Kilmacshane Bog

Cutaway Bog Decommissioning and Rehabilitation Plan 2020

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

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

This licence condition requires Bord na Móna agree with the EPA the measures that will provide for rehabilitation, i.e. stabilisation of Kilmacshane 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 permanently ceased at Kilmacshane Bog.

In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. P0502-01, due regard was also given to the proposed Peatlands Climate Action Scheme (PCAS) announced by the Minster. This Scheme will see the Minister support, via the Climate Action Fund, Bord na Móna in developing a package of measures, 'the proposed 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 proposed Scheme will be supported by Government through the Climate Action Fund, 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 Kilmacshane Bog, measures which goes beyond that required by Condition 10 in the Licence, the list of works necessary to comply with the 'standard' requirement of Condition 10 (in the absence of the proposed Scheme) is also included. The inclusion of the 'standard' measures together with the enhanced measures in this document allows the Scheme Regulator to distinguish and objectively determine the specific interventions (and their associated costs) eligible for support under the proposed Scheme.

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

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

Document Control Sheet

Document Name:	**Kilmacshane Bog Decommissioning and Rehabilitation Plan 2020**
Document File Path:	**Q:\Ecology Team\EPA draft rehab plans 2017 word docs\Blackwater ref.502\Blackwater sub-group 2017\Kilmacshane**
Document Status:	**Draft**

This document comprises:	**DCS**	**TOC**	**Text (Body)**	**References**	**Maps**	**No. of Appendices**
	1	**2**	**31**	**3**	**(3)**	**10**

Rev.	**1.0**	**Author(s):**	**Checked By:**	**Approved By:**
Name(s):		**AC**	**MMC**	**MMC**
Date:		**8/10/2020**	**8/10/2020**	**8/10/2020**

Rev.	**1.1**	**Author(s):**	**Checked By:**	**Approved By:**
Name(s):		**AC**	**MMC**	**MMC**
Date:			**21/12/2020**	**21/12/2020**

Table of Contents

SUMMARY

Name of bog: Kilmacshane **Area:** 1,296 ha

Site description:

- Kilmacshane Bog was drained and developed for industrial peat production in the 1960s and has been in active peat production since 1968. Industrial peat production was paused in 2014. Industrial peat extraction has now completely ceased at Kilmacshane.
- Kilmacshane has a pumped drainage regime. There are currently large areas of surface water and emerging wetland vegetation across the site as pumping has been reduced. The majority of the former peat production footprint is bare peat (c.50%) and contains active drainage channels.
- The majority of Kilmacshane Bog is classed as cutaway with shallow peat depths, although there are small pockets with remnant peat >2.5m deep.
- This site also includes Lehinch Island, a small island in the River Shannon that is grazed (under agreement) by local farmers.
- The site is located adjacent to the River Shannon and several designated conservation sites.

Rehabilitation goals and outcomes

Bord na Móna is committed to discharging the obligations arising from Condition 10 of the IPC licence. The primary goals and outcomes of this plan are to (1) meet condition 10 requirements and (2) optimise climate action benefits from enhanced rehabilitation measures.

Being cognisant of the proposed Scheme for supporting enhanced decommissioning, rehabilitation and restoration measures (PCAS), the primary rehabilitation goal and outcome for Kilmacshane Bog is **environmental stabilisation** of the site and **optimising climate action benefits**. This will be achieved via intensive **re-wetting and wetland creation**. This is defined as:

- Carrying out enhanced rehabilitation with the application of enhanced peat rehabilitation measures in selected areas to re-wet peat and slow water movement across the site. The site has already developed a mosaic of pioneer cutaway habitats. Rehabilitation will focus on targeted actions to raise water levels and areas where there is still significant bare peat cover. This site is likely to develop wetland habitats dominated by Reed Swamp.
- Optimising hydrological conditions for the development of wetlands, fen and Reed Swamp on shallow cutaway peat, and eventually naturally functioning wetland/peatland habitats.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities in suitable deep residual peat areas.
- Stabilisation or improvement in water quality parameters (e.g. suspended solids).
- Environmental stabilisation.
- Rehabilitation will support the National Policies on Climate Action and GHG mitigation by maintaining and enhancing the current peat storage capacity of the bog (locking the carbon into the ground). It is expected that the bog will have reduced emissions (reduced source) and in time develop its carbon sink function, in part, as some peat-forming habitats develop on site. 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 Kilmacshane Bog.

- EPA IPC Licence - Ref. P0502-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The key objective of 'rehabilitation', as required by this licence, is achieved by the **environmental stabilisation** of the bog.
- **The proposed 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 Kilmacshane Bog, in particular, optimising **climate action benefits**.
- The local environmental conditions of this bog. Kilmacshane has pumped drainage and a significant part of the site is suited to wetland development.
- The key goals and outcomes of rehabilitation at this bog outlined above.
- To minimise potential impacts on neighbouring land, some boundary drains around Kilmacshane Bog will be left unblocked as blocking boundary drains could affect adjacent land.
- Lehinch Island and callows grassland located at the eastern side of the side are not part of the scope of rehabilitation. These are subject to individual grazing agreements.

Criteria for successful rehabilitation:

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

- Rewetting of peat in the former area of industrial peat production to slow water movement across the site to retain silt, accelerating the development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat (IPC Licence validation) through the creation of further wetland/peatland habitat.
- Stabilising or reducing potential emissions to water (e.g. suspended solids) (IPC Licence validation).
- Reducing pressure from peat production on the local river catchment (WFD) (IPC Licence validation).
- Optimising the extent of suitable hydrological conditions to optimise climate action (Climate action verification).
- Reduction in carbon emissions (Climate action verification).
- Setting the site on a trajectory towards establishment of a mosaic of compatible habitats including wetland, fen, Reed swamp, wet woodland, heath, embryonic Sphagnum-rich peat forming communities, scrub and Birch woodland communities, where conditions are suitable, and eventually towards a reduced Carbon source (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 Kilmacshane Bog.
- Improvement in biodiversity and ecosystem services. (Climate action verification).

Meeting climate action verification criteria and monitoring of these criteria is dependent on support from the Climate Action Fund or other sources of funding.

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 to have sufficient resources (staff and machinery) to deliver the planned rehabilitation.
- Weather conditions to be within normal limits over the rehabilitation plan timeframe
- Natural colonisation of vegetation to develop semi-natural habitats at a rate within the normal limits.

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 assessment.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation.
- Carry out proposed measures, which will be a combination of pump management, drain blocking, peat field re-profiling and cell-bunding.
- Phase 2 measures may include fertiliser applications targeting headlands, high fields and other areas (where needed)., seeding of targeted vegetation and inoculation of *Sphagnum*.
- Silt ponds will continue to be maintained during rehabilitation and decommissioning.
- 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:

- 2020-2021: Short-term planning actions.
- 2021: Short-term practical actions.
- 2021-2024: Any Long term practical actions; Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.
- 2024: Decommission silt-ponds, if necessary.

Budget and Costing

- The rehabilitation plan outlined in this document is predicated on the understanding that it is the Minister's intention to support, via the Climate Action Fund, Bord na Móna in developing a package of measures, 'the proposed 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 2020). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.
- For the avoidance of doubt, should the proposed Scheme and the associated statutory obligation on Bord na Móna not materialise, Bord na Móna will not carry out the enhanced decommissioning, rehabilitation and restoration measures described in this plan. Bord na Móna will instead plan to complete only the 'standard' decommissioning and rehabilitation required under Condition 10, see Appendix I, and for which financial provisions have been made, to comply with that element of the Licence.

Monitoring, after-care and maintenance

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

- There will be initial quarterly monitoring assessments of the site to determine the general status of the site, the condition of the silt-ponds, assess the condition of the rehabilitation work, asses the progress of natural colonisation, monitoring of any potential impacts on neighbouring land and general land security. The number of site visits will reduce after 2 years to bi-annually. These site visits will assess the need to additional rehabilitation.
- **Water quality monitoring** will be established. Monitoring of key water quality parameters will include: Ammonia, Phosphorous, Suspended solids (silt) and pH.

- Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the appropriate 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 remote sensing survey, after rehabilitation measures are implemented. It is proposed that sites can be monitored against this baseline in the future.
- Biodiversity Ecosystem services will be monitored using specific indicators.
- Carbon emissions monitoring only be carried out on a small proportion of BnM sites to develop better understanding of carbon emissions and GHG emission factors from different types of BnM sites and will be developed on association with other established research programmes. Reduction in carbon emissions will be modelled by a combination of habitat condition assessment and application of appropriate carbon emission factors derived from other sites. Baseline monitoring (habitat condition) will be carried after rehabilitation is completed (during the Scheme). It is proposed that sites can be monitored against this baseline in the future.
- Monitoring as part of Climate Action Verification is dependent on support from the Climate Action Fund or other external funding.

Validation and IPC Licence surrender

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

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

1. INTRODUCTION

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. P0502-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The bog is part of the Blackwater bog group (see Appendix I for details of the bog areas within the Blackwater Bog Group). Kilmacshane Bog is located in Co. Galway.

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 critical success factors required for successful rehabilitation;
- Proposed rehabilitation actions;
- Proposed timeframe to implement these actions;
- Budget and Costings; and
- Associated aftercare, maintenance and monitoring.

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme (PCAS) on peatlands previously used for energy production. Note this proposal is also known colloquially as the 'Peatlands Climate Action Scheme'. The additional costs of the proposed Scheme will be supported by Government through the Climate Action Fund. Bord na Móna have identified a footprint of 33,000 ha (a subset of the BnM estate that has been used for energy production) as peatlands suitable for enhanced rehabilitation. This proposed Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations (Appendix VII) 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. However, it is important for all stakeholders to understand that 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 proposed Scheme.

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

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

These are collectively designed to optimise hydrological conditions (ideally and where possible water-levels <10 cm) for climate action benefits and to accelerate the trajectory of the site towards a naturally functioning ecosystem, and eventually a reduced carbon source/carbon sink again. (In some areas of dry cutaway this trajectory will be significantly longer and it is not feasible in the short-term to re-wet some areas. These areas will develop other habitats. The key to optimising climate action benefits is the restoration of suitable hydrological conditions and more intensive intervention means that the extent of suitable hydrological conditions can be optimised. These measures are designed to encourage development of habitats to optimise climate action benefits such as carbon storage, reducing carbon emissions and carbon sequestration, where possible. They are also designed to further slow the movement of water across the site (with the site acting similarly to a constructed wetland), slowing the release of water (improving local water attenuation) and water quality is also expected to improve as the site returns to a naturally functioning peatland ecosystem.

Kilmacshane Bog is proposed to be part of this proposed Scheme (PCAS) and this rehabilitation plan outlines the approach taken. In the event that additional external funding is not secured, Bord na Móna will revert to a standard rehabilitation plan (outlined in Appendix I). This rehabilitation plan will also meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions.

1.1 Constraints and Limitations

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

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

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

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

The area associated with Kilmacshane Bog also includes Lehinch Island and callows grassland at the eastern end of the site. However, this island and grassland has never been part of the bog development at Kilmacshane Bog (it is seasonally used for hay and grazed by a local farmer) and therefore there is no requirement for any decommissioning or rehabilitation. As such, this plan therefore does not consider Lehinch Island and grassland in the context of decommissioning or rehabilitation,

This rehabilitation plan takes account of the **future planned after-use** of Kilmacshane Bog. Biodiversity and ecosystem services have been identified as the primary land-use at Kilmacshane 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 Kilmacshane Bog, will be conducted in adherence to the relevant planning legislation and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.

Peat production activities have the potential to profoundly impact the habitats and environment of a bog. The ecological processes involved in the creation and maintenance of functioning, active bog systems are complex,

happen over very long time periods (>1,000 years) and not all are fully understood. Nevertheless, the basis for the proposed approaches and implementation outlined in the document is the experience gained in 40 years of research and implementation of the after-use development, rehabilitation and restoration of the Bord na Móna cutaway bogs as well as best practise internationally (see reference documents).

Industrial peat extraction at Kilmacshane Bog was paused in 2014 and permanently ceased in 2019. Currently a significant portion of the former peat production area is bare peat. The combination of active enhanced rehabilitation measures and natural colonisation will quickly establish pioneer vegetation and will be planned to accelerate environmental stabilisation. Nevertheless, it will take some time (30-50 years) for naturally functioning peatland and wetland ecosystems to fully re-establish.

Parts of Kilmacshane Bog (outside the areas owned and under the control of Bord na Móna) are currently 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 Kilmacshane 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.

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 proposed 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 site visits and monitoring and desktop analysis forms the basis for the development of the rehabilitation plan for the bog, along with:

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

2.1 Desk Study

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

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

- Lindsay (2010). Peatbogs and Carbon: a Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change.
- Mackin *et al*. (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al*. (2011). The Fen Management Handbook (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised Bog Special Areas of Conservation management plan. Department of Arts, Heritage and the Gaeltacht.
- Quinty & Rochefort (2003). Peatland Restoration Guide, second edition. Canadian *Sphagnum* Peat Moss Association and New Brunswick Department of Natural Resources and Energy.
- Regan*, et. al.* (2020). Ecohydrology, Greenhouse Gas Dynamics and Restoration Guidelines for Degraded Raised Bogs. EPA Research Report. Prepared for the Environmental Protection Agency by Trinity College Dublin.
- Renou-Wilson *et al*. (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.
- 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) webmapper;
- Inland Fisheries Ireland (IFI) Reports;
- Environmental Protection Agency database (www.epa.ie);
- EPA Guidance on Requests for Alterations to a Licensed Industrial or Waste Activity
- BirdWatch Ireland online data (including I-WeBS and CBS datasets; www.birdwatchireland.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive catchments.ie/maps/ Map Viewer (www.catchments.ie);
- OPW Indicative Flood Maps (www.floodmaps.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie);
- River Basin Management Plan for Ireland 2018 – 2021;
- Bord na Móna Annual Report 2020.
- Spatial data in respect of Article 17 reporting, available online at https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17.

2.2 Consultation

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

2.3 Field Surveys

Bord na Móna carried out a baseline ecological survey of all of its properties in 2009-2012 and developed habitat maps. As part of this exercise, Kilmacshane Bog was surveyed in January and June 2010 and resurveyed in 2014. Additional ecological monitoring and visits have taken place at Kilmacshane Bog between 2013-2020 to inform rehabilitation planning and habitat maps have been updated, where required. The latest visit took place in August 2019. This rehabilitation plan is informed by the original baseline survey as well as subsequent 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 developed for classifying pioneer cutaway habitats as Fossitt categories were deemed not to be detailed enough for cutaway bog (much of cutaway bog could be classified as Cutover Bog - PB4). Much of the pioneer cutaway vegetation is still at an early stage of its development and cannot be assigned to Fossitt Level 3 categories yet.

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

3. SITE DESCRIPTION

Kilmacshane Bog is located approximately 1.5 km to the north of Banagher and c.3.5km south of Shannonbridge in Co. Galway, on the western banks of the River Shannon (see Figure 3.1). The surrounding landscape is a mosaic primarily consist of low-lying agricultural land (pasture) interspersed with other raised bogs, many of which have also been managed by Bord na Móna for peat production with some areas utilised for domestic turf-cutting. The River Shannon is immediately adjacent to the eastern side and parts of Kilmacshane form part of the flood plain of the River Shannon, regularly flooding during winter and occasionally at other times when the water levels on the river are high.

A rail line connects Kilmacshane bog with Garryduff Bog to the north. There is also road access to the site alongside the railway line in the north and from a public road in the south-west. The only infrastructure on-site, apart from the rail links and associated machinery access roads and tracks, is a tea centre located at the northern end of the site next Garryduff.

The site is bisected by one main railway line running roughly North-west to south-east and this is situated on the old route of the Ballnasloe section of the Grand Canal, which was infilled as part of the bog development.

Lehinch is a small low-lying island, prone to winter inundation, in the main Shannon river channel that is cut off by a narrow channel. The island was leased back to the owners when title was obtained by Bord na Móna and is grazed by cattle during the summer. The island does not form part of the rehabilitation work detailed here.

3.1 Status and Situation

3.1.1 Site history

Kilmacshane Bog was drained and developed for industrial peat production in the 1960s and has been in active peat production since the 1968. Industrial peat production ceased in 2014. The peat was harvested from this site was used for fuel peat to supply West Offaly Power in Shannonbridge. Fannins Lock at the eastern part of the site is a feature of significant industrial history.

3.1.2 Current land-use

Industrial peat production has now completely ceased at Kilmacshane Bog. Biodiversity and ecosystem services has been identified as the main future as its primary land-use by Bord na Móna. The entire bog is not within the ownership of Bord na Móna and domestic turf cutting is having an impact on the bog, both within and outside the BnM boundary. A bog railway crosses through the site (Figure 3.5).

The River Shannon flows within close proximity to the eastern boundary of the site and some grassland (under BnM ownership) extend from the site to the River Shannon. The grassland is grazed under agreement.

This bog is a pumped bog with the water table significantly lower than the surrounding area.

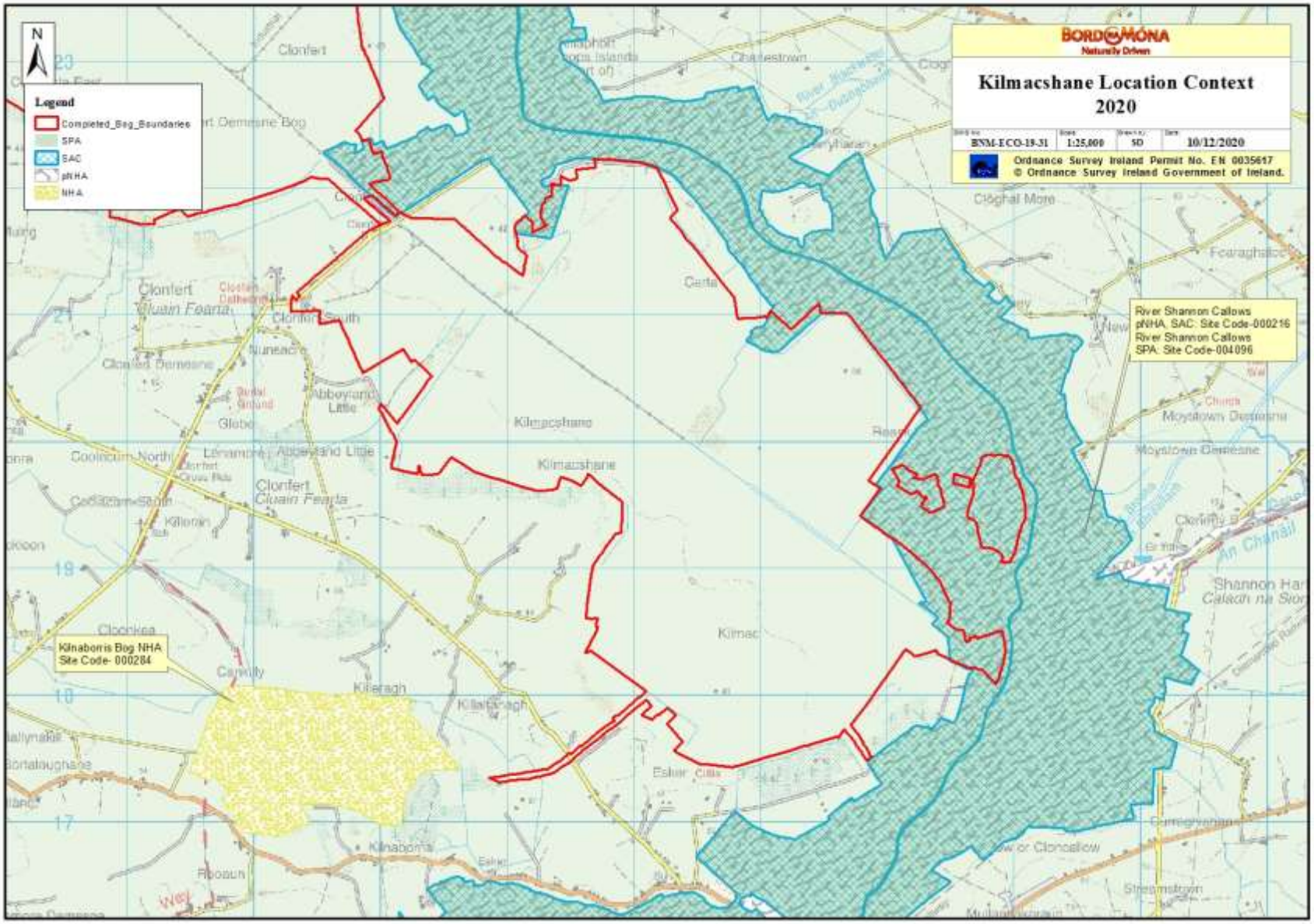

Figure 3.1 Location of Kilmacshane Bog in context to other Bord na Móna bogs and surrounding area.

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

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

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

3.2 Geology and Peat Depths

3.2.1 Sub-soil geology

The majority of the underlying geology at Kilmacshane Bog is dark limestone and shale with a small area on the southern end of the site of massive unbedded lime-mudstone,[1]. The underlying soils and sub-soils are classed as 'Raised Bog Cutover Peat'.

The peat is underlain in places by glacial deposits interbedded with glacio-fluvial deposits over limestone bedrock. The glacial deposits generally consist of grey gravelly clay/silt and have become exposed and are now ridges and mounds. Lacustrine deposits (lake deposits) are also present under the peat (lacustrine shell marl).

3.2.2 Peat type and depths

Although Kilmacshane Bog has been in commercial peat production for nearly 50 years, different parts of the bog have been developed at different times. The central and eastern sections are predominantly cutaway, with only small pockets of residual peat depth in excess of 2m (Figure 8.2). By contrast, the western section has relatively larger deposits of peat in situ, with large parts of the peat in these areas in excess of 2.5m deep.

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

3.3 Key Biodiversity Features of Interest

The majority of Kilmacshane Bog within the Bord na Móna boundary is bare peat as this site was in production until 2014 (see Figure 3.3). The River Shannon flows within close proximity to the eastern boundary of the site and the former Ballinasloe Canal (now in-filled) runs along the line of the railway through the middle of the bog.

3.3.1 Current habitats

Due to the relatively recent cessation of Kilmacshane Bog for peat harvesting, much of the site comprises extensive areas of bare peat and is not vegetated extensively (see Figure 3.3). However, in recent years some early pioneering poor-fen vegetation communities, such as some pioneer Marsh Arrowgrass-dominated vegetation in mosaic with patches of Bottle Sedge and Bog Cotton, are starting to develop, along with patches of Common Reed and Bulrush. The site can be divided into three main sections due to the natural topography of the site. The three sections are separated by stands of well-established Birch/conifer woodland. The western section is the driest section, was in full production until recently and is characterised by bare peat. The central section was also in development until recently and is re-vegetating with typical species such as Common Bog Cotton, Jointed Rush and Marsh Arrowgrass. Patches of Common Reed have started to develop across the wetted cutaway. Shell marl is exposed in some sections. Both sides of the railway are prone to water inundation during winter months. Higher ground is found to the south with colonisation by pioneer poor fen and Birch scrub species. The eastern side is also affected by winter inundation, but to a lesser extent. This section was also in milled peat production until recently although some areas where sub-soils were being exposed have been developing cutaway habitat for several years.

The mixed conifer woodland is of interest as these were planted in the mid 20th Century, after the bog was developed, and are some of the oldest conifer stands planted on Bord na Móna cutaway. Yew is present and spreading in the understorey.

Kilmacshane Bog has also been used for several rehabilitation trials. The first trial looked at using Reed Canarygrass and Triticale as a nurse crop on bare peat to accelerate the establishment of natural vegetation. This was partially successful in the short-term and Reed Canarygrass still persists in the trial area. However, natural vegetation (Reeds, Bulrush and other species) established at a similar rate in the control and surrounding areas.

The second trial looked to investigate the use of green hay to import wetland species to the cutaway that are slower to naturally colonise from other sources. Green hay can be used to import a direct source of seed. The donor site was callows grassland. Initial results indicate that using green hay in this way has not increased species diversity significantly.

A habitat map of the site is shown in Figure 3.4.

Figure 3.3. View of the typical peat surface with existing drainage and early pioneering vegetation communities across Kilmacshane Bog

3.3.2 Species of conservation interest

The main area of the bog is inundated annually with high winter water levels. These wet areas offer a refuge to significant flocks of Whooper Swans (listed on Annex I of the EU Birds Directive) and waterfowl such as Mallard, Wigeon and Teal. The results of the International Swan Census Survey published by BirdWatch Ireland, when a flock of 365 Whooper Swan were recorded on Kilmacshane Bog, rank the site as Internationally Important for this species (Crowe et al. 2015). Whooper Swan is a Special Conservation Interest (SCI) of the Middle Shannon Callows SPA and the River Suck Callows SPA (see Section 3.4).

The site attracts breeding waders such as Lapwing and Redshank (both BoCCI Red-listed) and Ringed Plover (BoCCI Amber-listed)

The Kilmacshane site includes several undeveloped fringe areas that are designated as part of the River Shannon Callows SAC. These areas include some remnant high bog and other typical fringe habitats such as scrub, cutover bog and bog woodland. The Kilmacshane boundary extends to the River Shannon channel in one section (east side at Fannin's Lock) and this area includes some wet species-rich sedge-dominated grassland that is part of the Shannon Callows. This section of the property contains a very rich and diverse suite of habitats along a transitional zone from the remnant high bog to the edge of the main river channel. The grassland is managed as hay meadows and for grazing under agreement and corresponds in part to the Annex I habitat – Lowland Hay Meadows. This area is likely to attract breeding waders.

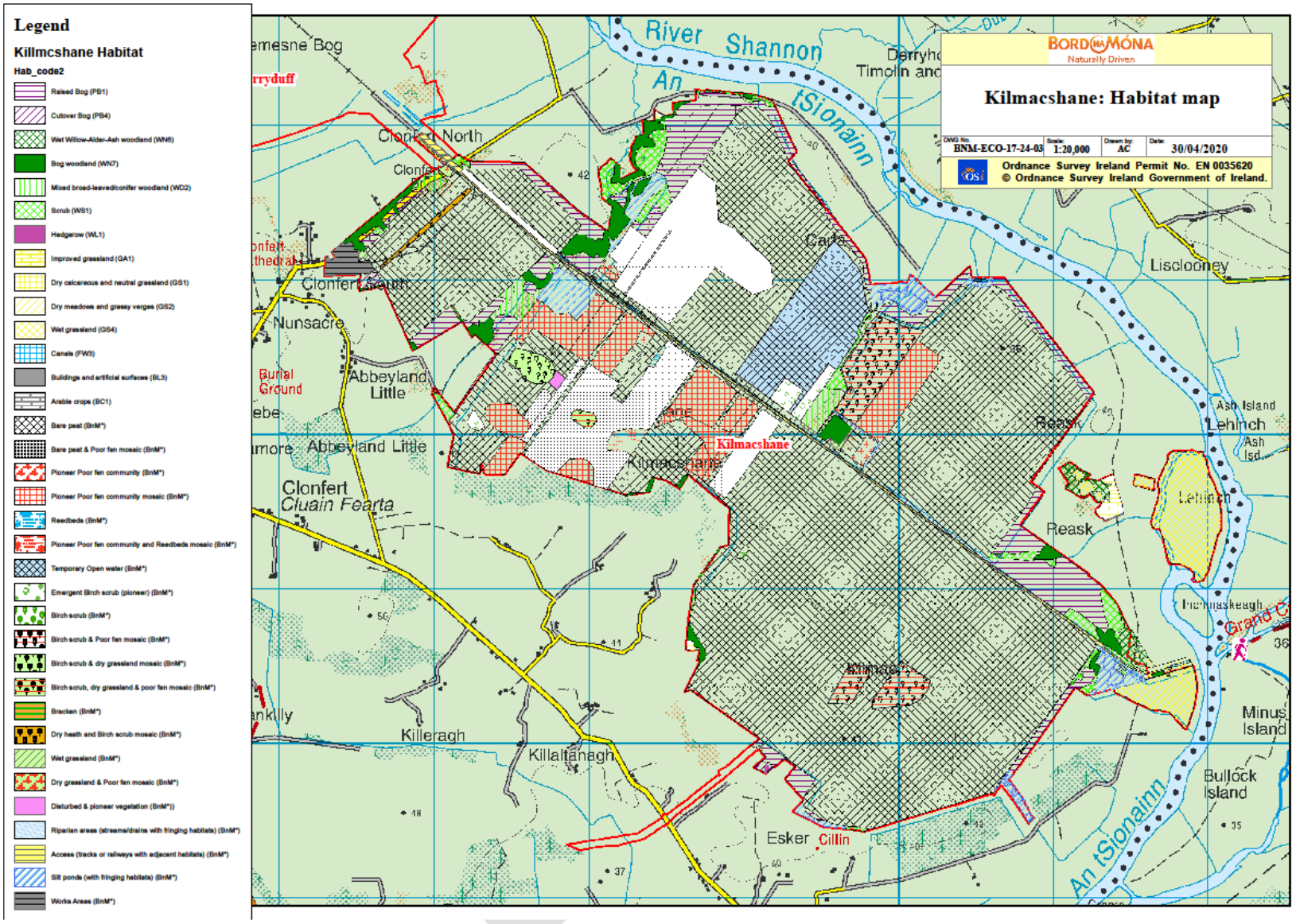

Figure 3.4 Habitat map of Kilmacshane Bog showing Bord na Móna habitat categorisation.

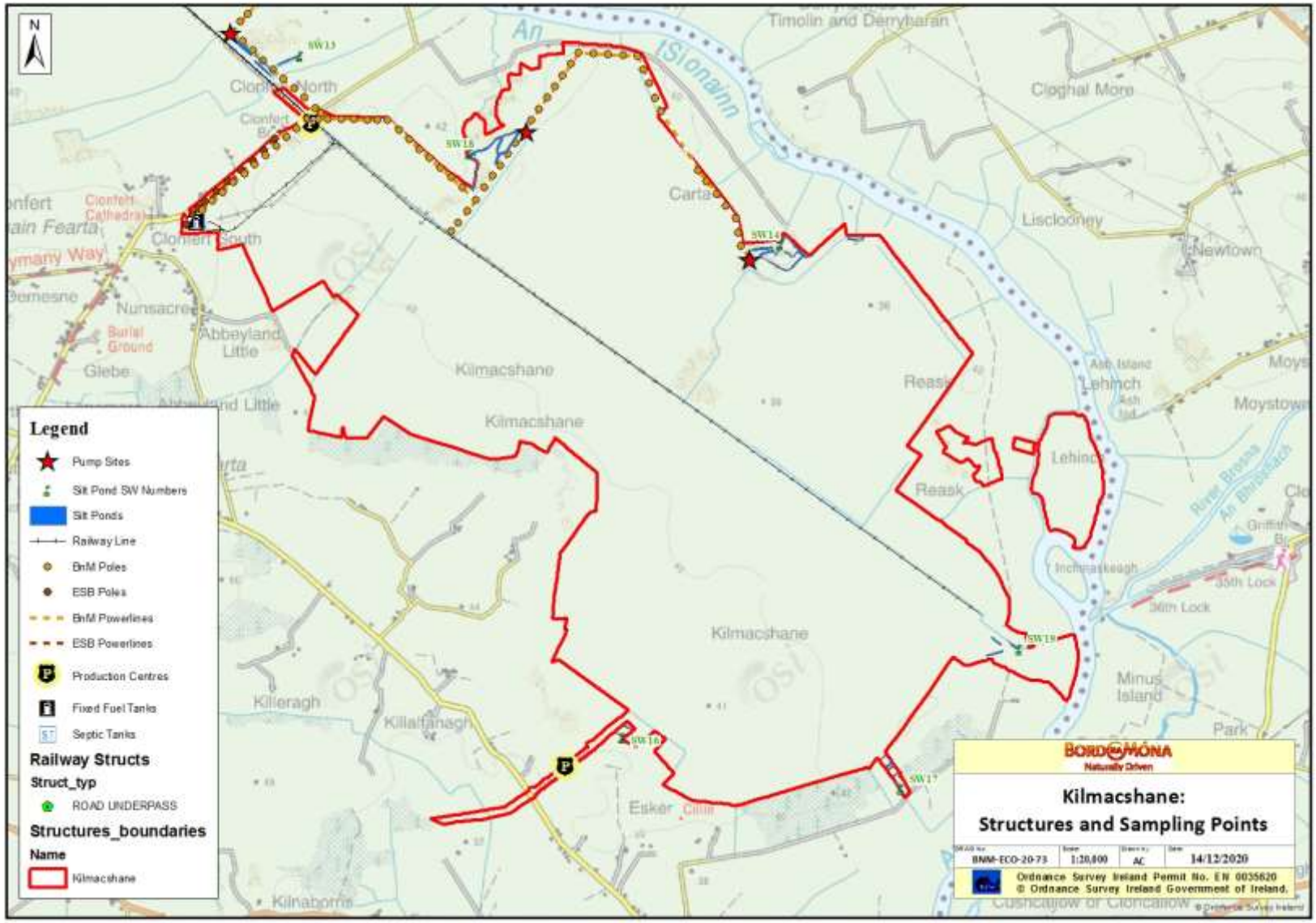

Figure 3.5. Map of Kilmacshane Bog showing structures and designated emission points.

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. No invasive species, as listed under Regulation (EU) 1143/2014 on the prevention and management of the introduction and spread of invasive alien species have been recorded at Kilmacshane Bog. A broad range of common garden escapes are occasionally present around the margins of Bord na Mona 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

Kilmacshane Bog partially overlaps with the River Shannon Callows SAC and pNHA (NPWS Site Code: 000216) and Middle Shannon Callows SPA (NPWS Site Code: 004096). The designated areas include several small areas and a narrow band of land in places around the northern boundary of the site and a larger area towards the east side of the site. These small areas generally contain sections of remnant high bog (PB1) and other typical fringing habitats such as scrub and small patches of bog woodland. The high bog is generally a narrow remnant fringe that was never developed for industrial peat production, although some of the high bog was ditched and is degraded. There are also small bands of production bog within the SAC boundary.

The River Shannon Callows SAC (and pNHA) is designated for grasslands (Molinia and Lowland Hay Meadows) as well as alluvial woodland and Otter. The Middle Shannon Callows SPA is designated for the assemblage of wintering wildfowl, many species of which occur in internationally and nationally important numbers as well, in addition to breeding Corncrake. It is also noted as being important for breeding waders and a range of other nationally scarce species such as breeding Shoveler, Quail and Whinchat.

The section of callows grassland adjacent to Kilmacshane is known to be a very good habitat for breeding waders. Corncrakes have been recorded along this section of grassland in the past but there have been no confirmed records of Corncrakes on the Shannon Callows for several years (BirdWatch Ireland *pers. comm*.).

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 Kilmacshane Bog (i.e. within 3km) The closest Ramsar Sites to Clooniff Bog include Mongan Bog and Clara Bog.

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

3.5 Hydrology and Hydrogeology

Kilmacshane Bog currently has a pumped drainage regime, although pumping has been reduced since peat production paused in 2014. It is expected than when pumping is further reduced or stopped that water levels will increase across a portion of the site. Initial hydrological modelling indicates the bog has basins that will develop a mosaic of wetland habitats when pumping is reduced or stopped. Some sections are expected to revert to a mosaic of wetland habitat with deeper water (> 2 m). Water levels will also fluctuate across the bog due to seasonal inundation. There is a strong alkaline influence on the ground water chemistry of this bog due to

exposed alkaline marls that are strongly alkaline. This is indicated by ecological indicators of alkaline water chemistry (species assemblage).

Kilmacshane Bog is located in the Lower River Shannon catchment. The Bord na Móna bog is directly drained by five small watercourses that flow in a largely southerly or easterly direction from the bog and drain into the River Shannon. The south-west corner of the bog drains into an un-named watercourse, which flows into the Fynagh stream c.1km south-west of Kilmacshane Bog (and then flows into the River Shannon just over 1km downstream). The southern tip of the bog is drained by the Cushcallow stream, which flows into the River Shannon c.800m downstream of the Kilmacshane Bog. Much of the southern end of the bog drains into the Reask stream (which occupies the former channel of the Ballinsaloe Canal) and then south east into the River Shannon c.400m downstream of the bog, although a small section of degraded raised bog also drains into the Lahinch stream, c.1km upstream of the River Shannon. The central part of the bog drains into the Derryholmes stream with flows c.500 north-east to drain into the River Shannon. The northern end of the bog drains into the Abbeyland Little stream, which in turn drains north-northeast into the River Shannon, c.800m downstream from the River Shannon. There are a number of small watercourses present along the eastern edge of Kilmacshane Bog that drain into the River Shannon but none appear to be linked to the Bord na Móna production bog. However, some of these watercourses are likely to have hydrological connectivity to some of the marginal raised bog remnant habitats that are present along this side of Kilmachsane Bog, and such potential connectivity will be taken into consideration when planning the rehabilitation activities described within this document.

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

The bog is largely located in an area mapped by GSI as of low groundwater vulnerability (GSI Mapviewer). Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability maps are based on the type and thicknesses of subsoils (sands, gravels, glacial tills (or boulder clays), peat, lake and alluvial silts and clays), and the presence of karst features. Groundwater is most at risk where the subsoils are absent or thin and, in areas of karstic limestone, where surface streams sink underground at swallow holes. These data indicate there is generally low risk of any groundwater contamination occurring at this site, although care must be taken if working at the site periphery.

The peat is underlain by glacial deposits interbedded with glacio-fluvial deposits over limestone bedrock. The glacial deposits generally consist of grey gravelly clay/silt (present on an adjacent cutaway site). The bog water table across the site is expected to be high when bog drains are locked, and perched above the underlying regional groundwater table. The ability of the shallow peat water to interact with the underlying regional groundwater flows is limited by the impermeability of the underlying glacial deposits. As such the potential for bog restoration to interact or impact on underlying groundwater is very low.

3.6 Emissions to surface-water and water-courses

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

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

Killmacshane bog has 5 treated surface water outlets to the Shannon Lower IE_SH_25SO12060. Peat extraction was not identified as a pressure in the second cycle of the river basin management plan and is indicated as remaining so in the third cycle, currently under preparation.

There are no EPA records of emissions of suspended solids or Ammonia from the bog to downstream water-courses exceeding IPC licence limits. As part of the rehabilitation plan and validation, surface water quality will be monitored to establish an expected stabilization or improvement in water quality parameters.

The main emission limit value associated with this bog is 35mg/l suspended solids, with trigger levels for ammonia of 4.27mg/l and COD 100mg/l. From an analysis of any monitoring over the past 5 yrs. of the IPC licence environmental monitoring of some of the discharges from this bog, indicate that results were under the ELV for SS and trigger levels for ammonia and COD (Table 3.1).

Table 3.1.

Bog	SW	Monitoring	pH	SS mg/l	TS mg/l	Ammonia mg/l	TP mg/l	COD mg/l	Colour
Kilmacshane	SW-14	Q3 17	8	8	406	0.88	0.05	48	83
Kilmacshane	SW-16	Q3 17	7.8	5	268	0.08	0.05	73	103
Kilmacshane	SW-17	Q3 17	7.8	5	172	0.69	0.05	60	172
Kilmacshane	SW-18	Q3 17	7.9	5	318	0.52	0.05	46	106
Kilmacshane	SW-19	Q3 17	8	5	442	0.44	0.05	58	231
Kilmacshane	SW-18	Q3 20	8	30	381	0.568	0.06	69	149

Rehabilitation of cutaway peatland is closely linked with control of emissions. One of the criteria for successful rehabilitation is stabilisation through re-vegetation, which will stabilise all substrates and in turn remove the need for further silt control measures. Re-wetted peat also aid the primary objective of stabilizing peat, as when peat is re-wetted it is not vulnerable to wind erosion. Re-wetted peat and the development of wetland/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.

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 rehabilitation is expected to have a positive impact on water quality and help the NWBMP deliver its objectives in relation to the WFD.

3.7 Fugitive Emissions to air

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

3.8 Carbon emissions

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

The EPA-funded CarbonRestore Project (Renou-Wilson et. al. 2012) found that rewetting of drained peatlands can lead to restoration of functional peatland, such as the return of typical plant and animal species, which in turn may lead to the restoration of peat-formation and the carbon sink function. It is expected that Kilmacshane Bog can become a carbon sink (albeit in the longer term) following rehabilitation.

It is expected that Kilmacshane Bog can become a reduced carbon source with small sections having potential to develop as a carbon sink (albeit in the longer term) following rehabilitation. The potential of any cutaway site to develop as a reduced carbon source/carbon sink in the longer-term depends on the success of the rehabilitation measures, the extent of development of *Sphagnum*-rich or other peat-forming habitats, the balance of carbon fluxes from different cutaway habitats and future climatic conditions. The majority of this site is expected to develop wetland with a mosaic of fen, Reed swamp, wet woodland and scrub. Birch woodland is expected to develop on the drier mounds and peripheral headlands. Parts of the bog with residual deeper peat have potential to develop *Sphagnum*-rich habitats.

3.9 Current ecological rating

(Following NRA (2009) Evaluation Criteria)

Current ecological rating ranges from **International** to **Local Importance (lower value).** The site partially overlaps with the River Shannon Callows SAC & pNHA (NPWS site code: 000216) and the Middle Shannon Callows SPA (NPWS site code: 004096) and this area is deemed to be of **International Importance**. Additionally, the

assemblage of wintering Whooper Swans recorded on the site appears to regularly exceed the threshold for international importance (>270 individuals).

The majority of the site is rated as **Local importance (lower value)** due to the dominance of bare peat associated with peat extraction operations. Cutaway habitats are generally poorly developed, as are marginal remnant habitats, which have a somewhat higher value and assigned a rating **Local importance (higher value)**. However some areas, where cutaway habitats have established, would be rated as being of **county importance** due to the wetland habitats that have developed there and the species that have been recorded, including breeding waders.

It is expected that the overall ecological value of this site will increase in the future as the site re-vegetates, matures and forms semi-natural habitats, such as extensive Reed Swamp, fen and wet woodland.

4. CONSULTATION

4.1 Consultation to date

Consultation will seek to engage an audience of relevant stakeholders at both a national and local level. National stakeholders have been identified from varied bog restoration and rehabilitation efforts undertaken by Bord na Móna over the past 40 years, with particular emphasis on engagement with stakeholders during ongoing rehabilitation and their Biodiversity Action Plan programme, in operation since 2009. National Stakeholders includes relevant government departments and agencies, relevant semi-state bodies, NGOs and other environmentally-focused groups with a national remit. Stakeholders can be emailed a copy of this draft plan when it has been finalised internally by Bord na Móna, and invited to make submissions on the objectives and content of this plan in relation to Kilmacshane Bog.

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

- Wintering wader and wildfowl usage through surveys of the site by Birdwatch Ireland (commissioned by BnM).
- General consultation with range of stakeholders at annual Bord na Mona Biodiversity Action Plan review days 2010-2018.
- Midlands & East Regional WFD Operational Committee (River Basin Management Plans).
- Sub-committee on Shannon Flooding Work Programme and Measures (OPW, Waterways Ireland, ESB, LA's, Fisheries Ireland, NPWs etc).
- Archaeological Liaison Committee (National Museum of Ireland & Dept of Culture Heritage and the Gaeltacht).

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

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

4.2 Issues raised by Consultees

N/A. Not issued to consultees yet.

4.3 Bord na Móna response to issues raised during consultation

N/A

5. REHABILITATION GOALS AND OUTCOMES

The key rehabilitation goal and outcomes for Kilamcshane Bog are **environmental stabilisation** of the site via **optimising climate action benefits**. This is defined as:

- Carrying out intensive rehabilitation with the application of enhanced rehabilitation measures (including pump management, drain-blocking, re-profiling, cell-bunding, fertiliser application, seeding of vegetation & inoculation of *Sphagnum* in suitable conditions).
- Optimising hydrological conditions for the development of wetlands, Reed Swamp, fen and other wetland habitats across the site and eventually naturally functioning wetland and peatland habitats. Kilmacshane Bog has a pumped drainage regime and a significant area is likely to develop as wetland habitat dominated by Reed Swamp.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities in suitable conditions.
- Stabilisation or reduction in water quality parameters (e.g. suspended solids).
- Environmental stabilisation.
- Setting the site on an appropriate trajectory to develop naturally functioning peatland and wetland habitats over time. 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). Nevertheless, re-wetting across the entire bog, as part of the proposed Scheme, will improve habitat conditions of the whole bog, making the overall bog wetter. Other peatland and wetland habitats such as fen, wet woodland, Reed Swamp and embryonic *Sphagnum*-rich vegetation will develop in a wider mosaic that reflects underlying conditions. It will take some time for stable naturally functioning habitats to fully develop at Kilmacshane Bog.

Re-wetting this site 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 (Grand-Clement *et al*., 2015; Anderson *et al*., 2017; Minayeva *et al*., 2017). This will reduce carbon emissions from the site from a larger carbon source to a smaller carbon source.

In time, a small part of the site has the capacity to develop in part as a carbon sink (residual deep peat areas with suitable hydrology). *Sphagnum*-rich raised bog communities are considered to be actively peat-forming and are considered to be raised bog carbon sinks (Renou-Wilson *et al*., 2011; NPWS 2017a). The bog will improve in condition after re-wetting and also has the capacity to reduce Carbon emissions with the development of wetlands in time.

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 Carbon sink function.

The main deliverable of this enhanced plan is the successful rehabilitation (environmental stabilisation) of peatlands used for industrial peat production at the bog in a manner that is acceptable to both external stakeholders and to Bord na Móna and which optimise climate action and other ecosystem service benefits.

6. SCOPE OF REHABILITATION

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

- The area of Kilmacshane Bog (Figure 3.1).
- EPA IPC Licence - Ref. P0502-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Kilmacshane Bog is part of the Blackwater Bog group.
- The proposed Scheme is designed to exceed the stabilisation requirements as defined by the IPC Licence. This scheme is designed to enhance the ecosystem services of Kilmacshane Bog, in particular, optimising **climate action benefits**. The proposed interventions will mean that environmental stabilization is achieved (meaning IPC obligations are met) and, in addition, significant other ecosystem service benefits particularly for climate action will be accrued.
- The local environmental conditions of Kilmacshane Bog identify wetland creation and deep peat re-wetting as the most suitable rehabilitation approach for different part of this site. Kilmacshane Bog has a pumped drainage regime and a significant area is likely to develop as wetland habitats, particularly Reed swamp.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog. Bord na Móna have defined the key goal and outcome of rehabilitation at Kilmacshane Bog as **environmental stabilisation** and **optimising suitable hydrological conditions, and setting the site on a trajectory towards the development of naturally functioning peatland and wetland habitats (embryonic *Sphagnum*-rich peat-forming habitats, fen, Reed Swamp, wet woodland and other associated wetland habitats).**
- Enhanced Rehabilitation of Kilmacshane Bog will support multiple national strategies of climate action, biodiversity action and other key environmental strategies such was the Water Framework Directive.
- The time frame for the delivery of the planned rehabilitation will be undertaken according to available resources and appropriate constraints.
- The scope of this plan does not include Lehinch Island and eastern callows grassland.

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). On parts of Kilmacshane Bog, only a certain proportion of peat has been removed leaving a largely un-vegetated surface over deep peat deposits whilst on other areas almost all the peat layer has been removed, revealing subsoil visible. There are local factors that will influence the future trajectory of this site (flow conditions of stream through the site) which need to be considered as part of the wider rehabilitation work. Hydrological factors – Kilmacshane Bog is a pumped bog – mean that a significant portion of the site is likely to develop as wetland.
- **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, as well as potential changes to the hydrology of surrounding designed sites. It is anticipated that the work proposed here (blocking drains and re-wetting cutaway peatlands) will not have any flooding impacts on adjacent land.

- **Archaeology**. The discovery of monuments or archaeological objects during peatland rehabilitation may potentially constrain the rehabilitation measures proposed for a particular area. If this occurs, rehabilitation measures will be reviewed and adapted. An archaeological impact assessment of the proposed rehabilitation at Kilmacshane Bog is being carried out (Appendix IX). There are several archaeological features known from this bog. These are generally located towards the margins of the site and will not be directly affected by the proposed rehabilitation. Rehabilitation in these zones will be avoided or minimised (peat barriers located to avoid damage to any archaeological features) (Figure 8.5). Rehabilitation methodologies in these areas will be amended or the areas excluded, depending on the AIA, to minimise or remove any impact.
- **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.
- **Other Constrained areas**. There is an existing grazing agreement at Kilmacshane Bog.

6.2 Key Assumptions

- It is assumed that Bord na Móna will have all resources required to deliver this project. For the avoidance of doubt, should the proposed Scheme and the associated statutory obligation on Bord na Móna not materialise, Bord na Móna will not carry out the enhanced decommissioning, rehabilitation and restoration measures described in this plan. Bord na Móna will instead plan to complete only the 'standard' decommissioning and rehabilitation measures required under Condition 10, and for which financial provisions have been made, to comply with that element of the Licence.
- It is expected that weather conditions will be within normal limits over the rehabilitation plan timeframe. Long periods of wet weather have the capacity to significantly affect ground conditions and constrain practical ground measures.

6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- The longer-term raised bog restoration trajectory of the site. The plan covers the short-term rehabilitation **actions** and **an additional monitoring and after-care programme** to monitor the rehabilitation and to respond to any needs. It is expected that this rehabilitation plan will set the site on an enhanced and accelerated trajectory towards the restoration of naturally functioning wetland and peatland habitats. The plan does not set any goals or outcomes, for example, the extent (specific area) of active raised bog habitat (ARB) that may develop at this site. This is beyond the scope of this rehabilitation plan.
- This plan is not intended to be an after-use or future land-use plan for Kilmacshane Bog.

- The longer-term management of this site, potentially as a nature conservation site, or for amenity, or for other uses in the future. This will require further engagement with stakeholders.

7. CRITERIA FOR SUCCESSFUL REHABILITATION

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

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

Rehabilitation is generally defined by Bord na Móna as

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

In addition, Bord na Móna wish to optimise climate action and other ecosystem service benefits via enhanced rehabilitation measures. Enhanced rehabilitation will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. The proposed interventions will mean that environmental stabilization is achieved (meaning IPC obligations are met) and, in addition, significant other benefits particularly for climate action will be accrued.

In general, the key objective will be to optimise the area of suitable hydrological conditions for climate action benefits (re-wetting peat and keeping water levels close to the peat surface) across this heterogeneous cutaway landscape to accelerate (1) the trajectory of deep peat re-wetting towards the establishment of embryonic Sphagnum-rich peat-forming habitat in suitable conditions, and (2) the trajectory of peat re-wetting towards the establishment of naturally functioning peatland habitats (fen and Reed swamp).

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

- Rewetting of deep peat in the former area of industrial peat production to offset potential silt run off and to encourage development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat. 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 stabilising/improving concentration of suspended solids and ammonia associated with the measures undertaken to stabilise the peat surface by the blocking of the internal drainage system and the maximised rewetting of the peat surface. This will be demonstrated by developing a stable or downward trajectory of water quality indicators (suspended solids and ammonia) towards what would be typical of a re-wetted cutaway bog. This will be measured via water quality monitoring (suspended solids and ammonia) for at least 2 years after the rehabilitation has been completed.
- 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. This will be measured by the EPA WFD monitoring programme.

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 deep peat re-wetting). This will be measured by an aerial survey after rehabilitation has been completed.
- Accelerating the trajectory of the site 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 Reed swamp and wetland, fen, wet woodland, scrub, Birch woodland and embryonic *Sphagnum*-rich peatland communities, where conditions are suitable. These habitats will generally establish initially as pioneer vegetation. It will take some time for stable naturally functioning habitats to fully develop at Kilmacshane Bog. This will be demonstrated and measured via aerial photography, habitat mapping and cutaway/habitat condition assessment. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Improvement in biodiversity and ecosystem services. This will be demonstrated by metrics outlined in Section 9.1 that can be used to measure changes in ecosystem services (e.g. water quality parameters, development of pioneer habitats, breeding bird monitoring). This will be measured by collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future. These metrics will be defined in the context of the overall Scheme resources and after consultation with stakeholders.

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

Criteria type	Criteria	Target	Measured by	Expected Time-frame
IPC validation	Rewetting in the former area of industrial peat production	Delivery of rehabilitation measures	Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking)	2021-2025

		Reduction in bare peat.	Establishment of a baseline for future monitoring of bare peat, vegetation establishment and habitat condition.	
IPC validation	Key water quality parameters Ammonia, Phosphorous, Suspended solids, pH and conductivity	Reduction or stabilisation of key water quality parameters	Water quality monitoring. Started in advance of the proposed rehabilitation.	2020-2023
IPC validation	Reducing pressure from peat production on the local water body catchment (WFD)	No decline in the WFD status of the local river catchment related to the 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.	2021-2025
Climate action verification	Reduction in carbon emissions.	Reduction in carbon emissions	Carbon emissions – estimated using a high bog condition assessment and appropriate carbon emission factors.	2021-2025
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.	2021-2025

Climate action verification	Biodiversity and ecosystem services. Habitat establishment Presence of key species – Sphagnum Breeding birds Pollinators	Improvement in biodiversity and ecosystem services.	Metrics that relate to selected biodiversity and ecosystem services (to be defined). Presence of key species – Sphagnum – Walkover survey Breeding birds – Breeding bird survey Pollinators – Pollinator walk	2021-2025

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 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

- **Funding to pay for resources required to deliver the planned rehabilitation (Bord na Móna and external).** Bord na Móna maintains a Provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence. It is expected that additional costs of enhanced rehabilitation will be supported by Government through the Climate Action Fund.
- **Bord na Móna to have sufficient resources (staff and training) to deliver the planned rehabilitation with required associated skills and competencies.**
- **Bord na Móna to have sufficient resources (suitable machinery) and staff to maintain this machinery.**
- **Weather conditions to be within normal limits over the rehabilitation plan timeframe.** Long periods of wet weather have the capacity to significantly affect ground conditions and constrain the delivery of rehabilitation. The potential impact of wet weather on ground conditions can be reduced by appropriate planning and management. Bord na Móna have significant experience of managing these issues through 70 years of working in these peatland environments.
- **Rehabilitation measures to be effective.** The rehabilitation measures proposed in this plan are based on 40 years of Bord na Móna experience of peatland management and best practise applied internationally in peatland management. Measures proposed in this plan have already been shown to be affective at other sites. Bord na Móna will apply a flexible and adaptable approach to the more innovative rehabilitation measures proposed in this plan**.** If measures are not initially effective, Bord na Móna will review any requirement for additional practical rehabilitation.
- **Natural colonisation of vegetation to develop semi-natural habitats at a rate within the normal limits.** The development of naturally functioning semi-natural habitats on cutaway peatland takes time. Pioneer

vegetation can develop relatively quickly (3-10 years) and wetland habitats can develop relatively quickly. Birch woodland make take 20-30 years to develop. However, it may take 50 years for active raised bog vegetation to re-develop on ground that was previously cutaway. Different environmental conditions will have a significant impact on the rate of natural colonisation, and as a result of the combination of different environmental conditions and the application of different rehabilitation measures, there will be a variety of habitat outcomes.

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

8. REHABILITATION ACTIONS AND TIME FRAME

Peatland rehabilitation requires detailed planning and the use of data from desktop surveys and field surveys. This data in association with topographical and hydrological modelling (Figure 8.3 & 8.4) 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 (Figure 8.4) 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).

The rehabilitation actions will be a combination of PCAS measures to re-wet peat. The distribution of these measures is provisionally outlined in Figure 8.5. (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 Kilmacshane Bog will include:

- Re-wetting the deep peat areas of the bog using berms and field re-profiling. This enhanced measure seeks to create large (c. 45m x 60m) flat areas or cells of shallow (< 10 cm) water conditions on bare peat, across multiple fields that are enclosed by shallow berms to retain shallow surface water;
- Re-wetting some deep peat areas of the bog through field drain blocking using a dozer to create peat barriers;
- Re-profiling of some fields within the deep peat areas to improve water retention capacity;
- Re-alignment of piped drainage;
- Optimise water retention in wetland areas, including placement of berms where required;
- Re-assessment of the pumping regime and turning off pumps if this desired and has no significant external impact. Initial hydrological modelling indicates that a significant part of the site will develop a mosaic of wetland habitats with deeper water, when pumping is reduced or stopped. Hydrological management will look to optimise summer water levels to maximise the development of wetland vegetation (by looking to set water depths at < 0.5 m, where possible. It is inevitable that some sections will naturally have deeper water due to the variable topography). Water-levels will be adjusted at outfalls and by adjusting piped drainage. More sustainable permanent gravity drainage solutions will be examined. It is expected that a natural seasonal flooding regime will develop, with water-levels fluctuating in association with levels in the adjacent River Shannon and Callows.
- Blocking drains in targeted marginal (degraded) high bog area and re-wetting, where possible, using an excavator to install peat barriers. Some bog remnants are too small to benefit from this approach;
- Targeted fertiliser applications to accelerate vegetation establishment on headlands and high fields. (It is noted that the application of fertiliser may need additional assessment and approval as per the IPC Licence),
- Seeding of vegetation such as Reeds in targeted areas;
- Seedling of vegetation in some sections is not required as this bog has already undergone significant natural colonisation and the development of pioneer habitats is already significantly progressed in particular sections.
- Silt ponds will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase silt ponds will be continually inspected and maintained, where appropriate. When it

is deemed that silt ponds are not required, as the bog has been successfully stabilised and there is no silt run-off, the condition of the silt ponds will be reviewed. Silt ponds will either be de-watered (water levels lowered to a level where the silt pond will naturally develop as a small wetland feature), left in situ, or infilled (where discharges do not require silt control).

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

- Seek formal approval of the enhanced plan, noting the alternative adapted standard plan should funding from the proposed Scheme not materialise, from the EPA;
- Agree an *ex ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator;
- Develop a detailed site plan with detailed site drawings outlining how the various rehabilitation methodologies (PCAS) will be applied to Kilmacshane Bog. This will take account of peat depths, topography, drainage and hydrological modelling. (See map for an indicative view of the application of different rehabilitation methodologies);
- Carry out a hydrology and drainage management appraisal of the proposed enhanced rehabilitation measures;
- Carry out a review of known archaeology and an archaeological impact assessment of the proposed rehabilitation. Incorporate the results of this assessment into the rehabilitation plan to minimise known archaeological disturbance, where possible;
- Carry out a review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements. Several known rights of way are present along the Bord na Móna margins.
- Carry out a review of remaining milled peat stocks. It is expected that all peat stocks will eventually be removed or decommissioned.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation, if required, such as the presence of sensitive ground-nesting bird breeding species (e.g. Curlew) or larval webs of Marsh Fritillary butterfly, etc. The scheduling of rehabilitation operations will be adapted, if required, as mitigation; and
- Ensure all activities comply with the environmental protection requirements of the IPC Licence.

Table 8.1. Enhanced rehabilitation measures and target area. *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	Code	Description	Area (Ha)
Deep peat cutover bog	DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes	
	DPT2	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows	32.9
	DPT3	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows	
	DPT4	Berms and field re-profiling (45m x 60m cell) + blocking outfalls and managing overflows+ drainage channels for excess water + *Sphagnum* inoculation	49.1
	DPT5	Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	
Dry cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	1.4
	DCT2	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	215.3
	DCT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows + targeted fertiliser treatment	
Wetland cutaway	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	
	WLT2	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site	233.
	WLT3	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site + constructing larger berms to re-wet cutaway + transplanting Reeds and other rhizomes	480.0
	WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	73.3
	WLT5	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	
Marginal land	MLT1	No work required	186.7
	MLT2	More intensive drain blocking (max 7/100 m)	
	MLT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows + boundary berm	
Other		Silt-ponds	9.8
		Archaeology	16.5
Total			1,298.1

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

- Carry out proposed measures as per the detailed site plan. This will include a combination of pump management, drain blocking, peat field re-profiling, cell-bunding and fertiliser applications targeting headlands, high fields and other areas (where required). All rehabilitation will be carried out with regard to best practice environmental control measures (Appendix IV);
- Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions;

- Carry out the proposed monitoring, as outlined.
- While natural colonisation is expected to commence almost immediately once peat production ceases, Phase 2 actions will be carried out in targeted areas to accelerate re-vegetation and colonisation of target species. Phase 2 actions may include seeding of targeted vegetation and inoculation of *Sphagnum*;
- Silt ponds will be monitored during this period and there will be continued maintenance and cleaning (if required) to prevent potential silt run-off from the site during the rehabilitation phase; and

- Submit an *ex post* report to the Scheme regulator to verify the eligible interventions 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 proposed 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

- **2020-2021**: Short-term planning actions.
- **2021**: Short-term practical actions.
- **2021-2024**: Long term practical actions. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- **2024**: 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, Bord na Móna in developing a package of measures, 'the proposed 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 proposed 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 2020). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.

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

Figure 8.1 Aerial photo of Kilmacshane Bog (2020).

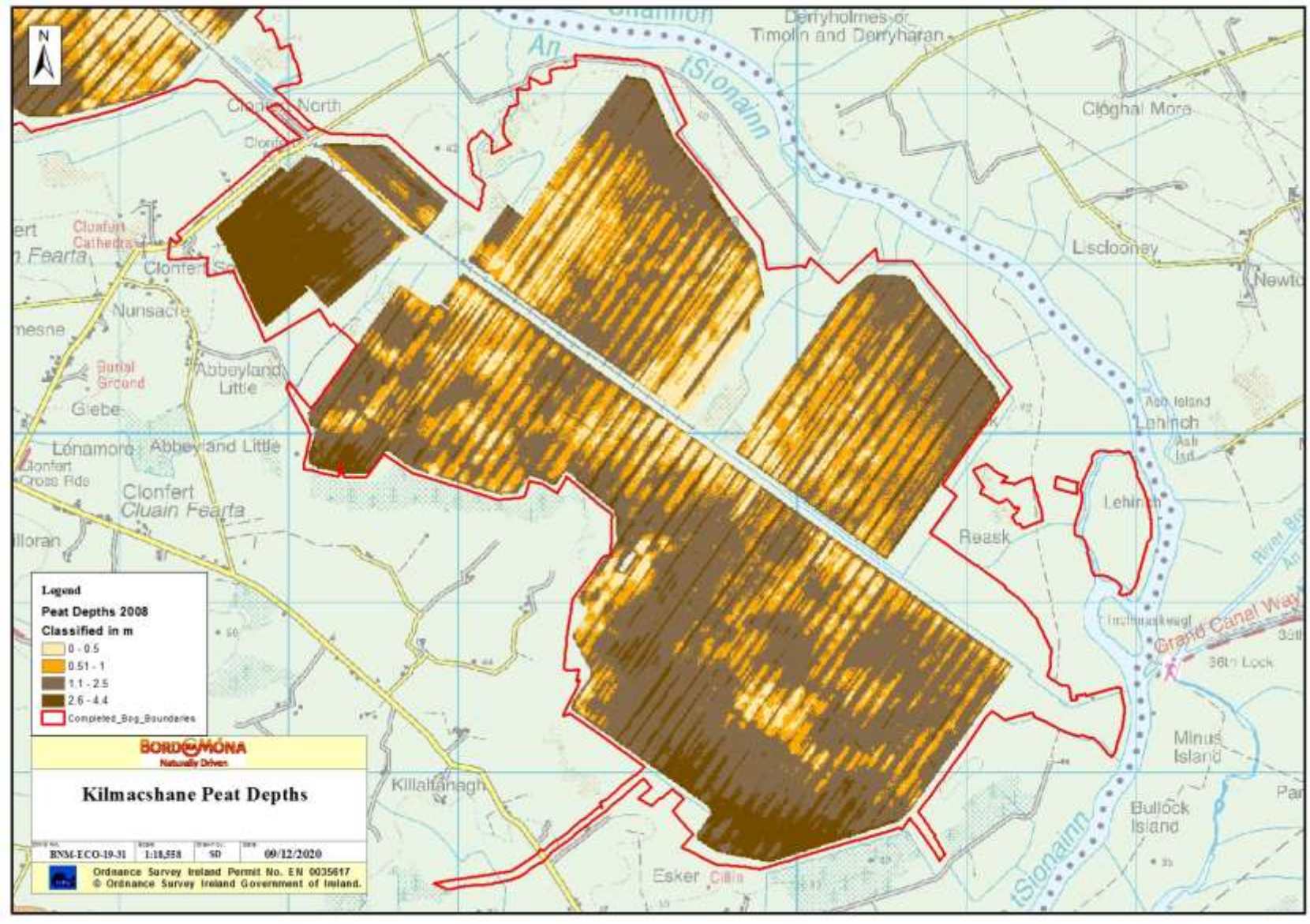

Figure 8.2. Peat Depth Map for Kilmacshane Bog. There are areas of deep peat in sections of the bog, particularly south of the railway. Much of the northern side of the bog and the areas along the railway has been cutaway.

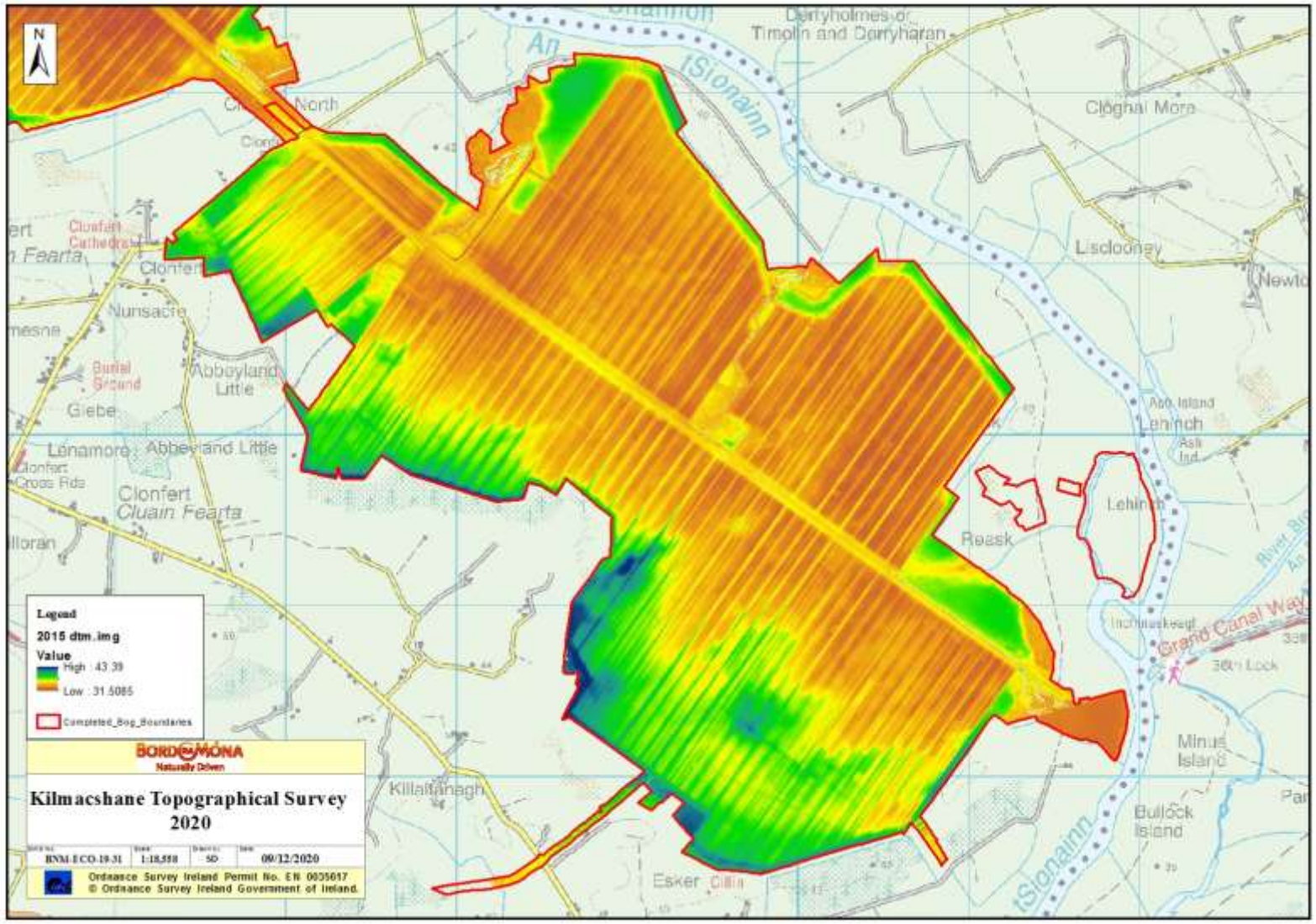

Figure 8.3. LIDAR topography map of Kilmacshane Bog. Low areas and basins are orange-yellow, more elevated areas are blue-green. There is some more elevated ground along the southern margin

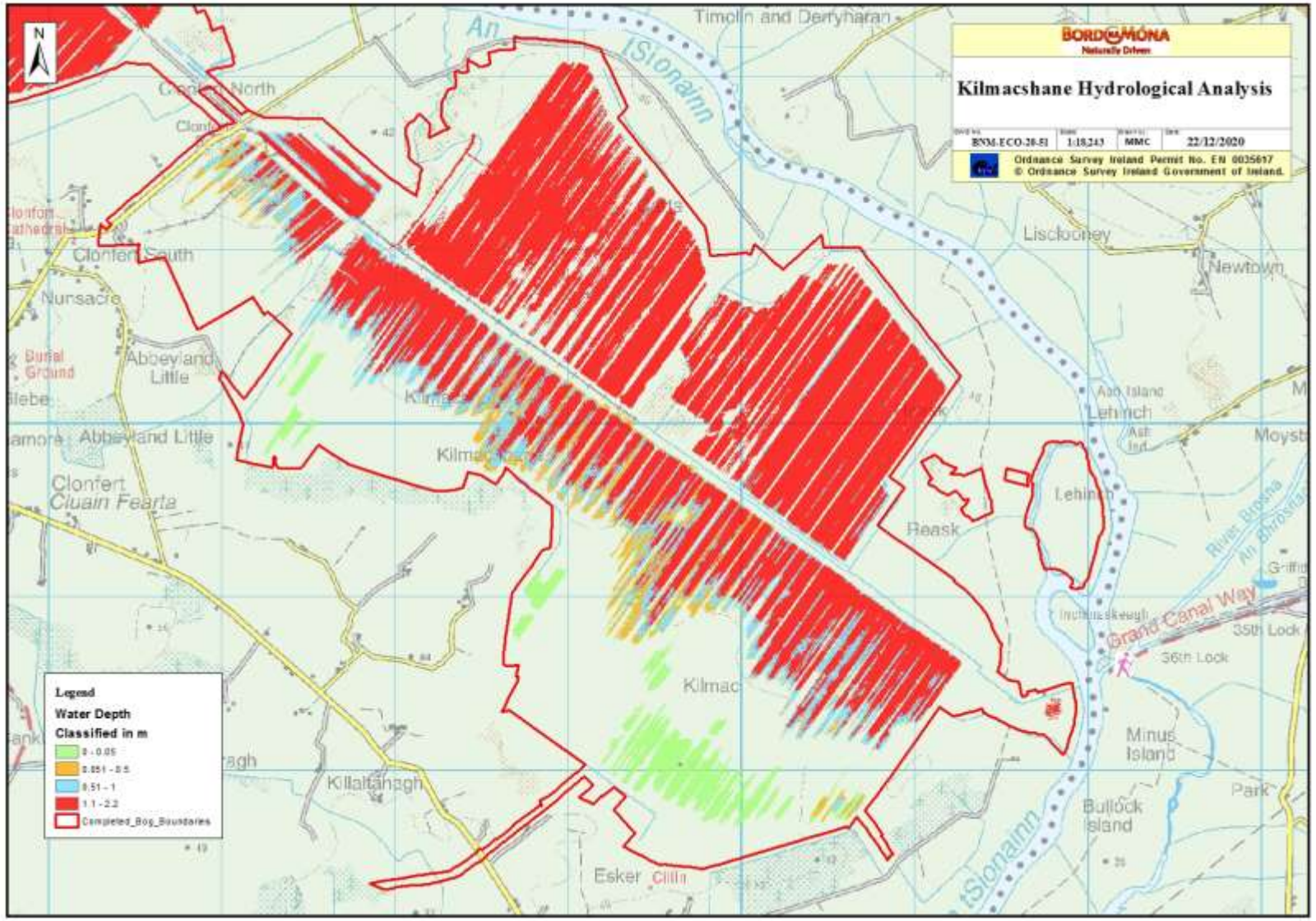

Figure 8.4. Hydrological model of Kilmacshane Bog. This shows expected water depths showing range of expected water depths based on current topography in the winter if pumps are turned off.

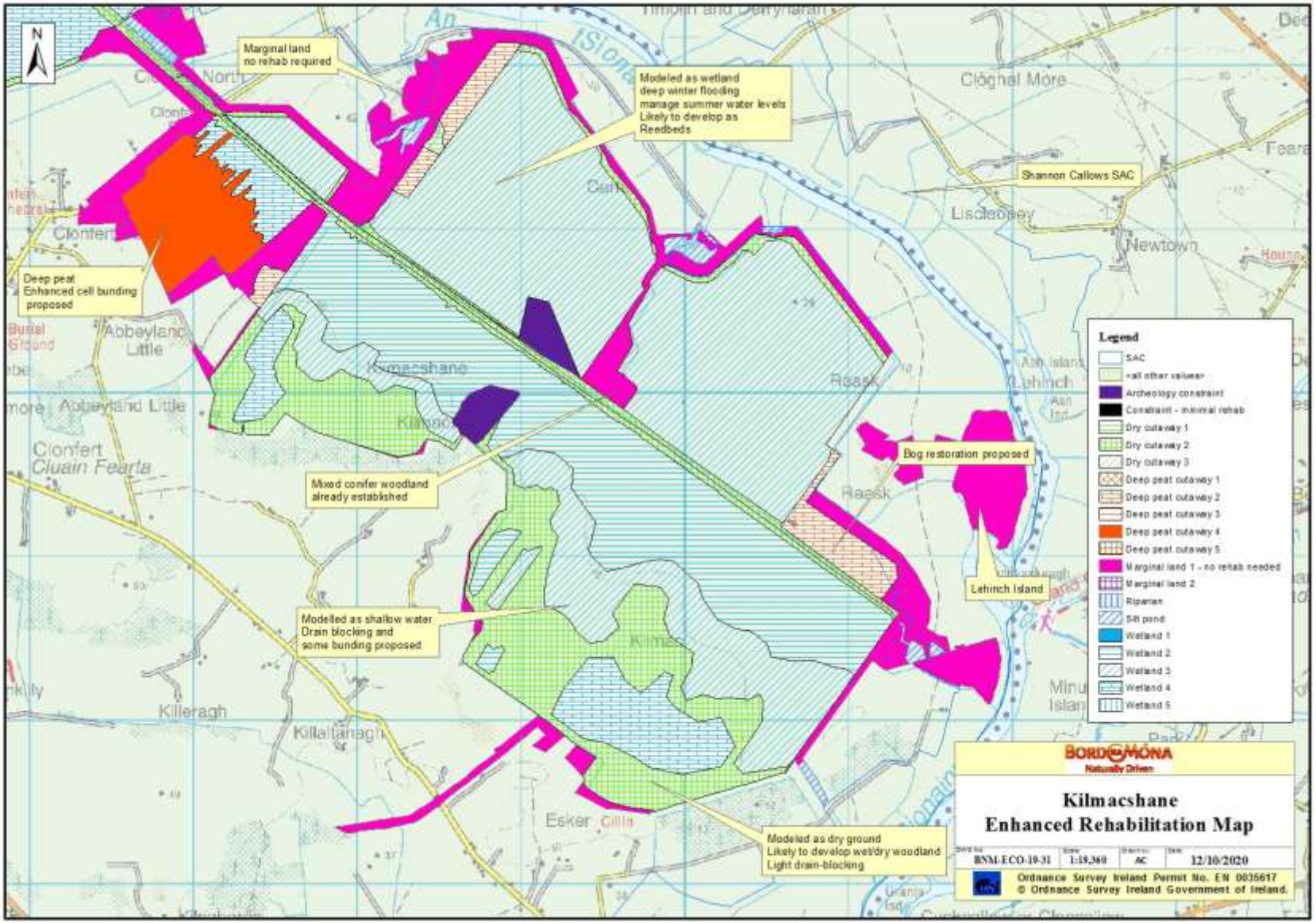

Figure 8.5. Indicative Enhanced Rehabilitation Plan for Kilmacshane Bog. *Note that the types of rehab and areas of rehab may change in response to stakeholder consultation and* refinement of the enhanced rehabilitation measures.

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. The extent of bare peat will be assessed using this baseline data, and habitat maps will be updated, if required. It is proposed that sites can be monitored against this baseline in the future.
- **Water quality monitoring** at the bog will be established. This will start in advance of the proposed rehabilitation. The main objective of this water quality monitoring will be to establish a baseline and then monitor the impact of peatland rehabilitation on water quality from the bog.
- In order to assist in monitoring surface water quality from this bog, it is planned to increase the existing licence monitoring requirements to sampling for the same parameters to every month during the scheduled activities and for a period up to two years. post rehabilitation, depending on the period required to confirm that the main two parameters, suspended solids and ammonia are remaining compliant with the licence emission and trigger limit values and there is an improving trajectory in these two parameters i.e. reduction in concentration.
- Water quality monitoring will aim to include up to 70% of a bogs drainage catchments. With regard to this bog.
- Monitoring results will be maintained, trended and reported on each year as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, which will be available in April each year at www.epa.ie.
- The parameters to be included (as per condition 6.2 of the IPC Licence) include monthly monitoring for pH, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour, and COD.
- 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 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 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, 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 appropriate assessment process and planning procedures.

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

- Vegetation and habitat monitoring after rehabilitation is completed using a cutaway bog condition assessment (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. Bord na Móna 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.
- It is proposed to monitor the improvement of some biodiversity ecosystem services. To be defined in relation to monitoring of the overall proposed Scheme and after consultation with stakeholders.

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

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

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

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

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

In the event that the proposed 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.

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 Kilmacshane Bog (Figure 3.1), excluding Lehinch Island and the callows grassland as indicated.
- EPA IPC Licence - Ref. P0502-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Kilmacshane Bog is part of the Blackwater Bog group.
- The current condition of Kilmacshane Bog. This site has pumped drainage. Pioneer vegetation is developing across a significant part of the site.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog.
- To minimise potential impacts on neighbouring land. some boundary drains around Kilmacshane Bog will be left unblocked as blocking boundary drains could affect adjacent land.
- Biodiversity and ecosystem services have been identified as the primary land-use by Bord na Móna.

Rehabilitation goals and outcomes

The key rehabilitation goal and outcome for Kilmacshane Bog is environmental stabilisation of the site via wetland creation and deep peat re-wetting. This is defined as:

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

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

Criteria for successful rehabilitation:

- Rewetting of residual peat in the former area of industrial peat production to offset potential silt run off and to encourage development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat.

- That there is a 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).
- That the main water body associated with surface water from this bog continues to be excluded in the EPA's list of peat pressure water bodies as reported in the River Basin Management Plans. Where the water body has been identified as under pressure from peat extraction, that the intervening EPA monitoring programme associated with its Programme of Measures for this water body shows positive improvements in water quality impacts that were attributable to the original peat extraction activity.

Rehabilitation indicators

- Demonstrating the delivery of the rehabilitation through site visits and through updated aerial photography (indicating presence of peat dams and re-wetting).
- Stabilising potential emissions from the site (e.g. suspended solids). The 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.

Rehabilitation measures: (see Figure Ap-1)

- Blocking field drains in the former industrial production area using a dozer to create regular peat blockages (three blockages per 100 m) along each field drain;
- Re-alignment of piped drainage to manage water levels across the site.
- Realignment of outfalls.
- Pump management – reducing or ceasing pumping.
- Fertiliser treatment of high fields and headlands (typically slow to naturally re-colonise) to encourage natural colonisation, if needed. (It is noted that the application of fertiliser may need additional assessment and approval as per the IPC Licence).
- No measures are planned for the 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:

- 2021. 1st phase of rehabilitation. Field drain blocking with dozer.
- 2021. 2nd phase. Further realignment of piped drainage, pump management 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 required. These will be determined by ongoing monitoring.
- 2023-2024. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.

- 2023-2024. Decommission silt-ponds, if necessary.

Budget and Costing

- Bord na Móna maintains a Provision on its balance sheet to pay for the future costs of rehabilitation and decommissioning when industrial peat extraction ceases. This is updated every year. For more information see the Bord na Móna Annual Report (Bord na Móna 2020). 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 basic rehabilitation provision has been allocated to the site based on the area of cutaway types across the site.

Table AP-1. Rehabilitation measures and target areas.

Type	Code	Description	Area (Ha)
Deep Peat	DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes	90.0
Dry Cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	216.7
Wetland cutaway	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	786.4
Marginal land	MLT1	No work required	186.7
Other		Silt-ponds	9.8
		Archaeology	16.4
Total			1,298.2

Monitoring, after-care and maintenance

- There will be initial quarterly monitoring assessments of the site to determine the general status of the site, the condition of the silt-ponds, assess the condition of the rehabilitation work, asses the progress of natural colonisation, monitoring of any potential impacts on neighbouring land and general land security. The number of site visits will reduce after 2 years to bi-annually. These site visits will assess the need for additional rehabilitation, if needed.
- 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, 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 appropriate 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.

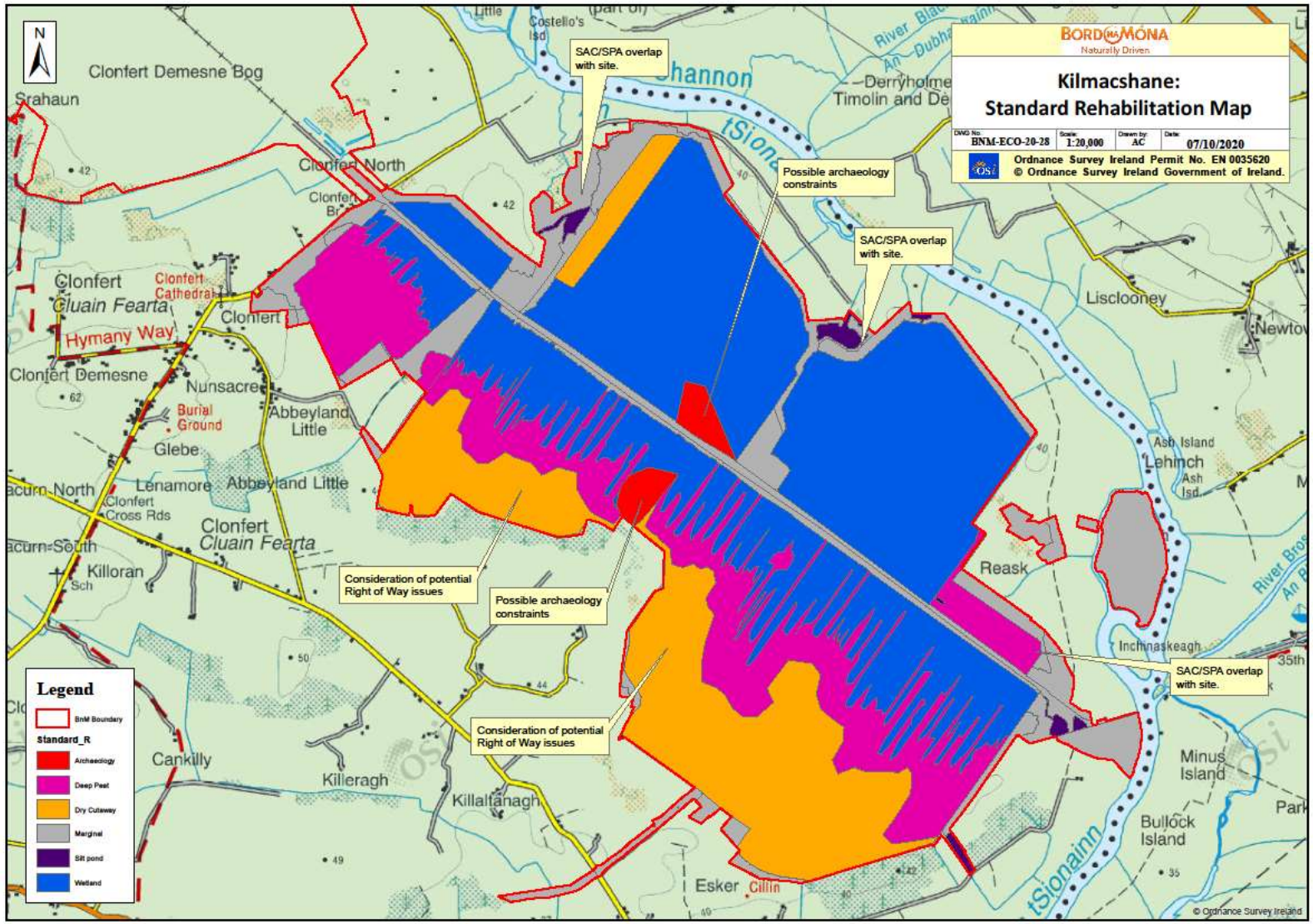

Figure Ap-1. Indicative standard rehabilitation plan for Kilmacshane Bog.

APPENDIX II: BOG GROUP CONTEXT

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

Industrial peat extraction in the Blackwater Bog Group has permanently ceased on the majority of sites. It is planned to supply remaining milled peat stocks to Shannonbridge (WOP) and Lanesborough (LRP) during 2020. Both power stations will cease using peat by the end of 2020. Decommissioning and rehabilitation for the Blackwater Bog Group is expected to start in 2020/2021.

A number (6) of bogs were initially drained but have never been used for industrial peat production (three former development bogs (Kellysgrove, Tirrur-Derrymore and Newtown-Loughgore), Clonboley, Killeglan and Derrydoo-Woodlough). The latter three bogs are classed as restored raised bogs, still contain active bog habitat (that qualifies as the Annex I EU Habitats Directive habitat) and now form the core of the Bord na Móna Raised Bog Restoration Project due to their high biodiversity value and bog restoration potential. NPWS have identified the Clonboley bog cluster as having high ecological value within the recent assessment of raised bog SACs, NHAs and non-designated sites (NPWS 2014[2]).

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

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

[2] http://www.npws.ie/peatlandsturf-cutting/nationalraisedbogsacmanagementplan/

A breakdown of the component bog areas for the Blackwater Bog Group IPC License Ref. PO502-01 is outlined in Table Ap-2.

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

Bog Name	**Area (ha)**	**Indicative Peat Production Status**
Attymon	336	BnM Industrial peat production permanently ceased – 2018. Cutaway Sod peat production now ceased Partially planted with Conifer forestry – Coillte
Cloonkeen	252	BnM Industrial peat production permanently ceased – 2018. Cutaway Sod peat production now ceased Partially planted with Conifer forestry – Coillte
Derrydoo-Woodlough	452	Never in peat production – zoned for biodiversity Rehabilitation (bog restoration) now complete
Total	**1,040**	

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

Bog Name	**Area (ha)**	**Indicative Status**
Ballaghhurt	597	Milled peat production is anticipated to continue at Ballaghurt Bog for the foreseeable future, depending on future peat resource requirements (subject to current substitute consent applications and future planning applications for industrial peat production). It is proposed to continue milled peat production to supply Derrinlough Briquette Factory Partial emerging naturally colonising cutaway
Belmont	316	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Fragmented former bare peat production areas Partial emerging naturally colonising cutaway Conifer forestry – Coillte
Blackwater	2,303	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Fragmented former bare peat production areas Extensive emerging naturally colonising cutaway Conifer forestry – Coillte
Bloomhill	883	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat
Bunahinly-Kilgarvan	390	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat Deep peat rehabilitation of a small area (25 ha)
Glebe	132	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat

Clooniff	523	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat Partial emerging naturally colonising cutaway
Cornafulla	460	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat
Cornaveagh	492	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat
Culliaghmore	442	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat Partial emerging naturally colonising cutaway
Garryduff	970	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Fragmented former bare peat production areas Extensive emerging naturally colonising cutaway
Kellysgrove	202	Former development bog (peat reserve) – drained, never in industrial peat production Bog restoration planned.
Kilmacshane	1,294	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Fragmented former bare peat production areas Peat reserve areas Partial emerging naturally colonising cutaway
Lismanny	449	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat Partial emerging naturally colonising cutaway
Total	**9,453**	

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

Bog Name	**Area (ha)**	**Indicative Status**
Derryfadda	1,111	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat
Boughill	415	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat
Castlegar	517	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat Annaghbeg Bog NHA – intact undrained raised bog
Gowla	650	Industrial peat production permanently ceased – 2019. Cutaway – 2019, Former peat production area is bare peat Emerging naturally colonising cutaway

Tirrur-Derrymore	422	Industrial peat production permanently ceased – 2019. Drained development bog, never in industrial peat production NPWS turf-cutting relocation site
Newtown-Loughgore	448	Drained development bog, majority of site never in industrial peat production Some sod peat production Rehabilitation (raised bog restoration) ongoing
Killeglan	581	Drained development bog, never in industrial peat production –biodiversity site Rehabilitation (raised bog restoration) complete
Cloonboley 1	675	Drained development bog, majority never in industrial peat production – biodiversity site Some sod peat production Rehabilitation (raised bog restoration) now complete
Cloonboley2	203	Drained development bog, never in industrial peat production – biodiversity site Rehabilitation (raised bog restoration) now complete
Total	**5,022**	

APPENDIX III: 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:	**Kilmacshane**	**Area (ha):**	1296 ha
Works Name:	Blackwater	**County:**	Galway
Recorder(s):	MMC & DF	**Survey Date(s):**	19-21/01/2010 & 2-3/06/2010

Habitats present (in order of dominance)

The most common habitats present at the site include:

- Bare peat (BP). The majority of the site in active production or is production-related cutaway. Areas mapped as BP can contain some small scale re-colonisation along the drains with pioneer poor fen communities (pJeff, pEang), scrub (eBir) and Reedbeds (pPhrag, pTyph) most common. (Codes refer BnM classification of pioneer habitats of industrial cutaway and production bog).
- Temporary open water (TOW). At the time of the original survey a significant part of the bog was quite wet, creating either large areas of open water or areas with a mosaic of open water and high dry bare peat fields between. The majority of the TOW was bare peat (BP).
- There was also significant cover of pioneer Marsh Arrowgrass-dominated vegetation (pTrig) in the wet areas, usually in mosaic with bare peat and or other sparse poor fen vegetation such as Soft rush-dominated vegetation (pJeff).
- Several small areas considered as production-related cutaway and some of the higher ground within active production areas is re-colonising with some vegetation cover. Pioneer Poor fen communities (pJeff, pEang) and Birch scrub (eBir) are most common habitats found.
- There are several areas of high bog containing bog woodland (WN7), some of which may have been planted and some of which contains conifers. Some woodland has also been classified as mixed-conifer woodland (WD3) due to the high proportion of conifers in the canopy. (Codes refer to Heritage Council habitat classification, Fossitt 2000), See Appendix II.)
- Fringe habitats around the margins of the bog include raised bog remnants (PB1, PB4) scrub developing on high bog (WS1), Bracken (HP1) and bog woodland (WN7).
- Some species-rich sedge-dominated wet grassland (GS4) is present towards the east side of the site adjacent to the main Shannon river channel and is part of the Shannon callows.
- There are small amounts of wet Willow-Alder-Ash woodland (WN6) in this section.
- Species-rich calcareous grassland (GS1) has also developed along the old embankment of the Ballinasloe canal. This is still intact at Fannin's Lock.

Description of site

Kilmacshane is located in east Galway, 2 km north of Banagher and adjacent to the River Shannon (Galway-Offaly county boundary). Kilmacshane is a relatively large industrial peat production site. This bog is a pumped bog with the water table significantly lower than the surrounding area. The site experienced rapid rising water levels in November 2009, with significant areas of open water still present at the time when initial field surveys were undertaken. The site is bisected by one main railway line running roughly NW-SE and this is situated on the old route of the Ballnasloe section of the Grand Canal, which has been infilled. A small Work-shop is located at the north-west end of the site.

The majority of the site is not vegetated and was either bare peat or temporarily inundated with surface water in 2015. One notable feature of the site was the lack of natural re-vegetation, even along the drains, and the site was relatively 'clean' and dominated by bare peat as a result.

The site can be divided into three main sections due to the natural topography of the site.

North-West section

This is the smallest of the three sub-sections of the bog. A small works area is located at the entrance to the bog and this area is also used for access to the adjacent Garryduff bog with a railway linkage. The railway bisects this production area into a northern and southern sub-section. This sub-section is divided from the mid-section by bog woodland developed on high bog around the margins that partially encloses the area. There is a narrow fringe of high bog (part of a larger high bog area) that is inside the northern BnM boundary of this section. Remnant high bog is also present around the fringes in the SE corner.

The bog woodland north of the railway line (east side of this section) was dominated by a Birch canopy and was notable for the development of mature Holly under the canopy. The Birch was relatively mature and tall (up to 20 m). The ground cover was dominated by Bracken and Bramble and also contained Heather and Purple Moorgrass. Adjacent to this bog woodland was some high bog that contained transitional or disturbed raised bog vegetation with Purple Moor-grass, Bog Myrtle and Heather prominent. Of note was the appearance of Black Bog-rush (a rich fen indicator) along the edge of this area in a disturbed section.

A section of mixed conifer woodland (WD3) is located south of the small works area is also of note as its canopy is dominated by Scot's Pine and it contains a significant amount of naturally regenerating Yew. Other species include Alder, Birch and Holly. The ground flora consisted of Bracken, Holly and Yew seedlings and Bilberry along with a luxuriant covering of mosses. This woodland is likely to have been planted with Scot's Pine originally but has become more rich and varied over time as other species have become established, particularly Yew.

The majority of the production bog north of the railway was quite wet at the time of the survey, as was a smaller part of the southern side. The remainder of this section is mainly Bare Peat with very little pioneer vegetation development.

In June 2010 water levels had receded and the majority of the ground cover was dominated by bare peat as most of this area was in active production. A small series of low fields adjacent to the railway contained some pioneer Marsh Arrowgrass-dominated vegetation in mosaic with patches of Bottle Sedge and Bog Cotton, and scattered over bare peat.

Mid section

This large area of the Kilmacshane Bog is also dominated by bare peat. The majority of this section north of the railway line had high water levels at the time of the survey and any exposed peat was generally bare and devoid of vegetation. A large part of the area adjacent to the south side of the railway line was also quite wet. However, there is some high ground along the southern boundary and this area also contains some pioneer vegetation. Habitats in this section consisted of bare peat (BP) for the majority of this area but other pioneer poor fen habitats (pJeff, pTrig, pCamp, eBir & gCal) were becoming established. There are also some small areas on both sides of the railway that have been out of production for a number of years and have developed some vegetation.

This section also has a relatively narrow fringe of high bog along the northern boundary that is located within the cSAC/pNHA boundary. The largest section of remnant high bog is located in the NE corner. Part of this high bog was ditched and quite dry and degraded, being dominated by Heather. Birch and conifer trees were spreading over this section. The un-ditiched sections contained typical raised bog vegetation and were of marginal and sub-marginal quality. *Sphagnum fuscum* was noted in this section. Negative indicator species such as the prominent Carnation Sedge were notable in the vegetation. Some large hummocks were degraded. No pools were evident but *Sphagnum cuspidatum* was noted in some damp hollows. Some former pools were noted but these were dried out with no associated *Sphagnum* cover. Some small areas associated with tracks on the high bog had

prominent cover of White Beak-sedge cover that was associated with temporary pooling of water related to the damage caused by the tracks.

Some woodland is located at the east side of this mid-section of the bog on higher ground and this ridge separates the mid section from the South-east section. This woodland was probably developed as a plantation in the past as there are two definite rectangular blacks of woodland. However, both blocks are somewhat more mature than the plantations previously seen on Bord na Móna properties including the 1980s plantations. These blocks are not managed by Coillte. The smaller square section is dominated by Birch (canopy 15-20 m) and contains significant regenerating Yew of different ages in the understorey and shrub layers. Scot's Pine is in the canopy and Holly is also very prominent in the understorey layers and there is some Gorse. Some of the older Yew may have been planted. The canopy is open in places and the ground cover is again dominated by Bramble and Birch (pictures taken). The woodland ground cover was poorly developed. The larger block contains patches of conifers including Sitka Spruce, Scot's Pine and Larch. The Spruce has failed in places and is mixed with Birch.

North of the woodland there is a high embankment covered in Gorse that extends to the northern boundary and to a silt pond complex. Adjacent to this embankment there are several fields out of production that have some vegetation cover .

6th June 2010

Water levels had receded by the time of the second survey. Both sides of the bog generally either had bare peat or had patches of pioneer poor fen vegetation dominated by Marsh Arrowgrass (pTrig) developing in bare peat in the previously inundated areas. There were also some patches dominated by Horsetails (pEq). Elements of Rush-dominated vegetation (pJeff) were also present within the vegetated areas. However, the majority of the vegetation was quite sparse.

Several series of fields in the north-eastern part were still quite wet during the summer survey (although this water was going to be let off shortly). This wet area included several fields that were partially vegetated with poor fen and emergent scrub. This area attracted several different wetland bird species such as Little Grebe, Heron, Mallard, Redshank and Lapwing. Breeding waders were likely as the water level was low enough to expose several 'islands' of peat/marl and sparse vegetation that is suitable nesting habitat. While this pioneer wetland is going to be drained, this is an excellent example of the potential of this site to develop wetland habitats and attract wildlife in the future when production has ceased.

A silt pond complex is located at the west side of this section. Of note was the appearance of Alder colonising within this area. Alder is not normally found on the cutaway. Black Bog-rush was also noted within the silt pond complex. This species was also noted colonising cutaway to the north of the railway (north of the silt pond). There was no other indication of spring influences. This is the first occasion this has been recorded on cutaway.

The woodland to the mid-west of this section can be divided into two main habitats, a smaller section of Oak-Ash-Hazel (WN2) with the main section of woodland comprised of mixed conifer/broadleaved woodland (WD2). It is worth noting at this point that the area classified as WN2 is small and does not contain Oak, Ash of Hazel, however it does have the characteristic ground flora and indicator species for this habitat type. The species lists for each habitat is as follows;

WD2 – Scot's Pine, Holly, Yew, Birch, Rowan, Alder, Sycamore, Thuidium tamariscinum, Eurhynchium striatum, Isothecium myosuroides, Hypnum cupressiforme, Razor strop, Honeysuckle, Broad Buckler Fern, Purple Moor-grass, Devil's bit-scabious, Hard Fern, Glaucous sedge, Male Fern and Polytrichum commune. Significant amounts of both standing and fallen dead wood were also present. Periodic grazing appears to occur also.

WN2 – Alder, Yew, Holly, Hawthorn, Birch, Elder, Grey Willow, Bramble, Gorse, Ivy, Broad Buckler Fern, Enchanter's Nightshade, Remote Sedge, Nettle, Cleavers, Iris, Soft Shield Fern, Honeysuckle, Herb Robert, Glaucous sedge, raspberry, Meadow Sweet and Thuidium tamariscinum.

South-east Section

This large section of the site is also largely managed for industrial peat production and dominated by bare peat. While water levels in 2010 were not as high compared to the mid-section, there were still numerous low fields that were quite wet along both sides of the railway that were interspersed with high dry fields and Stockpiles. The majority of this area is dominated by Bare Peat with very little vegetation cover. There is some exposed marl within these fields. There is a small mound in the SE part of this section that is vegetated with Birch-dominated scrub.

There is also a narrow band of remnant high bog running along the northern boundary of this section. This high bog becomes somewhat more extensive towards the eastern side. However, this part of the bog remnant was ditched and was likely to be significantly degraded. There are some other typical fringe habitats associated with this area such as scrub, cutover bog and bog woodland developing on the edge of the high bog. The margins of the southern side have much less intact habitat development as the production area generally extends to the BnM boundary. However, there are some blocks of high bog (PB1) and cutover bog (PB4) still present.

6th June 2010

The BnM property continues further east of the production bog along the route of the Ballinasloe branch of the Grand Canal towards Fannins Lock and includes wet grassland (GS4), wet Willow-Alder-Ash woodland and Reedbeds (FS1) that are part of the Shannon callows. This area is quite diverse and contains a suite of different habitats that are well-developed. The old channel of the canal is still evident in places and has naturally or partially infilled and been colonised with Alder-rich scrub and species-rich wet grassland. Some brown mosses such as *Scorpidium scorpoides* were noted in the base of the channel. The banks of the canal contain species-rich dry calcareous grassland that is also likely to be orchid-rich (see habitat description section). To the south of the canal and Fannins Lock these is a large field within the BnM property that contains species-rich and sedge-dominated wet grassland that is typical of the Shannon Callows. This whole area was inundated during the winter.

North of the canal and Fannins Lock there is a mixture of wet Willow-Alder-Ash woodland, scrub and patches of wet grassland. This area is very diverse and contained species such as Buckthorn and Brimstone Butterfly. There is a diverse transition from high bog vegetation at the edge of the production bog, through patches of bog woodland and also old cutover bog that is now dominated by Bog Myrtle and contains some other lagg indicators to the wet grassland/wet Willow-Alder-Ash woodland communities. Further north there are several patches of BnM property that contain similar habitats.

Lehinch Island

This is a small low-lying island, prone to winter inundation, in the main Shannon river channel that is cut off by a narrow channel. It contains species-rich sedge-dominated wet grassland typical of the Shannon callows. There are minor patches of Reedbeds (FS1) with Bulrush around the margins of the island and several small patches of scrub dominated by Willow. The island is grazed by cattle during the summer. Corncrakes have been recorded on the island in the past. The island was leased back to the owners when title was obtained by Bord na Mona. Some of the farmers have managed sections of the island as part of the Corncrake Management Scheme in the past.

Adjacent habitats and land-use

Habitats around the margins of the site include the River Shannon Callows (low-lying wet grassland and Reedbeds that are prone to winter inundation), the main channel of the River Shannon, improved grassland (GA1) and wet grassland (GS4). Much of this grassland is grazed during the summer and fodder is also cut. Other typical marginal peatland habitats are present including remnant high bog (PB1), cutover bog (PB4) and scrub. Some naturally developed bog woodland has developed in places around the margins of the site on the remnant high

bog. Some conifer forestry has also been planted in places (non Coillte) along the southern boundary that also contains Rhododendron. There is some active peat cutting by private individuals along the SE boundary on high bog outside the BnM boundary.

Watercourses (major water features on/off site)

- The main channel of the Shannon passes close to this site. All the drainage on the site is linked to the river. The site is also 4 km from the main River Shannon channel.
- An old branch of the Grand Canal extending between Ballinasloe and the Shannon passes through the mid-section of Kilmacshane. It was constructed in 1823. This canal was closed in 1961 and was infilled for the most part to create the main BnM railway line through the site. The main drain along the railway is part of the old canal channel.

Fauna biodiversity

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

- A large flock of **349** Whooper Swans were counted on the bog in inundated sections during the survey. This was a max count on one of the days and numbers fluctuated during the time spent on the site. The birds were quite spread out although the densest numbers were on the western wet area. Birds were roosting and feeding (N.B. a National Swan census the preceding weekend showed very low numbers of Swans were counted around the Boora wetlands. It was speculated that many of the birds previously using bog areas at Boora could have moved to this site temporally.) A very significant number of Whooper Swans (internationally important > 210) seems to have been present on this site, and on the adjacent Garryduff bog for several months in 2009/2010, according to these counts and to other accounts of swan useage for these sites.
- Wildfowl including Mallard, Teal and Wigeon were noted on the site using the inundated bog. A max count of all the wildfowl noted 140 birds.
- Snipe were flushed from several sections of the site including some of the remnant high bog around the margins.
- Other more common birds were noted on the site each day. These included Blackbird, Grey Crow, Rook, Blue Tit and Reed Bunting.

2nd June 2010

- A small wetland area in the central section that had high water levels had attracted a number of different species. These included 2 pairs of Whooper Swans, 3 Heron, 16 Mallard, Little Grebe (possibly breeding), 1 pair of Redshank, 3 par of Lapwing and 1 Ringed Plover. The waders were possibly breeding on islands within this small wetland. A Group of Black-headed Gulls was also present (10).
- The silt traps in the mid-west of the site had Moorhen, Mallard and Heron present.
- Goldcrest and Blackcap were noted in the mixed-conifer woodland and bog woodland.
- Whitethroat and Blackcap were noted in the wet Willow-Alder-Ash woodland (WN6) at the east side of the site
- Other more common birds noted on the site included Meadow Pipit, Swallow, Cuckoo, Blue Tit, Skylark, Willow Warbler and Chaffinch.

Mammals

- Signs of Deer (most likely Fallow Deer) were noted at several locations around the margins of the site.

- Grazing by Rabbits/Hares was widespread throughout the site and Hare droppings were noted around the margins and on some of the high bog.
- Signs of Badger foraging and footprints were also frequently noted around the margins of the site.
- A fox was observed on the site.
- An Otter spraint was noted along a boundary drain on the south-west part of the production bog area.
- BnM staff have confirmed sightings of Otter and Mink around the site with Mink seeming to be particularly frequent.

2nd June 2010

- During the second site visit Pine Marten scats were frequently noted in the mixed-conifer woodland. Several scats were also noted along the central railway line and within the crop area.
- Hares were also frequently sighted.

Other species

- Green-veined White butterfly
- 4-spotted chaser Dragonfly
- Blue Damselflies

Fish

- Sticklebacks were noted in several of the drains around the site

Activities on the site

Activities on the site include:

- The Inland Waterways Association of Ireland (http://walks.iwai.ie/callows/index.shtml) list several walkways walks along this part of the Shannon including a walk along the old Ballinasloe branch of the Grand Canal and into the BnM property along the railway line from Fanning's Lock.
- There are grazing rights issued by BnM for callows grassland at the east side of the site and for Lehinch Island.

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HABITAT DESCRIPTIONS

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

HABITAT DESCRIPTIONS

Dry calcareous grassland (GS1) (Fannin's Lock)

This grassland habitat was species-rich and had developed on the old banks of the canal. It was being grazed by horses. The dominant grasses were *Festuca rubra, Briza media, Carex flacca, Anthoxanthum odoratum* and *Festuca pratensis.* Other common species included *Hieracium pilosella, Lotus corniculatus*, *Centaurea nigra* and *Achillea millefolium*,. Other species present included *Leucanthemum vulgare, Listera ovata, Dactylorhiza maculata*, *Bellis perennis*, *Plantago lanceolata*, *Medicago lupulina*, *Galium verum*, *Carex panicea*, *Daucus carota*, *Dactylis glomerata*, *Stellaria media*, *Trifolium repens*, *Trifolium pratense* and *Primula veris.* Other species are likely to be present and *Dactylorhiza maculata* is likely to be frequent.

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 measures area.
- The proposed rehabilitation measures 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 measures 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, work will be halted, if there is significant risk of peat disturbance.
- Rehabilitation measures will be implemented using a suitably sized machine and in all circumstances, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.
- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
- Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Vehicles will never be left unattended during refuelling.
- No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
- All plant refuelling will take place using mobile fuel bowsers. Only dedicated trained and competent personnel will carry out refuelling operations.
- Mobile storage such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked. All pumps using fuel or containing oil will be locally and securely bunded where there is the possibility of discharge to waters.
- Potential impacts caused by spillages etc. during rehabilitation measures will be reduced by keeping spill kits and other appropriate equipment on-site.
- Rehabilitation and decommissioning will be carried out in accordance with 'environmental best practice' (Currently being updated). 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

No invasive species have been recorded at Kilmacshane Bog.

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 plague[3] and Zebra Mussel will be adhered with throughout all rehabilitation activities.

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

APPENDIX VI. POLICY AND REGULATORY FRAMEWORK

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

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

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

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

1 EPA IPC Licence

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. PO-502-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The bog is part of the Blackwater Bog group. This regulatory requirement is the main driver of the development of this rehabilitation plan.

2 The Peatlands Climate Action Scheme (PCAS)

Bord na Móna (BnM) appreciates the Minister's intention to support, via the Climate Action Fund, Bord na Móna in developing a package of measures, 'the proposed Scheme', for the enhanced decommissioning, rehabilitation and restoration of cutaway peatlands, referred to as the 'Peatlands Climate Action Scheme'. The proposed Scheme includes lands previously used to supply peat for electricity generation within the State. The enhanced decommissioning, rehabilitation and restoration of the peatlands funded by the proposed 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.

It is envisaged that Bord na Móna carry out an enhanced decommissioning, rehabilitation and restoration, under the proposed Scheme, and supported by the Climate Action Fund across a footprint of 33,000 ha (a subset of the BnM estate that has been used for energy production). This proposed 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 proposed 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.

For the avoidance of doubt, should the proposed 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. 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 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.

5 National River Basin Management Plan 2018-2021 (Water Framework Directive)

The National River Basin Management Plan (2018-2021) (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 outlines 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) is part of the WFD (2018-2021) programme of measures. The NRBMP takes account of the fact that Bord na Móna is 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 rehabilitation target is set to be superseded by the acceleration of the Bord na Móna de-carbonisation programme and the proposed **Scheme (PCAS)**.

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

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.

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.

Kilmacshane Bog partially overlaps with the River Shannon Callows SAC and pNHA (NPWS Site Code: 000216) and Middle Shannon Callows SPA (NPWS Site Code: 004096) at three small location on the eastern and southern periphery of the site. The River Shannon Callows SAC (and pNHA) is designated for grasslands (Molinia and Lowland Hay Meadows) as well as alluvial woodland and Otter. The Middle Shannon Callows SPA is designated for the assemblage of wintering wildfowl, many species of which occur in internationally and nationally important numbers as well, in addition to breeding Corncrake. It is also noted as being important for breeding waders and a range of other nationally scarce species such as breeding Shoveler, Quail and Whinchat.

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.

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 2015-2020

The All-Ireland Pollinator Plan 2015-2020 outlines key objectives and actions to protect and support pollinating insects and the habitats they rely on. There are several Bord na Móna specific actions in this plan including 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, wind energy, and economy/enterprise.

11 National Archaeology Code of Practise

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

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

- BNM must ensure that any monuments or archaeological objects discovered during peat extraction are protected in an appropriate manner by following the Archaeological Protection Procedures.
- BNM must ensure that any newly discovered monuments on Bord na Móna lands are reported in a timely manner to the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht.

- BNM must ensure that any archaeological objects discovered on Bord na Móna lands are reported immediately to the Duty Officer of the National Museum of Ireland.

Bord na Móna will endeavour to adhere to this code of practise during the peatland rehabilitation phase and appropriate archaeology mitigation is carried out before and during cutaway peatland rehabilitation. An Archaeological Impact Assessment is being carried out for the proposed rehabilitation at this site (Appendix IX). The recommendations of this assessment will be incorporated into the rehabilitation plan to minimise impacts on known archaeology. In addition, Bord na Móna will adhere to the Archaeology Code of Practise relating to management of stray 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."*

The Kilmacshane Bog Rehabilitation Plan is aligned to the CBD target and the EU Biodiversity Strategy target and will help Ireland meet its commitment to these international Biodiversity polices.

13 Bord na Móna commitments

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

The company announced that 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 will 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 has also committed to a significantly larger rehabilitation target. This is 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 plan to restore a further

1,000 hectares of raised bog habitat by 2025. These targets are significant in both timing and scale and are indicative of Bord na Móna's increased new ambition in this area.

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.

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

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. 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, while taking account of the need for sustainability and their biodiversity value.

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

APPENDIX VII. DECOMMISSIONING

1. Condition 10 Decommissioning

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

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

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

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

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

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

Item	Description	Kilmacshane Decommissioning Plan
1	Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices	Clean-up of Bog
2	Cleaning Silt Ponds	Cleaning Silt Ponds
3	Decommissioning Peat Stockpiles	Peat Stockpile Management via Levelling
4	Decommissioning or Removal of Buildings and Compounds	If feasible
6	Decommissioning Fuel Tanks and associated facilities	Decommissioning and De-Gassing Mobile Fuel Tanks
7	Decommissioning and Removal of Bog Pump Sites	If feasible
8	Decommissioning or Removal of Septic Tanks	De-sludge Septic Tank

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

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

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

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

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

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

waste.

7.3.3 The ultimate destination of the waste.

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

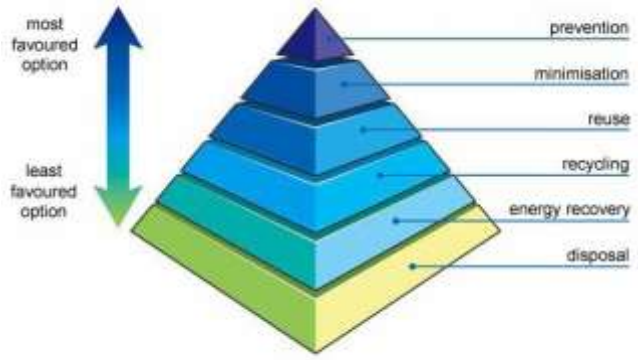
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

7.3.6 Details of any rejected consignments.

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

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

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



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

2. Enhanced Decommissioning.

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

Item	Enhanced Decommissioning Type	Kilmacshane 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, heath, scrub and dry woodland habitats.

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

Enhanced rehabilitation: This is defined as rehabilitation carried out under proposed 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 proposed 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 proposed Scheme.

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

Rehabilitation: Rehabilitation is defined in general by Bord na Móna as environmental stabilisation of the former cutaway. This is generally achieved via re-wetting, where possible, and natural colonisation of the former cutaway, with or without intervention. It is not possible to restore raised bog habitats on BnM cutaway in general

in the short-term. In general, most of the peat mass has been removed from many BnM cutaway sites and the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status. This means there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland). Other after-use development may also serve to act as rehabilitation.

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

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

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

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

APPENDIX IX. 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

22

Code of Practice

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

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

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

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

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

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

BORD NA MÓNA Naturally Driven	**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 Rehabilitation at Kilmacshane Bog, Co. Galway. Dr. Charles Mount. Nov 2020.