Castlegar Bog

Cutaway Bog Decommissioning and Rehabilitation Plan 2020

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0506-01:

> "*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 Castlegar 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 Castlegar Bog.

In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. PO-502-01, due regard was also given to the proposed Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme (EDRRS) 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 the Castlegar bog, activities which goes beyond that required by Condition 10 in the Licence, rehabilitation necessary to comply with the 'standard' requirement of Condition 10 (in the absence of the proposed Scheme) is also included, to estimate costs. The inclusion of the 'standard' rehabilitation together with the enhanced rehabilitation in this document allows the Scheme Regulator to distinguish and objectively determine the specific activities (and their associated costs) eligible for support under the proposed Scheme.

Bord na Móna have defined the key rehabilitation outcome at Castlegar 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 Castlegar Bog, such as amenity, will be conducted in adherence to the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.

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SUMMARY

Name of bog: Castlegar **Area:** 520 ha

Site description:

- Castlegar Bog was drained and developed for industrial peat production in the 1990s and has been in active peat production since the 2004. Industrial peat production permanently ceased in 2019.
- The majority of the former peat production footprint is bare peat (~75%) and contains active drainage channels.
- Remnant peat depths are generally > 4 m. Castlegar is considered a **deep peat** cutover bog.
- The site is located adjacent to the River Suck 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 ecosystem service benefits from enhanced rehabilitation measures.

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

- Carrying out enhanced rehabilitation with the application of enhanced deep peat rehabilitation measures to re-wet peat and slow water movement across the site.
- 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 condition peat storage capacity of the bog (locking the carbon into the ground). In time, it is expected that the bog will develop its carbon sink function, in part, as *Sphagnum*-rich communities develop across the bog. It will also support Ireland's commitments towards Water Framework Directive, the National Biodiversity Action Plan 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 Castlegar Bog.
- EPA IPC Licence - Ref. P0-502-01. 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 key objective of 'rehabilitation', as required by this licence, is achieved by the **environmental stabilisation** of the bog.
- **The proposed Scheme (EDRRS)** 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 Castlegar Bog, in particular, optimising **climate action benefits**.
- The local environmental conditions of this bog. Castlegar Bog has a gravity drainage system and a significant part of the site has deeper residual peat that is suited to the development of *Sphagnum*-rich peatland habitats.
- The key goals and outcomes of rehabilitation at this bog outlined above.

- Minimising potential impacts on neighbouring land. Some boundary drains around Castlegar Bog will be left unblocked as blocking boundary drains could affect adjacent land.

Criteria for successful rehabilitation:

The Criteria for successful rehabilitation for IPC Licence validation and for climate action verification have been defined as:

- Rewetting of residual peat in the former area of industrial peat production to slow water movement across the site to retain silt, accelerating the development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat (IPC Licence validation) through the creation of further wetland/peatland habitat. (IPC Licence validation).
- Stabilising or reducing key potential emissions to water (e.g. silt-run-off) (IPC Licence validation).
- Reducing pressure from peat production from this bog 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 poor fen and embryonic *Sphagnum*-rich raised bog peatland communities, where conditions are suitable, and eventually towards a reduced carbon source/carbon sink (Climate action verification). Some areas will naturally be dry and develop Birch woodland and other drier habitats. These habitats will generally establish initially as pioneer vegetation. It will take some time for stable naturally functioning peatland habitats to fully develop at this 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 Mona and external).
- Bord na Mona 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.

- Trial deep peat enhanced rehabilitation methodologies at Castlegar Bog.
- Planning actions, including developing a detailed site plan and carrying out a drainage and hydrological assessment.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation.
- Carry out proposed measures, which will be a combination of drain blocking, peat field re-profiling, cell-bunding and fertiliser applications targeting headlands, high fields and other areas (where required)
- Phase 2 measures may include fertiliser application, seeding of targeted vegetation and inoculation of *Sphagnum* in suitable areas.
- Silt-ponds will continue to be maintained during the rehabilitation and decommissioning schedule.
- Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.

- Decommissioning of silt-ponds will be assessed and carried out, where required.

Timeframe:

- 2020-2021. Short-term planning actions.
- 2020-2021. 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.

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 support via the Climate Action Fund 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 (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 Castlegar Bog, as required to meet Condition 10 of the IPC Licence and to validate climate action benefits, is defined as:

- There will be initial quarterly monitoring assessments of the site to determine the general status of the site, the condition of the silt-ponds, assess the condition of the rehabilitation work, assess the progress of natural colonisation, monitoring of any potential impacts on neighbouring land and general land security. The number of site visits will reduce after 2 years to bi-annually. These site visits will assess the need to any additional rehabilitation.
- 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** will be established. Monitoring of key water quality parameters for 2 years after rehabilitation will include: Ammonia, Phosphorous, Suspended solids, Total Solids, COD, Colour, pH and DOC.
- Approval will be sought to set up a *monitoring programme* to **measure carbon emissions** at Castlegar Bog (Greenhouse Gases and fluvial carbon), as part of a wider monitoring of enhanced rehabilitation measures.

- The monitoring and validation of re-vegetation via natural colonisation and changes in bog condition will be carried out using aerial survey, after enhanced rehabilitation measures are implemented. It is proposed that sites can be monitored against this baseline in the future.
- Other ecosystem services such as water flow attenuation will be monitored.
- Biodiversity Ecosystem services will be monitored using specific indicators (Breeding birds, pollinators).
- Note. 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.
- Monitoring as part of Climate Action Verification is dependent on support from the Climate Action Fund or other external funding.
- 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 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. P0506-01). 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 II for details of the bog areas within the Blackwater Bog Group). Castlegar 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 key targets to validate rehabilitation;
- Proposed rehabilitation actions;
- Proposed timeframe to implement these actions;
- Budget and Costings; and
- Associated aftercare, maintenance and monitoring.

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme (EDRRS) 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 EDRRS 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 improvements will accelerate the trajectory towards a naturally functioning peatland ecosystem.

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

- more intensive management of water levels through drain-blocking 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, which will develop other habitats. Other areas will naturally have deeper water). The key to optimising climate action benefits is the restoration of suitable hydrological conditions and more intensive intervention means that the extent of suitable hydrological conditions can be optimised. These measures are designed to encourage the development of peat-forming habitats, where possible. They are also designed to further slow the movement of water across the site (with the site acting similarly to a constructed wetland), slowing the release of water (improving local water attenuation) and water quality is also expected to improve as the site returns to a naturally functioning peatland ecosystem.

Castlegar Bog is proposed to be part of this proposed Scheme (EDRRS) and this rehabilitation plan outlines the approach taken. In the event that additional external funding is not secured, Bord na Mona will carry out a standard rehabilitation plan (outlined in Appendix I). This standard 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. P0506-01:

> "*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 only covers the area of Castlegar Bog.

This rehabilitation plan takes account of the **future planned after-use** of Castlegar Bog. The future use of Castlegar Bog has not been defined by Bord na Móna but biodiversity and ecosystem services have been identified as the current primary land-use at Castegar. Bord na Móna are also considering the use of the site in the future as potential herb project (Wild-crafting of Bog Myrle), (which would be compatible with re-wetting the bog.) Bord na Mona will continue to review the future after-use of its land-bank. Any consideration of any other future after-uses for Castlegar 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 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 Castlegar Bog permanently ceased in 2019. Currently 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 ecosystems to fully re-establish.

Parts of Castlegar 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 the margins of Castlegar 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 enhanced rehabilitation plan considered potential impacts of these on the delivery of the stated objectives.

The Castlegar property includes a large area of Annaghbeg Bog NHA. Bord na Mona never carried out any activities or drainage work at Annaghbeg Bog, apart from acquisition. This is an undrained intact raised bog subject to intensive marginal turf cutting by private individuals with turbary rights. The scope of this rehabilitation plan covers the former Castlegar Bog industrial peat production area. No measures are proposed for Annaghbeg Bog as there has been no Bord na Mona drainage, bog development or industrial peat production. It was designated as a Natural Heritage Area (NHA).

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 (EDRRS). The development of this rehabilitation plan considered **draft** guidance issued by the EPA in 2019 – **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 (EDRRS)**. 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 Castlegar 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.
- Barry, T.A. et al (1973). A survey of cutover peats and underlying mineral soils. Soil Survey Bulletin No. 30. Dublin, Bord na Móna and An Foras Taluntais.
- 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.
- 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,

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, Castlegar Bog was originally surveyed in June 2012. Additional ecological walk-over surveys and visits have taken place at Castlegar Bog between 2012-2020 to inform rehabilitation planning and habitat maps have been updated, where required. As the industrial peat production footprint at Castlegar Bog did not change between 2012 to 2019, the area mapped as bare peat has not changed either and no pioneer cutaway habitats have developed at Castlegar during this period. 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 baseline survey report for Castlegar Bog is contained in Appendix III.

3. SITE DESCRIPTION

Castlegar Bog is located in east Co. Galway, just over 4km east of Ahascragh and 6km north of Ballinasloe (see Figure 3.1 &3.2). 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. Castlegar Bog lies to the West of the River Suck and is linked to Derryfadda Bog (also owned by Bord na Móna) to the north by a railway line and machinery travel path, which provides the main access to the site. Industrial peat production has now permanently ceased at Castlegar Bog.

Annaghbeg Bog lies to the south-west and is part of the BnM Castlegar property, but this bog was never drained by Bord na Mona or been in industrial peat production. Bord na Mona never carried out any drainage, bog development or industrial peat production activities on this bog, apart from acquisition. It was designated as a Natural Heritage Area (NHA (although it is to be delisted)). There are also several BnM bogs adjacent to Castlegar Bog to the east (across the River Suck), including Newtown/Loughgore and Killeglan; however, there are no direct connections between these bogs (i.e. no road or rail linkages).

In addition to the railway line around the northern side of the site, there is a tea centre at the entrance from the road to the north of the site next to the railway/level crossing there and a small tool shed located adjacent to the railway on the northern part of the site.

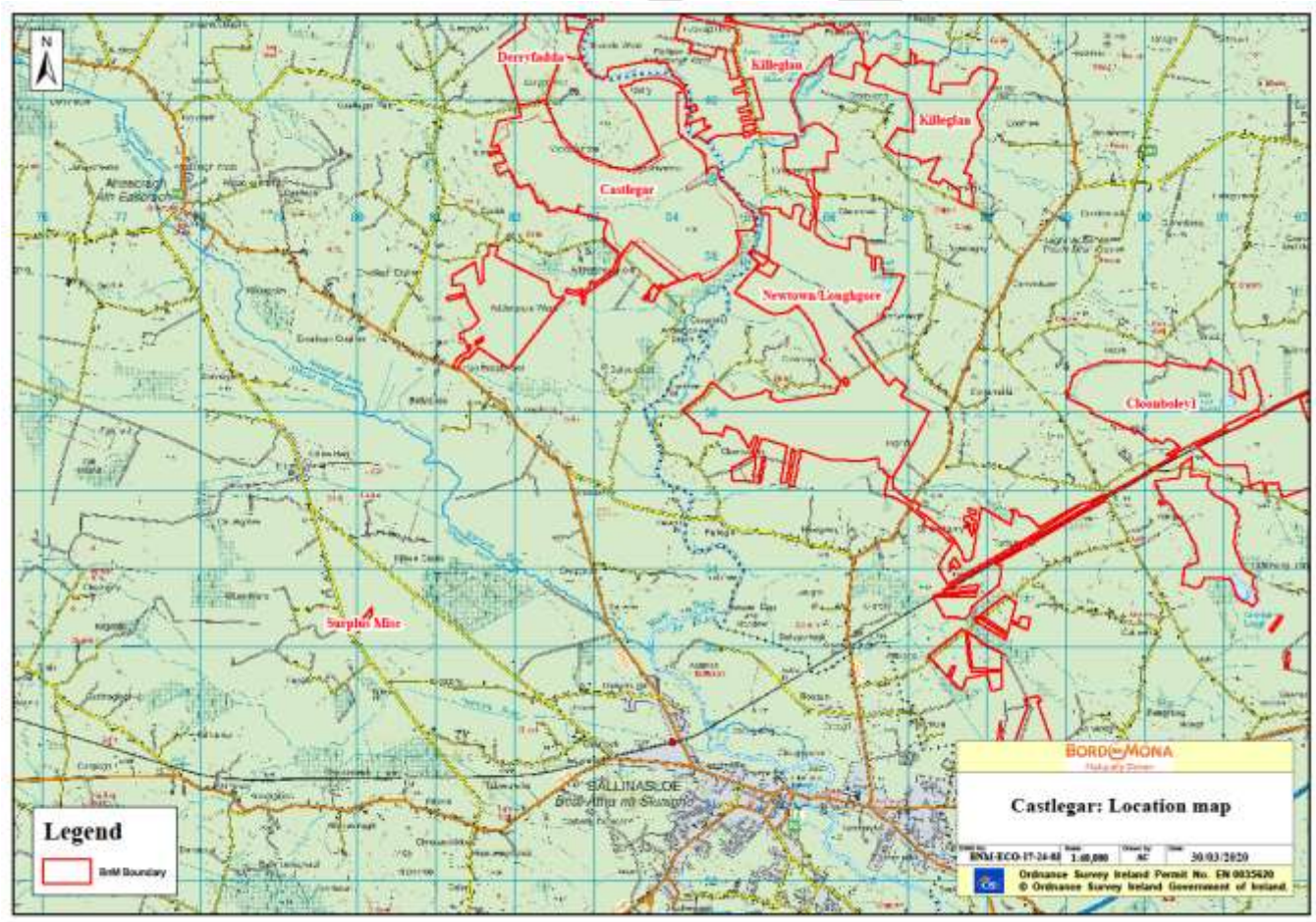

Figure 3.1 Location of Castlegar in context to other Bord na Móna bogs and surrounding area

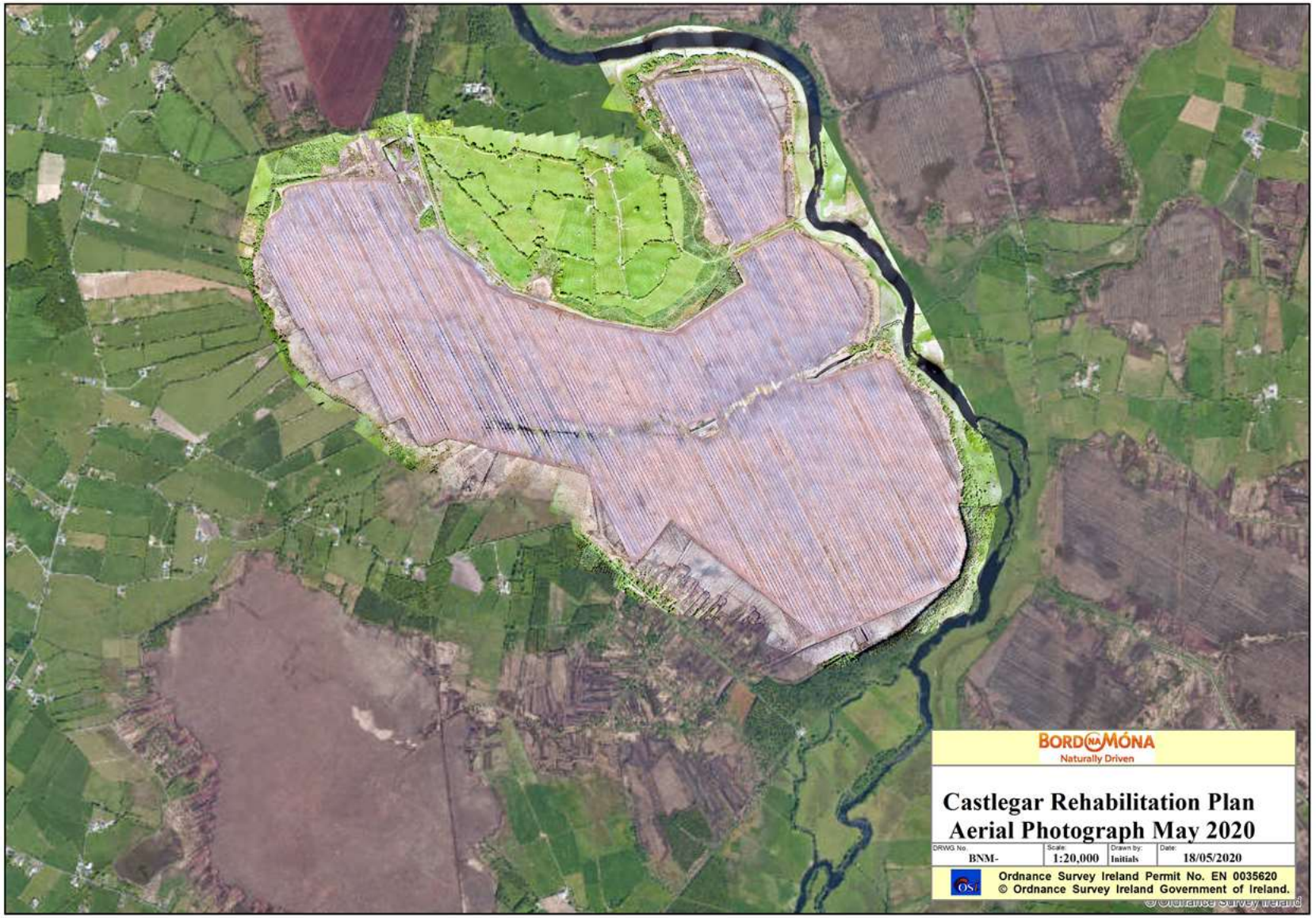

Figure 3.2 Aerial photo of Castlegar Bog (2015).

3.1 Status and Situation

3.1.1 Site history

Castlegar Bog has only been in peat production in the last twenty years. The peat was harvested for fuel peat to be used in Lough Ree Power in Longford and West Offaly Power in Shannonbridge, Offaly.

3.1.2 Current land-use

Industrial peat production has now permanently ceased at Castlegar Bog. Future land-use has not been defined by Bord na Móna but biodiversity and ecosystem services has currently the primary land-use. The potential to develop a herb project with wild crafting of Bog Myrtle is also being considered.

3.2 Geology and Peat Depths

3.2.1 Sub-soil geology

The underlying geology at Castlegar Bog is limestone and calcareous shale bedrock[1]. The underlying soils and sub-soils are classed as 'Raised Bog Cutover Peat'.

3.2.2 Peat type and depths

Commercial peat extraction has only been undertaken at Castlegar Bog relatively recently (within the past 20 years). As a result, there are substantial peat depths of over 4 m across most of the site. The peat on site is mostly "red" or "*Sphagnum* peat" and is used as fuel peat supplying Lough Ree Power and West Offaly Power (See Figure 8.1 & 8.2).

3.3 Key Biodiversity Features of Interest

Castlegar Bog (production area) is mainly composed of bare peat as the entire bog was in active peat production until very recently (Figures 3.3, 3.4, 8.1). Marginal habitats include Birch woodland (WN7), remnant sections of raised bog (PB1), scrub (WS1) and active and inactive cutover bog (PB4). The remnant sections of raised bog are generally small and are dry with a dominance of Heather.

The site is located adjacent to the River Suck and includes part of the riparian zone. The River Suck and its associated riparian habitats is an important wildlife corridor and is a key link for connectivity of habitats and species. There is a natural transition of habitats from the river to the edge of the former production bog in places. The wet grassland riparian zone floods in winter and is an example of callows type grassland.

3.3.1 Current habitats

Sections of Birch woodland and wet grassland are located along the margins of the site. The areas of callows-type wet grassland are managed as seasonal grazing are located along the banks of the River Suck.

A stream flows into the River Suck at the eastern boundary of the site and the last 500m are above ground. The above ground sections of the stream contain riparian habitats such as bracken (HD1), scrub (WS1), riparian woodland (WN5) and wet grassland (GS4). The riparian woodland was comprised of Oak, Ash, Alder, Purging Buckthorn, Willow and Birch.

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

To the south of the stream a band of scrub is located between the production bog and the wet grassland that runs parallel to the River Suck. This area is not dense scrub and contains tree species such as Crab Apple, Purging Buckthorn and Blackthorn with an under storey of Bracken and Bramble.

Figure 3.3. View of the typical milled peat surface with existing drainage across Castlegar Bog

A habitat map of the site is shown in Figure 3.5.

3.3.2 Species of conservation interest

During field surveys Kingfisher and signs of Otter were recorded on site.

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 EDRRS are described here – However no such records exist for Castlegar. A broad range of common garden escapes are occasionally present around the margins of Bord na Mona bogs, and although spatial overlap with the EDRRS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during EDRRS activities (Appendix V).

Figure 3.4 View of former stream channel (now piped); course still indicated by vegetation patterns

3.4 Statutory Nature Conservation Designations

The River Suck Callows NHA (site code 000222) and the River Suck Callows SPA (site code 004097) overlap the site at several locations along the eastern boundary. Some non-production marginal areas are also located within the designated area. This site has been designated for its importance for wintering wildfowl and species of conservation importance such as Greenland White-fronted Geese and Whooper Swan.

Some undeveloped and partially fringe habitats within the BnM boundary are designated as part of this NHA and SPA. Other habitats include small amounts of remnant high bog, wet grassland, scrub and Birch woodland. Part of the BnM boundary extends out to the River Suck and this section takes in some wet grassland and fringing Reedbed and scrub along the edge of the river. A small proportion (eastern area) of the production bog is within the NHA.

Annaghbeg Bog NHA (site code: 002344) is located to the south west of the production bog. A significant proportion (but not all the bog) is within the BnM Castlegar property, and private turf cutting for domestic purposes is extensive along the margins of this bog.

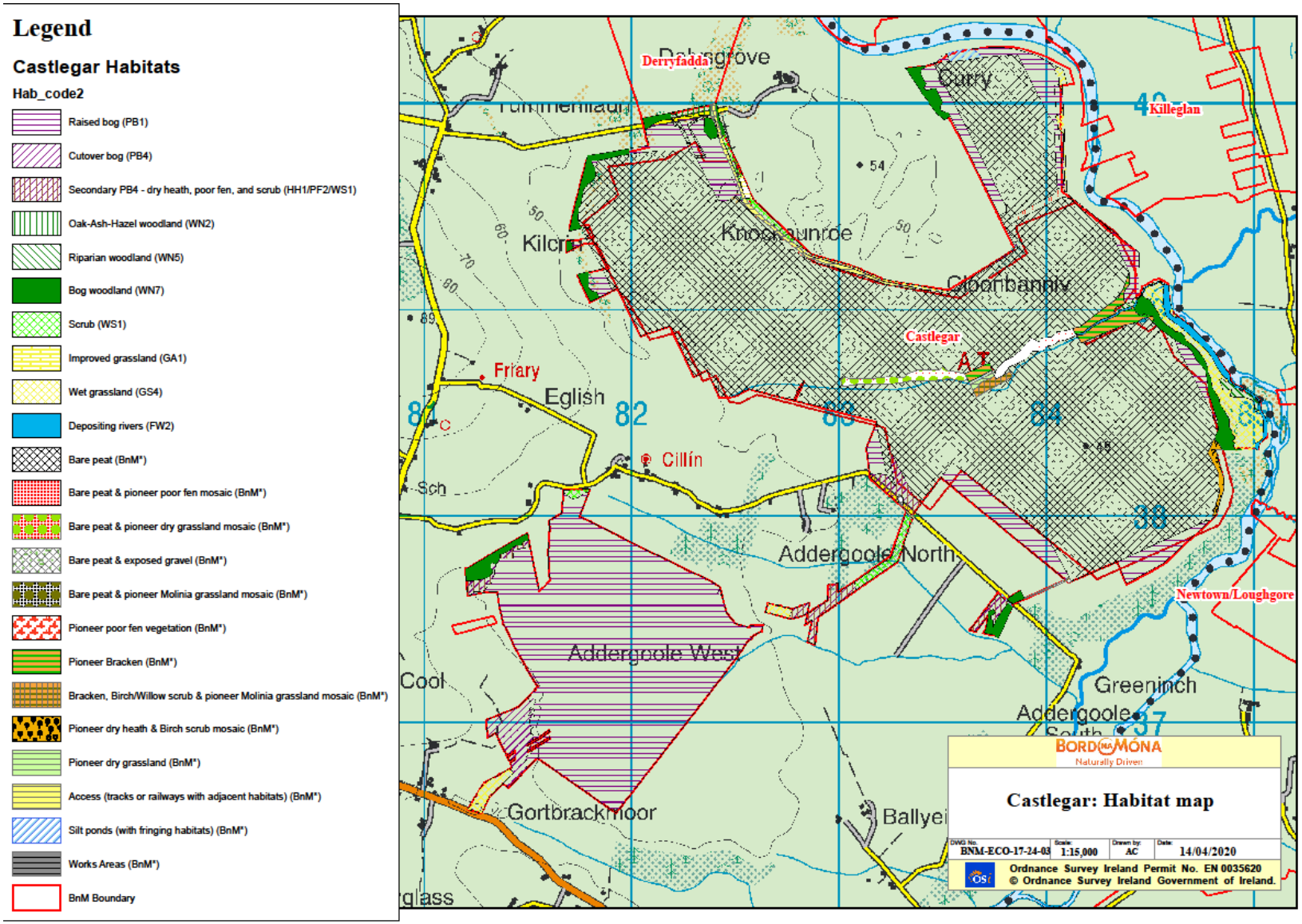

Figure 3.5. *Habitat map of Castlegar Bog showing Bord na Móna habitat categorisation*

3.5 Hydrology and Hydrogeology

Castlegar Bog is located in the Upper River Shannon Catchment. It is mainly drained by one (un-named) stream that originally flowed through the centre of the site (this now flows through pipes), with some drainage into the Eglish Stream to the south and directly into the River Suck to the north and east, which the other two streams also flow into.

Silt ponds are present within the centre of the site to manage discharges into the central stream and River Suck, with further silt ponds to the northern and eastern edges of the site (into the River Suck) and on the southern edge of the site, controlling water flows into the Eglish Stream. The bog has field drains running in a north-northwest to south-southeast orientation.

The bog is located in an area with a regionally important (karstified (conduit)) bedrock aquifer (Rkc). 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 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 groundwater contamination occurring at this site.

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 permeability of the underlying glacial deposits. As such the potential for bog rehabilitation 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 Castlegar Bog.

Silt ponds are the key silt control infrastructure to control potential emissions from industrial peat production sites. As required under licence, BNM have a number of procedures for how it manages and maintains its silt

pond network. The silt that builds up in silt ponds is excavated on a regular basis by Bord na Móna to facilitate an efficient level of silt control. Silt ponds will continue to be maintained during the rehabilitation and decommissioning period. The silt ponds are inspected and maintained in accordance with the licence. Silt pond decommissioning will be considered when sites are deemed to be on a trajectory of environmental stability and peatland rehabilitation has been completed. There are eight silt ponds at Castlegar Bog, with seven located around the periphery of the site and one located in the centre.

Water exits the five silt ponds towards the northern end of the site into small land drains that discharge directly into the River Suck (Suck 130 (IE_ SH_26S071200). Two silt ponds (in the centre of the site and on the eastern edge) are drained by the un-named stream that formerly crossed the site before also discharge into the River Suck. The southern side of the site drains into a silt pond at the south-west corner of the site, which itself flows into the Eglish Stream (Eglish 26) (IE_SH_26S071200) which itself drains into the River Suck.

Castlegar bog surface water outlets discharge to the River Suck IE_SH_26S071200. This water body is classified as Good Status in the 2013 – 2018 classification, was not listed as being under pressure from peat extraction in the second cycle of the River Basin Management Plan and is indicated as retaining this status in the third cycle, currently under preparation.

There are no exceedances in the IPC Licence limits for Suspended solids and Ammonia resulting from the surface water monitoring programme. 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 4.27 mg/l and COD 100mg/l. From an analysis of the last 3 yrs. of IPC licence environmental monitoring of some of the discharges from this bog indicate that results were well under the emission limit value (ELV) for SS and trigger level for ammonia and COD (Table 3.1).

Table 3.1. Water quality parameter results for surface water discharge from Castlegar Bog.

Bog	SW	Monitoring	pH	SS mg/l	TS mg/l	Ammonia mg/l	TP mg/l	COD mg/l	Colour
Castlegar	SW-119	Q4 19	6.2	<2	93	0.479	<0.05	57	291
Castlegar	SW-120	Q4 19	5	<2	106	0.079	<0.05	81	398
Castlegar	SW-121	Q4 19	4.2	<2	103	0.025	<0.05	88	453
Castlegar	SW-122	Q4 19	5.3	<5	239	0.027	<0.05	96	376
Castlegar	SW-123	Q4 19	6.9	3	109	0.18	<0.05	46	209
Castlegar	SW-124	Q4 19	6.5	5	115	0.202	<0.05	67	309
Castlegar	SW-117	Q2 18	7.9	5	302	0.55	0.09	54	174
Castlegar	SW-118	Q2 18	7.8	5	186	0.71	0.05	89	324
Average			6.225	4.5	156.625	0.2815	0.07	72.25	316.75

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

Water quality of water discharges from restored peatlands normally improves as a result of bog rehabilitation and restoration measures and the restoration of natural peatland processes (Bonn *et al*., 20017). Peatland

rehabilitation is also expected to improve water attenuation of the site as the drains are blocked, slowing water movement and water release from the site. Colonisation of plants can immobilise silt by trapping it with roots stems and leaves, helping with sedimentation. Plants and microbes also extract compounds from water through natural processes and lock them into the ecosystem. Restored peatlands help slow the release of water and aid the natural regulation of floods downstream (Minayeva *et al.*, 2017). The National River Basin Management Plan (NRBMP) 2018-2021 (DHPCLG, 2017) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD). The NRBMP outlines how key actions such as the Bord na Móna Raised Bog Restoration Project is expected to have a positive impact on water quality and help the NWBMP deliver its objectives in relation to the WFD.

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

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

The EPA-funded CarbonRestore Project (Renou-Wilson et. al. 2012) found that rewetting of drained peatlands can lead to restoration of functional peatland, such as the return of typical plant and animal species, which in turn may lead to the restoration of peat-formation and the carbon sink function. The EPA NEROS project carried out GHG flux research at Moyarwood Bog and found that Moyarwood Bog was overall a Carbon sink (sink for CO_2 and a source for Methane) 6 years after bog restoration was carried out (Renou-Wilson et al. 2018).

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

3.9 Current ecological rating

(Following NRA (2009) Evaluation Criteria)

Current ecological rating ranges from **International** to **Local Importance (lower value).** The majority of the site can be rated as having **(E) low local ecological value** as it is dominated by bare peat.

Some parts of the site have a higher value **International National value (A)** as they are designated as part of a SPA (this is the callows grassland at east of Castlegar Bog).

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 naturally functioning peatland habitats.

4. CONSULTATION

4.1 Consultation to date

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

Local stakeholders will also be identified through ongoing engagement with neighbours whose land adjoins Castlegar 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 Castlegar Bog.

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

- Status of Annaghbeg Bog NHA with NPWS.
- 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).
- Development of enhanced rehabilitation trials at Castlegar Bog with NPWS.

All correspondence received will be acknowledged and evaluated against the rehabilitation work proposed here, and the final draft of the Castlegar 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 Castlegar Bog are **environmental stabilisation** of the site via **optimising climate action benefits**. This is defined as:

- Carrying out intensive rehabilitation with the application of a combination of enhanced rehabilitation measures (including drain-blocking, re-profiling, cell-bunding, fertiliser application, seeding of vegetation &, inoculation of *Sphagnum*).
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities and eventually naturally functioning wetland and peatland habitats.
- Stabilisation or reduction in water quality parameters (e.g. suspended solids).
- Environmental stabilisation.
- Setting the site on an appropriate trajectory to enable the development of *Sphagnum*-rich raised bog vegetation communities and 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 Scheme, will improve habitat conditions of the whole bog, making the overall bog wetter. Other peatland habitats such as bog woodland will develop in a wider mosaic that relates to underlying conditions. It will take some time for stable naturally functioning habitats to fully develop at Castlegar Bog

Re-wetting this site will initially maintain and enhance the carbon storage capacity of the bog. There is a world-wide 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, the site has the capacity to develop in part as a carbon sink. *Sphagnum*-rich active 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 majority of the cutaway bog will improve in condition after re-wetting and also has the capacity to develop as reduced carbon source/carbon sink with the restoration of naturally functioning peatland and wetland communities.

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 Mona 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:

- EPA IPC Licence - Ref. P0506-01. 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. Castlegar 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 Castlegar Bog, in particular, optimising **climate action benefits**. The proposed improvements 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 area of Castlegar Bog is defined by Figure 3.1.
- No rehabilitation measures are proposed for Annaghbeg Bog NHA as BnM never drained, or developed or carried out any industrial peat extraction on this bog.
- The local environmental conditions of Castlegar Bog identify deep peat re-wetting as the most suitable rehabilitation approach for this site (Figure 8.1-8.5).
- 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 Castlegar Bog as **environmental stabilisation** and **optimising deep peat re-wetting, and setting the site on a trajectory towards the development of embryonic *Sphagnum*-rich vegetation communities**.
- Enhanced Rehabilitation of Castlegar 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.
- It is not proposed to carry out any rehabilitation in the narrow marginal raised bog remnants within BnM ownership around the site. Generally, these bog remnants are narrow, or are subject to turbary, and do not have positive bog restoration prospects.

6.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, there is potential for raised bog restoration at some sites where there has not been significant industrial peat extraction and the peat body is largely intact (deep peat sites that are drained). At other sites, most of the peat mass has been removed, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status), and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland). At Castlegar Bog, only a certain proportion of peat has been removed leaving a largely un-vegetated surface over deep peat deposits. 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.
- **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.

- **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.
- **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 Castlegar was carried out (Appendix X). This indicates there are several known archaeological features. Rehabilitation in these zones has been avoided or amended (e.g. location of peat barriers adjusted) to avoid or minimise impact to any archaeological features (Figure 8.1 & Appendix X).

6.2 Key Assumptions

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

6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- The longer-term raised bog restoration trajectory of the site. The plan covers the short-term rehabilitation **actions** and **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 deep peat re-wetting. 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 Castlegar Bog.
- The longer-term management of this site, potentially as a nature conservation site, or for amenity, or for other uses in the future.

7. CRITERIA FOR SUCCESSFUL REHABILITATION

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

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

Rehabilitation is generally defined by Bord na Móna as

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

In addition, Bord na Mona 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 improvements 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 the trajectory of deep peat re-wetting towards the establishment of embryonic Sphagnum-rich habitats.

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. This will be demonstrated and measured by site monitoring (updated aerial photography) to demonstrate and measure that bare peat cover is reducing and that natural stable vegetation cover is increasing. The delivery of enhanced rehabilitation measures will be demonstrated and measured through site visits and through updated aerial photography (indicating delivery of measures and re-wetting). See Table 7.1 for a summary of the criteria for successful rehabilitation and associated monitoring.
- 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). This will be measured via water quality monitoring.
- 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.

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

- Optimising the extent of suitable hydrological conditions to optimise climate action and other ecosystem service benefits (optimising 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). It is proposed that sites can be monitored against this baseline in the future.
- Reduction in carbon emissions. This will be demonstrated and measured via a combination of GHG flux measurement (tower and static chambers) and water quality monitoring (fluvial carbon).
- Setting the site on a trajectory towards establishment of a mosaic of compatible habitats including, poor fen and embryonic *Sphagnum*-rich raised bog 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 Castlegar Bog. This will be demonstrated by the reduction in bare peat and the establishment of pioneer habitats. This will be measured via aerial photography, habitat mapping and cutaway/habitat condition assessment. 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 of deep peat in the former area of industrial peat production	Delivery of rehabilitation measures Reduction in bare peat.	Aerial photography – to demonstrate measures Establishment of a baseline for future monitoring of bare peat, vegetation establishment and habitat condition.	2020-2023
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 river catchment (WFD)	No decline in the WFD status of the local river catchment related to this bog	EPA WFD monitoring programme	WFD schedule
Climate action verification	Optimising the extent of suitable hydrological conditions to optimise climate action	Optimal extent of suitable hydrological conditions	Aerial photography and Habitat mapping to map extent of suitable hydrological conditions (Cutaway bog condition map). Network of piezometers to monitor water levels in different rehab types	2021-2024
Climate action verification	Reduction in carbon emissions.	Reduction in carbon emissions	Flux tower, chamber measurements, Cutaway bog condition map	2021-2024
Climate action verification	Setting the site on a trajectory towards establishment of a mosaic of	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	2021-2024

	compatible habitats		can be re-monitored in the future and compared against this baseline.	
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	2021-2024

Meeting climate action verification criteria and monitoring of these criteria 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.

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

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

- **Funding to pay for resources required to deliver the planned rehabilitation (Bord na Mona 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 Mona 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 Mona experience of peatland management and best practise applied internationally in peatland management. Measures proposed in this plan have already been shown to be effective at other sites. Bord na Mona 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 Mona 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 Mona 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 EDRRS 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 Castlegar bog will include**:**

- A pilot programme to test some of the methodologies developed for the Scheme (EDRRS) will be carried out. This will focus on the Deep peat methodologies (DPT1-DPT5) (Table 8.1) (See Figure 8.1). The test programme will be developed on a portion of the Castlegar production bog. The deep peat enhanced rehabilitation methodologies are the subject on ongoing development and adaption to increase effectiveness and efficiency.
- These rehabilitation methodologies will be then rolled out to the rest of the site – as per Figure 8.1.
- Blocking drains in targeted **marginal (degraded) high bog** area and re-wetting, where possible, using an excavator to install peat barriers.
- Targeted fertiliser applications on bare peat areas to accelerate vegetation establishment on headlands and high fields. (It is noted that the application of fertiliser may need additional assessment and agreement with EPA as per the IPC Licence).
- Seeding of vegetation and inoculation of *Sphagnum* in targeted areas.
- Prior to bog development on site a natural water-course drained the majority of the bog and was located through the centre of the production area. This water-course was channelized and is now almost entirely contained within underground pipes (See Figure 3.4). A more natural water-course/drainage feature will be developed along this outfall (in the zone marked as riparian). The piped section will be modified, pipes will be lifted and removed and a more natural drainage feature developed. Control weirs (and single pipes), and natural topographic features (low mounds and ridges) will be used to manage water levels along the line of the new channel on site. The objective will be to continue to allow discharge along this channel while retaining shallow water within the channel and minimising any further peat drainage. This will further slow the movement of water through and out of Castlegar Bog. Natural riparian development will be encouraged along this zone. In periods of high rain-fall the rehabilitation measures across the production area will attenuate water flows. The riparian zone will act a swale to hold elevated water levels and manage discharges. Silt ponds are located along the line of this drainage channel. Hydrological modelling will be used to estimate peak flows and discharges and to design a channel that will be able to manage these discharges, as well as minimising the drainage zone of influence. These silt ponds will be retained in the short-term. Care has to be taken as there is discharge upstream of the bog into this

drainage feature. Hydrological modelling and levelling will mean that unintended upstream impacts will be avoided and that water can continue to discharge along this drainage feature.

- 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).

Table 8.1. Rehabilitation methodologies

Code	Description
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 (7/100 m) + blocking outfalls and managing overflows
DPT3	More intensive drain blocking (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
DPT5	Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + Sphagnum inoculation

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

- Seek formal approval of the enhanced plan 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 (the proposed EDRRS) will be applied to Castlegar 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 assessment of the proposed enhanced rehabilitation measures;
- Carry out a review of known archaeology and an archaeological impact assessment (see Appendix X) 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.

- Carry out a review of remaining milled peat stocks.
- Carry out a drainage and hydrological assessment of the proposed enhanced rehabilitation measures.
- It is proposed to pilot several different rehabilitation methodologies at Castlegar Bog.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation, such as the presence of sensitive ground-nesting bird breeding species (e.g. Curlew or Lapwing) or larval webs of Marsh Fritillary butterfly, etc. The scheduling of rehabilitation operations will be adapted, if needed. Surreys will be scoped and carried out based on the baseline ecological survey and previous knowledge of sites.
- Ensure all activities comply with the environmental protection requirements of the IPC Licence.

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 Deep peat methodologies (DP1-DP5) (Table 8.1), drain blocking, peat field re-profiling, cell-bunding and fertiliser applications targeting headlands, high fields and other areas (where required),
- All rehabilitation measures will be carried out with regard to 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 will include fertiliser application, seeding of targeted vegetation and inoculation of *Sphagnum*.
- Silt-ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent silt run-off from the site during the rehabilitation phase.
- Submit an *ex post* report to the Scheme regulator to verify the eligible measures to be carried out in year 1 of the Scheme, and an *ex ante* estimate for year 2 of the Scheme; and so on for each year of the 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.
- Reporting to the EPA will continue until the IPC License is surrendered.

8.4 Timeframe

- 2020-2021. Short-term planning actions.
- 2020-2021. 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.

Figure 8.1. Aerial photo of Castlegar Bog. The production bog is bare peat.

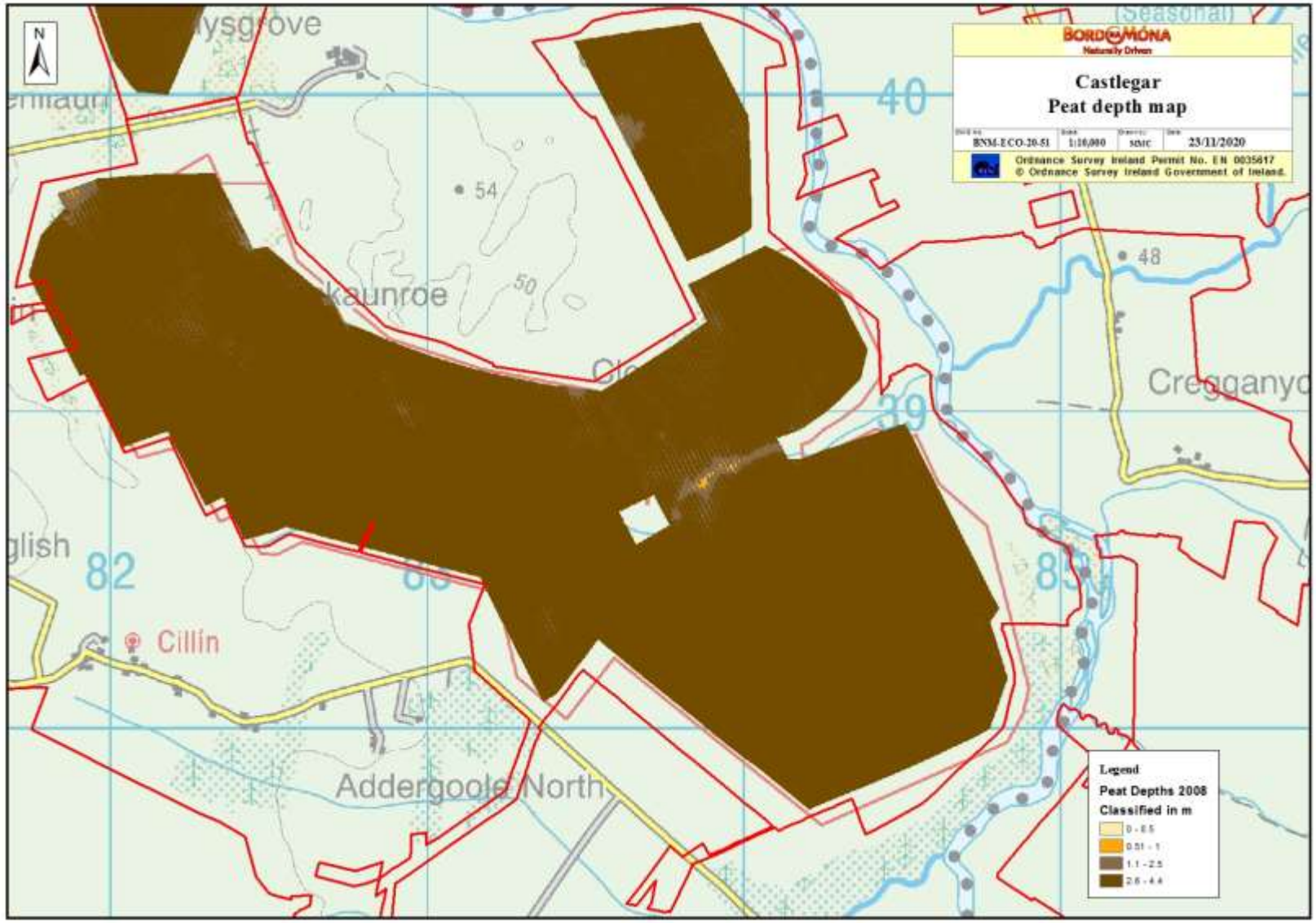

Figure 8.2. Peat depth map for Castlegar Bog. The majority of the bog is characterised as deep peat cutover bog.

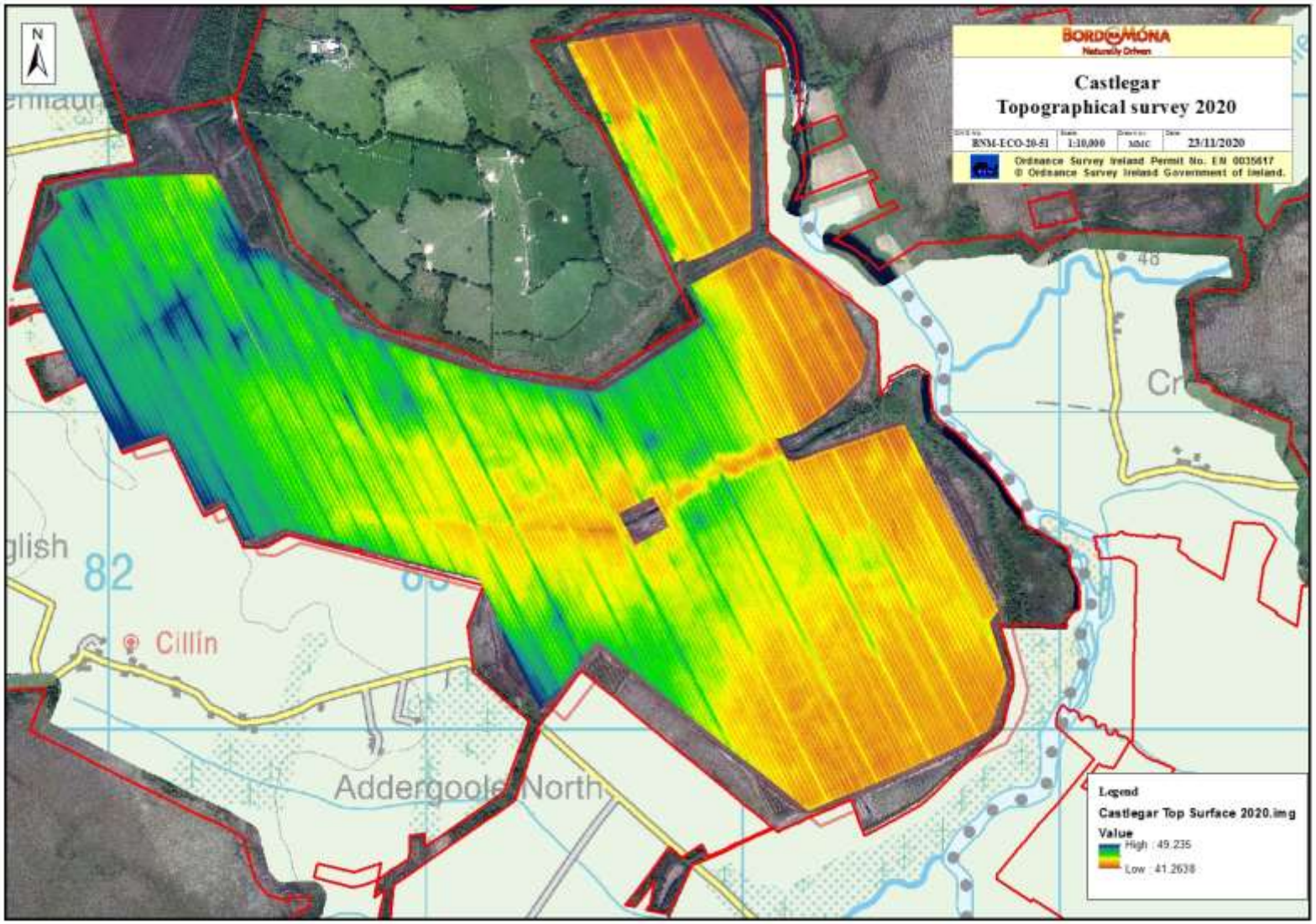

Figure 8.3. LIDAR topography map of Castlegar Bog. Low areas and basins are orange-yellow, more elevated areas are blue-green. The majority of the bog slopes towards a central main drainage channel.

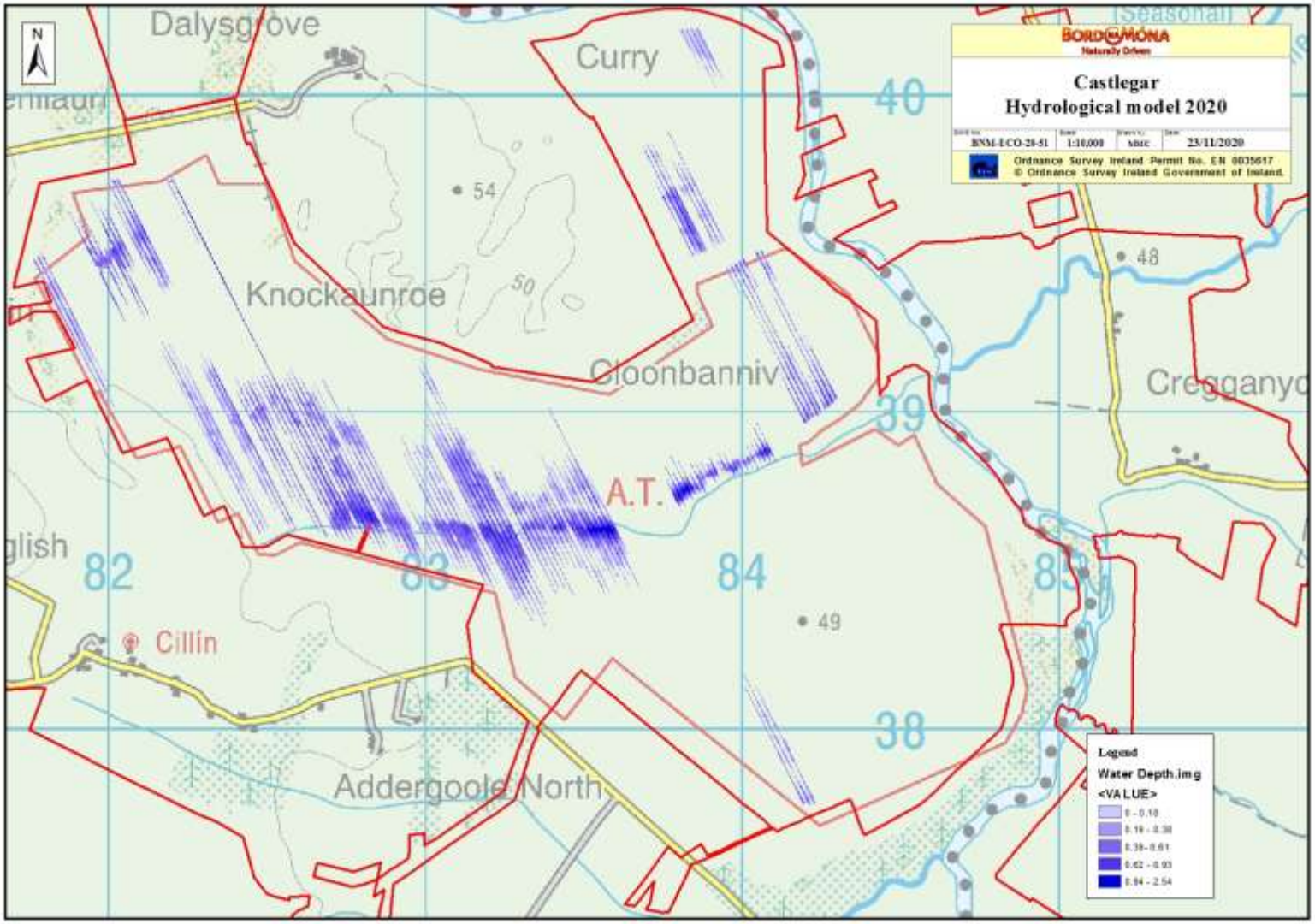

Figure 8.4. Hydrological modelling for Castlegar Bog showing range of expected water depths based on current topography.

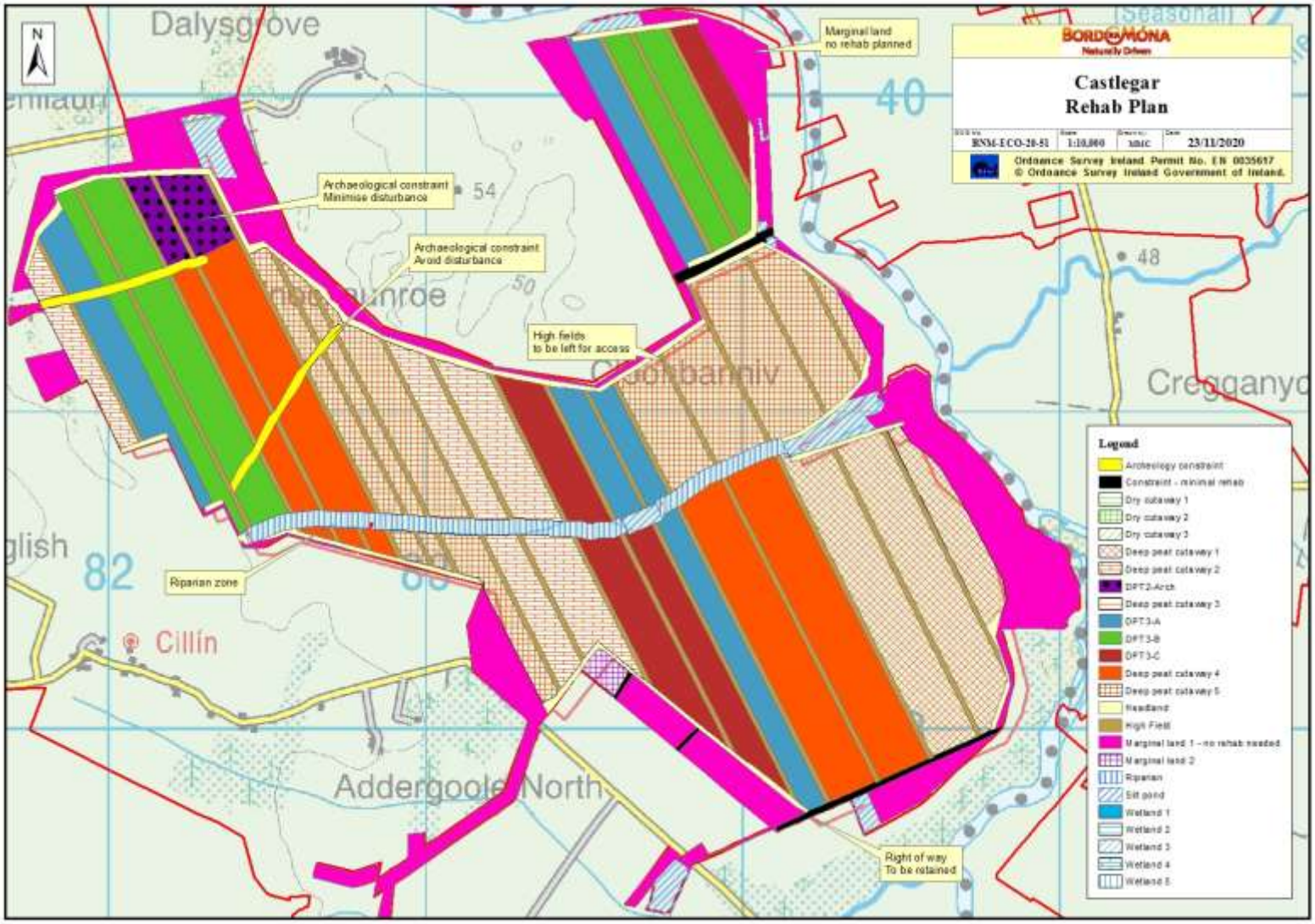

Figure 8.5. Indicative Enhanced Rehabilitation Plan for Castlegar Bog. Note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.

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 licence compliance costs of mandatory 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 'mandatory' 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).

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 further requirements for practical rehabilitation measures.
- The **baseline condition of the site will be established** post-rehabilitation implementation by using an aerial drone survey to take an up to date aerial photo, when rehabilitation is completed. The extent of bare peat will be assessed using this baseline data, and habitat maps will be updated.
- **Water quality monitoring** at the bog will be established. This will start in advance of the proposed rehabilitation. The main objective of this water quality monitoring will be to establish a baseline and then monitor the impact of peatland rehabilitation on water quality from the bog.
- In order to assist in monitoring surface water quality from this bog, it is planned to increase the existing licence monitoring requirements to sampling for the same parameters to every month during the scheduled works and for a period up to three 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.
- This enhanced water quality monitoring programme will aim to include up to 70% of a bogs drainage catchments. With regard to this bog, this includes three surface water emission points: SW-118, SW-123 and SW-124.
- Monitoring results will be maintained, trended and reported on each year as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, which will be available in April each year at www.epa.ie.
- The parameters to be included (as per condition 6.2 of the IPC Licence) include monthly monitoring for pH, Flow, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour, and COD.
- This monthly sampling regime on a selected number of silt ponds will be carried out over a two year cycle. The original (licence) requirement was for a quarterly sampling regime but this has been increased to a monthly regime to appropriately track the changing water chemistry that will occur as part of this enhanced rehabilitation programme. In addition, DOC will be included as a parameter to try and identify any changes in carbon in the surface water.
- If, after two years, key targets for successful rehabilitation are being achieved, then the water quality monitoring programme will be reviewed, with consideration of potential ongoing scientific research on site. The water quality data, the aerial surveys and the habitat mapping will be collated and will be submitted to the EPA as part of the final validation report.
- If, after two years, key targets for successful rehabilitation have **not** been achieved, then the rehabilitation measures and status of the site will be evaluated and enhanced, where needed. This evaluation may indicate no requirement for additional enhancement of rehabilitation measures, but may

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

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

Additional monitoring measures are also proposed to monitor ecosystem service benefits that have been derived by enhanced rehabilitation. The costs of these proposed monitoring measures are expected to be supported by the Government through the Climate Action Fund or additional other funding. These are defined as:

- It is proposed to set up a monitoring programme to **measure carbon emissions** from this site (Greenhouse Gases and fluvial carbon). It is expected that the costs of this monitoring will be supported by the Government through the Climate Action Fund, with support from other areas of research funding. The monitoring programme will include the development of a new Eddy Covariance (EC) flux tower as well as a network of static chambers and water sampling in combination with remote sensing. No GHG research has been carried out on a BnM deep peat cutover bog to date. (Note. This carbon 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.)
- Vegetation and habitat monitoring will be carried out 5 years 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.
- 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 and different cutaway bog conditions. GHG emission factors have been determined for various peatland habitats in Ireland (Wilson *et al*., 2015) and are constantly being refined with more and more research. BnM is actively supporting research into GHG fluxes in different rehabilitated peatland habitats. This means that a 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 other potential ecosystem services such as water flow attenuation. This will be measured by a network of piezometers and other scientific hydrological equipment (e.g. flumes) to monitor and measure water flows.
- It is proposed to monitor the improvement of some biodiversity ecosystem services. A breeding bird and Pollinator monitoring programme will be established. Specific pollinator indicators will be monitored (Bee and Butterfly). 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.
- The water quality monitoring programme demonstrates that water quality indicators are moving towards what would be typical of a re-wetted cutaway bog.
- 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 (EDRRS) 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 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:

- EPA IPC Licence - Ref. P0-502-01. 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. Castlegar bog is part of the Blackwater Bog group.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog.
- The area of former industrial peat production at Castlegar Bog as defined by Figure 3.1. Industrial peat production has now permanently ceased at Castlegar Bog. No rehabilitation measures are proposed for Annaghbeg Bog NHA as BnM never drained, or developed or carried out any industrial peat extraction on this bog.
- Minimising potential impacts on neighbouring land. Some boundary drains around Castlegar Bog will be left unblocked as blocking boundary drains could affect adjacent land.

Rehabilitation goals and outcomes

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

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

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

Criteria for successful rehabilitation:

- Rewetting of 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.
- 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 targets

- Demonstrating the delivery of the rehabilitation through site visits and through updated aerial photography (indicating presence of peat barriers and re-wetting). This will be demonstrated by a post rehab survey.
- Stabilising potential emissions from the site (silt run-off). The key target will be developing a stable or downward trajectory of water quality indicators (suspended solids and ammonia). This will be demonstrated by water quality monitoring results.

Rehabilitation measures: (see Figure Ap-1)

- Blocking field drains in the former industrial production area using a dozer to create regular peat barriers (three barriers per 100 m) along each field drain.
- Re-alignment of piped drainage.
- Realignment of gravity outfalls (where needed).
- Fertiliser treatment of high fields and headlands (typically slow to naturally re-colonise) to encourage natural colonisation, if required. (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 period.
- Evaluate success of short-term rehabilitation measures and enhance where necessary.
- Decommissioning of silt-ponds will be assessed and carried out, where required.

Timeframe:

- 2020-2021. 1st phase of rehabilitation. Field drain blocking.
- 2021. 2nd phase. Further realignment of piped drainage and other re-wetting measures dependent on success of 1st phase re-wetting, as determined by ongoing monitoring of water levels and re-vegetation.
- Other enhancement measures such as fertiliser treatment will be carried out, if 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 standard rehabilitation provision has been allocated to the site based on the area of different cutaway types across the site.

Table AP-1. Rehabilitation measures and target area.

Type	Code	Description	Area (Ha)
Deep peat	DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes	326
Dry Cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	
Wetland	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	
Marginal land	MLT1	No work required	182
Silt ponds		Silt-ponds	10
Total			**518**

Monitoring, after-care and maintenance

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

Validation and IPC Licence surrender

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

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

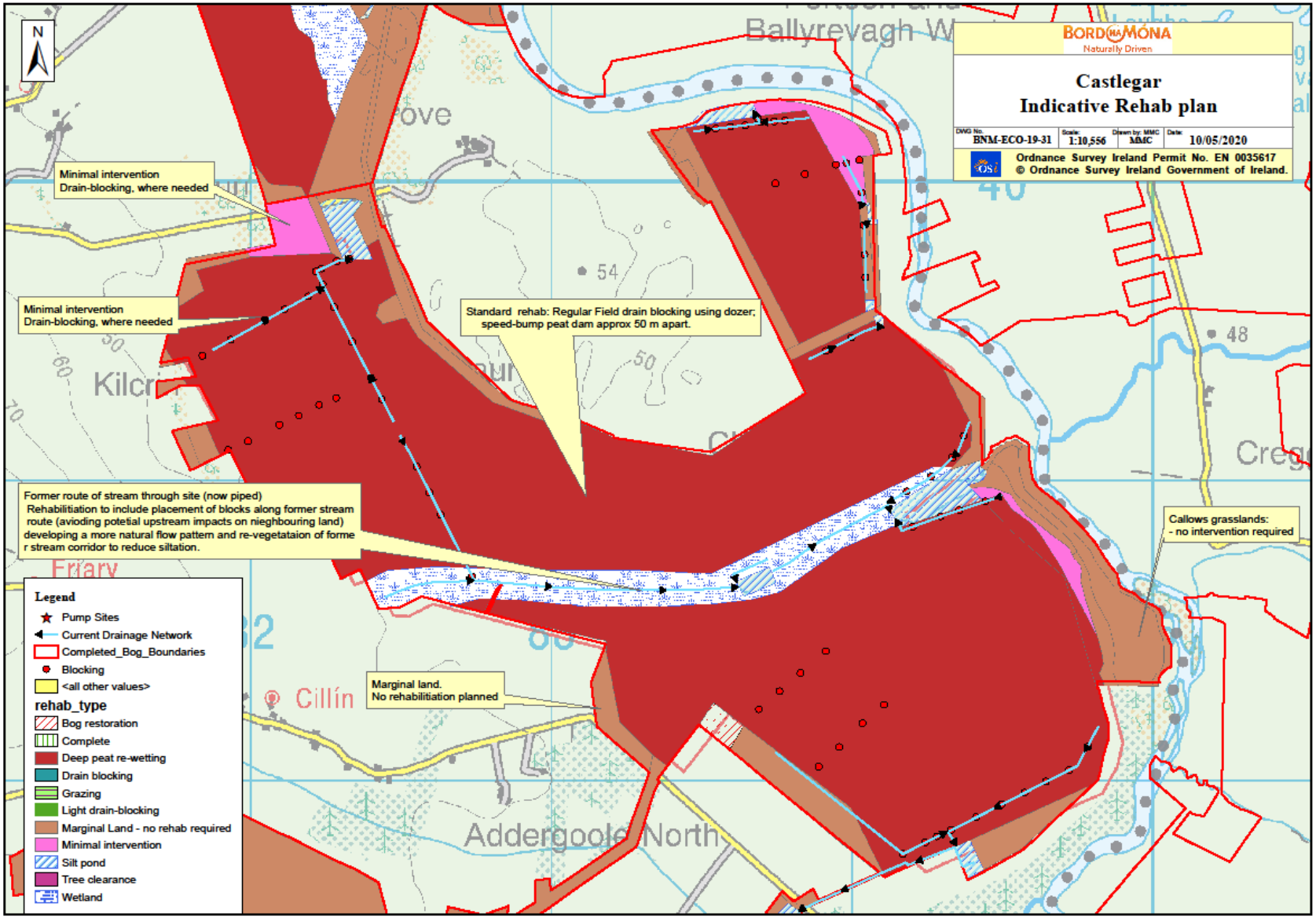


Figure Ap-1. Indicative adapted standard rehabilitation plan for Castlegar Bog.

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. PO-502-01 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 Ballahurt 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 Brickette 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 II: ECOLOGICAL SURVEY REPORT

Ecological Survey Report

Note: This report outlines a baseline 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:	**Castlegar**	**Area (ha):**	519ha
Works Name:	Derryfadda	**County:**	Galway
Recorder(s):	DF	**Survey Date(s):**	20th June 2012

Habitats present (in order of dominance)

The most common habitats present at this site include:

- Bare peat (BP) (Codes refer BnM classification of pioneer habitats of production bog.
- Pioneer dry heath communities (dHeath)
- Silt Ponds with associated habitats such as scrub, Bracken, rank grassland (GS2), dry calcareous grassland (gCal) and typical pioneer communities of disturbed areas (disTuss).

The most common habitats present around the margins at this site include:

- Birch woodland (WN7) (Codes refer to Heritage Council habitat classification, Fossitt 2000),
- Scrub (WS1) (Gorse scrub and Birch scrub developing of dry high bog around margins)
- Raised bog (PB1)
- Cutover bog (PB4) (several small fragments)
- Wet grassland (GS4) along the edges of the site

Description of site

Castlegar Bog is located approximately 7.7km to the North East of Ahascragh in County Galway. The production bog is located within one main block. A further area of intact raised bog (Annaghbeg Bog NHA) is located to the south west of the production bog and is part of the Castlgar BnM property. A railway line connects the North of the site with Derryfadda Bog. The River Suck forms a boundary with the eastern edge of the site.

The majority of Castlegar contains in excess of 2.6m of peat remaining on the site. This bog has only been in peat production in the last fifteen years. The peat is harvested for fuel peat to be used in Lough Ree Power in Longford.

Industrial peat extraction has now ceased.

Castlegar Bog (production area) is mainly composed of bare peat as the entire bog is in active peat production. Marginal habitats include Birch woodland (WN7), remnant sections of raised bog (PB1), scrub (WS1) and cutaway bog (PB4). The remnant sections are generally small and are dry with a dominance of Heather.

Sections of Birch woodland and wet grassland are located along the margins of the site. The areas of wet grassland are managed as seasonal grazing and are located along the banks of the River Suck. This is carried out by parties other than BnM and there are no lease arrangements on these areas despite the areas being shown as part of the BnM property.

Prior to production commencing on the site a stream was present around the centre of the production area. This stream is now almost entirely contained within underground pipes. The outline of the stream is still visible on the

surface of the bog as a line of soft rush, grasses and bare peat. The stream flows into the River Suck at the eastern boundary of the site and the last 500m are above ground. The above ground sections of the stream contain riparian habitats such as bracken (HD1), scrub (WS1), riparian woodland (WN5) and wet grassland (GS4). The riparian woodland was comprised of Oak, Ash, Alder, Purging Buckthorn, Willow and Birch. Otter and kingfisher are using this riparian area.

To the south of the stream a band of scrub is located between the production bog and the wet grassland that runs parallel to the River Suck. This area is not dense scrub and contains tree species such as Crab Apple, Alder Buckthorn and Blackthorn with an under storey of Bracken and Bramble.

Domestic turf cutting is carried out at a number of locations around the margins of the production bog and a proportion of this activity is licensed by BnM.

Annaghbeg Bog NHA (site code 002344) is located to the south west of the production bog. BnM does not own the entire area of this section of bog and turf cutting is extensive along the southern boundary of the high bog. The raised bog still retains a dome and the bog surface is quaking, however extensive rainfall had occurred in the weeks prior to the ecological survey. Small pools are still in evidence on the high bog and contain species such as Bog Bean, *Sphagnum cuspidatum* and *Drosera anglica*. Other species found on the site include Deer sedge, Heather, *Sphagnum magellanicum*, *S. subnitens*, *S. capillifolium* and *S. imbricatum*. A fence runs across the site, however there were no signs of grazing at the time of the ecological survey.

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

The River Suck Callows NHA (site code 000222) and the River Suck Callows SPA (site code 004097) overlap the site at several locations along the eastern boundary. Small sections of the production bog are located within the designated area. Some non-production marginal areas are also located within the designated area. This site has been designated for its importance for wintering wildfowl and species of conservation importance such as Greenland White-fronted Geese and Whooper Swan.

Some undeveloped and partially fringe habitats within the BnM boundary are designated as part of this NHA and SPA. Other habitats include small amounts of remnant high bog, wet grassland, scrub and Birch woodland. Part of the BnM boundary extends out to the River Suck and this section takes in some wet grassland and fringing Reedbed and scrub along the edge of the river. A small proportion (eastern area) of the production bog is within the NHA.

Annaghbeg Bog NHA (site code: 002344) is located to the south west of the production bog. Bord na Mona own a significant proportion of the bog (but not all the bog), while turf cutting for domestic purposes is extensive along the margins of the bog.

Adjacent habitats and land-use

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

Watercourses (major water features on/off site)

- The River Suck flows along the eastern boundary of the site.
- A stream formally flowed across the site before peat production began.

Peat type and sub-soils

The majority of the site has in excess of 2.6m of peat remaining. Castlegar Bog has only been in active peat production for the past 15 years. The peat on site is mostly “red” or “Sphagnum peat” and is used as fuel peat.

Fauna biodiversity

Birds

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

- Kingfisher
- Willow Warbler
- Chiff Chaff
- Mallard (3)
- Skylark
- Other more common species include Grey Crow, Meadow Pipit, Blackbird, Robin, Wood Pigeon

Mammals

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

- Otter
- Badger
- Fox

Other species

Frog

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

- Bog restoration/rehabilitation measures will be restricted to within the footprint of the proposed rehabilitation area.
- The proposed rehabilitation will have due regard to noise limits and hours of operation (i.e. dusk and dawn) to minimise any potential disturbance on resident and local fauna that utilise the site and immediate environs.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- The proposed 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 increasing risks of siltation, activities will be halted.
- Rehabilitation will be carried out using a suitably sized machine and in all circumstances, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.
- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
- Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Vehicles will never be left unattended during refuelling.
- No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
- All plant refuelling will take place using mobile fuel bowsers. Only dedicated trained and competent personnel will carry out refuelling operations.
- Mobile storage such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked. All pumps using fuel or containing oil will be locally and securely bunded where there is the possibility of discharge to waters.
- Potential impacts caused by spillages etc. during rehabilitation will be reduced by keeping spill kits and other appropriate equipment on-site.
- Rehabilitation and decommissioning will be carried out in accordance with '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 flora species have been recorded at Castlegar 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 work 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] will be adhered with throughout all rehabilitation works and 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 Enhanced Peatlands Decommissioning Restoration and Rehabilitation Scheme

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 enhanced decommissioning, rehabilitation and restoration 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 standard mandatory rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Improvements 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 costs associated with the additional and enhanced measures, i.e., those which go beyond the existing standard mandatory 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 mandatory rehabilitation necessary to comply with pre-existing Condition 10 IPC Licence requirements, will be deemed eligible costs by the Scheme regulator and funded by the Climate Action Fund, such eligible costs are also constrained by state aid considerations.

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 standard decommissioning and rehabilitation 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 Mona 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 Mona de-carbonisation programme and the proposed **Enhanced Decommissioning and Rehabilitation Scheme**.

The development of site rehabilitation plans and the delivery of peatland rehabilitation by Bord na Mona 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 Mona 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.

Castlegar Bog is bordered to the east by the River Suck Callows SPA (NPWS Site Code: 004097) and Suck River Callows NHA (NPWS Site Code 000222). The SPA is of conservation interest for wintering birds while the NHA is of conservation value for wintering birds, callow grassland and raised bogs.

Annaghbeg Bog NHA (NPWS Site Code: 002344) lies to the south-west of the site. This raised bog comprises both high and cutover bog. A significant proportion of Annaghbeg Bog is part of the BnM Castlegar property.

.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.

Castlegar Bog is located in an area zoned by Galway County Council as open countryside.

11 National Archaeology Code of Practise

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

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

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

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

Bord na Móna will 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 has been carried out for the proposed rehabilitation at this site (Appendix X). The recommendations of this assessment have been incorporated into the rehabilitation plan to minimise impacts on known archaeology.

.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 Monas 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 Castlegar 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.

4.14 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 Mona 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	Castlegar Decommissioning Plan
1	Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices	Clean-up of Bog
2	Cleaning Silt Ponds	Cleaning Silt Ponds
3	Decommissioning Peat Stockpiles	Peat Stockpile Management via Levelling
4	Decommissioning or Removal of Buildings and Compounds	Decommission and Removal of Porto-cabin tea centre and materials store
6	Decommissioning Fuel Tanks and associated facilities	Decommissioning and De-Gassing Mobile Fuel Tanks
7	Decommissioning and Removal of Bog Pump Sites	Not Applicable

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.

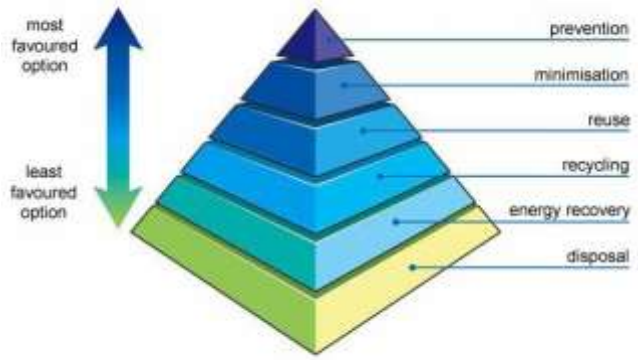
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

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

APPENDIX VIII. ENHANCED REHABILITATION MEASURES AND TARGET AREA.

Table AP-3. Enhanced rehabilitation measures and target area.

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	41
	DPT2	More intensive drain blocking (max of 7/100 m) + blocking outfalls and managing overflows	42
	DPT3	More intensive drain blocking (max of 7/100 m), + field reprofiling + blocking outfalls and managing overflows	104
	DPT3a	More intensive drain blocking (max of 7/100 m), + field reprofiling (using dozer) + blocking outfalls and managing overflows	
	DPT3b	More intensive drain blocking (max of 7/100 m), + field reprofiling (using dozer and screw-leveller) + blocking outfalls and managing overflows	
	DPT3c	More intensive drain blocking (max of 7/100 m), + field reprofiling (using screw-leveller) + infilling drains + creating cross berms + 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	72
	DPT5	Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	66
Dry cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	
	DCT2	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	
	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	
	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 + forming l berms to re-wet cutaway + transplanting Reeds and other rhizomes	
	WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	
	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	168
	MLT2	More intensive drain blocking (max 7/100 m)	
	MLT3	More intensive drain blocking (max 7/100 m) + managing outfalls overflows + boundary berm	
Other		Silt-ponds	10
		Archaeology	
		Riparian	10
Total			518[1]

[1]Note. Includes Annaghbeg Bog.

APPENDIX IX. GLOSSARY

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.

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 activities carried out in the proposed Bord na Mona Decommissioning, Rehabilitation and Restoration Scheme.

Enhanced rehabilitation: This is defined as rehabilitation carried out under proposed Bord na Mona Decommissioning, Rehabilitation and Restoration Scheme. It is proposed by Government that Bord na Mona be obligated to carry out enhanced decommissioning, rehabilitation and restoration on peatlands previously used for energy production. It is expected that this will be supported by the 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 measures. This proposed Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Improvements 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, enhanced and accelerated 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.

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 Enhanced rehabilitation 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 Mona 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.

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 Mona 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 X. ARCHAEOLOGY

Archaeological Impact Assessment of Proposed Bog Rehabilitation at Castlegar Bog, Co. Galway. Dr. Charles Mount. Nov 2020.

Role of the Archaeological Liaison Officer

1. To communicate this Code of Practice and the *Archaeological Protection Procedures* (Appendix IV) to all personnel operating on the bog.

2. To ensure that all notices relating to the *Archaeological Protection Procedures* are posted and maintained at appropriate locations on the bog.

3. To report any stray finds, presented to the Liaison Officer from his/her group of bogs, to the Duty Officer of the National Museum of Ireland.

4. To provide for the appropriate protection of the stray find, whether in-situ or removed from the bog, as directed by the Duty Officer of the National Museum of Ireland.

Code of Practice

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Code of Practice

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

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

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

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

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

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

BORD NA MÓNA 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	13/19/2020	First release	EMcD
2			

Archaeological Impact Assessment of Proposed Bog Rehabilitation at Castlegar Bog, Co. Galway

Report For

Bord Na Móna Energy Ltd.

Author

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Bord Na Móna Project Archaeologist

Introduction

This archaeological impact assessment report was prepared by Dr. Charles Mount for Bord na Móna Energy Ltd. It represents the results of a desk-based assessment of the impact of proposed bog rehabilitation on c.366 hectares at Castlegar Bog, Co. Galway on the known archaeological heritage of the bog. The proposal is to carry out:

- Drain blocking (speed bump method) with dozers (3 bumps per 100m) excavating to an average depth of 0.3m and a maximum 0.5m.
- Drain Blocking with excavator (10 blocks per 100m) with peat being excavated from a borrow pit dug to a max of 0.5m, then reprofiled with material directly around it, and 0.5m taken from the bottom and sides of the drain to obtain a key for blockage.
- Field profiling using dozer.
- Surface profiling (45m x 60m ponds) using dozer to create surrounding berms (5m wide) using excavator and dozer to install drainage pipes in berms.
- Cut and fill profiling (30m x 30m ponds "Sluggan") using excavator to create surrounding berms (5m wide) using excavator to install drainage pipes in berms.
- Install outfall pipes at boundary outlet.
- Install controlled weir at boundary outlet.
- Install drainage channels with excavator to rout excess water to boundary outlets to a maximum depth of 1m.

Castlegar Bog is the southernmost bog of the Derryfadda group of bogs and is located 4.5km east of Ahascragh. It is u-shaped in plan, enclosing a large dryland island known as Dalysgrove on its northern side. The bog occupies the townlands of Tummerillaun, Dalysgrove, Curry, Kilcrin, Knockaunroe, Eglish, Cloonbanniv and Addergoole North on OS 6 inch sheets Galway 61 and 74. The unclassified road that provides access to Dalysgrove runs along the northern side of the bog, separating it from Killaderry Bog South. It is bounded by the River Suck along its eastern and southern sides and to the west by higher ground that overlooks the bog.

The bog has a total area of 366 hectares and was until recently in milled peat production. The 148 production fields are orientated recorded on the northwest side of the bog with the majority orientated roughly northwest/southeast. Industrial peat development started in 1975 and the bog is in milled peat production since 2004.

Methodology

This is a desk-based archaeological assessment that includes a collation of existing written and graphic information to identify the likely archaeological potential of Castlegar Bog. The bog extent is indicated in Fig. 1. This area was examined using information from the:

- The Bord na Móna Peatland Survey 2007 & 2008.
- The Bord na Móna 2010-2013 excavation programme.
- Record of Monuments and Places (RMP) for County Galway.
- The Sites and Monuments Record that is maintained by the Dept of Culture, Heritage and the Gaeltacht.

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

Desktop assessment

Recorded Monuments

The Record of Monuments and Places (RMP) for Co. Galway which was established under Section 12 of the National Monuments (Amendment) Act, 1994 was examined as part of the assessment (DAHGI 1997). This Record was published by the Minister in 1997 and includes sites and monuments that were known in Castlegar Bog before that date. This review established that there are no Recorded Monuments situated in the proposed rehabilitation area (see Fig. 1).

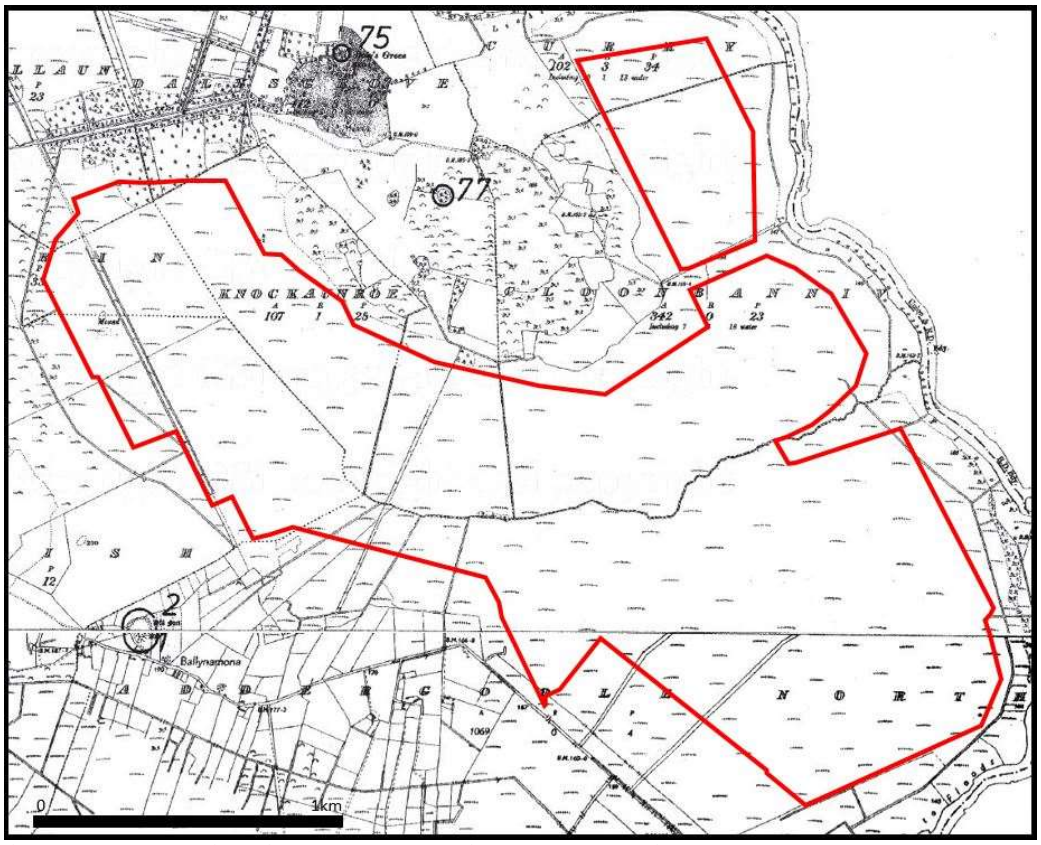

Fig. 1. Castlegar Bog, Co. Galway, detail of the Record of Monuments and Places maps sheet Nos. 61 and 74. The proposed rehabilitation area is outlined with the redline .There are no Recorded Monuments in the area.

The Peatland Survey 2007 & 2008

Castlegar was the subject of the Peatland Survey 2007 & 2008 which was commissioned by the Department of the Environment, Heritage and Local Government to assess the archaeological potential of the Bord na Móna production bogs, and was carried out by Archaeological Development Services at Castlegar in August-September 2007 (Rohan 2009). The survey methodology involved the walked visual inspection of every second production field horizontal surface, and the visible vertical face of every second drain above the water level. The depth to which the vertical drain faces were visible is not recorded in the report, but it can be estimated. Archaeology was identified to a maximum depth of 1.50m below the 2007 surface, and this may be estimated as the maximum drain depth visible in 2007. In total, 56 sites were recorded confined in the north-west part of Castlegar Bog, in Kilcrin and Knockaunroe townlands (Fig. 2). These included twelve toghers, thirteen platforms and thirty-one sightings of archaeological wood. All the

archaeology identified during the survey was situated between the peat surface and a maximum depth of 1.50m, with 80% of the sites at less than 60cm depth. These sites and monuments were all notified to the Archaeological Survey of Ireland.

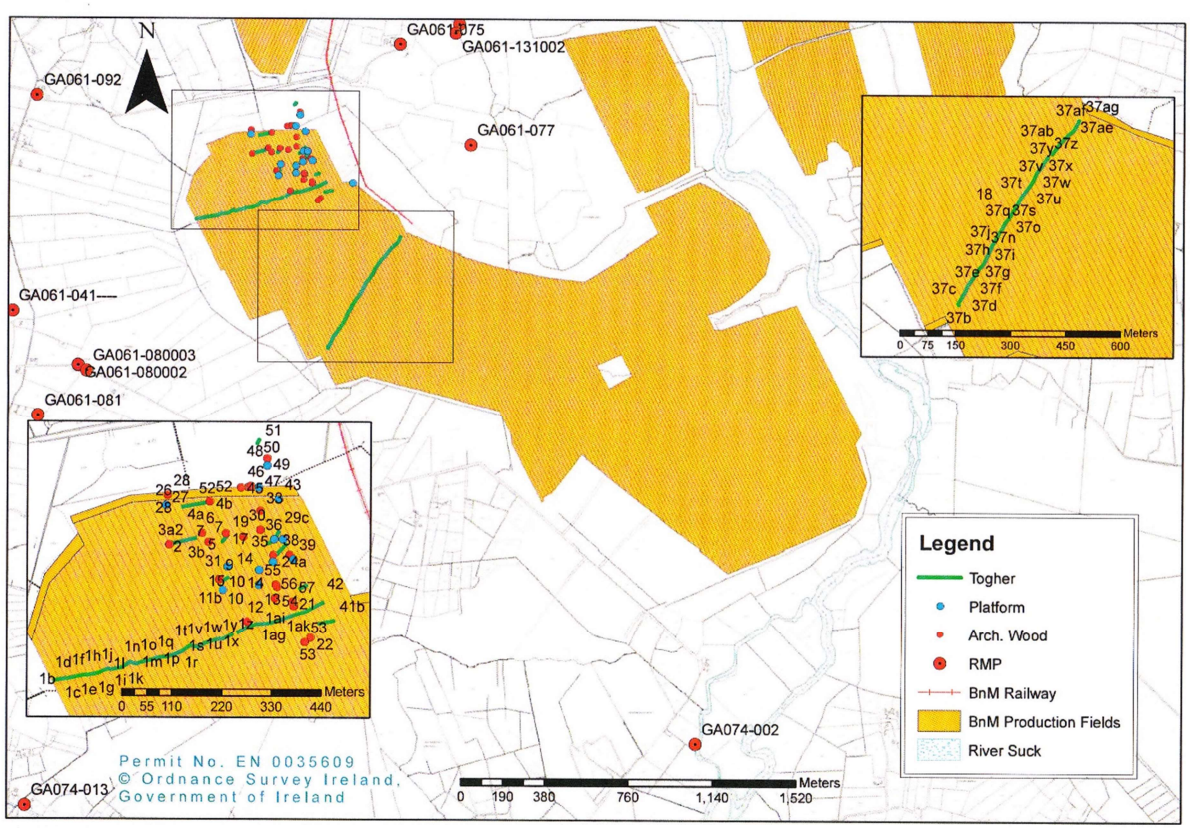

Fig. 2. Castlegar Bog, Co. Galway, sites and monuments identified during the Peatland Survey 2007 & 2008 (From Rohan 2009).

Castlegar Bog finished production in 2018 and had production every year after the Peatland Survey 2007 & 2008. Estimate of the peat removed from the bog based on the results of a 2020 drone survey indicates that an average of 0.855m depth of peat has been removed between 2008 and 2020. This suggests that harvesting has not penetrated to a level below that visually inspected in 2007 and the survey results are a good guide to the archaeology present below the existing ground level. However, as most of the sites and monuments identified in the 2007 survey in the production areas were situated at less than 0.60m below the 2007 ground level, they have been removed by the subsequent harvesting. Only the16 sites listed below in Table 1 are likely survive *in situ.* These sites are identified as 7 toghers, 5 platforms and 4 archaeological wood.

Site code	Site Type	Depth below 2007 surface
CGR003a-b	Road-Class 2 togher	1.17-1.24m
CGR004a	Road-Class 2 togher	0.94m
CGR008a-c	Road-Class 2 togher	0.87-0.9M
CGR009	Archaeological wood	0.90m
CGR012	Archaeological wood	0.85m
CGR013	Platform	0.88m

CGR014	Platform	0.95m
CGR016b	Road-Class 2 togher	0.85m
CGR024a	Road-Class 2 togher	0.90m
CGR029c	Road-Class 2 togher	0.90m
CGR031	Platform	1.20m
CGR038	Archaeological wood	1.15m
CGR039	Platform	0.90m
CGR047	Platform	1.20m
CGR054	Archaeological wood	0.85m
CGR058a-b	Road-Class 3 togher	0.90-1.10m

Table 1. List of sites identified in the Peatland Survey 2007 & 2008 in Castlegar Bog likely to survive *in situ*.

2010-2013 excavation programme

Three of the monuments identified in the Peatland Survey 2007 & 2008 were selected for investigation as part of the 2010-2013 Bord na Móna excavation programme (Whitaker 2012). These monuments are noted below.

- License No. 11E0193. GA-CGR001a-al a Class 1-togher was investigated with 5 cuttings
- License No. 11E0194. GA-CGR050b a Class 2-togher was investigated with 1 cutting
- License No. 11E0195. GA-CGR051b a Class 2-togher was investigated with 1 cutting

Reported Finds

Enquiries to the Derryfadda Group Archaeological Liaison Officer indicated that there have been no finds of artifacts or monuments in the bog since the 2007 Castlegar field survey.

Sites and Monuments Record

The Sites and Monuments Record (SMR) which is maintained by the Department of Culture, Heritage and the Gaeltacht was examined as part of the assessment on the 20th May 2020. The SMR consists of records included in the RMP and sites and monuments notified to the Dept. since the publication of the RMP. This review established that there are 29 monuments entered in the SMR in the proposed rehabilitation area. The monuments are indicated in Table 2 and on Fig. 3. Apart from GA061-082----, these are all monuments identified by the Peatland Survey 2007 & 2008 (Rohan 2009) that were notified to the Archaeological Survey of Ireland. The SMR does not provide a concordance between the SMR number and the original Peatland Survey 2007 & 2008 site code. As noted above, some of these monuments were located at depths shallower than 0.855m and have been removed in the course of peat harvesting.

GA061-082----	Eglish, Kilcrin	Boundary mound
GA061-173----	Kilcrin, Knockaunroe	Road - class 1 togher
GA061-174----	Kilcrin	Platform – peatland
GA061-175----	Kilcrin	Road - class 2 togher
GA061-176----	Dalysgrove, Tummerillaun	Road - class 2 togher
GA061-177----	Kilcrin, Knockaunroe	Road - class 2 togher
GA061-178----	Kilcrin	Platform – peatland
GA061-179----	Kilcrin	Platform – peatland
GA061-180----	Kilcrin, Knockaunroe	Road - class 2 togher
GA061-181----	Kilcrin	Platform – peatland
GA061-182----	Knockaunroe	Platform – peatland
GA061-183----	Knockaunroe	Platform – peatland

GA061-184----	Knockaunroe	Platform – peatland
GA061-185----	Knockaunroe	Road - class 2 togher
GA061-187----	Tummerillaun	Platform - peatland
GA061-188----	Tummerillaun	Platform – peatland
GA061-189----	Knockaunroe	Road - class 2 togher
GA061-190----	Tummerillaun	Platform – peatland
GA061-191----	Knockaunroe	Platform – peatland
GA061-192----	Knockaunroe	Road - class 3 togher
GA061-193----	Knockaunroe	Platform – peatland
GA061-194----	Knockaunroe	Platform – peatland
GA061-196----	Knockaunroe	Platform – peatland
GA061-197----	Knockaunroe	Platform – peatland
GA061-198----	Knockaunroe	Platform – peatland
GA061-199----	Knockaunroe	Platform – peatland
GA061-200----	Knockaunroe	Platform – peatland
GA061-206----	Knockaunroe	Platform – peatland
GA061-203----	Knockaunroe	Road - class 3 togher

Table 2. List of sites and monuments included in the SMR in Castlegar Bog.

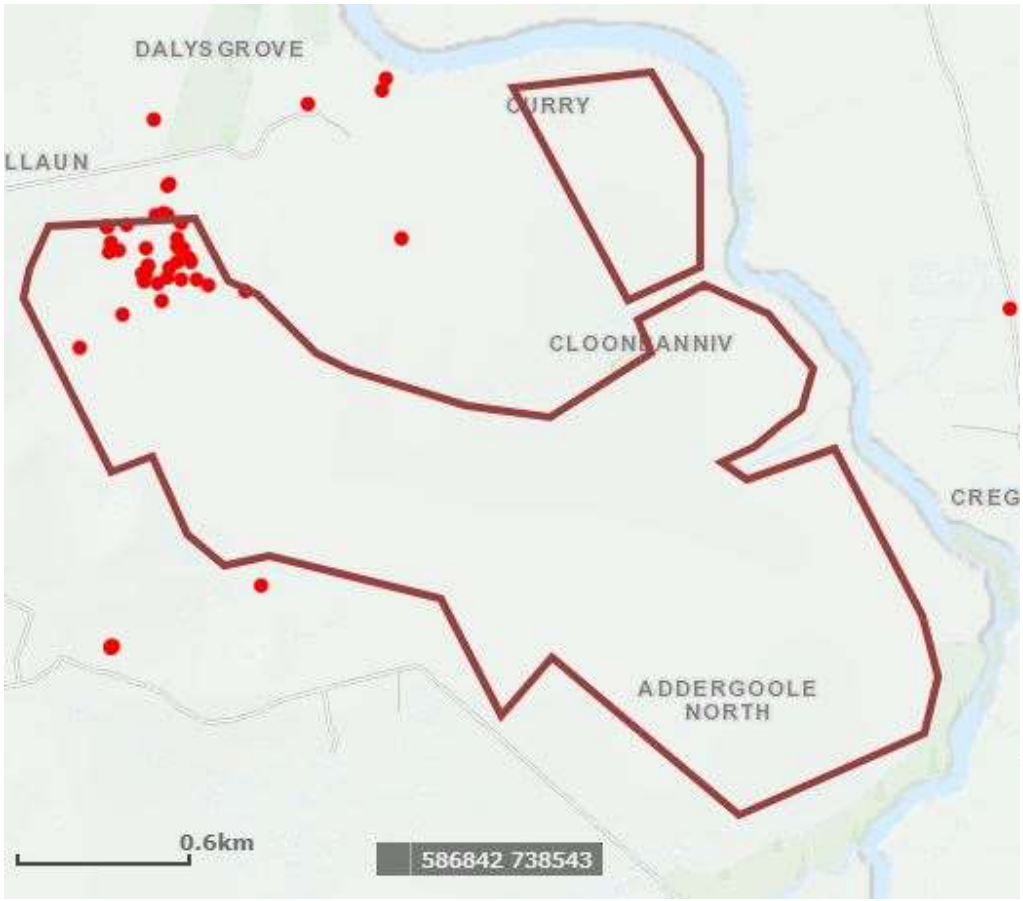

Fig. 3. Castlegar Bog, Co. Galway, detail of the Sites and Monuments Record. The proposed rehabilitation area is outlined with the redline .There are no Recorded Monuments in the area.

Impact Assessment

Most of the known items of archaeological heritage identified by the Peatland Survey 2007 & 2008 (some of which were subsequently entered in the Sites and Monuments Record) in the proposed rehabilitation area have been removed by peat harvesting. 16 sites listed in Table 1 are likely to survive *in situ.* These sites are identified as 7 toghers, 5 platforms and 4 archaeological wood. No finds of artifacts or monuments have been reported in Castlegar Bog since the Peatland Survey 2007 & 2008.

Unlike peat harvesting, which removes the entire horizontal surface of the bog, the proposed rehabilitation excavation will impact much more limited areas to a maximum depth of 0.5m. The works will impact an area of bog, horizontal and vertical, that has already been archaeologically assessed during Peatland Survey 2007 & 2008. There was approximately 1.5m of vertical drain face visible in 2007, and the surface has been reduced by c.0.855m through peat harvesting, leaving c. 0.645m of the drain faces remaining that were visible in 2007. The maximum excavated depth of the proposed rehabilitation excavations will be 0.5m. These proposed works will penetrate the bog to a level approximately 0.145m above the lowest level visible at the time of the Peatland Survey 2007 & 2008. As the locations and extent of archaeology in the bog is known, there is limited potential for the proposed rehabilitation work to impact unknown archaeological heritage, i.e. archaeology not identified by the Peatland Survey 2007 & 2008.

Recommendations

1. The sites and monuments identified in Castlegar Bog by the Peatland Survey 2007 & 2008, listed in table 1, should be avoided by the rehabilitation works wherever practical.

2. As the locations and extent of archaeology in the bog is known, there is limited potential for the proposed rehabilitation work to impact unknown archaeological heritage, i.e. archaeology not identified by the Peatland Survey 2007 & 2008. However, should any archaeological material be uncovered in the course of the rehabilitation works, it should be reported to Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

Conclusion

This is a desk-based archaeological assessment and includes a collation of existing written and graphic information to identify the likely archaeological potential of the proposed rehabilitation area. There are 16 sites and monuments identified by the Peatland Survey 2007 & 2008 surviving *in situ* in Castlegar Bog. The sites and monuments identified in Castlegar Bog by the Peatland Survey 2007 & 2008 should be avoided by the rehabilitation works wherever practical. The possibility of the presence of additional unknown archaeological monuments or artefacts within the proposed rehabilitation area is considered minimal. However, should any archaeological material be uncovered in the course of the rehabilitation works, it should be reported to Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

References

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

Whitaker, J. 20212. Preliminary Report on Archaeological Excavations in Knockaunroe and Kilcrin townlands, Castlegar Bog, Co. Galway Licence Nos: 11E0193, 11E0194, 11E0195. Unpublished report for Bord na Móna.

Rohan, N. 2009. Peatland Survey 2007 & 2008. Unpublished report prepared for DOEHLG and Bord na Móna.

Dr. Charles Mount
26 May 2020