressions which contain shallow peat.

Rehabilitation goals and outcomes

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

This is defined as:

- Meeting conditions of the IPC licence.
- Stabilisation or improvement in water quality parameters (e.g. suspended solids).
- Environmental stabilisation.
- Optimising hydrological conditions for the further development of embryonic *Sphagnum*-rich peat forming communities, wetland, Reed swamp, wet woodland and fen habitats on cutaway peats, along with management of existing pioneer habitats.
- Integrating rehabilitation measures with current infrastructure and land-uses, and future land-uses.
- Rehabilitation will support the National Policies on Climate Action and GHG mitigation by maintaining and enhancing the current residual peat storage capacity of the bog (locking the carbon into the ground). It is expected that the bog will have reduced emissions (reduced source) as it develops naturally functioning peatland habitats and will have some potential to develop carbon sink function in part. It will also support Ireland's commitments towards Water Framework Directive and the National River Basin Management Plan 2018-2021.

Scope of rehabilitation

The principal scope of this rehabilitation plan is defined by:

- The area of Timahoe South
- EPA IPC Licence - Ref. P0503-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The key objective of 'rehabilitation', as required by this licence, is achieved by the **environmental stabilisation** of the bog.
- **The Scheme (PCAS)** includes enhanced measures which are designed to exceed/meet the standard stabilisation requirements as defined by the IPC Licence and to enhance the ecosystem services of Timahoe South, in particular, optimising **climate action benefits**.
- The key goals and outcomes of rehabilitation at this bog outlined above.
- To minimise potential impacts on neighbouring land, some boundary drains around the bog will be left unblocked, as blocking boundary drains could affect adjacent land. Fire breaks are also to be retained.
- Current Land-use. The bog contains existing waste management infrastructure (Drehid Facility). Peatland rehabilitation will be integrated with this infrastructure.
- Proposed land-use. Bord na Móna are reviewing Timahoe South Bog for potential to develop a renewable energy project. A footprint has been identified for this potential solar energy project. In advance of this

proposed planning submission, it is planned to rehabilitate the area around this footprint. The remaining area will be rehabilitated after the renewable energy construction is complete, or at a later date. Bord na Móna remain committed to rehabilitating all of Timahoe South Bog and meeting conditions of the IPC Licence for this bog.

- Other constraints include Turbary rights and Archaeology.

Criteria for successful rehabilitation:

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

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

Meeting climate action verification criteria and monitoring of these criteria after the Scheme is completed is dependent on support from the Climate Action Fund and Ireland's National Recovery and Resilience Plan or other sources of funding.

Summary of measures:

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

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

Timeframe:

- 2021-2022: Short-term planning actions.
- 2022: Short-term practical actions.
- 2022-2025: Any Long term practical actions; Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.
- 2025: Decommission silt-ponds, if necessary.

Budget and Costing

- The rehabilitation plan outlined in this document is predicated on the understanding that it is the Minister's intention to support Bord na Móna in developing a package of measures, 'the Scheme', for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme'. *However, only the additional costs associated with the additional and enhanced rehabilitation, i.e., measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support.*
- In relation to the pre-existing Condition 10 IPC Licence requirement to carry out what can be termed the 'standard' decommissioning and rehabilitation, Bord na Móna maintains a Provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. This is updated every year. For more information see the Bord na Móna Annual Report (Bord na Móna 2021). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.

Monitoring, after-care and maintenance

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

- Quarterly monitoring assessments of the site to determine the general status of the site, assess the condition of the rehabilitation work, assess the progress of natural colonisation, monitoring of any potential impacts on neighbouring land and general land security. The number of site visits will reduce after 2 years to bi-annually. These site visits will assess the need to additional rehabilitation, if needed.
- **Water quality monitoring** will be established. Monitoring of key water quality parameters for a minimum of 2 years after rehabilitation will include: Ammonia, Phosphorous, Suspended solids (silt) & Ph.
- Where other uses are proposed for the bog, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the required assessment and planning procedures.

Additional Monitoring:

- The monitoring and validation of re-vegetation via natural colonisation and changes in bog condition will be carried out using an aerial survey, after rehabilitation measures are implemented. It is proposed that sites can be monitored against this baseline in the future.
- Biodiversity Ecosystem services will be monitored using specific indicators.
- Carbon emissions monitoring only be carried out on a small proportion of BnM sites to develop better understanding of carbon emissions and GHG emission factors from different types of BnM sites and will be developed on association with other established research programmes. Reduction in carbon emissions will be modelled by a combination of habitat condition assessment and application of appropriate carbon emission factors derived from other sites. Baseline monitoring (habitat condition) will be carried after rehabilitation is completed (during the Scheme). It is proposed that rehabilitated sites can be monitored against this baseline in the future.

Validation and IPC Licence surrender

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

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

DRAFT

1. INTRODUCTION

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Allen-Lullymore bog group (Ref. P0503-01). 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. Timahoe South bog is part of the Allen-Lullymore bog group (see Appendix II for details of the other bog areas within the Bog Group). Timahoe South Bog is located in Co. Kildare.

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

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

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

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

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

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

It is envisaged that the enhanced rehabilitation scheme will support activities, interventions, or measures across the Bord na Móna cutaway peatlands which accelerate the original timelines. Selected rehabilitation measures

will take account of site environmental conditions, which can vary significantly. These measures potentially include:

- more intensive management of water levels through drain-blocking, re-profiling and cell bunding or the creation of berms;
- 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 subject 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 hence 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.

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

1.1 Constraints and Limitations

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0503-01:

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

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

This document covers **Timahoe South Bog**.

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

Industrial peat extraction at Timahoe South to supply various power stations permanently ceased in the 1980's. Currently the former peat production areas comprise a mosaic of largely pioneering cutaway habitats, in addition to marginal¹ habitats.

A portion of Timahoe South has been re-developed in recent years to build the Drehid Waste Management Facility. This area is now excluded from the IPC license extent.

In addition a consented (2013) Mechanical Biological Treatment (MBT) Facility (Drehid MBT Facility) is to be located ca.1km to the south of the waste facility, and is presently (2021) under construction. Other land is under consideration for a proposed extension to the waste management facility.

A further portion of the bog, within the present IPC license extent is currently under consideration for a renewable energy development.

The proposed Irish Water Shannon Pipeline corridor traverses the north-western margin of Timahoe South Bog.

It is anticipated that the combination of active enhanced rehabilitation measures and natural colonisation will quickly accelerate environmental stabilisation. Nevertheless, it will still take some time (30-50 years) for naturally functioning peatland ecosystems to fully re-establish.

Some sections around the margins have been licensed to 3rd parties for sod turf cutting by Bord na Móna in recent years. This activity is now ceased. There have been ongoing issues with trespass (burning & some turf-cutting) at the site, which are currently being managed.

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

Rehabilitation in other areas of the bog may also be constrained due to other property issues or issues such as rights of way, the presence of firebreaks or underground cabling. There are a number of archaeological features described for the northern portion of Timahoe South which may constrain PCAS activities.

Timahoe South is subject to gravity drainage. It had been previously pumped in the past, but these pumps have been decommissioned.

The BnM industrial rail line at Timahoe South is now redundant and no longer in use.

¹ Marginal land is defined as land around the margin of the industrial peat production area. This margin generally contains a range of habitats including scrub, Birch woodland, cutover bog and raised bog remnants.

2. METHODOLOGY

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

The ecological information and site information collected during the Bord na Móna ecological baseline survey, additional confirmatory site visits (covering the period 2012 to 2021 inclusive) and monitoring and desktop analysis forms the basis for the development of the rehabilitation plan for the bog, along with:

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

2.1 Desk Study

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

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- 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:

- Blackwater Integrated Pollution Control Licence;
- Blackwater Annual Environmental Reports;
- Review of the National Biodiversity Data Centre (NBDC) web mapper;
- Inland Fisheries Ireland (IFI) Reports;
- Environmental Protection Agency database (www.epa.ie);
- EPA Guidance on Requests for Alterations to a Licensed Industrial or Waste Activity;
- BirdWatch Ireland online data (including I-WeBS and CBS datasets; www.birdwatchireland.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Historic Environment Viewer at <https://webgis.archaeology.ie/historicenvironment/>
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);

- Water Framework Directive catchments.ie/maps/ Map Viewer (www.catchments.ie);
- OPW Indicative Flood Maps (www.floodmaps.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie);
- River Basin Management Plan for Ireland 2018 – 2021;
- Bord na Móna Annual Report 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 are contacted during the rehabilitation planning process for their views. See Section 4.

2.3 Field Surveys

Bord na Móna carried out a baseline ecological survey of all of its properties in 2009-2012 and developed habitat maps. As part of this exercise, Timahoe Bog was surveyed in April of 2010. Additional ecological walk-over surveys and visits have taken place between 2010-2021 (visited during winter of 2012 and 2016), but also final confirmatory surveys took place in August and September of 2021. Habitat maps have been updated, where required. This rehabilitation plan is informed by the original baseline survey as well as subsequent confirmatory site walk-over surveys and visits, and updates to baseline data.

Habitat mapping followed best-practise guidance from Smith *et al.* (2011). Map outputs including all habitat maps and target notes were produced using GIS software application packages (ArcGIS). General marginal habitats and other habitats that had not been modified significantly by industrial peat extraction were classified using Fossitt *et al.* (2000). Plant nomenclature for vascular plants follows Stace (2010), while mosses and liverworts nomenclature follows identification keys published by the British Bryological Society (2010). A more detailed Bord na Móna classification system was previously developed for classifying pioneer cutaway habitats as Fossitt categories were deemed not to be detailed enough for cutaway bog (much of cutaway bog could be classified as Cutover Bog - PB4). Much of the pioneer cutaway vegetation is still at an early stage of its development and cannot be assigned to Fossitt Level 3 categories yet. A site visit was used to categorise any changes in habitat extent at Timahoe South in August and September of 2021.

A detailed ecological survey report for Timahoe South is contained in Appendix II.

3. SITE DESCRIPTION

Timahoe South Bog is located 2km north of Allenwood, in Co. Kildare. It is flanked to the southwest by the Lullymore complex of bogs and to the immediate north by Timahoe North Bog. The R403 and Grand Canal are to the south, and Giltown Bog is to the north east.

Industrial peat extraction has ceased at Timahoe South Bog for 30-40 years allowing the majority of the bog to develop a mosaic of Birch woodland, wetland and peatland habitats. Part of the bog was developed for waste management (Drehid) in the 2000's. There has been ongoing turf cutting in peripheral areas. These areas are largely bare peat.

The main landscape feature in this area is the Bog of Allen.

See Drawing number BNM-DR-23-19-01 titled **Timahoe South Bog: Bog Site Location**, included in the accompanying Mapbook², which illustrates the location of Timahoe South Bog in context to the surrounding area.

3.1 Status and Situation

3.1.1 Site history

Timahoe South bog came into production in the 1940's. Production of sod peat by Bord na Móna ceased in the 1980's. Peat production at Timahoe was never fully converted to milled peat extraction. The majority of the site has developed as cutaway since then. There is still a significant amount of peat still present in Timahoe (fuel peat layers).

Private sod-peat cutting has also been undertaken at a number of locations at Timahoe South in the past.

3.1.2 Current land-use

Much of Timahoe South is older cutaway and has been developing 30-40 years. This land is largely vegetated and is developing a mosaic of woodland, grassland, wetland and peatland habitats. A portion of the bog has continued to be used for sod peat production. This was licenced (in part) to third parties by Bord na Móna. However this activity has now ceased and no more licences to cut turf will be issued by Bord na Móna. In addition, there has been ongoing turf-cutting trespass at Timahoe South, which is being managed by Bord na Móna.

Industrial peat production has now permanently ceased at Timahoe South.

A portion of Timahoe South has been re-developed in recent years to build the Drehid Waste Management Facility. The original footprint of this facility was removed from the Allen-Lullymore IPC License. In addition a consented (2013). Mechanical Biological Treatment (MBT) Facility (Drehid MBT Facility) is to be located ca.1km to the south of the waste facility, and is presently (2021) under construction.

Some cutaway bog is being considered for an expansion of the Drehid waste management facility. This project is in the pre-planning stage.

A further portion of the bog, within the present IPC license extent is currently under consideration for a renewable energy development (solar project). The footprint of this proposed area has already been identified.

² Cutaway Bog Decommissioning and Rehabilitation Plan – Timahoe South Bog Map Book

3.1.3. *Socio-Economic conditions*

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

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

In respect of Timahoe South Bog, jobs provided during the peat extraction phase would have included those to facilitate extraction of peat at this site, and associated processing and transfer to the relevant power station (Allenwood) from operation until its decommissioning in the mid-1990's.

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

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

3.2 **Geology and Peat Depths**

3.2.1 *Sub-soil geology*

Due to its size, subsoil geology at Timahoe South varies however most of the underlying geology is categorised as 'Waulsortian limestones' comprising massive, unbedded limestone; nodular & muddy limestone & shale as part of the Boston Hill Formation is also present, along with thick bedded limestone as part of the Allenwood formation.

Basal peat in Timahoe South, is largely underlain with limestone till.

3.2.2 *Peat type and depths*

Peat depths at Timahoe South are 0-2.5m on average, however ca. one third of the bog has peat depths of 1m or less. Much of the residual peat in Timahoe South is somewhat more acidic peat. Some remnant high bog areas have at least up to 5m depth of peat present.

See Drawing number BNM-DR-23-19-04 titled **Timahoe Bog: Bog Peat Depths**, included in the accompanying Mapbooks.

3.3 Key Biodiversity Features of Interest

Industrial peat production has ceased at Timahoe South for nearly 30 years. In that period there has been extensive re-vegetation. The majority of the bog has already re-vegetated, although habitat development is at different stages, and there is still some bare peat associated with turf-cutting. Older sections are developing dense Birch woodland and scrub, while areas where there was more recent activity tend to have younger pioneer poor fen vegetation communities. The breakdown of drainage within the site has led to more recent development of some wetland. There has been regular burning at the bog in recent years, resulting in fresh pioneering vegetation. A large area was affected by fire in 2020.

3.3.1 Current habitats

The most common habitats present at this site include (Codes in brackets refer to equivalent Heritage Council habitat classification, Fossitt 2000):

- Heather-dominated communities on cutover bog (PB4) dominated by Heather has developed over large areas of Timahoe South mainly in mosaic with grassier areas of Bog Cotton and also with various stages of scrub. In most areas where this habitat occurs trees are establishing, forming scrub mosaics.
- Birch scrub at emergent, open and closed stages of development. Some sections have developed sufficiently to be classified as Birch woodland (WN7). The north-eastern section adjacent to the conifer plantation contains significant naturally colonising Pine that dominates in some sections.
- Recolonising cutover (PB4) comprising Poor fen with Bog Cotton-dominated vegetation (It should be noted that this community contains more frequent indicators of acidic substrate (bog-wet heath vegetation) compared to other bogs. Other communities present include pioneering rush and sedge dominated communities.
- Cutover Bog (PB4). Parts of Timahoe South around the margin are being intensively cut for private sod peat production with bare peat and pioneer communities most common.
- Dry grassland (GS2) along the main railway embankments. This habitat occurs in association with patches of Nettle, Willowherb and Bramble. There is also a transitional zone dominated by Purple Moor-grass at the base of the embankment adjacent to the other cutaway habitats.
- Open water (FL1) with emergent wetland communities (poor fen) and some Reedbeds.
- Recolonising Cutover (PB4) comprising dense Bracken & dry Purple Moorgrass-dominated grassland on some low mounds.
- Raised bog (PB1), remnant sections of raised bog occur along some of the fringes of Timahoe South.
- Birch woodland (WN7) occurs in some small patches around the margins.
- Dry Meadow grassland (GS2).
- Scrub (WS1) (around margins, mainly dominated by Gorse, some dominated by Blackthorn).
- Riparian zones (old drains FW4) with associated fringe scrub.

See Drawing number BNM-DR-23-19-17 titled **Timahoe South Bog: Bog Habitat Map** included in the accompanying Mapbooks.





 <p><i>Poor fen on Cutover Bog at Timahoe South</i></p>	 <p><i>Embryonic (Sphagnum-rich) peat-forming habitat at Timahoe South</i></p>
 <p><i>Recolonising Trackway at Timahoe South</i></p>	 <p><i>Typical Recolonised Cutover at Timahoe South</i></p>

Table 1: Photos of Habitats at Timahoe South Bog.

3.3.2 Species of conservation interest

Bird species previously recorded at Timahoe South include the Amber listed ³Hen Harrier (*Circus cyaneus*) (occurs during the winter months and possibly roosts on site) and Whooper Swan (*Cygnus cygnus*) – no expansive wetlands are present for the latter but they have been noted utilising larger drains.

Species of bird breeding at Timahoe South include the Red listed Common Snipe (*Gallinago gallinago*) which likely uses the wetter habitats present to breed and Red listed Eurasian Woodcock (*Scolopax rusticola*).

The general assemblage of birds utilising the bog reflects the current extent of largely recolonised bare peat and emergent woodland and scrub with species such as Meadow pipit (*Anthus pratensis*), Eurasian Jay (*Garrulus glandarius*) and Raven (*Corvus corax*) recorded on recent visits in 2021 to inform Rehab Planning. Common Buzzard (*Buteo buteo*) and Kestrel (*Scolopax rusticola*), also occur. A Little Grebe (*Tachybaptus ruficollis*) was

³ Gilbert G, Stanbury A and Lewis L (2021), "Birds of Conservation Concern in Ireland 2020 –2026". Irish Birds 9: 523—544

present at the tailings pond for the waste facility in September of 2021. The waste facility itself attracts species such as gulls and Lesser Blacked Backed Gulls (*Larus fuscus*)(Amber listed) were recorded in September of 2021.

Mammal species known to occur include Irish Hare (*Lepus timidus hibernicus*), Badger (*Meles meles*) , Red Fox (*Vulpes vulpes*), Pine Marten (*Martes martes*) and Squirrel (most likely Red).

Marsh Fritillary (*Euphydryas aurinia*) have been recorded in the 10km square N72 which overlaps the southern half of Timahoe South, but there are no on-site records. The Small Skipper (*Thymelicus sylvestris*) butterfly has been recorded at Timahoe South along the grassy verges of the onsite (no longer in use) rail network. This species is a recent colonist to Ireland (first recorded 2014) and has a restricted range (i.e. 3 no. 10km squares) in this part of Kildare.

3.3.3 Invasive species

Invasive alien species known to occur at the subject bog (or desktop review suggests presence is likely), and for which reasonably foreseeable source impact pathways for dispersal may result from the proposed PCAS are described here. Greater White toothed Shrew (*Crocidura russula*) was recorded from Timahoe South in September of 2021. Regarding invasive alien flora , Cotoneaster (*Cotoneaster* spp.) can be found near the old rail line in the west of Timahoe South in several locations. A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs, and although spatial overlap with the PCAS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during PCAS activities.

3.4 Statutory Nature Conservation Designations

Ballynafagh Bog SAC (Site Code 000391) is located 1.6km to the south east of Timahoe South and has as its qualifying interests; Active raised bogs [7110], Degraded raised bogs still capable of natural regeneration [7120] and Depressions on peat substrates of the Rhynchosporion [7150].

The Grand Canal pNHA (Site Code 002104) occurs less than 1km to the south of Timahoe South, but is hydrologically distinct. Hodgestown Bog NHA (Site Code 001393) occurs ca.1km to the east of Timahoe South and is designated for Raised Bog habitat.

Other pNHA's in proximity include Donadea Wood (Site Code 001391), ca.5km to the north east. There are no SPA's in close proximity to Timahoe South.

See drawing BNM-DR-23-19-23 **Timahoe Bog: Proximity to Designated Sites** for further information.

3.4.1 Other Nature Conservation Designations

The Ramsar Convention entered into force in Ireland on 15th March 1985. Ireland currently has 45 sites/wetlands designated as Wetlands of International Importance (Ramsar Sites). These cover a surface area of 66,994ha. There are no Ramsar Sites in the local vicinity of Timahoe-South Bog (i.e. within 3km) The closest Ramsar Site is Pollardstown Fen, the largest remaining spring fed fen in Ireland, which is ca.10km south.

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

3.5 Hydrology and Hydrogeology

The majority of Timahoe South is located in the Barrow catchment (the upper Ballinakill, the Figile_SC_010 and Slate_SC_010 sub-catchments). Part of Timahoe South forms part of the Boyne Catchment (Catchment ID : 07) as defined by the EPA under the Water Framework Directive (WFD) and is primarily situated within the Blackwater [Longwood]_SC_010 sub-catchment. The bog is located west of the civil parish of Timahoe and to the east of the village of Derrinturn. The bog contains several drainage pathways and discharge locations, with the majority of the bog discharging to the Blackwater river in the north of the bog. It should also be noted that the bog appears to drain into the Figile and Slate Rivers in the south of the bog. The nearest Water Framework Directive gauging monitoring points in the area is located 0.65km West of Timahoe South bog and the status was recorded as poor in 2015 (Q=2-3, Station Name: 0.6km u/s Parsonstown 14 Trib).

Regional hydrological data suggest that Timahoe South receives average precipitation of 795mm/yr (1981-2010), with an estimated evapotranspiration rate of c. 524mm/yr, leaving an average effective precipitation of 271mm/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 271mm/yr, which equates to an annual runoff rate of c. 2,710m³/ha.

Timahoe South has a gravity drainage regime currently. The bog was formerly pumped in the past but these pumps have been turned off and decommissioned. Initial hydrological modelling indicates the bog has several basins that will develop a mosaic of peatland and wetland habitats.

The west side of Timahoe South is drained by the Figile (EPA Code Figile_10) and Abbeylough (EPA Code Abbeylough_10) rivers, whilst the eastern side is drained by the Slate River (EPA Code Slate_040).

GSI data indicates that Timahoe South Bog is underlain by Waulsortian Limestones, Allenwood Formation and Boston Hill Formation. The Allenwood Formation is classified as a locally important karstified aquifer, while the other bedrock types are classed as Locally important aquifers which are moderately productive only in local zones. An area in the east of the bog overlaps a Locally Important Aquifer – Karstified. Geological Survey of Ireland (GSI) mapping does not identify any mapped karst features within close proximity to the bog. No data exists concerning depth to bedrock, although there is a small area of bedrock outcrop mapped close to the eastern boundary of the bog.

Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability maps are based on the type and thicknesses of subsoils (sands, gravels, glacial tills (or boulder clays), peat, lake and alluvial silts and clays), and the presence of karst features. Groundwater is most at risk where the subsoils are absent or thin and, in areas of karstic limestone, where surface streams sink underground at swallow holes.

Quaternary Sediment maps show Timahoe South to be underlain by peat, yet surrounded by inorganic deposits, including limestone till which is the dominant subsoil type in the surrounding area. There are also a number of a small pocket of gravels derived from limestones alluvium and marl to the west of the site. 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. Groundwater vulnerability for the surrounding areas is generally ranges between moderate to high, however, a number of extreme vulnerability areas have been mapped in areas where subsoils are thin.

Data used in compilation of the sub-peat map suggest that peat rests directly on glacial till across the majority of the site. Studies completed at Clara Bog, Co. Offaly indicate that glacial till derived from limestone material has a higher hydraulic conductivity than lacustrine deposits. In the case of Timahoe South, the vertical water losses are considered to be most significant in those areas where glacial tills directly underlie peat and there are strong downward gradients.

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 typically 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. In the case of Timahoe South however, limited silt pond infrastructure was created, as industrial peat production ceased in the 1980's, prior to IPC licencing.

Timahoe South bog has six surface water outlets, north to the Cushaling River (IE_SE_14F010100 FIGILE_020). The remaining outlets are to the east to the Allenwood Nth stream and on to the Slate River (IE_SE_14S010050 SLATE_040) and further outlets to the west to the Abbeylough River (IE_SE_14A010840 Abbeylough_010) which flows to the Figile River (IE_SE_14F010100 FIGILE_020)

Peat extraction was identified as pressure in the second cycle of the River Basin Management Plan in all three river catchments associated with Timahoe bog and is indicated as remaining so in the third cycle currently out for consultation.

Details of silt ponds (where applicable), associated surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed on the accompanying structures maps along with water quality maps. See Drawing numbers BNM-DR-23-19-02 titled **Timahoe South Bog: Structures and Sampling** along with Drawing number BNM-DR-23-19-WQ01 titled **Timahoe South Bog: Water Quality Map** in the accompanying Mapbook, which illustrate the various drainage and water quality infrastructure present at Timahoe South.

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 are 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 14 months from September 2020 to Dec 2021 and indicate the baseline water quality from one of the largest catchments in the bog. Timahoe Sth. was never utilised for milled peat extraction and ceased all sod turf extraction in the 1980's, so the baseline results represent a baseline status not linked to active milled peat extraction, which is not the case with the majority of peatlands schedule for rehabilitation. During this monitoring period, suspended solids and ammonia indicating a slight upward trend, most likely linked to normal weather patterns over the seasons. All other parameters fluctuated slightly, most likely influenced by normal weather patterns, especially rainfall.

Monthly ammonia concentrations from August 2020 to December 2021 had a range of 0.007 to 0.593 mg/l with an average of 0.180 mg/l. Results for suspended solids for the same period indicate a range of 2 to 16mg/l with an average of 5.8 mg/l.

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

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

Water will still discharge from designated emission points when rehabilitation at Timahoe South has been completed. This discharge will have improving water quality and there will be increased wetland attenuation, meaning slower release of water. This is expected to have a positive impact on status of the key water body receptor, the Barrow, and is expected to support the future status of the waterbody as being of Good Status.

Decommissioning and Rehabilitation Programme Water Quality Monitoring.

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

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

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

In the preparation of this monitoring programme, Bord na Mona have been providing the Local Authority Water Programme (LAWPRO) with details of the surface water emissions points associated with this bog and will be amending some of the proposed monitoring locations on foot of this engagement. LAWPRO have in turn provided details of their 2021 monitoring programme and these are included in the Water Quality Map.

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

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

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

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

3.7 Fugitive Emissions to air

The bog is no longer in industrial peat production. Rehabilitation of the cutaway peatland will seek to re-wet the dry peat where possible, and re-vegetate all areas (whether wet or dry).

3.8 Carbon emissions

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

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

It is expected that a significant part of Timahoe South Bog will become a reduced Carbon source following rehabilitation. The potential of any cutaway site to develop as a carbon sink in the longer-term depends on the success of the rehabilitation measures, the extent of development of *Sphagnum*-rich or other peat-forming habitats, the balance of carbon fluxes from different cutaway habitats and future climatic conditions. Some *Sphagnum*-rich vegetation has already developed on Timahoe South Bog in suitable hydrological conditions and the key objective will be to expand/or replicate the footprint of these suitable hydrological conditions. This habitat has potential to develop as a carbon sink for Green-house gases. Sections of this site has potential to develop *Sphagnum*-rich habitats eventually, in combination with drier Heather-dominated vegetation and Birch woodland. There will also be smaller amounts of Reed Swamp and fen habitats with alkaline emission factors. Birch woodland is expected to develop on any drier mounds and peripheral headlands which are currently devoid

of vegetation. It is noted that Timahoe South already has some areas (in the north east) naturally colonising with Pine, which will likely become wooded in the future.

3.9 Current ecological rating

(Following NRA (2009) Evaluation Criteria)

A large part of the site can be rated as having a **medium-high local ecological value (D-C)** as it contains cutaway of medium-high local value. The active (private) peat production areas have a lower ecological value (**E**).

DRAFT

4. CONSULTATION

4.1 Consultation to date

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

There has been ongoing consultation about rehabilitation, biodiversity and other general issues over the years about the Allen-Lullymore group bogs including Timahoe South 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.
- Biodiversity Action Plan Review – held in Lullymore in 2018.
- Consultation with Butterfly Conservation Ireland and Dublin Naturalists Field Club regarding the presence of Small Skipper on site.
- Peatland rehabilitation in Kildare (2020) (presentation to Kildare County Council and public representatives).
- Peatland rehabilitation in Kildare (2020) (presentation to local Green Party representatives).
- Consultation regarding bog-fires, trespass and anti-social activities with local representatives and local Garda and Fire Service staff in 2020.
- Consultation with the Natural Heritage Council regarding butterfly habitats and turf-cutting activities (2020).
- Midlands & East Regional WFD Operational Committee (River Basin Management Plans).
- Archaeological Liaison Committee (National Museum of Ireland & Dept of Culture Heritage and the Gaeltacht).
- Consultation in relation to the Drehid waste management facility and ongoing development is not part of this process.

To inform the current Plan, both national and local stakeholders, including neighbours whose land adjoins Timahoe South and local representatives of national bodies (such as Regional National Parks and Wildlife Service staff) and relevant offices in County Councils (such as the Heritage or Environmental Offices) will be contacted. Any identified local interest groups will be sought and informed of the opportunity to engage with this rehabilitation plan, and when identified invited to submit their comments or observations in relation to the proposed rehabilitation at Timahoe South Bog.

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

4.2 Issues raised by Consultees

N/A Yet as consultation has not commenced.

4.3 Bord na Móna response to issues raised during consultation

N/A Yet as consultation has not commenced.

5. REHABILITATION GOALS AND OUTCOMES

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

- Meeting conditions of IPC Licence.
- Stabilisation or reduction in water quality parameters of water discharging from the site (e.g. suspended solids).
- Reducing pressure on receiving waterbodies that have been classified as At Risk from peatlands and from peat extraction, via stabilization or improving water-quality from this bog, and therefore, reducing pressures.
- A significant part of the site has already largely vegetated and is developing more mature habitats. These areas are considered rehabilitated. The aerial photos demonstrate the contrast between the older vegetated cutaway and areas used recently for turf cutting. More intensive PCAS measures will be focused on bare peat areas. Targeted drain-blocking and other measures will be focused on suitable areas that have already revegetated, to improve their hydrological condition, where possible.
- Optimising hydrological conditions for **climate action benefits as part of PCAS**.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities on deep peat, or reed swamp and fen on shallower more alkaline peat and other subsoils, where possible.
- Optimising hydrological conditions for the development of active raised bog on extant high bog, where possible.
- Optimising hydrological conditions for the protection of any exposed archaeological structures, their retention in situ and preservation into the future, where possible.
- Supporting current and future waste management infrastructure. Integrating rehabilitation measures with current waste management infrastructure. It is not proposed to carry out any rehabilitation actions to change or negatively affect any infrastructure. It is proposed to optimise hydrological conditions and re-wet areas in the surrounding cutaway peatland.
- Integrating peatland rehabilitation with future planned renewable energy infrastructure on site. It is proposed to optimise hydrological conditions and re-wet areas in the surrounding cutaway peatland.
- The main goal and outcome of this plan is the successful rehabilitation (environmental stabilisation) of peatlands used for industrial peat extraction 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.

- Rehabilitation goals and outcomes that have been set for this bog take account of the **current and planned land-uses and to balance different needs**.
- It will take some time for stable naturally functioning habitats to fully develop at Timahoe South. This will happen over a longer time-frame than the implementation of this rehabilitation plan.
- Re-wetting residual peat will initially maintain and enhance the carbon storage capacity of the bog. There is scientific consensus that restoration of hydrology in damaged bog can improve carbon storage, water storage and attenuation and help support biodiversity both on the site and in the catchment (See Section 3.8). This will reduce carbon emissions from the site from a larger carbon source to a smaller carbon

source. In time, the site has the capacity to develop in part as a carbon sink. PCAS is expected to deliver significant contributions to Ireland's climate action.

- It is not expected that the site has the potential to develop active raised bog (ARB) analogous to the priority EU Habitats Directive Annex I habitat within the foreseeable future (c.50 years). Furthermore, only a proportion of the bog has potential to develop *Sphagnum*-rich habitats in this timeframe. Nevertheless, re-wetting across the bog, as part of the Scheme, will improve habitat conditions of the whole bog. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.
- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as the development of new habitat to support biodiversity and local attenuation of water flows from the bog.
- WFD status in receiving water bodies can be affected by peatlands and peat extraction, but is also affected by other sources such as agriculture. In addition, receiving water bodies that are assessed as At Risk from peatlands and from peat extraction are likely to have several contributory sources of impacts (private peat extraction and Bord na Móna). Reducing pressures due to former peat extraction activities at Timahoe South will contribute to stabilising or improving water quality status of receiving water bodies in general. Ultimately, improving the WFD status of the receiving water-body will depend on reducing pressure from a range of different sources, including peatlands in general (private and Bord na Móna).
- Bord na Móna are also planning rehabilitation measures in some adjacent bogs in 2022 (e.g. Lodge Bog). There are expected to be cumulative water quality and other ecosystem service benefits to receiving water bodies such as the River Barrow from rehabilitating more than one bog in the same catchment.
- Re-wetting in general will benefit the future preservation of most known and unknown archaeological features. An Archaeological Impact Assessment (AIA) is to be carried out under the PCAS scheme.

6. SCOPE OF REHABILITATION

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

- The area of Timahoe South.
- EPA IPC Licence - Ref. P0503-01. 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. Timahoe South is part of the Allen Lullymore 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 Timahoe South, in particular, optimising **climate action benefits**. The proposed interventions will mean that environmental stabilization is achieved (meaning IPC obligations are met) and, in addition, significant other ecosystem service benefits particularly for climate action will be accrued.
- The local environmental conditions of Timahoe South mean that deep peat measures along with some dry cutaway prescriptions are the most suitable rehabilitation approach for this bog. Timahoe South Bog had a gravity drainage regime currently but does have residual deep peat along with (heavily vegetated) shallower areas.
- The key goals and outcomes of rehabilitation set by Bord na Móna. Bord na Móna have defined the key goal and outcome of rehabilitation at Timahoe South as **environmental stabilisation, optimising residual peat re-wetting, and the development of embryonic raised bog on deep peat along with wetlands/Reed Swamp and fen on shallow more alkaline peat and other subsoils and areas where there is likely to be deeper water**.
- The cutaway is already developing a mosaic of woodland, grassland, wetland and cutaway peatland habitats. Much of this vegetation has largely stabilised. Rehabilitation is proposed to enhance residual peat re-wetting and other ecosystem services in these areas while taking account of the current infrastructure and land-uses.
- Current land-use. The bog supports a waste management facility. This area is constrained out of the rehabilitation plan. Rehabilitation measures will be integrated with current waste management infrastructure. Other land-use related constraints are firebreaks and underground cabling.
- Proposed future land-use. Bord na Móna are reviewing Timahoe South Bog for potential to develop a renewable energy project. A footprint has been identified for this potential solar energy project. An additional area is proposed for an expansion of the waste management infrastructure. This area is constrained out of the rehabilitation plan.
- Rehabilitation of Timahoe South will support multiple national strategies of climate action, biodiversity action and other key environmental strategies such as the Water Framework Directive.
- The time frame for the delivery of the planned rehabilitation will be undertaken according to available resources and appropriate constraints.
- It is proposed to carry out some targeted rehabilitation (drain-blocking) on some raised bog remnants around the margins of Timahoe South.

6.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, there is potential for raised bog restoration at some sites where there has not been significant industrial peat extraction and the peat body is largely intact (deep peat

sites that are drained). At other sites, most of the peat mass has been removed, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status, etc.) and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland).

- **Timahoe South Bog is already largely vegetated and stabilised with Birch woodland developing in the drier areas.** Rehabilitation measures are designed to take account of the vegetation and habitats that has already developed, to minimise disturbance to existing vegetation, but to optimise hydrological conditions. Hydro-geological assessments indicate that peat at this bog is underlain by glacial till, which is likely to promote downward vertical water-losses (as glacial till is more permeable compared to marl or clay for example). This means that future peatland habitat outcomes at Timahoe South are expected to be drier compared to other sites.
- Peat Production at Timahoe South commenced in the 1940's, and finished in the 1980's. Remaining peat depths are typically up to 2.5m deep for the most part. Some deeper areas persist around the margins.
- **Surrounding landscape and neighbours.** Another key constraint is the interaction between the Bord na Móna sites and the surrounding landscape. Care has to be taken that no active rehabilitation management is carried out that could negatively and knowingly impact on surrounding land. This includes any hydrological management on neighbouring farmland or forestry. It is anticipated that the work proposed here (blocking drains and re-wetting cutaway peatlands) will not have any flooding impacts on adjacent land. Cognisance has also been given to the requirement for firebreaks to alleviate fire risk to neighbouring lands.
- **Current land-use.** The bog supports a waste management facility (Drehid). It is planned to integrate rehabilitation measures with current waste management infrastructure. It is not proposed to carry out any rehabilitation actions to change or negatively affect any infrastructure. Some key drainage will be left unblocked to facilitate this current land-use. The original footprint of the Drehid facility has already been removed for Allen-Lullymore IPC License. The Drehid facility is likely to have some indirect influence on the hydrology of the surrounding peatland habitats. In addition underground cabling adjacent to the waste facility access road is treated as a constraint.
- **Future land-use.** The area being considered for a potential renewable energy project. It is not proposed to carry out any rehabilitation actions to within this footprint in advance of submission of planning for this project. Some key drainage will be left unblocked to facilitate this potential project. This project is currently in pre-planning. The proposed project does not change the overall goals and outcomes of the proposed rehabilitation (re-wetting residual peat) for the overall site, and where possible is a temporal constraint on the scope of rehabilitation. See Timahoe South Bog: Mapbook, which outlines the proposed cutaway footprint to be rehabilitated with PCAS enhanced rehabilitation measures (drawing number BNM-DR-23-19-05: Enhanced Rehab Measures and BNM-DR-23-19-20: Standard Rehab Measures).
- **Proposed Water Supply Project – Eastern and Midlands Region (Irish Water).** This proposed Irish Water Project that is currently in the pre-planning stage also traverses the north-western section of Timahoe Bog. It is expected that the enhanced rehabilitation measures planned for Timahoe South 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.

- The route of the proposed Water Supply Project 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.
- **Archaeology.** The discovery of monuments or archaeological objects during peatland rehabilitation may potentially constrain the rehabilitation measures proposed for a particular area. While the rehabilitation will optimise hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future, any new archaeology may require rehabilitation measures will be reviewed and adapted. If this occurs, rehabilitation measures will be reviewed and adapted. An Archaeological Impact Assessment (Appendix XII) will be carried out to mitigate against any impact on found archaeology at Timahoe South. The proposed rehabilitation will have no impact on any known archaeological material in the application area or the vicinity. In the worst-case scenario works affecting the surface and sub-surface of the bog might disturb previously unknown archaeological deposits or artefacts without preservation by record taking place. Should any previously unknown archaeological material be uncovered during the rehabilitation works, it will be avoided and reported to Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland. There currently some known features in the north of the bog.
- **Public Rights of Way.** Where a public right of way or similar burden exists on Bord na Móna property, consideration will be given to ensuring that this remain intact where possible. In some instances, depending upon previous land uses and management, alternative solutions may be required. These will be explored in consultation with local communities and statutory bodies during the consultation work associated with the decommissioning and rehabilitation work described here.
- **Third party registered lands.** Have been constrained out. These mainly relate to turbary.

6.2 Key Assumptions

- It is assumed that Bord na Móna will have all resources required to deliver this project.
- It is expected that weather conditions will be within normal limits over the rehabilitation plan timeframe. Long periods of wet weather have the capacity to significantly affect ground conditions and constrain drain blocking and other ground activities.

6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- **Current land-use.** Part of Timahoe South is also developed for waste management infrastructure. This area was removed for the IPC License (as it is licenced via waste management). This is not considered part of the scope of the rehabilitation plan.
- **Future land-use.** Planned renewable energy development. Any proposed rehabilitation measures (i.e. targeted drain-blocking) will be integrated to enable any future renewable energy development. It is expected that the rehabilitation measures planned for Timahoe South will be carried out in advance of the potential development of this project, which will be still subject to planning consent. Bord na Móna do not propose to carry out any rehabilitation works within the footprint of this potential project. It is expected that the footprint of this project will be rehabilitated post the construction of the proposed renewable energy project. The peatland rehabilitation will either be in association with a potential renewable energy project, with peatland rehabilitation integrated into the proposed project, or will be

completed in the absence of any proposed renewable energy project. Bord na Móna remain committed to rehabilitating all of Timahoe South Bog and meeting conditions of the IPC License for this bog.

- The longer-term development of stable naturally functioning habitats at this bog.
- This plan is not intended to be an after-use or future land-use plan for Timahoe South.
- The longer-term management of this site, potentially for nature conservation, or for amenity, or for other uses in the future.

DRAFT

7. CRITERIA FOR SUCCESSFUL REHABILITATION

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

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

Rehabilitation is generally defined by Bord na Móna as

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

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

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

As the monthly monitoring program at Timahoe South Bog continues in 2022, during the rehabilitation works, and data from the 2020/21/22 monitoring program is compiled, further trending will be produced to verify any ongoing trends.

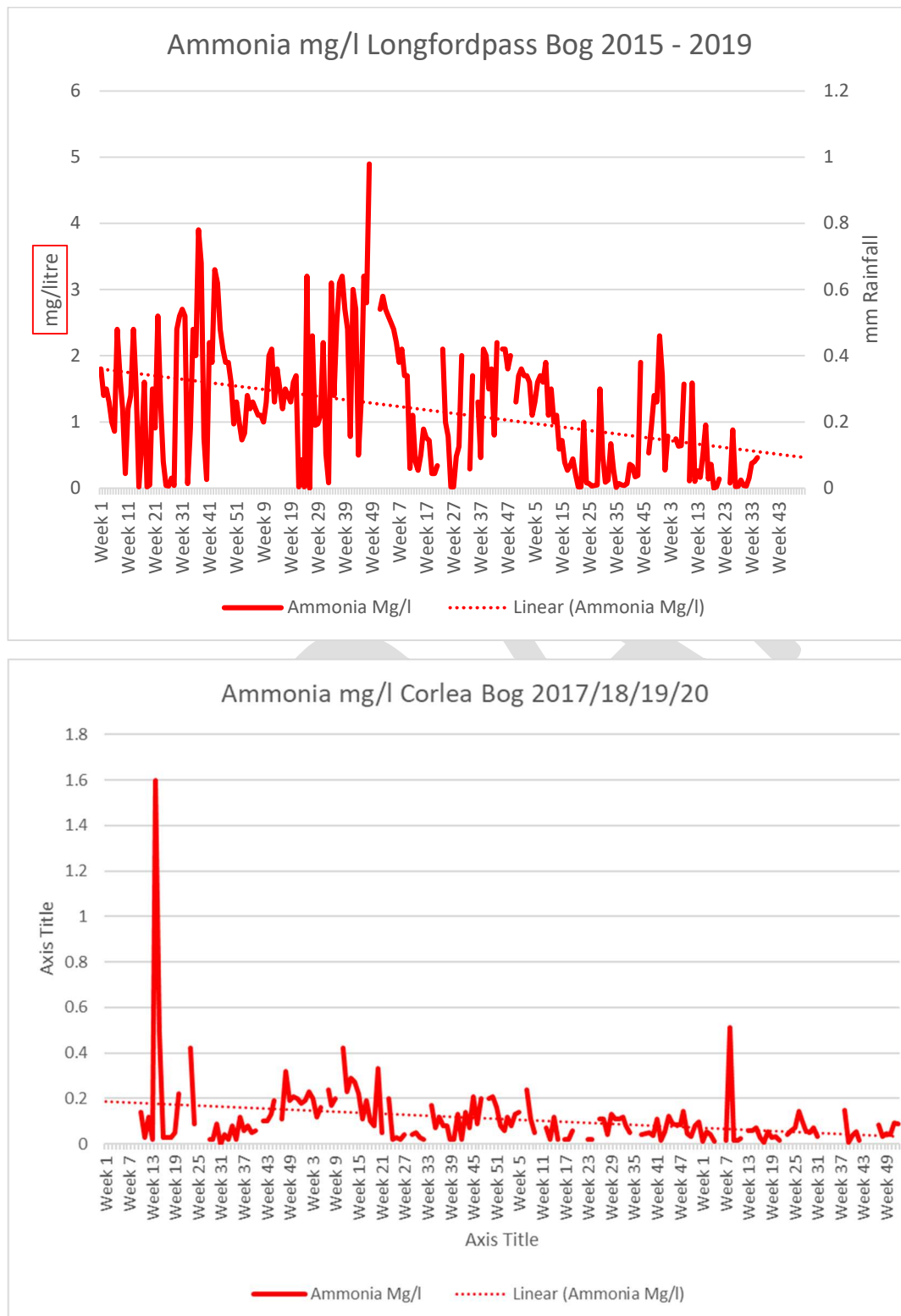


Figure 7.1. Ammonia levels over the period 2015-2019 at Longfordpass and Corlea.

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

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

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

Criteria type	Criteria	Target	Measured by	Expected Time-frame
IPC validation	Rewetting in the former area of industrial peat production	Delivery of rehabilitation measures Reduction in bare peat.	Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking) Establishment of a baseline for future monitoring of bare peat, vegetation establishment and habitat condition.	2022-2025
IPC validation	Key water quality parameters Ammonia, Phosphorous, Suspended solids, pH and conductivity	Reduction or stabilisation of key water quality parameters associated with this bog	Water quality monitoring for a period after rehabilitation has been completed	2021-2024
IPC validation	Reducing pressure from peat production on the local water body catchment (WFD)	Where this section of the water body, that this bog drains to, has not been identified as under pressure from peat extraction, that the intervening EPA monitoring programme associated with its Programme of Measures for this water body, confirms that its classification remains at not being at risk from peat extraction associated with activities at this bog.	EPA WFD monitoring programme	WFD schedule

Climate action verification	Optimising the extent of suitable hydrological conditions to optimise climate action	Optimal extent of suitable hydrological conditions	Aerial photography and Habitat mapping to map extent of suitable hydrological conditions. Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	2022-2025
Climate action verification	Reduction in carbon emissions.	Reduction in carbon emissions	Carbon emissions – estimated using a bog condition assessment and appropriate carbon emission factors.	2022-2025
Climate action verification	Setting the site on a trajectory towards establishment of a mosaic of compatible habitats	Establishment of compatible cutaway habitats	Habitat map, Cutaway bog condition map Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	2022-2025
Climate action verification	Biodiversity and ecosystem services. Habitat establishment Presence of key species – Sphagnum	Improvement in biodiversity and ecosystem services.	Metrics that relate to selected biodiversity and ecosystem services Presence of key species – Sphagnum – Walkover survey	2022-2025

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

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

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

- **Funding to pay for resources required to deliver the planned rehabilitation (Bord na Móna and external).** Bord na Móna maintains a Provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence. It is expected that additional costs of enhanced rehabilitation will be supported by Government.
- **Bord na Móna to have sufficient resources (staff and training) to deliver the planned rehabilitation with required associated skills and competencies.**
- **Bord na Móna to have sufficient resources (suitable machinery) and staff to maintain this machinery.**
- **Weather conditions to be within normal limits over the rehabilitation plan timeframe.** Long periods of wet weather have the capacity to significantly affect ground conditions and constrain the delivery of rehabilitation. The potential impact of wet weather on ground conditions can be reduced by appropriate planning and management. Bord na Móna have significant experience of managing these issues through 70 years of working in these peatland environments.
- **Rehabilitation measures to be effective.** The rehabilitation measures proposed in this plan are based on 40 years of Bord na Móna experience of peatland management and best practise applied internationally in peatland management. Measures proposed in this plan have already been shown to be effective at other sites. Bord na Móna will apply a flexible and adaptable approach to the more innovative rehabilitation measures proposed in this plan. If measures are not initially effective, Bord na Móna will review any requirement for additional practical rehabilitation.
- **Natural colonisation of vegetation to develop semi-natural habitats at a rate within the normal limits.** The development of naturally functioning semi-natural habitats on degraded bog takes time. It may take 30-50 years for active raised bog vegetation to re-develop on suitable cutaway that was previously bare peat. However, Bord na Móna experience has demonstrated the effectiveness of these type of measures for re-wetting bog and creating carbon sinks (Renou-Wilson et al. 2018).
- Rehabilitation measures have been designed to accelerate and work with natural colonisation and other natural processes. Bord na Móna experience of rehabilitation has shown that re-wetting improves conditions for natural colonisation and that natural colonisation is accelerated where the environmental conditions are most suitable. Rehabilitation measures have been designed to modify the conditions of areas within sites where conditions are less suitable for natural colonisation (modifying hydrology, topography, nutrient status or availability of potential seed sources).
- **Monitoring to be robust and effective.** Rehabilitation Monitoring will be established to validate the success of rehabilitation as required by Condition 10 of the IPC Licence and to verify the benefits of the proposed enhanced measures to optimise climate action. This will focus on collecting a range of scientific data that can then quickly be adapted into metrics that can be used to measure changes in various ecosystem services.

8. REHABILITATION ACTIONS AND TIME FRAME

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

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

BNM-DR-23-19-22 titled **Timahoe South Bog: Aerial Imagery** 2020

BNM-DR-23-19-04 titled **Timahoe South Bog: Peat Depths**

BNM-DR-23-19-03 titled **Timahoe South Bog: LiDAR Map**

BNM-DR-23-19-09 titled **Timahoe South Bog: Depression Analysis**

The rehabilitation actions themselves will be a combination of PCAS measures to re-wet peat. The distribution of these measures is provisionally outlined in drawing titled **BNM-DR-23-19-05 Timahoe South Bog: Rehabilitation Measures** in the accompanying Mapbook (Note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.)

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

- Deep Peat measures including drain blocking, the creation of berms and re-profiling on bare peat where needed, resulting in bunded areas suitable for *Sphagnum* colonisation, on deeper peat;
- Modifying outfalls, and management of water levels with overflow pipes and blocking of internal outfalls;
- Regular drain blocking (3/100) on dry cutaway along with the blocking of outfalls and management of water levels, as additional works;
- Intensive drain blocking (up to 7/100m) on targeted Marginal land drains;
- Intensive blocking of drains in targeted marginal (drained) raised bog remnants around the margins of Timahoe South and re-wetting, where possible, using an excavator to install peat blockages.
- Targeted fertiliser applications (where required and where constraints allow) to accelerate vegetation establishment on areas of **bare peat** on headlands and high fields, and within certain areas of dry cutaway. Areas where vegetation has established do not need fertiliser application.
- Initial hydrological modelling indicates that a part of the rehabilitated extent will develop a mosaic of wet peatland and wetland habitats with the potential for some deeper water. Hydrological management will look to optimise summer water levels to maximise the development of wetland vegetation (by looking to set water depths at < 0.5 m, where possible. It is inevitable that some small sections will naturally have deeper water due to the topography at this site). Water-levels will be adjusted at outfalls and by adjusting piped drainage.

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

Type		Enhanced Rehabilitation Measure	Extent (Ha)
Deep Peat	DPT 2	More intensive drain blocking (max 7/100), blocking outfalls and Sphagnum inoculation	27.8
Deep Peat	DPT 4	Berms (45x60m cell), blockings, drains, blocking outfalls and managing overflows & drainage channels for excess water & Sphagnum Inoculation	357.3
Marginal land	MLT1	No work required	48.2
Marginal land	MLT2	More intensive drain blocking (max 7/100 m)	31.1
Silt ponds	Silt pond	Silt ponds	1.4
Dry Cutaway 1	DCT1	Blocking Outfalls and managing water levels with overflow pipes	179.5
Additional Works	AW2	Drain blocking and outfall management	217.9
Constraint	Constraint	Other Constraints	843.9
Archaeology	ARCH	Archaeology Zone	0.5
Total			1707.4

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

- Seek formal approval of the enhanced plan, noting the alternative standard plan should funding from the Scheme not materialise, from the EPA.
- Agree an *ex ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator.
- Develop a detailed site plan with engineering drawings outlining how the various rehabilitation methodologies (The Scheme PCAS) will be applied to Timahoe South. This will take account of peat depths, topography, drainage and hydrological modelling. (See map for an indicative view of the application of different rehabilitation methodologies).
- A drainage management assessment of the proposed enhanced rehabilitation measures will be carried out and any issues identified resolved and the rehabilitation plan adapted.
- A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation will be carried out. The results of this assessment will be incorporated into the rehabilitation plan to minimise known archaeological disturbance, where possible.
- A review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements is to be carried out.
- A review of remaining milled peat stocks (if applicable) is to be carried out.
- Review silt control measures and establish suitable silt control, where needed;
- An ecological appraisal of the potential impacts of the planned rehabilitation on the presence of sensitive ground-nesting bird breeding species (e.g. breeding waders) is to be carried out. The scheduling of rehabilitation operations will be adapted, where required.

- Ensure all activities comply with the environmental protection requirements of the IPC Licence.
- Carry out Appropriate Assessment of the Rehabilitation Plan.
- Track implementation and enforcement of the relevant IPC Licence conditions, any required mitigation measures (AA) and other environmental control measures during the implantation of the rehabilitation plan.

8.2 Short-term practical actions (0-3 years)

- Carry out proposed measures as per the detailed site plan. This will include a combination of high bog restoration, deep peat cell bunding, drain blocking, and fertiliser applications targeting bare peat areas of headlands, high fields and other areas (where required) in addition to management prescriptions. All rehabilitation will be carried out with regard to best practice environmental control measures (Appendix IV).
- Some proposed measures will be carried out on a phased basis as stock is removed from the site. It is not expected that the site will be completely cleared of peat stock before rehabilitation begins.
- Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions.
- Carry out the proposed monitoring, as outlined.
- While natural colonisation is expected to commence almost immediately once peat production ceases, Phase 2 actions will be carried out in targeted areas to accelerate re-vegetation and colonisation of target species. Phase 2 actions may include seeding of targeted vegetation and inoculation of *Sphagnum*.
- Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent potential run-off of suspended solids from the site during the rehabilitation phase.
- Submit an *ex post* report to the Scheme regulator to verify the eligible measures to be carried out in year 1 of the Scheme, and an *ex ante* estimate for year 2 of the Scheme; and so on for each year of the Scheme.

8.3 Long-term (>3 years)

- Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary;
- Delivery of a monitoring, aftercare and maintenance programme (See section 10.2 below);
- Decommissioning of silt-ponds will be assessed and carried out, where required; and
- 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 allocated to the site based on the area of different cutaway types across the site (See Appendix I).

9. AFTERCARE AND MAINTENANCE

9.1 Programme for monitoring, aftercare and maintenance

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Scope of rehabilitation

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

- The area of Timahoe South.
- EPA IPC Licence - Ref. P0503-01. 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. Timahoe South is part of the Allen Lullymore group.
- The current condition of Timahoe South This site has gravity drainage.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog.
- A significant part of the site has already largely vegetated and largely stabilised and is also used for a variety of land-uses. These areas are considered rehabilitated. Rehabilitation will be targeted to those areas that are not considered stabilized (bare peat).
- To minimise potential impacts on neighbouring land. Some boundary drains around Timahoe South will be left unblocked as blocking boundary drains could affect adjacent land.
- Current land-use. Part of the site is used for waste management infrastructure. The Drehid Facility is not considered as part of the scope of the rehabilitation plan.
- Future land-use. Peatland rehabilitation will be integrated with the proposed future renewable energy project.

Rehabilitation goals and outcomes

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

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

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

Criteria for successful rehabilitation:

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

Rehabilitation targets

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

Rehabilitation measures: (see Figure Ap-1)

- Blocking field drains in drier sections of the former bare peat production areas to create regular peat blockages (three blockages per 100 m) along each field drain.
- Re-alignment of piped drainage; and management of water levels to create/enhance existing wetlands.
- No measures are planned for the other surrounding marginal peatland habitats.
- Silt ponds will continue to be maintained during the rehabilitation and decommissioning phase.
- Evaluate success of short-term rehabilitation measures and enhance where necessary.
- Decommissioning of silt-ponds will be assessed and carried out, where required.

Timeframe:

- 2022. 1st phase of rehabilitation. Field drain blocking.
- 202-2024. 2nd phase. Further realignment of piped drainage and other re-wetting measures dependent on success of 1st phase re-wetting, as determined by ongoing monitoring of water levels and re-vegetation.

- Other enhancement measures such as fertiliser treatment will be carried out, if needed. These will be determined by ongoing monitoring.
- 2024-2026. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- 2024-2026. Decommission silt-ponds, if necessary.

Table AP-1. Rehabilitation measures and target area.

Type	Code	Description	Area (Ha)
Dry Cutaway	DCT1	Limited drain blocking, Blocking outfalls and managing water levels with overflow pipes	
Deep Peat	DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes	
Marginal Lands	MLT1	No work required	
Constraint	Constraint	No work required	
Wetland	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	
Silt Ponds	Silt Ponds	Silt Ponds	
Additional	AW1	Additional Drain Blocking	
Total			

See Drawing number BNM-DR-23-19-20 titled **Timahoe South Bog: Standard Rehab Measures** included in the accompanying Mapbook which illustrate the standard rehab measures to be applied.

Monitoring, after-care and maintenance

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

Validation and IPC Licence surrender

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

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

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APPENDIX II: BOG GROUP CONTEXT

The Allen Bog Group comprises 2 main sub-groups: Clonsast (17 bog units, 2 land units used for transport & 1 transport link) and Lullymore (15 bog units & 1 land unit (farmland) acquired for linkages).

The Allen -Lullymore Bog Group is located mainly in counties Kildare and Offaly. The majority of these associated bogs are located in the River Barrow Catchment and some bogs are located in the River Liffey catchment.

The Lullymore Bogs sub-group is mostly situated in west Co. Kildare and overlaps with Co. Offaly. The core area extends across an area between Rathangan and Edenderry (9 km north-south and 10 km east-west). A second section of peatland is found further east (Timahoe North and South Bogs) and is separated from the core area by the Grand Canal. The core area of the Lullymore Bogs sub-group is very much a continuous area of bogland (Bog of Allen) that has developed according to the local topography and been sub-divided by Bord na Móna for administrative purposes. The Edenderry-Rathangan Road crosses the main section and is bordered by milled peat production bog.

The Lullymore Bogs sub-group has had a long industrial peat production history. Sod peat for fuel was originally produced at Lullymore and in the Timahoe Bogs, which then supplied at old power station at Allenwood (now demolished). Milled fuel peat was then supplied to Edenderry Power Station, Co. Offaly) via the Bord na Móna industrial railway. Many bogs have now been in industrial peat production for a number of decades.

An agricultural research station was also established at Lullymore by An Foras Talúntais to investigate the potential future after-uses of cutaway bog. Agricultural grassland was also established in this area by Bord na Móna. This grassland has now been sold to local farmers. A large area of cutaway at Lullymore was also developed for conifer forestry by Coillte.

Bord na Móna also maintains transport links and an industrial railway through some of the cutaway that has developed in the Lullymore Bogs sub-group. 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).

Much of the Allen -Lullymore Bog complex became cutaway as long term peat extraction 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 -Lullymore 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. Several rehabilitation trials (test programmes) have been developed more recently, where different techniques have been trailed and implemented. While agricultural fields and coniferous forestry have been developed successfully on the cutaway bogs, it was found that these require financial investment that generally exceeds any potential commercial output value.

Much of the earliest cutaway was developed from sod peat production, and therefore had deeper remnant peat. The first forestry trials on cutaway were developed at Clonsast Bog (Trench 14) in the 1960's and this informed much of the forestry development across Bord na Móna cutaway. About 260 ha of cutaway and marginal bog was developed for conifer forestry by Coillte at Lullybeg, Lullymore, Glashabaun South and Killinagh in the Lullymore sub-group. There is ongoing management of these areas by Coillte. More recently, new forestry trials (90 ha) were established at Derrybrennan and Killinagh by Bord na Móna.

Wetlands enhancement with the blocking of the main outfall has also been carried out at Lullymore (2009). There has been ongoing targeted management to maintain and raise water levels in 2016 & 2017 with the construction

of a berm to block a low-lying corner, blocking of other outfalls and the construction of an overflow piped outfall. Some cutaway at Lullymore used as a spread-ground for sod peat up until recently was treated with fertiliser to enhance natural colonisation. This trial has been very successful.

Bord na Móna have also transferred ownership of two separate parcels of land to the Irish Peatland Conservation Council. The first section was an intact remnant of raised bog at Lodge Bog. The second was an area of cutaway called Lullymore West. Both areas are now being managed as nature reserves by the IPCC. A small portion of cutaway at Lullymore has recently been leased to Lullymore Heritage Centre for amenity and educational use and Bord na Móna assisted with its rehabilitation. Bord na Móna are also working with Butterfly conservation Ireland to manage another area of cutaway at Lullybeg for butterfly conservation. This site contains Marsh Fritillary (a rare butterfly species listed in Annex II of the EU Habitats Directive).

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).

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

Bord na Móna is currently developing a wind energy project called Ballydermot Windfarm. This proposed project is in the pre-planning stage. It is expected to be submitted to planning in 2021. This proposed project is expected to have a footprint on the majority of bogs in Allen – Lullymore. Bord na Móna is currently developing a project with ESB to develop solar energy at Timahoe North bog. Part of Timahoe South Bog has been re-developed as a waste disposal and composting facility (Drehid).

A breakdown of the component bog areas for the Allen - Lullymore Bog Group IPC License Ref. P0503-01, and current, indicative Peat Production Status, is outlined in Table Ap-2.

Table Ap-2a: Allen - Lullymore Group names, area and indicative status (Allen - Lullymore sub-group)

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Ballydermot	902	Peat extraction since 1940s Peat extraction ceased in 2020 Parts completely cutaway Parts still have deep peat	Ballydermot formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Some small sections supplied sod moss for horticultural use. Some areas of cutaway are developing pioneer cutaway vegetation communities. Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning.	2020	Draft 2017
Barnaran	499	Peat extraction since before 1975 Peat extraction ceased in 2020 Parts completely cutaway	Barnaran formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Parts used for turf production in recent years.	2020	Draft 2017

		Parts still have deep peat	Some areas of cutaway are developing pioneer cutaway vegetation communities. Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning.		
Blackriver	790	Peat extraction since before 1975 Peat extraction ceased in 2020 Majority completely cutaway	Blackriver formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Parts used for turf production in recent years. Some areas of cutaway are developing pioneer cutaway vegetation communities. Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning.	2020	Draft 2017
Codd	548	Peat extraction since before 1975 Peat extraction ceased in 2020 Majority of bog still has relatively deep peat	Codd formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Some small sections supplied sod moss for horticultural use. Majority of the site is bare peat. Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning.	2020	Draft 2017
Derrybrennan	224	Peat extraction since 1940s Peat extraction ceased in 2020 Majority completely cutaway	Derrybrennan formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Cutaway habitats are emerging. Mostly vegetated. Part used as a BnM commercial forestry trial. Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning.	2020	Draft 2017
Glashabaun North	493	Peat extraction since before 1975 Peat extraction ceased in 2020 Majority completely cutaway	Glashabaun North formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Cutaway habitats are emerging. Mosaic of pioneer vegetation and bare peat Long Derries SAC. Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning.	2020	Draft 2017
Glashabaun South	569	Peat extraction since 1940s Part cutaway since 1980s Peat extraction completely ceased in 2020 Majority completely cutaway Parts still have deep peat	Glashabaun South formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Parts used for turf production in recent years. Cutaway habitats are emerging. Mostly vegetated. Part planted with conifer forestry – Leased to Coillte.	2020	Draft 2017

			Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning. .		
Killinagh	245	<p>Peat extraction since 1940s</p> <p>Part cutaway since 1990s. Ceased milled peat extraction in 2000s</p> <p>Peat extraction complexly ceased in 2020</p> <p>Majority completely cutaway</p> <p>Parts still have deep peat</p>	<p>Killinagh formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Parts used for turf production in recent years.</p> <p>Cutaway habitats are emerging. Mostly vegetated.</p> <p>Part used as a forestry trial.</p>	2020	Draft 2017
Lodge	432	<p>Peat extraction since before 1975</p> <p>Peat extraction completely ceased in 2020</p> <p>Mosaic of peat depths, part cutaway</p> <p>Parts still have deep peat</p>	<p>Lodge formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Some small sections supplied sod moss for horticultural use.</p> <p>Some areas of cutaway are developing pioneer cutaway vegetation communities.</p> <p>Wetlands cutaway rehab trial</p> <p>Beadamoss Sphagnum inoculation trial.</p> <p>Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning. .</p>	2020	To be updated 2021
Lullybeg	271	<p>Peat extraction since before 1975</p> <p>Part cutaway since 1990s. Ceased milled peat extraction in 2015</p> <p>Mosaic of peat depths, part cutaway</p>	<p>Lullybeg formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Parts used for turf production in recent years.</p> <p>Part planted with conifer forestry – Leased to Coillte</p> <p>Cutaway habitats are emerging. Mostly vegetated.</p> <p>Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning. .</p>	2020	Draft 2017
Lullymore	184	<p>Peat extraction since 1940s</p> <p>Part cutaway since 1980s. Ceased milled peat extraction in 2000s.</p> <p>Peat extraction completely ceased in 2015 (turf)</p> <p>Majority completely cutaway</p>	<p>Lullymore formerly supplied turf for fuel and energy and latterly milled peat for electricity production. Parts used for turf production in recent years.</p> <p>Part planted with conifer forestry – Leased to Coillte</p> <p>Cutaway habitats are emerging. Mostly vegetated.</p> <p>Cutaway - zoned for biodiversity</p> <p>Wetlands rehabilitation trial</p> <p>Carbon Flux research</p> <p>Part-leased to Lullymore Heritage Group - amenity</p>	2020	Draft 2017
Ticknevin	459	<p>Peat extraction since 1980s</p> <p>Peat extraction ceased in 2020</p>	<p>Ticknevin formerly supplied turf for fuel and energy and latterly milled peat for electricity production.</p>	2020	Draft 2017

		Majority of bog still has relatively deep peat	Cloncannon bog remnant – zoned for biodiversity Mostly bare peat. Expected to be part of the proposed Ballydermot Windfarm, which is currently in pre-planning. .		
Timahoe McNally	43	Never in peat extraction	Farmland Rail connection	2020	Draft 2017
Timahoe North	806	Peat extraction since 1940s. Widespread BnM extraction ceased in 1990s Peat extraction completely ceased in 2020 (turf) Relatively deep peat remaining	Timahoe North formerly supplied turf for fuel and energy. It was never converted to milled peat extraction. Parts used for turf production in recent years. Cutaway habitats have developed. Mostly vegetated. BnM-ESB Solar energy project consented 2020 for part of the site.	2020	Draft 2019
Timahoe South	1699	Peat extraction since 1940s. Widespread BnM extraction ceased in 1990s Peat extraction completely ceased in 2020 (turf) Relatively deep peat remaining	Timahoe South formerly supplied turf for fuel and energy. It was never converted to milled peat extraction. Parts used for turf production in recent years. Cutaway habitats have developed. Mostly vegetated. Resource Recovery (Drehid Facility). Extension of facility in planning. Under consideration for a renewable energy project. The proposed Irish Water pipeline crosses this bog.	1980's	To be updated 2021

See Drawing number BNM-DR-23-19-24 titled **Allen Bog Group**, included in the accompanying Mapbook(s) which illustrates the location of Timahoe South and the Allen Bog Group in context to the surrounding area.

APPENDIX III: ECOLOGICAL SURVEY REPORT

Ecological Survey Report

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

Bog Name:	<u>Timahoe South</u>	Area (ha):	1699ha
Works Name:	Ballydermot	County:	Kildare
Recorder(s):	MMC & DF	Survey Date(s):	21 st & 22 nd April 2010, 10/2016

Habitats present (in order of dominance)

The most common habitats present at this site include:

- Cutover bog dominated by Heather has developed over large areas of the site mainly in mosaic with grassier areas of Bog Cotton and also with various stages of scrub. In most areas where this habitat occurs trees are establishing, forming scrub mosaics.
- Birch scrub at emergent (eBir), open (oBir) and closed (cBir) stages of development. Some sections have developed sufficiently to be classified as Birch woodland (WN7). The north-eastern section adjacent to the conifer plantation contains significant naturally colonising Pine that dominates in some sections. (Codes refer BnM classification of pioneer habitats of production bog. See Appendix II).
- Poor fen with Bog Cotton-dominated vegetation (pEang) most common. (It should be noted that this community contains more frequent indicators of acidic substrate (bog-wet heath vegetation) compared to other sites). Other communities present include pJeff and pRos.
- Cutover Bog (PB4). Parts of the site are being intensively cut for private sod peat production with bare peat and pioneer communities most common. (Codes refer to Heritage Council habitat classification, Fossitt 2000, See Appendix II.)
- Dry grassland (gDac-Arr) (developing to GS2) along the main railway embankments. This habitat occurs in association with patches of Nettle, Willowherb and Bramble. There is also a transitional zone dominated by Purple Moor-grass at the base of the embankment adjacent to the other cutaway habitats.
- Open water (OW) including temporary-flooded sections with emergent wetland communities (poor fen) and some Reedbeds (pTyph, pPhrag)
- Dense Bracken (dPter) & Dry Purple Moorgrass-dominated grassland (gMol) on some low mounds
- Raised bog (PB1), remnant sections of raised bog occur along some of the fringes of the site
- Birch woodland (WN7) occurs in some small patches around the margins of the site.
- Dry Meadow grassland (GS2)
- Scrub (WS1) (around margins of site, mainly dominated by Gorse, some dominated by Blackthorn).
- Riparian zones (RIP) (old drains) with associated fringe scrub.

Description of site

Timahoe South is located approximately 7.6 kilometres east of Carbury in County Kildare. The Carbury to Timahoe road forms a boundary with the northern section of the site. The R403 Carbury to Allenwood road runs along the south of the site with access to the Drehid landfill site gained from this road. Several Coillte-owned conifer plantations are located adjacent to the boundaries of the site. An adjacent BnM property called Timahoe North is located adjacent to the north side of this bog and the development of this site is quite similar to this bog. The surrounding landscape is quite flat and largely dominated by farmland. Much of the grassland located adjacent to the site boundaries has been reclaimed in the past from bogland. The other main habitats found around the margins include typical small patches of cutover and remnant high bog and associated scrub/Birch woodland located outside the Bord na Móna boundary.

A significant portion of the site has been re-developed in the past 5 years to build the Drehid waste facility. This facility is located in the northern part of the site and a new road several kilometres long was built to access the site. A new lake/tailings pond (FL8) was also constructed to the south of the main landfill. The landfill and tailings pond were not examined in detail during this survey. However, much of the landfill area could be mapped as either spoil or bare ground (ED2) or recolonising ground (ED3). The tailings pond has not revegetated to any great extent yet, although it did have some waterfowl. A Bord na Móna puraflo facility is located on the eastern edge of the site. The site is also used to privately cut sod-peat at several locations around the margins where there are access points.

The majority of the site is currently classed as cutaway apart from some remnant high bog and cutover bog around the margins. It was commercially harvested for horticultural peat until the 1980's, with different sections probably coming out of production prior to this date. The relatively long period of time since production has ceased has meant that the majority of the site has successfully re-vegetated and that some of the habitats are better developed and more diverse than other cutaway sites, which may be younger. However there still is a significant amount of disturbance on site with private sod peat-cutting in several different locations. Some of this peat-cutting is quite extensive and commercial in scale. Large areas of bare peat remain on the site as a result of active turf cutting and there are also areas with younger pioneer vegetation as a result of these activities. The majority of the site has either revegetated with cutover bog with Heather or with Birch scrub (oBir/cBir) in various stages of development. The development of vegetation communities seems to be strongly correlated with time since sections were taken out of production, with the oldest sections containing Birch scrub/woodland. This has led to the creation of a complex mosaic of different habitats. The youngest sections and areas that have been most recently disturbed seem to be dominated by poor fen communities or still have some bare peat. Hydrology is also an important factor and some of the damper or lower areas also seem to be dominated by Bog Cotton-dominated vegetation. Some occasional small hollows still contain open water with associated wetland vegetation around them. The largest areas of open water and wetland habitats are developing adjacent to the landfill. A series of low mounds in the centre of the site have developed patches of Dense Bracken and dry Purple Moorgrass-dominated grassland (gMol) in mosaic with scrub/woodland. Other features such as a small river that flowed off the bog towards the west side are still present (although within a deep channelised ditch). The site is divided into several sub-sections by old railway embankments that have now developed dry grassland. These embankments are still used as access routes.

The Birch scrub/woodland found on the site is in various stages of development. Significant areas did have a closed canopy but when they were investigated, the woodland development as yet was poor with no significant layer structure. (All of the best-developed scrub/woodland has been mapped as closed Birch at this site although some of it deserves to be called Birch woodland with canopies regularly above 5 m high. This is because of the difficulty of separating Birch woodland from mature scrub, especially for stands where there was no ground-truthing). Birch was generally the most dominant species with some sections being quite evenly-aged. Pine and Willow were occasionally found within the stands along with Hawthorn. The north western section of the site contained sections with Hazel. The ground cover was generally dry and dominated by Bramble or Heather (in the younger stands) with frequent Broad Buckler Fern, Male Fern and Purple Moorgrass. Other species present included Hair's-tail Bog-Cotton, Bilberry and Scaly Male Fern. The species composition of the ground cover generally related the surrounding or preceding successional habitats with species of dry heath common.

Some of the best developed ground flora is found along the main drains that have been wooded for some time. Other typical woodland species occasionally found on richer soils along the drains (and grazed by cattle and ponies in places) included Elder, Rose sp., Raspberry, Honeysuckle, Creeping Bent, Herb Robert, Hogweed, Nettle, Nettle, Ivy, Bracken, Common Dog Violet and Dandelion.

Some sections along the east side, particularly adjacent to the conifer plantation, contain much more Pine (both Lodgepole and Scot's Pine), which dominates in places. The majority of this is open scrub with no conifer woodland developing as yet. Birch or Pine scrub is found in association with Heather and the poor fen communities and a significant part of the site contains dry Heather-dominated vegetation with light-heavy cover of Birch or Pine at the sapling/young tree stage. Gorse is also present. These areas are likely to eventually become wooded in future.

Cutover bog is generally dominated by tall Heather. This community can still contain a significant cover of bare peat in some places. Other typical species include Cross-leaved Heath, Purple Moor-grass, Common Bog Cotton, Common Yellow Sedge and Soft Rush. One feature of interest is the presence also of more typical bog species such as White Beak Sedge and Hare's-tail Bog Cotton indicating the presence of more acidic peat than typical of cutaway sites. Hummocks of *Sphagnum palustre* and *S. subnitens* are also occasionally found throughout this vegetation type, especially in the damper sections where there is greater cover of Common Bog Cotton. Hummocks of *S. capillifolium* are also present and *S. denticulatum* was recorded. Other typical bryophytes include *Campylopus introflexus*, *Hypnum* spp. *Thuidium tamariscinum*, *Hylocomium splendens*, *Rhytidiadelphus squarrosus* and *Polytrichum juniperum* (particularly on the bare peat between the Heather bushes) and large hummocks of *Polytrichum commune*. Lichens include *Cladonia portentosa*, *C. floerkeana* and *C. fimbriata*. The Heather-dominated vegetation is frequently found with Birch, Willow and Pine scattered through it forming scrub/heath mosaics. Bog Myrtle was noted in this habitat at one location. Some drains within Heather-dominated vegetation contain *S. cuspidatum* and *Juncus bulbosus*.

The main poor fen community found at this site was dominated by Common Bog Cotton. Other species present include Purple Moorgrass, Soft Rush and *Polytrichum commune* hummocks. Again this community exhibited characteristics typical of more acidic peat with the occasional presence of *S. palustre*, *S. subnitens* and *S. capillifolium*, along with White-beaked Sedge and Hare's-tail Bog Cotton. The latter two species are not

generally found within typical poor fen vegetation present on milled peat cutaways so the classification of this community may need to be reconsidered in the future, perhaps as an embryonic bog community. *Sphagnum* cover is rare-occasional within this community and is mainly found as hummocks. Frequently, gradual transitions from Heather-dominated vegetation to poor fen dominated by Common Bog Cotton were present. Open water and associated wetland habitats were not a common habitat at this site. The most extensive open water has developed adjacent to the landfill. There are indications that parts of this area have only re-wetted recently and that the extent of wetland communities is increasing. There is some drowned scrub present. The open water is generally found in a mosaic with fringing emergent poor fen (pJeff, Pros, pEang), along with some Reedbeds (pTyph, pPhrag). These wetlands generally exhibit more typical poor fen characteristics with species such as Jointed Rush, Mint, and Cuckoo Flower and *Calliergonella cuspidata*. North of the open water there was a large wet area with standing water dominated by Bottle Sedge that is found on the site of a former soak present on the original bog. There may be potential in the future for this area to develop into rich fen if it is fed by springs.

Embryonic bog communities were associated with several small wet hollows and old riparian zones with open water towards the west side of the site. This habitat was dominated by Common Bog Cotton (like poor fen) around the margins with significant emergent re-wetted vegetation. However, associated with it were fringing carpets of *S. cuspidatum* and other typical raised bog species such as Cross-leaved Heath, Hare's-tail Bog Cotton, *Polytrichum* spp. and White-beaked Sedge. There are some extensive and well-developed hummocks of *S. palustre* associated with these areas in the drier sections as well as *S. subnitens* and *S. papillosum*. This community seems quite well-developed.

Several old embanked railways and associated access routes run through the site. These routes are clearly visible as they are generally raised above the level of the surrounding areas of the site and are largely vegetated by dry grassland. They are still used for access around the site. The grassland is typical of gDa-An but is somewhat better developed and is typical of roadside verges (GS2). The vegetation is dominated by Cocksfoot. There are sections with large patches of Rose-bay Willowherb, Nettles or Bramble, which are invading from the adjacent scrub. There are also patches of Raspberry. There are also sections with elements of dry calcareous grassland (gCal). At the base of these embankments and along some of the other access routes there is transition to more acidic grassland dominated by Purple Moorgrass, although this is generally never extensive. Some of these embankments are being grazed by cattle and horses with further enrichment.

Old drainage systems (RIP) are still in place although these drainage systems appear to be breaking down. As result, the drains appear to be developing a more naturalised appearance with pools and areas where the steep banks have fallen away. Some are being colonized with Reedmace and also have a fringe of Bottle Sedge. Some of the deep drains are quite silted up and have poor development of aquatic communities. These old drainage ditches, for the most part, contain dense scrub and appear to have been the first areas on the site to become vegetated. The woodland appeared to be oldest along the ditches with woodland spreading outwards from the drains.

A remnant section of raised bog (PB1) is located in the north-eastern section of the site. This area is dry and degraded with no areas of regenerating bog. Active turf cutting is encroaching on this area from the south while trees (mainly Pine) appeared to be rapidly colonising the remaining areas of raised bog.

The cutover bog (PB4) areas are characterised by bare peat if this are in active use. Some fields have been used more recently but are not used at present and therefore have more typical pioneer poor fen vegetation. This vegetation community is also associated with some sections of the cutaway that have been disturbed more recently by private peat cutting. There is some abandoned cutover bog in the north-east corner of the site that has been abandoned for some time. This area contains extensive *Sphagnum* regeneration, with hummocks of *S. papillosum*, *S. capillifolium*, *S. magellanicum* and *S. subnitens* all frequent. *Sphagnum cuspidatum* can be found within the drains and some hollows. White Beaked-Sedge is prominent in the wetter sections.

Turf cutting is still being carried out by private individuals in some locations around the site. Some of this cutting seems to be commercial in scale. There are several access points onto the bog, generally from old bog roads or through Coillte plantations. Some large areas of bare peat remain on the site as a result of active turf cutting. Sod peat cutting has extended quite far into the site in places where there are accessible tracks along the railway embankments.

A large section of the site towards the southern end has been burnt recently (mainly scrub and Heather-dominated vegetation). There is a significant amount of standing dead and badly damaged Birch trees and trees of other species. The Heather cover has also been burnt and is beginning to re-grow again. Bare peat is a prominent feature of this area and Purple Moorgrass is also frequent in sections.

A section of older Birch woodland (WN7) is located along the eastern edge of the site. It was mainly made up of Scot's Pine, European Larch, Holly, Birch and Rowan with an understorey of Bramble. Bracken and Bilberry. Birch woodland with similar characteristic is also found at the northern end of the site. Adjacent to this woodland is a small mineral island with meadow vegetation (GS2) dominated by Cocksfoot and Tufted Hair-grass and scrub dominated by Blackthorn.

Designated areas on site (cSAC, NHA, pNHA, SPA other) None
Adjacent habitats and land-use Adjacent habitats include conifer plantations, agricultural grasslands, Birch woodland, raised bog and residential properties.
Watercourses (major water features on/off site) <ul style="list-style-type: none"> • Abbeylough river flows south westerly direction from the western edge of the site. • The Cushaling River flows along part of the western boundary of the site. • Two Tributaries of the Slate River flow out of the south east of the site. • All watercourses on the site are part of the south-eastern Barrow catchment.
Peat type and sub-soils The majority of the bog still has more acidic bog peat present. There is no significant exposure of sub-soil at this site, although there are some areas that are developing grassland with calcareous elements or mounds with Purple Moorgrass dominated vegetation.
Fauna biodiversity Bird species Several bird species were noted on the site during the survey. <ul style="list-style-type: none"> • Buzzard hunting over the site. This species has been frequently recorded on site (around the landfill by Bord na Móna staff). There is possibly a nesting site on this bog or in the area. • Kestrel • Willow Warbler (frequent) (in scrub/woodland) • Grasshopper Warbler (3) (in scrub/woodland) • Mallard (13) (using old riparian zones) • Mute Swan (2) (possibly breeding in wetland) • Wheatear (4) • Raven (3) • Cuckoo (1) (in scrub/woodland) • Grey Heron (2) • Linnet (3) • Reed Bunting (2) in scrub/woodland) • Moorhen (in wetland) • Coal Tit and Great Tit (associated with Pine scrub) • Snipe (7) within poor fen/ Heather-dominated vegetation or wetland habitat. • Skylark (3) • Blackcap (in Pine scrub). • Many other more common birds were noted on the site including Blackbird, Robin, Wren, Grey Crow, Rook, Pheasant, Swallow, Mistle Thrush, Wood Pigeon (4) and Chaffinch. Mammals <ul style="list-style-type: none"> • Badger tracks noted at several locations. Extensive Badger sett recorded in old Birch woodland at the north end of the site. • Signs of Pine Marten. • Signs of Squirrel (possibly Red) in woodland along the eastern boundary of the site. • Hare (6) • Fox Other <ul style="list-style-type: none"> • Bumblebees • Common White butterfly (along old railway embankments) • Peacock butterfly (along old railway embankments) • Frog; Tadpoles in several of the drains

<p>Fungal biodiversity</p> <p>The ecological survey was not carried out at an appropriate time of year for a fungal survey</p>
<p>Activities on the site</p> <p>Activities on the site include:</p> <ul style="list-style-type: none"> • A large section of the site is currently in use as a landfill site. This facility is used to dispose of waste materials. A road has been constructed in recent years. • Widespread sod-peat cutting at several different locations associated with the various access routes onto the site. Peat was being dug from face-banks and sods were laid out using sausage machines. A cutover area has been developed along the north-eastern boundary along the old headland. This cutover area is about 1.5 km long. There has also been increased access to parts of the site with newly created or bull-dozer tracks to more easily access other areas for peat cutting. • Some shooting is occurring on the site. • Some burning has occurred on the site. • Some of the site adjacent to a point along the southern boundary where the old railway embankment meets an access point is grazed by cattle. Some of this land is fenced off for this purpose. Cattle are also being fed with fodder brought onto the site. The rest of the embankment is grazed by horses and ponies, some of which are tethered. • There are been some felling of trees/woodland and clearance of scrub for timber, probably as fuel at several locations associated with the various access points. This activity was not extensive, although it may become more widespread in the future as the woodlands mature.
<p>References</p> <p>European Commission (1996). Interpretation manual of European Union habitats. Brussels. European Commission, DGXI.</p> <p>Fossitt, J. (2000). A guide to habitats in Ireland. Kilkenny. The Heritage Council.</p>

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

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

APPENDIX V. BIOSECURITY

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

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

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

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

In addition to the above, Best Practise measures around the prevention and spread of Crayfish plague⁴ will be adhered with throughout all rehabilitation measures and activities.

⁴ <https://www.biodiversityireland.ie/projects/invasive-species/crayfish-plague/>

APPENDIX VI. POLICY AND REGULATORY FRAMEWORK

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

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

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

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

1 EPA IPC Licence

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Allen-Lullymore bog group (Ref. 503). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The bog is part of the Allen-Lullymore bog group (Ref. 503). 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.

Begnagh Bog is located in an area zoned by Longford County Council as open countryside.

11 National Archaeology Code of Practise

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

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

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

12 Bord na Móna Biodiversity Action Plan 2016-2021

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

One example of a key CBD target is:

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

The 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 policies.

13 Bord na Móna commitments

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

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

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

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

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

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

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

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

APPENDIX VII. DECOMMISSIONING

1. Condition 10 Decommissioning

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

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

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

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

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

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

Item	Description	Timahoe South 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	n/a
3	Decommissioning Peat Stockpiles	n/a
4	Decommissioning or Removal of Buildings and Compounds	Not relevant
5	Decommissioning Fuel Tanks and associated facilities	Where required.
6	Decommissioning and Removal of Bog Pump Sites	Where required.
7	Decommissioning or Removal of Septic Tanks	n/a

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.

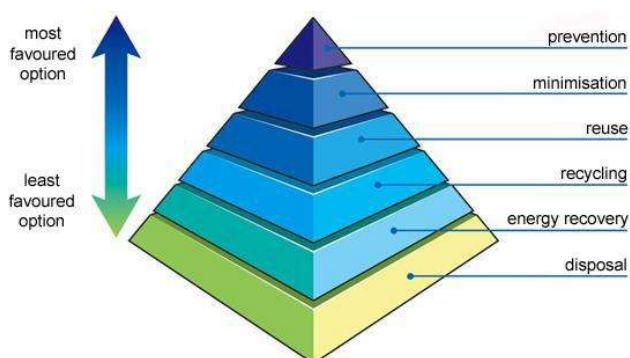
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

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	Timahoe South Decommissioning Plan
1	Removal of Railway Lines	Removal of Railway Lines
2	Decommissioning Bridges and Underpasses	If feasible
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	If feasible

APPENDIX VIII. GLOSSARY

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

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

Dry cutaway bog: Cutaway bog is categorised as dry cutaway where it is not practical or feasible to re-wet these areas completely. It is inevitable that some areas of cutaway will remain relatively dry due to the heterogenous topography of the cutaway, as well as requirements for continued drainage on site for identified after-uses, or off site in relation to neighbouring lands or other infrastructure. Ridges and mounds of glacial deposits can become exposed during peat extraction and form a heterogenous topographical mosaic separated by basins. Dry cutaway may have very thin or no residual peat where ridges and mounds have been exposed. The exposed sub-soils are a mix of glacial gravels, muds and tills that can be quite free-draining. Dry cutaway may also have deeper residual peat but in a location (ie. at the margin) where the peat can not be re-wetted due to boundary constraints. Dry cutaway may also develop in situations where there a relatively steep slope that inhibits re-wetting. The majority of dry cutaway will develop towards grassland, degraded, cutover bog, 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 Licence. This is achieved by a combination of re-wetting, where possible, and natural colonisation of the former cutaway, with or without intervention. Habitats will develop that reflect the underlying environmental conditions. Other after-use development may also serve to act as environmental stabilisation.

Marginal land. Marginal land is defined as land around the margin of the industrial peat production area. This margin generally contains a range of habitats including scrub, Birch woodland, cutover bog and raised bog remnants. It has a variety of land-uses including turf-cutting (private turbary). The Scheme will consider potential rehabilitation and restoration actions (e.g. drain blocking) within marginal land zones, where appropriate.

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

Restoration: Ecological restoration is defined as the process of re-establishing to the extent possible the structure, function and integrity of indigenous ecosystems and the sustaining habitats they provide" (SER 2004). Defined in this way, restoration encompasses the repair of ecosystems (Whisenant 1999) and the **improvement of ecological conditions in damaged wildlands** through the **reinstatement of ecological processes**. In general, Bord na Móna cutaway peatlands cannot be restored back to raised bog in a reasonable timeframe as their environmental conditions have changed so radically (with the removal of the acrotelem – the living layer and much of the peat mass). However, they can be returned to a **trajectory** towards a naturally functioning peatland system (Renou-Wilson 2012). **Raised bog restoration** is an objective of some BnM sites where there is residual natural raised bog vegetation and where the majority of the peat is still intact.

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

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

Wetland cutaway bog. Wetland cutaway bog is defined as former raised bogs that have been in industrial peat production, where production has ceased and the majority of peat has been cutaway, and where this cutaway has the potential to be re-wetted. A significant number of Bord na Móna sites have pumped drainage and these sites are likely to develop a mosaic of wetland habitats when pumping is reduced or stopped. The water chemistry of wetland cutaway frequently is strongly influenced by the more alkaline sub-soils that have been exposed during peat production. This means that pioneer vegetation is more typical of fen and wetland, rather than raised bog. Wetland cutaway will have a broad range of hydrological conditions depending on the local topography. In some cases, these wetlands may form deep water (> 0.5 m) whilst other areas may have the water table at or just below the surface of the ground.

APPENDIX IX. EXTRACTIVE WASTE MANAGEMENT PLAN

(Minimisation, treatment, recovery and disposal)

Objective:

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

Scope:

This plan covers IPPC Licence's P0503-01, Allen Group of Bogs in Counties Kildare and Offaly.

1.0 Extractive Waste:

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

1.1 Silt Pond excavations and maintenance.

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

1.2 Power Station screenings:

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

1.3 Bog Timbers:

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

2.0 P0503-01 IPPC Licence Extractive Waste Conditions

2.1 Condition 7.5 Extractive Waste Management

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

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

2.2 Condition 7.6 Waste Facility

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

2.3 Condition 7.7 Excavation Voids

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

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

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

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

3.0 Minimisation.

3.1 Silt pond excavation material and cleanings.

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

3.2 Power Station Screenings.

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

3.3 Bog Timbers.

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

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

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

4.2 Power Station Screenings.

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

4.3 Bog Timbers

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

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

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

5.2 Power Station Screenings.

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

5.3 Bog Timbers

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

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

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

6.2 Power Station Screenings.

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

6.3 Bog Timbers

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

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

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

5 (2a)(ii)

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

5 (2a)(iii)

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

5 (2a)(iv)

The peat bogs do not contain any topsoil, so this is not required.

5 (2a)(v)

Peat mineral resources do not undergo any treatment.

5 (2b)

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

5 (2c)(i, ii & iii)

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

5 (3)

The three extractive wastes arising from peat extraction operations at this site are classified wastes from mineral non-metalliferous excavation, with an EWC code of 0101 02. The materials are not classified as hazardous under Directive 91/689/EEC20, and do not contain substances or preparations classified as dangerous under Directives 67/548/EEC5 or 1999/45/EC6 above a certain threshold.

The peat excavations and cleanings are stored in locations and in a manner that they could not collapse, and are remote in their nature. The stockpiles are located adjacent to silt ponds that are cleaned regularly and as such these stockpiles are managed and levelled to facilitate further cleanings.

Therefore the material stored at these waste facilities would not be considered to be a Category A waste facility.

Classification in accordance Annex II.

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

Description of operations.

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

Closure plan. (Bog Rehabilitation Plan).

Condition 10.1 – 10.3 of the IPPC Licence requires the following:

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

10.2 Cutaway Bog Rehabilitation Plan:

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

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

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

10.4 A final validation report to include a certificate of completion for the Rehabilitation Plan, for all or part of the site as necessary, shall be submitted to the Agency within six months of execution of the plan. The licensee shall carry out such tests, investigations or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment. This plan including maps and ecological classifications are available on file at the Blackwater IPPC Licence Coordinators office.

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

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

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

Review.

This plan will be reviewed every five years, the first review to take place in September 2017. This review will entail an inspection of these waste facilities to ensure their placing, management, maintenance and stability comply with the requirements of the Extractive Waste Management requirements and condition 7 of the Blackwater IPPC Licence P0503-01.

APPENDIX X. MITIGATION MEASURES FOR THE APPLICATION OF FERTILISER

- Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
 1. The land is waterlogged;
 2. The land is flooded, or it is likely to flood;
 3. The land is frozen, or covered with snow;
 4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann).
 5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- No fertiliser will be spread on land within 2 metres of a surface watercourse.
- Buffer zones in respect of waterbodies, as specified on <https://www.epa.ie/about/faq/name,57156,en.html>, will be adhered with at all times with regard to fertiliser application. Reproduced as follows:

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

APPENDIX XI. CONSULTATION SUMMARIES

Table APX -1 Consultees contacted

Table APX -2 Response summary from Consultees contacted

DRAFT

APPENDIX XII. ARCHAEOLOGY

Role of the Archaeological Liaison Officer

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




Code of Practice

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Code of Practice

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



	Procedure: ENV017	Rev: 1
Title: Archaeological Findings	Approved: EM	Date: 13/10/2020

1) Purpose

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

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

2) Procedure

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

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

Your Archaeological Liaison Officer is

3) Records

Revision Index			
Revision	Date	Description of change	Approved
1	13/09/2020	First release	EMcD
2			



**Archaeological Impact Assessment of Proposed Bog
Decommissioning and Rehabilitation at Timahoe Bog South,
Co. Kildare**

Draft

Report For

Bord Na Móna Energy Ltd.

Author

Dr. Charles Mount

Bord Na Móna Project Archaeologist



Introduction

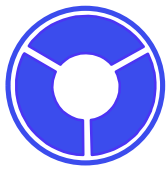
The EPA (2020) *Guidance on the process of preparing and implementing a bog rehabilitation plan* notes that the licensee should characterise the bog prior to embarking on detailed planning and implementation. This characterisation should detail how the land is classified in terms of statutory protections, 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 at Timahoe South Bog, Co. Kildare 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 Timahoe Bog will include:

- Deep Peat measures including drain blocking, the creation of berms and re-profiling on bare peat where needed, resulting in bunded areas suitable for Sphagnum colonisation, on deeper peat;
- Intensive drain blocking around shallow peat areas / modelled depressions on little or no peat to create/promote the spread of wetland habitats,
- Modifying outfalls, and management of water levels with overflow pipes and blocking of internal outfalls;
- Regular drain blocking (3/100) on dry cutaway along with the blocking of outfalls and management of water levels, along with organic fertiliser application;
- Intensive drain blocking (up to 7/100m) on targeted Marginal land drains;
- Intensive blocking of drains in targeted marginal (degraded) raised bog remnants around the margins of Timahoe South and re-wetting, where possible, using an excavator to install peat blockages.
- Outfall management and/or further drain blocking in one area at least which was formerly subject to rehabilitation, as additional works;
- Targeted fertiliser applications to accelerate vegetation establishment on areas of bare peat on headlands and high fields, and within certain areas of dry cutaway. Areas where vegetation has established do not need fertiliser application.
- Seeding of vegetation and inoculation of Sphagnum will be undertaken where required.
- Initial hydrological modelling indicates that a part of the site will develop a mosaic of wet peatland and wetland habitats with the potential for some deeper water. Hydrological management will look to optimise summer water levels to maximise the development of wetland vegetation (by looking to set water depths at < 0.5 m, where possible. It is inevitable that some small sections will naturally have deeper water due to the topography at this site). Water-levels will be adjusted at outfalls and by adjusting piped drainage.

Timahoe South Bog is located c.6km northwest of Prosperous, Co. Kildare and south of the L5025 road. The overall rehabilitation area occupies the townlands of Allenwood North, Ballynakill Upper and Lower, Coolcarrigan, Coolearagh West, Corduff, Drehid, Drummond, Kilkeaskin, Killiniagh Upper and Lower, Loughnacrush, Parsonstown and Timahoe West on OS 6 inch sheets Kildare Nos. 8, 9, 12 and 13.

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



- Investigations carried out by the National Museum of Ireland
- The Peatland Survey 1992
- 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

Early Investigations

In 1966 Etienne Rynne of the National Museum of Ireland investigated a narrow oak trackway (Wth 1.25m) on a brushwood substructure that crossed Timahoe South Bog (east northeast-west southwest) between dry ground at Drumachon 'island' to the east, and dry ground in Kilkeaskin townland to the west (NMI Record). This together was later included in the Record of Monuments and Places (RMP) as KD008-030001-. It intersected a second together (KD008-029----/KD009-019----) which crosses the same stretch of bog, but on a north northwest-east southeast orientation. In 1986 Martin Munro of the Palaeoecology Centre, Queen's University, Belfast investigated the oak trackway (KD008-030001-) and a second trackway (RMP KD008-029001-) (Munro 1987).

Recorded Monuments

The Record of Monuments and Places (RMP) for Co. Kildare 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 1996 and includes sites and monuments that were known in Timahoe South Bog before that date. This review established that there are 4 RMPs located in the proposed rehabilitation area (see Fig. 1 and Table 1). These are the western and eastern parts of the two toghers identified in the early investigations by Rynne and Munro.

RMP No.	ITM E	ITM N	Irish Grid E	Irish Grid N	Townland	RMP Classification
KD008-029001-	674507	732403	-	-	Loughnacush, Parsonstown, Timahoe West	Togher
KD008-030001-	674643	732517	-	-	Kilkeaskin, Loughnacush, Timahoe West	Togher
KD009-18---	-	-	27527	23265	Timahoe West, Kilkeaskin	Togher
KD009-19---	-	-	27537	23207	Timahoe West	Togher

Table 1. List of sites included in the Record of Monuments and Places in Timahoe South Bog.

Peatland Survey

Timahoe South Bog was surveyed by the Irish Archaeological Wetland Unit (IAWU) in 1992 as part of the Archaeological Survey of Ireland Peatland Survey (Unlicensed). 10 sightings of archaeological material were made (see Table 2). These archaeological sightings were notified to the Archaeological Survey of Ireland. There are no grid coordinates available for these sightings in the data supplied by the IAWU. However the coordinates of eight of the sightings have been worked out by the Archaeological Survey of Ireland and are included in the Sites and Monuments Record (SMR).

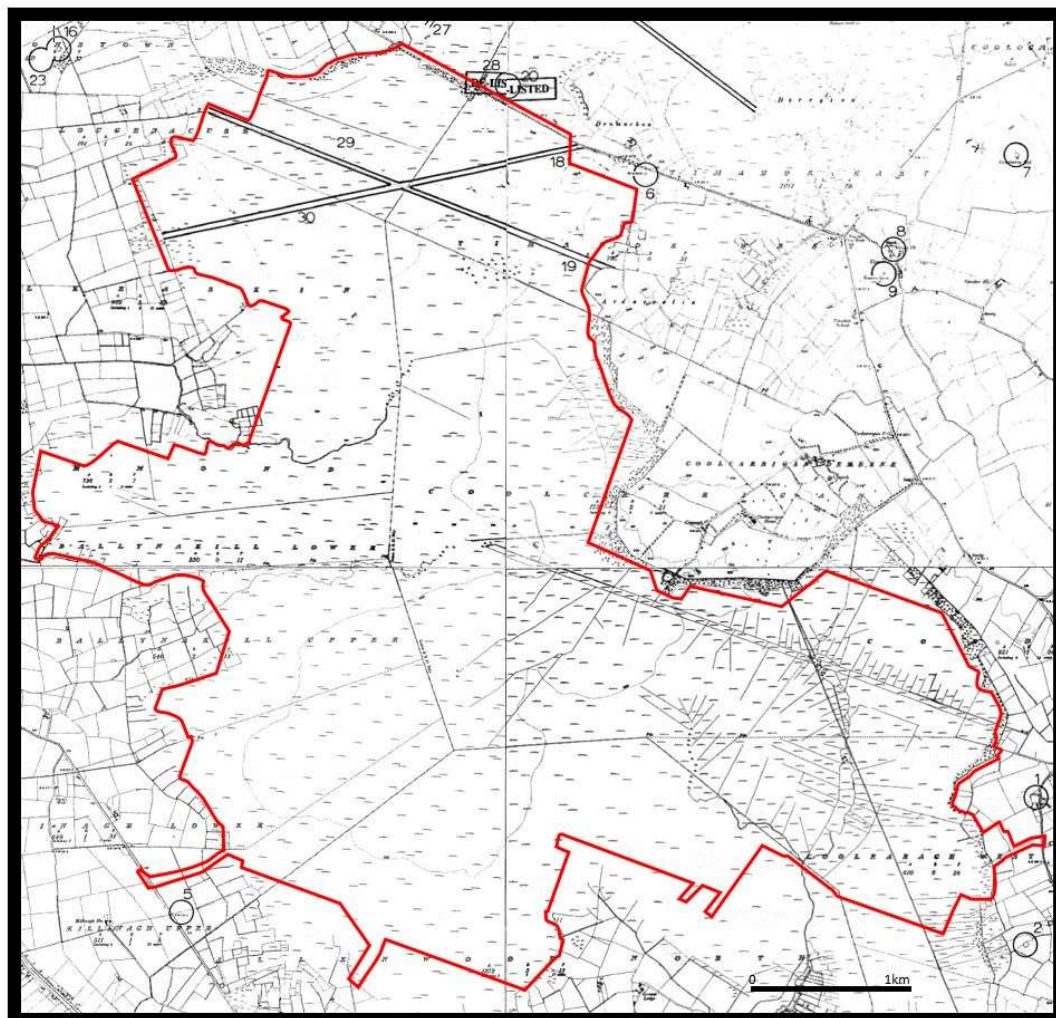
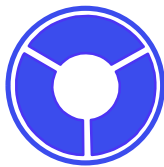


Fig. 1. Timahoe South Bog, Co. Kildare, detail of the RMP map sheets Nos. 8, 9, 12 and 13. The proposed rehabilitation area is outlined with the red line. There are several RMPs in the north of the rehabilitation area.

SMR_NO	Peatland Survey No..	Survey Type	Townland	Irish Grid E	Irish Grid N	Depth m
KD008-036----	KD-TEW 0001	TOGH	Timahoe West	-	-	1.12
KD008-030----	KD-TEW 0002	TOGH	Timahoe	-	-	0.00
KD008-037002-	KD-TEW 0003	TOGH	Timahoe	-	-	0.25
-	KD-TEW 0004	WWIS	Timahoe	-	-	0.00
KD009-027----	KD-TEW 0005	WWIS	Timahoe	-	-	0.00
KD009-030----	KD-TEW 0006	WWIS	Timahoe	-	-	0.00
-	KD-TEW 0007	WWIS	Timahoe	-	-	1.00
KD009-028----	KD-TEW 0008	WWIS	Timahoe	-	-	0.00
KD008-038----	KD-TEW 0009	TOGH	Timahoe	-	-	0.00
KD009-029----	KD-TEW 0010	TOGH	Timahoe	-	-	0.00

Table 2. List of archaeological sightings in Timahoe South Bog made by the Peatland Survey 1992 with SMR numbers.



Previous assessments

2004 EIS

In 2004 an Environmental Impact Assessment (EIS) was prepared by TES Consulting Engineers in connection with an application for construction of the Drehid Waste Management Facility in the townlands of Parsonstown, Loughnacush, Kilkeaskin, Timahoe West, Drummond and Coolcarrigan (Kildare Co. Council File No. 04371). The EIS included an assessment of archaeological and cultural heritage by Arch Consultancy Ltd that included a site visit and walkover survey of the site of the proposed landfill. The assessment found that there were no extent remains of the toghers investigated by Rynne and Munroe (RMP KD008-029001-, KD008-030001-, KD009-18--- and KD009-19---) in the area of the proposed landfill. The completed waste facility occupies the locations of SMR KD008-038---- and KD009-029----).

Archaeological Monitoring

A number of phases of licenced archaeological monitoring associated with the development of the Drehid Waste Management Facility have been carried out in 2006, 2011, 2012, 2013, 2014 and 2017. No archaeological material was identified in the monitoring. The reports are summarised below (Note Timahoe Bog South is referred to as Drehid Bog).

Drehid Bog, Drehid No archaeological significance Licence number: 06E0746 Sinclair Turrell

Monitoring of peat stripping, associated with the first phase of the development of a waste management facility at Drehid Bog, was carried out on behalf of Bord na Móna from 14 August to 15 December 2006. This bog, also known as Timahoe West, forms part of the Allen group of bogs and is situated 9km east of Edenderry, between the Hill of Allen and Carbury Hill. In order to construct the 5km access road, an area of c. 200m by 400m was stripped down to the underlying gravel and stone. An area for the waste management plant, measuring 500m by 225m, was also stripped of peat. The peat throughout the bog was mainly a fibrous, poorly humified sphagnum peat with occasional tree roots. The maximum depth of peat was 3.5m, except in an area of virgin bog along the south-west edge where a depth of 7m was recorded. Nothing of archaeological interest was revealed during the monitoring.

Drehid Bog, Drehid No archaeological significance Licence number: 06E0746 ext. Sinclair Turrell

Monitoring of peat-stripping associated with the expansion of an existing waste management facility took place in Drehid Bog, Co. Offaly, between 8 and 19 August 2011. This phase of works was to facilitate the construction of a sixth waste reception cell (see Excavations 2006, no. 954, for a report on earlier works). The development site consisted of a rectangular parcel of bog measuring approximately 180m east-west x 100m. It was bounded to the east by the Phase 5 waste reception cell, which was constructed in July 2010, and to the south by the Phase 3 waste reception cell, which was constructed, along with the Phase 4 cell, in March 2009. The surface of the Phase 6 development area was overgrown with sedge, some dense birch scrub and heather. The first part of the groundworks consisted of removing the surface vegetation and trees with a mechanical excavator. The peat within the future waste cell was then stripped down to the underlying marl and stones. Nothing of archaeological interest was found during the course of these groundworks.

Drehid Bog, Drehid No archaeological significance Licence number: 06E0746 ext. Sinclair Turrell

Monitoring of peat stripping associated with the expansion of an existing waste management facility took place in Drehid Bog, Co. Kildare between 14 November 2012 and 8 February 2013. This phase of works



was to facilitate the construction of a seventh waste reception cell. Nothing of archaeological interest was found during the course of these groundworks.

Drehid Bog, Drehid No archaeological found Licence number: 06E0746 ext. Tim Coughlan

Monitoring was undertaken for Phase 13-15 works, waste cell and access road construction at Drehid Waste Management Facility, Timahoe West, Co. Kildare. The programme of work was carried out in response to planning conditions attached to the proposed development. It follows a previous monitoring report of works carried out during Phases 11 and 12 by Tim Coughlan and Brenda Fuller. Monitoring of Phase 13-15 works began in January 2017 and was completed in August 2017, with works continuing intermittently throughout this time. During monitoring of works, it was revealed that the peat deposits in the area varied in depth from a minimum 1m to a maximum 3m. The deposits exposed during the course of the groundworks all appeared to date to the early Holocene, with evidence of primal mixed oak woodland giving way as bog development commenced. No features of archaeological significance were noted during monitoring of this phase of works.

2012 EIS

In 2012 an EIS was prepared by Patrick J. Tobin & Co Ltd in connection with an application for the Drehid Mechanical Biological Treatment Facility in the townlands of Coolcarrigan, Drummond and Kilkeaskin. The EIS included an assessment of archaeological and cultural heritage by Arch Consultancy Ltd that included a site visit and walkover survey. The walk-over survey of the proposed development site revealed no features of archaeological or cultural heritage significance.

2018 EIS

Timahoe South Bog has been the subject of an Environmental Impact Assessment Report carried out by Irish Archaeological Consultancy LTD in 2018 for Bord na Móna Energy Limited in relation to IPC Licence P0500-01. This assessment included a review of the topographical files and finds registers of the National Museum of Ireland intended to identify all finds from the bog reported to the Museum by that date and these finds are included below in Table 4 (Pers Comm. Jane Whitaker). The assessment noted that there was a high potential for archaeological features to be uncovered during the course of any future development works in Timahoe South Bog.

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 9th of December 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 12 entries in the SMR in the proposed rehabilitation area (see Table 3). These entries are the toghers investigated by Rynne and Munro and material notified by the Peatland Survey 1992. There are SMR files on all entries except KD009-034----, KD009-035---- and KD008-043---- so it is possible to create a concordance between most of the two sets of data.

SMR No.	Class	Townland	ITM E	ITM N	Peatland Survey Code
KD008-029001-	Road - class 1 togher	Loughnacush, Parsonstown (Windmill Cross Ed), Timahoe West	674507	732403	-
KD008-030----	Road - class 1 togher	Kilkeaskin, Loughnacush, Timahoe West	674643	732517	KD-TEW 0002
KD008-036----	Road - class 2 togher	Timahoe West	674995	732799	KD-TEW 0001
KD008-037002-	Road - class 2 togher	Timahoe West	674982	732531	KD-TEW 0003



KD008-038----	Road - unclassified togher	Coolcarrigan	674709	731748	KD-TEW 0009
KD008-043----	Structure - peatland	Timahoe West	674933	732805	-
KD009-027----	Structure - peatland	Timahoe West	675050	732504	KD-TEW 0005
KD009-028----	Structure - peatland	Timahoe West	675338	732041	KD-TEW 0008
KD009-029----	Road - unclassified togher	Coolcarrigan, Timahoe West	675133	731916	KD-TEW 0010
KD009-030----	Structure - peatland	Timahoe West	675054	732493	KD-TEW 0006
KD009-034----	Structure - peatland	Timahoe West	675021	732518	-
KD009-035----	Structure - peatland	Timahoe West	675033	732500	-

Table 3. List of archaeological sightings in the rehabilitation area included in the SMR.

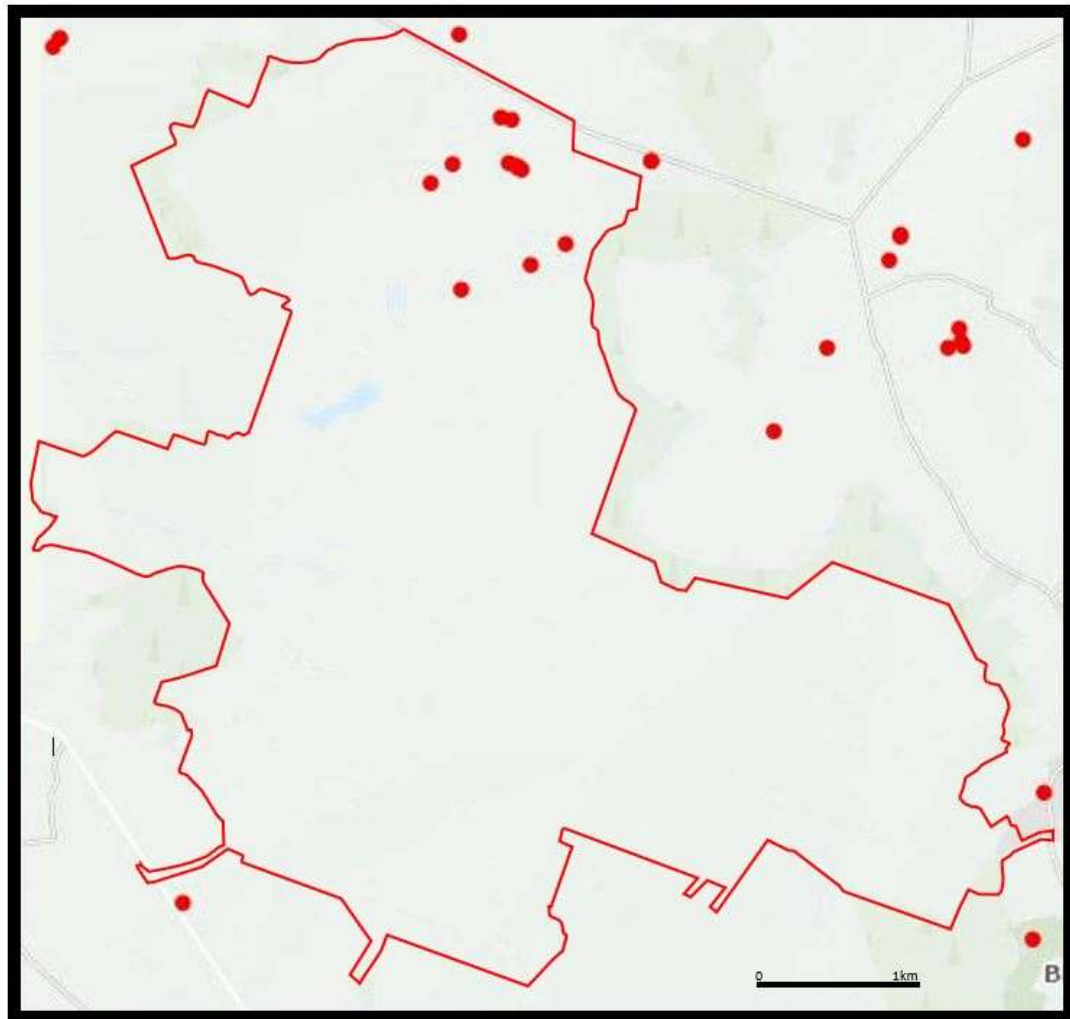


Fig. 2. Timahoe South Bog, Co. Kildare, detail of the SMR. The proposed rehabilitation area is outlined with the red line. There are several SMRs in the rehabilitation area.

Reported finds

As noted above the Environmental Impact Assessment Report carried out by Irish Archaeological Consultancy LTD in 2018 for Bord na Móna Energy Limited in relation to IPC Licence P0500-01 contains a complete list of known finds from Timahoe South Bog reported to the National Museum of Ireland up to 2018. The finds are included below in Table 4.



Townland	Museum No.	Description
Killinagh	1929:1298	Bog butter
Kilkeaskin	1937:2420	Stone axeheads
Kilkeaskin	1968:438-439	Two stone axeheads
Kilkeaskin	2010C2:700	Stone axeheads

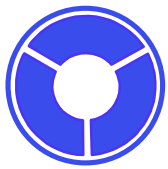
Table 4. List of archaeological finds from Timahoe South Bog reported to the National Museum of Ireland.

Impact assessment

A total of 12 sightings of archaeological material were identified and recorded in Timahoe South Bog by assessments carried out between 1966 and 2012 (two trackways identified 1966-1986 and 10 by the IAWU in 1992) and these were subsequently entered into the Sites and Monuments Record (see Table 5). Fieldwork carried out in the bog between 2004 and 2017 in connection with the development of the Dredge Waste Management Facility found that there were no extent remains of the toghers investigated by Rynne and Munroe (RMP KD008-029001-, KD008-030001-, KD009-18--- and KD009-19---) and identified no additional archaeological material. Two of the IAWU 1992 sightings (SMR KD008-038---- and KD009-029----) were removed by the development of the Dredge waste facility. Seven of the IAWU 1992 sightings were on the surface and three ranged from 0.25m – 1.12m below the surface. The LIDAR data indicates that from 0.01mm – 0.30mm of peat has been removed from the locations of the IAWU 1992 sightings since 2008 and this would have removed the 7 surface sightings. KD008-036---- was 1.12m below the surface in 1992 and may survive. It is not possible to tell what the original depths of KD009-034----, KD009-035---- and KD008-043---- were so they may also possibly survive.

SMR_NO	SMR Class	Townland	ITM E	ITM N	Depth m	Peat depth 2008 m	Peat depth 2020 m	Peat removed	Status
KD008-029001-	Road - class 1 togher	Loughnacush, Parsonstown (Windmill Cross Ed), Timahoe West	674507	732403	?	83.62	87.24	-3.61	Gone
KD008-030---	Road - class 1 togher	Kilkeaskin, Loughnacush, Timahoe West	674643	732517	0.00	84.32	84.34	-0.02	Gone
KD008-036---	Road - class 2 togher	Timahoe West	674995	732799	1.12	84.95	85.25	-0.30	Possibly extant
KD008-037002-	Road - class 2 togher	Timahoe West	674982	732531	0.25	86.75	87.03	-0.28	Gone
KD008-038---	Road - unclassified togher	Coolcarrigan	674709	731748	0.00	82.88	82.59	0.29	Gone
KD008-043---	Structure - peatland	Timahoe West	674933	732805	?	84.96	84.73	0.23	Possibly extant
KD009-027---	Structure - peatland	Timahoe West	675050	732504	0.00	87.46	87.37	0.09	Gone
KD009-028---	Structure - peatland	Timahoe West	675338	732041	0.00	83.76	83.86	-0.10	Gone
KD009-029---	Road - unclassified togher	Coolcarrigan, Timahoe West	675133	731916	0.00	83.35	83.52	-0.17	Gone
KD009-030---	Structure - peatland	Timahoe West	675054	732493	0.00	87.03	87.17	-0.13	Gone
KD009-034---	Structure - peatland	Timahoe West	675021	732518	?	87.15	87.33	-0.18	Possibly extant
KD009-035---	Structure - peatland	Timahoe West	675033	732500	?	87.17	87.18	-0.01	Possibly extant

Table 5. List of archaeological sightings in Timahoe South Bog with the depth of peat removed and current status.



Recommendations

Of the 12 known archaeological sites and sightings in Timahoe South Bog KD008-036----, KD009-034----, KD009-035---- and KD008-043---- may survive *in situ*, and should be protected within 20m buffer zones. 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.

SMR_NO	SMR Class	Townland	ITM E	ITM N	Peat depth 2008 m	Peat depth 2020 m	Peat removed	Status
KD009-034--- -	Structure - peatland	Timahoe West	675021	732518	87.15	87.33	-0.18	Possibly extant
KD009-035--- -	Structure - peatland	Timahoe West	675033	732500	87.17	87.18	-0.01	Possibly extant
KD008-036--- -	Road - class 2 togher	Timahoe West	674995	732799	84.95	85.25	-0.30	Possibly extant
KD008-043--- -	Structure - peatland	Timahoe West	674933	732805	84.96	84.73	0.23	Possibly extant

Table 6. List of archaeological sightings in Timahoe South Bog that may survive and should be protected within buffer zones.

Conclusion

Of the 12 known archaeological sites and sightings in Timahoe South Bog KD008-036----, KD009-034----, KD009-035---- and KD008-043---- may survive *in situ*, and should be protected within 20m buffer zones. 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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EPA 2020. Guidance on the process of preparing and implementing a bog rehabilitation plan.

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Dr. Charles Mount
14 December 2021

APPENDIX XIII. INITIAL WATER QUALITY DATA FROM TIMAHOE SOUTH

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

	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
SW Code	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
GIS	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
TS 1	2	2	13	2	6	2	2	5	6	11	3	5	16	7
ELV	35	35	35	35	35	35	35	35	35	35	35	35	35	35
	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour
	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co
	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
TS1	332	277	437	345	279	227	279	178	164	195	92.8	141	470	258
	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
TS1	81	68	83	77	70	61	62	51	62	52	37	37	84	60
	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units
	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
TS1	7.8	7.5	7.4	7.5	7.4	7.6	7.7	7.8	7.7	7.7	7.8	7.8	7.4	7.7
	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
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
TS1	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05
	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS	TS
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
TS1	371	405	256	354	362	408	371	462	416	506	382	430	413	381
	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
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
TS1	0.04	0.387	0.135	0.17	0.31	0.283	0.087	0.074	0.07	0.007	0.063	0.124	0.182	0.593
	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21
TS1	33.4	28.7	30.9	27.2	24.2	21.9	25.7	17.8	18.6	71	79	14.5	34.1	22.8

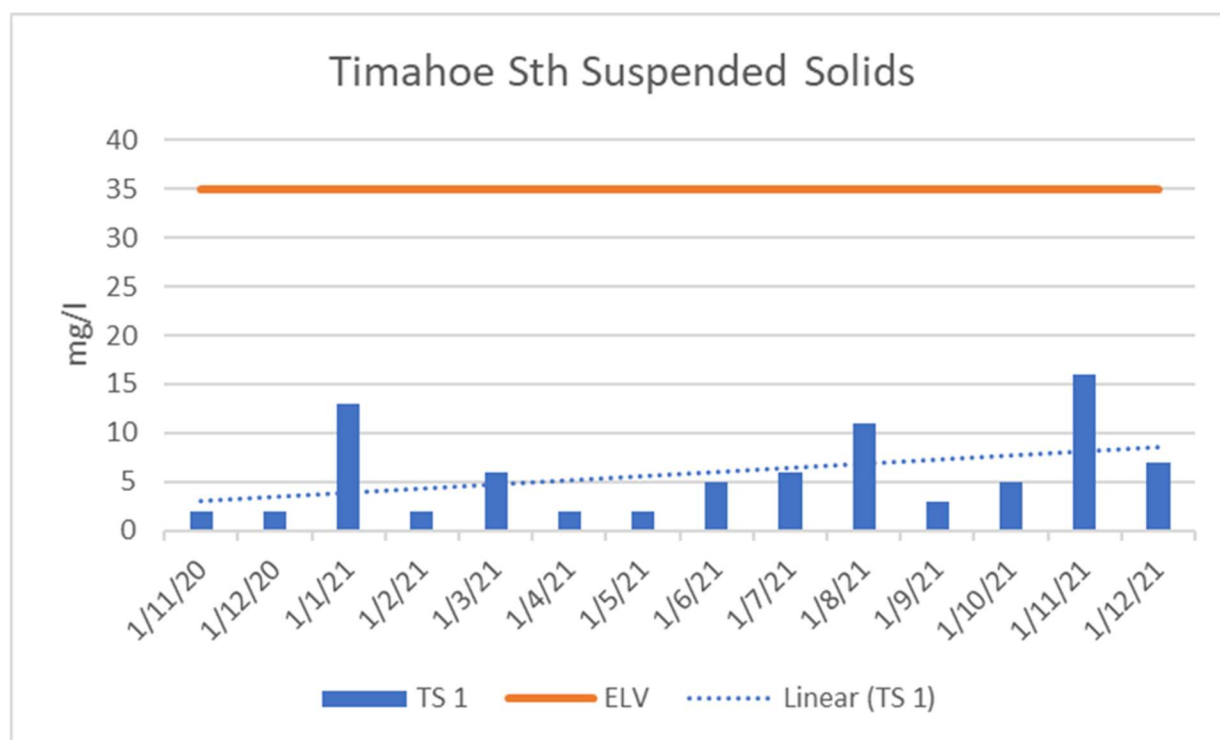


Figure AP13.1. Suspended solids in water sampling at Timahoe South from different discharge points. 35 mg/l is the emission limit value.

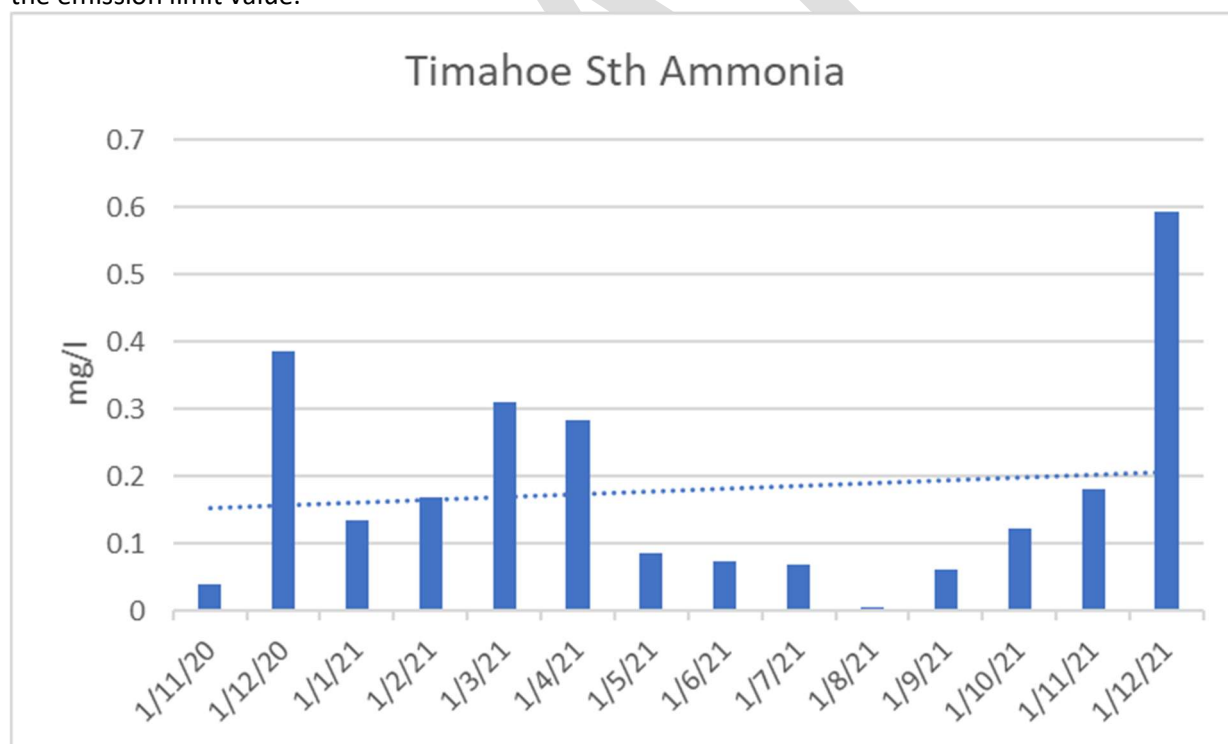


Figure AP13.2. Ammonia concentrations in water sampling from Timahoe South from different discharge points. The main trigger level for ammonia is 1.42mg/l for reporting to EPA.