# BORD NA MÓNA

# Cutaway Bog Decommissioning and Rehabilitation Plan

## Natura Impact Statement

## Castlegar Bog,

## Co. Galway

**April 2021**

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# ***DOCUMENT APPROVAL***

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| | **Prepared by** | **Reviewed by** | **Approved by** |
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| Date<br>April 2021 | Signature | Signature | Signature |

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# 1. SCREENING REPORT FOR APPROPRIATE ASSESSMENT

Bord na Móna have in recent years permanently ceased industrial peat production on a significant area of bog. In line with Bord na Móna's accelerated decarbonization strategy, the company has also committed to ambitious enhanced peatland decommissioning and rehabilitation improvements.

This strategy has been developed to optimise benefits of peatland rehabilitation and restoration for climate action. In addition, it will also have benefits for biodiversity, water (catchment management) and other ecosystem services. These improvements are in line with the Government Climate Action agenda and will bring with it, significant natural capital benefits. It will also create a stable natural landscape for the benefit of neighbours and local communities in former peat production areas.

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater Bog group (Ref. P0/502-01). As part of the condition 10.2 of the IPC license, decommissioning and rehabilitation of cutaway boglands is required. Castlegar bog, located within the above group, is also to be subject to the above referenced improvements as part of a scheme titled the Peatland Climate Action Scheme (hereafter PCAS). The pertinent detail per BnM bog for both requirements under IPC license condition 10.2 and the proposed PCAS is described in a decommissioning and rehabilitation plan (hereafter 'plan' or 'the plan'), as required under Condition 10.2 of the respective IPC license. It is this plan which forms the subject of the appraisal herein.

The general objective of peatland rehabilitation is to ensure environmental stabilisation of the former industrial peat production areas. Enhanced rehabilitation focuses on optimizing suitable hydrological conditions (stable water levels close to the surface) by blocking production field drains, and other measures as described in the appended plan. This will create soggy peatland conditions that will be naturally colonised by plants and animals and will allow compatible peatland habitats to re-develop. It will also slow water movement across these bogs.

The enhanced decommissioning to be carried out on the bogs as part of the PCAS includes typically the clean-up of the bog, the cleaning of silt ponds, the management of peat stockpiles via levelling, the decommissioning and de-gassing of mobile fuel tanks, and the removal of buildings (generally porto-cabins).

This Screening Report for Appropriate Assessment has been prepared by Jennings O'Donovan and Partners Limited and contains sufficient objective scientific information to facilitate the competent public authority to determine whether the decommissioning and rehabilitation outlined in the plan referenced above requires Appropriate Assessment, or whether the potential for significant effects on any designated European Site can be excluded.

## 1.1 Appropriate Assessment Process

Under Article 6(3) of the Habitats Directive, an Appropriate Assessment of the implications of any plan or project on a European Site is required before a project is approved. This must include all the aspects of the plan or project which can, either individually or in combination with other plans or projects, affect the conservation objectives of that European Site, in the light of the best scientific knowledge in the field. The competent national authorities are to authorise a plan, project or activity only if they have made certain that it will not adversely affect the integrity of any European Site.

This current document comprises reporting to determine whether Appropriate Assessment is required. The Screening must identify whether the project, alone or in combination with other plans and projects, is likely to have significant effects on any European Site in view of the qualifying interests and conservation objectives of these sites; or whether the potential for such significant effects can be excluded. This test is completed with cognisance of emerging case law.

### 1.1.1 Stages of the Appropriate Assessment Process

Appropriate Assessment involves a number of steps and tests that are applied using a stage-by-stage approach. Each step or stage in the assessment process precedes and provides a basis for other steps. The four stages in an Appropriate Assessment (AA), are further described below.

Guidance on the Appropriate Assessment (AA) process was produced by the European Commission in 2002, which was subsequently developed into guidance specifically for Ireland by the Department of Environment, Heritage and Local Government (DEHLG) (2009). These guidance documents identify a staged approach to conducting an AA, as shown in **Figure 1**.

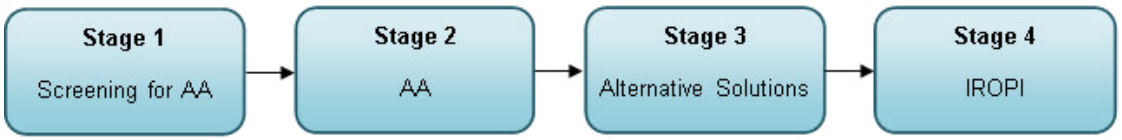



**Figure 1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DEHLG, 2009).**

#### 1.1.1.1 Stage 1 - Screening for AA

This stage examines the likely effects of a project either alone or in combination with other projects upon a European site and considers whether it can be objectively concluded that these effects will not be significant.

#### 1.1.1.2 Stage 2 – Appropriate Assessment

In this stage, the impact of the project on the integrity of the European site is considered with respect to the conservation objectives of the site and to its structure and function. Mitigation measures should be applied to the point where no adverse impacts on the site(s) remain.

#### 1.1.1.3 Stage 3 - Alternative Solutions

Should the Appropriate Assessment determine that adverse impacts are likely upon a European site, this stage examines alternative ways of implementing the project that, where possible, avoid these adverse impacts. For the avoidance of doubt, no reliance is placed on Stage 3.

#### 1.1.1.4 Stage 4 - IROPI

Assessment where no alternative solutions exist and where adverse impacts remain: Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the European site will be necessary. European case law highlights that consideration must be given to alternatives outside the project area in carrying out the IROPI test. It is a rigorous test which projects are generally considered unlikely to pass. In any event, the proponent does not purport to place any reliance on Stage 4.

## 1.2 Guidelines; Project Approach & Baseline Surveys

1.2.1 Guidelines & Project Approach

The preparation of this Screening for Appropriate Assessment Report has had regard to;

- EU Habitats Directive (92/43/EEC),
- EU Birds Directive (Council Directive (2009/147/EC)
- European Communities (Birds and Natural Habitats) Regulations 2011,
- Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001,
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (2010).
- Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC, European Commission, 2018.
- *Castlegar Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2021* (2021) as prepared by BnM – see Appendix B of this document.

For the avoidance of doubt, within this appraisal, no reliance is made on existing mitigation measures which form part of current or previous industrial peat production. The scope of this appraisal refers to the proposed decommissioning and rehabilitation only, as described in the Plan included as Appendix B.

1.2.2 Baseline Surveys

**1.2.2.1 Habitats & Fauna**

A range of baseline surveys have previously been completed at Castlegar Bog by Bord na Mona. As part of the formulation of the Castlegar Bog Rehabilitation Plan ecological field surveys were completed between 2012 and 2020.

Surveys to inform the current Appropriate Assessment reporting were completed by JOD on the following dates: 8th December 2021; and 5th March 2021. Additional site visits were completed by Bord na Móna ecologist on the 1st December, 3rd December and 7th December 2021.

The 2012 to 2020 surveys were based on an Extended Phase 1 Habitat Survey which involved walking the bog, identifying and mapping habitats, recording all birds seen and heard and recording all signs of non-volant protected mammals during the survey. The field surveys completed in 2021 involved a transect of the bog to record bird species, and particularly wetland birds and bird species that are listed as special conservation interest bird species of the River Suck Callows SPA (which adjoins Castlegar Bog to the west). The 2021 surveys also involved a survey of all silt ponds on site and the stretch of the River Suck to the east of the site for the presence of otter holts, couches and field signs.

Habitats were identified and mapped during the 2012 – 2020 field surveys and a detailed description of the field survey results is provided as Appendix III Ecological Survey Report to the Castlegar Rehabilitation Plan 2021. Figure 4 provides a habitat map of Castlegar Bog. Following the completion of these surveys the most common habitats present at Castlegar Bog identified as:

- Bare peat.
- Pioneer dry heath communities
- Silt Ponds with associated habitats such as scrub, Bracken, rank grassland, dry calcareous grassland and typical pioneer communities of disturbed areas.

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

- Birch woodland
- Scrub (Gorse scrub and Birch scrub developing of dry high bog around margins)
- Raised bog
- Cutover bog (several small fragments)
- Wet grassland along the edges of the site.

The results of the surveys completed during the over-wintering season between 2013 and 2019 are relevant to this screening exercise given the proximity of Castlegar Bog to River Suck Callows SPA, which is designated for its role in supporting a range of over-wintering species. During the surveys between 2013 and 2019, all of which were all completed during the over-wintering bird

season, Castlegar Bog was not identified as a site upon which wetland birds relied. Mallard and kingfisher were the only waterbirds recorded at the bog during these surveys.

During the December 2020 survey the following waterbirds were recorded (numbers in parenthesis): Mallard (3) and Coot (2). One Peregrine was observed flying over the site during the December 2020 survey.

During the March 2021 survey the following wetland bird species (numbers in parenthesis) were recorded: snipe (16); Mallard (2); Wigeon (7) and Coot (4). The wigeon and coot were recorded from the silt pond no. SW119/ CG235A.

The following mammal species (or their field signs) have been recorded at Castlegar Bog between the 2012 and 2021 surveys:

- Otter
- Badger
- Fox

Within the boundary of Castlegar Bog the onsite silt ponds represent suitable habitat for supporting otters and their holts and couches. During the 2020 and 2021 surveys at Castlegar Bog, each of the silt ponds on site were surveyed for the presence of otter holts and couches as well as field signs indicating the presence of otters. No definitive signs of otters were recorded at any of the 8 silt ponds occurring at the Castlegar Bog (05/03/21). Mammal entrances were observed in woodland habitat fringing silt pond SW119 which is the principal silt pond within the bog. The location of this entrance is shown on Figure 4 Habitat Map (below). There was no evidence of recent activity at the entrances and the largest entrance was less than 20cm in width – a size that is likely to be too small to be used by otters.

#### 1.2.2.2 Castlegar Bog Silt Pond Water Quality

In accordance with the existing Integrated Pollution Control licence for Castlegar Bog, all drainage water is discharged via an appropriately designed silt pond treatment arrangement as required in Condition 6.6. of the licence.

There are 8 silt ponds at Castlegar Bog and each of these are inspected and maintained in accordance with the licence. Castlegar bog surface water outlets discharge to the River Suck.

The main emission limit value associated with this bog is 35mg/l suspended solids, with trigger levels for ammonia of 1.42 mg/l and COD 100mg/l.

An analysis of monitoring over the past 5 years of the IPC licence environmental monitoring at discharge points from this bog indicate that results were under the ELV for SS and trigger level for ammonia and COD. See Table 1 below.

**Table 1: EPA Monitoring data (EPA) for the previous five-years in relation to 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 |

## 1.3 Certainty and Sufficiency of Data Provided

All field survey work was carried out by qualified and experienced ecologists, and in line with Best Practice.

In addition, where required, or possible, specific data requests have been made to NPWS via the online data request facility, specifically with regards to records of sensitive species; and the results of IWeBS surveys with respect to the River Suck, held by BirdWatch Ireland were also consulted to inform the examination detailed in this report.

Further sources of data which were reviewed included previously commissioned baseline reporting of Bord na Mona Bog Groups, reporting to inform Bord na Mona wind farm proposals, and any available Bord na Mona wind farm monitoring reports where it was deemed there was overlap with the current scope of PCAS activities. Citations are provided at the end of this report for any reports which have been referenced.

For the avoidance of doubt, due regard has been given to the passage of time & any changes to the baseline environment in the interim period were considered by a suitably qualified ecologist; visits to inform the current appraisal were used as ground-truthing exercises to confirm the relevance or not of any previously defined baseline.

In the most part, due the continuation of industrial Peat Extraction by Bord na Mona up to and including the year 2018, it was considered that habitats at many of the bogs under consideration remained relatively unchanged from the point at which many prior baseline surveys were undertaken, and therefore, it is considered that data presented in prior baseline reporting was of relevance.

# 2. STAGE 1 SCREENING

## 2.1 Screening Evaluation Process

The Screening process examines the likely effects of the described Castlegar Bog decommissioning and rehabilitation, as described in the appended 'plan' (Appendix B), either alone or in combination with other projects or plans, upon any European Site and considers whether it can be objectively concluded that these effects will not be significant. The Screening evaluation comprises four steps, as outlined in the diagram below:

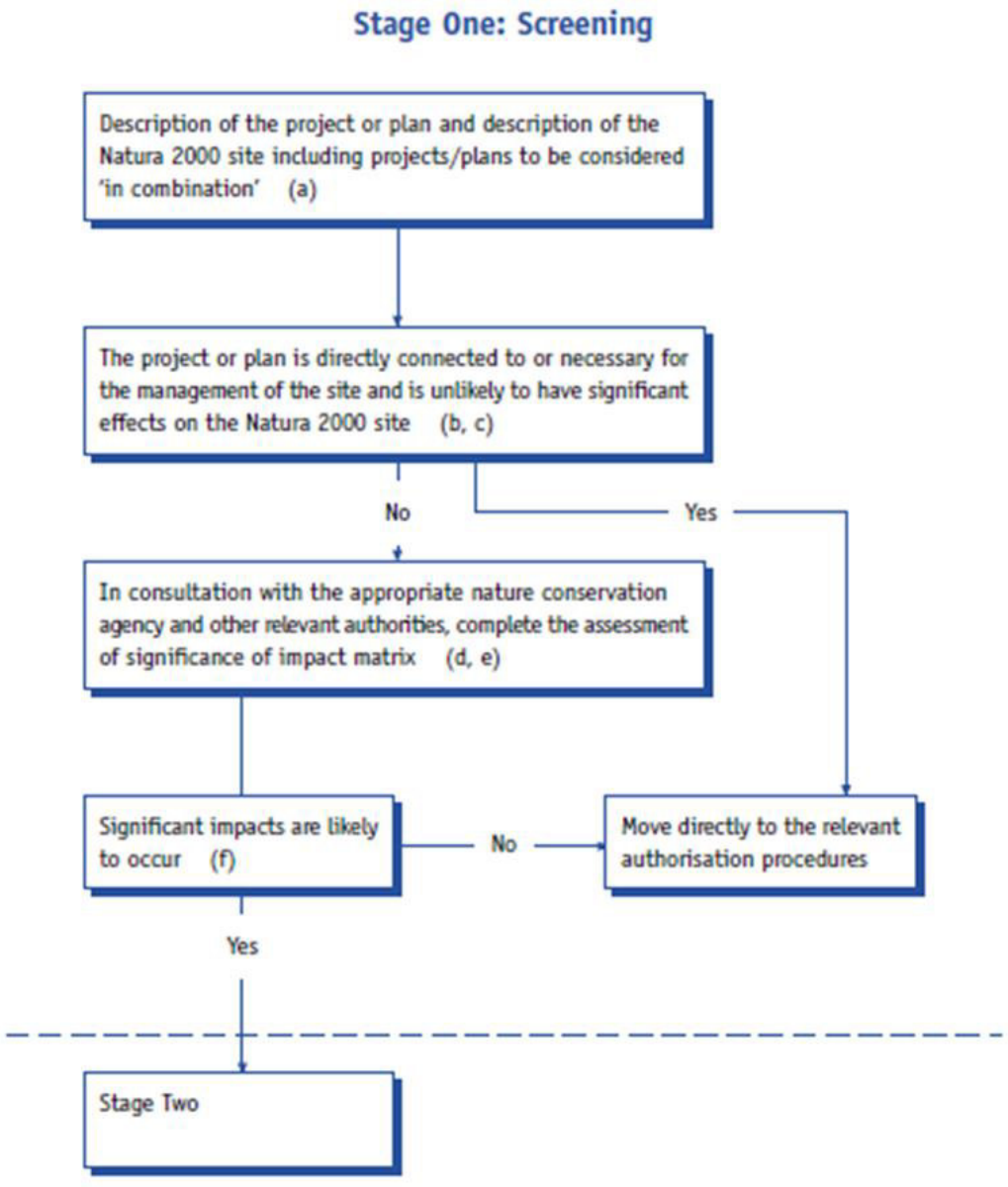



**Figure 2: Stage 1 Screening**

## 2.2 Overview of Castlegar Bog Decommissioning and Rehabilitation

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. P0502-01). As part of Conditions 10.1 and 10.2 of this license, respectively, decommissioning and rehabilitation must be undertaken to ensure the permanent rehabilitation of the cutaway bog lands within the licensed area. Castlegar bog is part of the Blackwater bog group. Castlegar Bog is located in Co. Galway.

A document titled '*Castlegar Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2021'* has been prepared specifically to describe the proposed decommissioning and rehabilitation measures at Castlegar Bog and is appended to this document as Appendix B.

It is proposed by Government that Bord na Móna carry out a PCAS on peatlands previously used for energy production. 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 – including Castlegar Bog. This proposed Scheme will significantly go beyond what is required to meet rehabilitation obligations under existing EPA IPC licence conditions.

**Decommissioning** seeks to address condition 10.1 of license Ref. P0-502-01, which 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.*

Decommissioning must take place at each bog prior to or concurrent with rehabilitation – the scale of decommissioning per bog varies dependant on the items/ infrastructure previously in place to facilitate prior peat extraction.

Enhanced decommissioning as part of the PCAS will enhance the future after use of the bog for amenity value, security against access for illegal and unsocial activities and general State and community benefit.

**Rehabilitation** seeks to address the requirements of Condition 10.2 of IPC License Ref. P0502-01, and is based on a reference document prepared by BNM per Bog for which the IPC license is applicable. See the following extract from IPC License Ref. P0502-01:

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

Castlegar Bog was drained and developed for industrial peat production in the 1990s and has been in active peat production since 1998. Industrial peat production ceased in 2019. The primary rehabilitation goal and outcome for Castlegar Bog is **environmental stabilisation** of the bog.

Enhanced Rehabilitation interventions supported by the above referenced 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.

## 2.3 Screening Evaluation: Is the Project Directly Connected to or Necessary for Management of a European Site?

For a project or plan to be 'directly connected with or necessary to the management of the site', the 'management' component must refer to management measures that are for conservation purposes, and the 'directly' element refers to measures that are solely conceived for the conservation management of a site and not direct or indirect consequences of other activities.

**Finding: No, the proposed Castlegar Bog Decommissioning and Rehabilitation is not directly connected to or necessary for the management of a European Site.**

## 2.4 Description of the Proposed Decommissioning and Rehabilitation

### 2.4.1 Location, Size, Scale and Landover

#### 2.4.1.1 Location

Castlegar Bog is located in Co. Galway approximately 6.5km to the north of Ballinasloe. It is located in or overlaps the townlands of Dalysgrove, Tummerillaun, Knockaunroe, Curry, Cloonbanniv, Addergoole North, Eglish and Kilcrin. It is located within the River Suck subcatchment (Water Framework Directive (WFD) sub-catchment code Suck_SC_070) of the River Shannon catchment (WFD Catchment Code: 25_01). The River Suck corridor forms the eastern boundary of Castlegar Bog.

The Castlegar property includes a large area of Annaghbeg Bog NHA. Bord Na Móna 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 Móna drainage, bog development or industrial peat production. It was designated as a Natural Heritage Area (NHA).

See **Figure 3: Site Location of Castlegar Bog.**

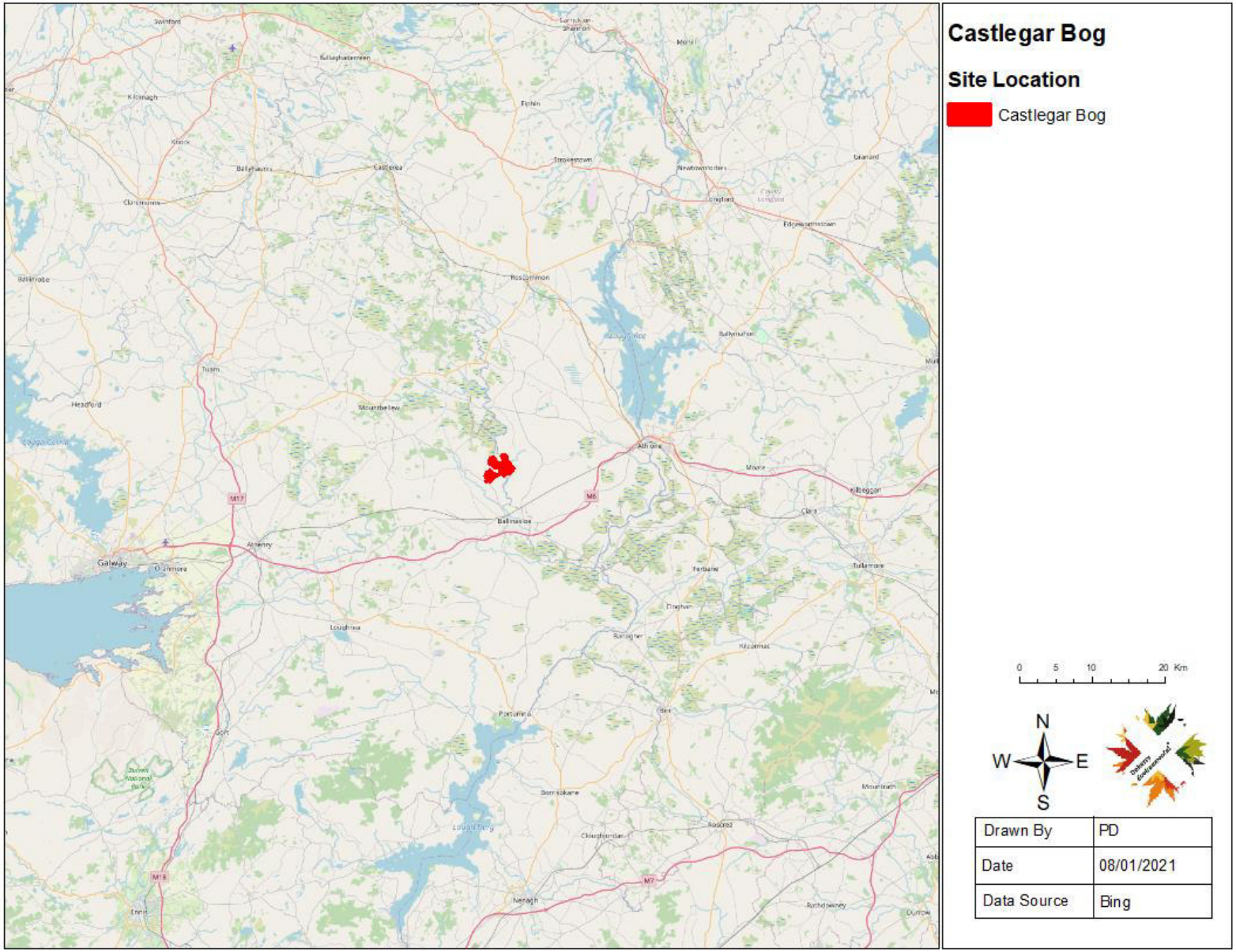



**Figure 3: Site Location of Castlegar Bog**

#### 2.4.1.2 Size, Scale, Landcover

**Size and Scale**: The area of Castlegar Bog, including Annaghbeg bog, comprises 518Ha in total.

Castlegar Bog (production area) is mainly composed of bare peat as the entire bog was in active peat production until very recently (See Appendix B). There are some remnant sections of raised bog still present but these are generally small. As noted above the Annaghbeg Bog is an undrained intact raised bog (which is excluded from PCAS scheme activities).

As noted in Section 2.4.1.1 above the eastern boundary of the site is formed by the River Suck corridor and includes part of this river's 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.

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'.

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

In terms of size and scale, **decommissioning** at Castlegar Bog includes:

- the cleaning of existing silt ponds (eight no.)
- the decommissioning and Removal of a Porto-cabin tea centre and a further materials store
- decommissioning and de-gassing mobile fuel tanks
- peat stockpile management via levelling
- the de-sludging of an existing septic tank
- removal of rail lines
- decommissioning of railway level crossing
- restricting access to the bog.

Enhanced measures may include the lifting of the existing rail line, decommissioning of existing level crossings and measures to restrict access to the bog.

The total area of Castlegar Bog is 518Ha of which 321.9Ha or approximately 62% of the present Landcover (2020) will be subject to **rehabilitation** measures/activities.

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

**Landcover**

Existing:

Habitats occurring within and immediately adjacent Castlegar Bog are comprised of:

- Lowland Rivers (FW2) in the form of the River Suck to the east of the Castlegar Bog site;
- Drainage Ditches (FW4), including a minor stream flowing west to east through the site that is currently piped and flows into SW119;
- Marsh (GM1/Tall Herb Swamp (FS2) which is located within the bog bay to the east and also forms part of the River Suck riparian corridor and the River Suck Callows SPA
- Improved agricultural grassland (GA1), which occurs at the boundary and surrounding the bog site
- Raised bog (PB1), which is comprised of remnant, uncut sections of raised bog habitat occurring towards the margins of the bog
- Pioneering, cutover bog which are located along wetter depressions within the bog adjacent to drains. This habitat is colonised by pioneering *Eriophorum* species
- Bare peat (PB4), which is the dominant habitat within the site and is generally devoid of vegetation
- Cutover bog (PB4), which was historically cut by hand and is now re-vegetated and generally supports peat-forming vegetation
- Wet heath (HH2) which occurs towards the margins of the bog where the underyling peat has become desiccated and is now more representative of a wet heath vegetation community
- Wet heath (HH2)/Scrub (WS1), which occurs at the margins of the bog on desiccated peat
- Bog woodland (WN7), which occurs at the margins of the bog
- Scrub (WS2), which occurs at the margins of the bog
- Built land (BL3), which is represented by the existing site entrance and associated site offices

Extent of Landcover requiring Decommissioning: Decommissioning will be applicable across all of Castlegar Bog.

Extent of Landcover requiring Rehabilitation: The total area of Castlegar Bog that will be subject to the PCAS is 401Ha of which 321.9Ha or approximately 80% of the present Landcover (2021) will be subject to **rehabilitation** measures/activities.

Future Landcover: Following decommissioning and rehab, future landcover of habitats currently evaluated as not requiring Rehab (i.e. Access Tracks and rights of way, marginal lands such as agricultural land, and marginal areas (e.g. high bog) around the edges of Castlegar Bog) will remain in line with existing baseline trends for these habitats, albeit without any waste or materials which would have been left in situ in the absence of decommissioning.

For habitats where rehabilitation is undertaken, landcover 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.

The development of these habitats will reflect the varying underlying environmental conditions and in part will develop as a mosaic of habitats. Rehabilitation will also modify the local environmental conditions (e.g. hydrology and topography).

The proposed rehabilitation will mean that environmental stabilization is achieved (meaning IPC obligations are met) and, in addition, significant other positive quality effects particularly for climate action will be accrued.

In general, the key rehabilitation objectives 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 bog 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.

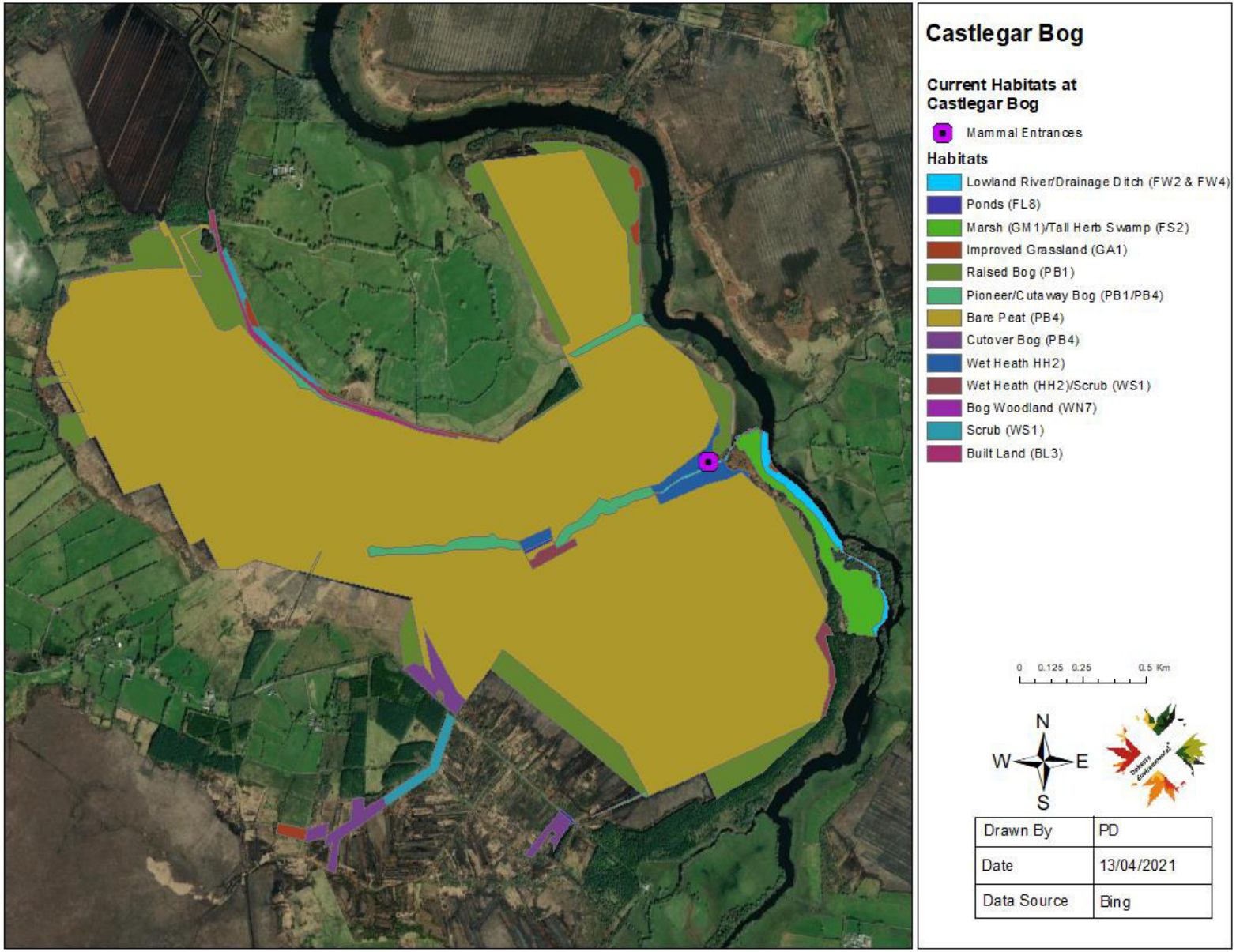



**Figure 4: Current Habitats at Castlegar Bog**

2.4.2 Application of Protective Measures in the Screening Evaluation

The Screening evaluation to inform the AA process, presented in Section 2.8 below, has been carried out in the absence of any protective measures or mitigation measures considered to avoid harmful effects on European Sites.

2.4.3 Decommissioning and Rehabilitation Stage

The proposed **decommissioning** at Castlegar Bog includes the cleaning of existing silt ponds, the decommissioning and removal of a Porto-cabin tea centre and a further materials store, decommissioning and de-gassing mobile fuel tanks, and peat stockpile management via levelling. Further measures may include the lifting of the existing rail line, decommissioning of existing level crossings and measures to restrict access to the bog.

The proposed Castlegar Bog rehabilitation comprises a series of bespoke (to Castlegar Bog) interventions designed to stabilise the existing baseline and meet compliance with the requirements of the existing EPA, IPC License and the proposed PCAS. Prescriptive measures are unique to the existing baseline habitats and comprise 3 no. broad categories, 1) those associated with (exposed) Deep Peat; 2) measures associated with the creation of wetland habitats, along the former route of the stream through the centre of the bog, and 3) measures associated with marginal lands, such as access roads, improved grassland around the periphery of the bog and lands on which private turbary is currently practised. The aim of Rehabilitation is as much as possible to place existing peatlands on a trajectory towards a naturally functioning peatland system (Renou-Wilson 2012).

#### 2.4.3.1 Decommissioning and Rehabilitation Access

Access will be through the existing entrance at Castlegar, where existing infrastructure is already in place via access tracks to facilitate the previous peat extraction. Alternative access to the bog is available at Castlegar. No change to baseline conditions to facilitate access for either decommissioning or rehabilitation is required.

#### 2.4.3.2 Standard Methodology for Decommissioning

**Decommissioning** at Castlegar will involve the deployment of a work crew to collect and oversee the removal of any remaining plant or potentially contaminating waste left *in situ* in line with Condition 7 of License Ref. P0502-01. This condition specifically requires that BnM's procedures for the 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 the IPC license 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 EPA. Waste sent off-site for recovery or disposal shall only be conveyed to a waste contractor, as agreed by the EPA, 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.

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

- The names of the agent and transporter of the waste
- The name of the persons responsible for the ultimate disposal/recovery of the waste
- The ultimate destination of the waste
- Written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site
- 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
- Details of any rejected consignments

A copy of this Waste Management record shall be submitted to the Agency as part of the AER for Castlegar Bog. As required by the license, these waste items will be removed for recycling or disposal, using external contractors with the required waste collection permits, with waste records maintained as required. Where possible, Bord Na Móna will utilize the appropriate waste hierarchy to identify waste that can reused or recycled ahead of disposal.

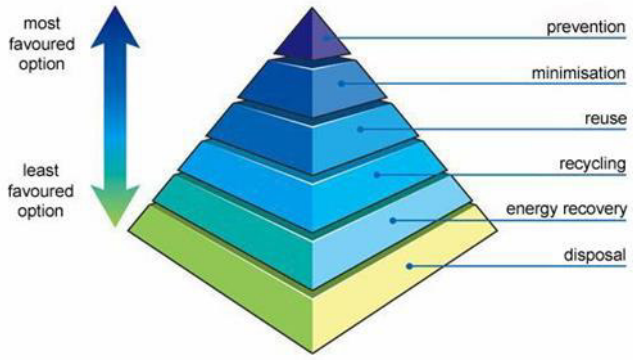



**Figure 5: Waste Hierarchy**

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 license.

Decommissioning may also include measures to restrict access to the bog or silt ponds.

Regarding the lifting of rail lines this will be facilitated by a manual work crew either a) loading rail line components onto a trailer and removing a) direct to contractor, b) to a consolidation area via tractor, prior to disposal, or c) utilizing the rail line itself to remove the components in reverse order onto a locomotive trailer, with again, the parts being delivered up the rail line to to be stored and/or disposed of, in line with IPC license conditions.

Peat stockpiles: Any existing peat stockpiles that are unsalable will be required to be decommissioned and rehabilitated into the adjoining fields ('levelling'), from where it was originally harvested. This process first involves the associated silt pond being cleaned if necessary, the stockpile field drains blocked to capture any run-off, with blockages every 100m. The peat is then deposited by dozer onto the adjoining field and blocked drain, where it is cambered and compacted.

Decommissioning and De-Gassing Mobile Fuel Tanks: These tanks are first emptied of any usable fuel and then degassed using a suitable hazardous waste contractor, with appropriate certification provided. The tank is then either removed for reuse or recycling or retained within the bund as a site asset. In addition, the concrete bund is cleaned and any hazardous wastes generated are removed by hazardous waste contractor. Any remaining concrete bunds, once cleaned and deemed as an infrastructural asset to the site will be retained.

Decommission and Removal of Porto-cabin tea centre and materials store: Tea-centres were used to provide canteen and welfare facilities for bog operations and are either a concrete building, a portacabin or older prefabricated older bee hive units and typically contain tables and chairs, a fridge, lockers, cabinets, sinks and other fixtures and fittings. All basic fixtures and fittings will be retained with all other general waste or unused items removed and disposed to skips for removal off-site.

Regarding the (porto-cabin) materials store onsite once all oil barrels and associated bunded trays have been removed, this store is decommissioned in line with the above.

De-sludging of Septic Tanks: The septic tank at the bog will be desludged by a licenced contractor. All sludge material will be transported off-site for treatment and disposal at an appropriately licenced facility.

Bog area clean up: These bog areas include the parking spaces for production plant and equipment, locations for storing rail line, drainage pipes and stockpile covering. All remaining or unconsolidated old and unused polythene will be collected for recycling or disposal, depending on condition. Any remaining older and immobile plant will be brought in from bog and removed off site. Any remaining hazardous waste oils, fluids and batteries will be removed off site by qualified appropriate hazardous waste contractors. All remaining unused drainage pipes will be

gathered up for reuse, recycling or disposal. All remaining, unconsolidated unused rail line sections will be collected from the bog and stored at the main access location for dismantling.

#### 2.4.3.3 Standard Methodology for Rehabilitation Activities

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

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

- Experience of 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (Clarke, 2010; Bord na Móna, 2016)
- Significant international engagement during this period with other counties in relation to best-practise regarding peatland rehabilitation and after-use through the International Peat Society and the Society for Ecological Restoration (Joosten & Clarke, 2002; Clarke & Rieley, 2010; Gann *et al*., 2019)
- Consultation and engagement with internal and external stakeholders
- GIS Mapping
- BNM drainage surveys
- Bog topography and LIDAR data:
- Hydrological modelling
- The development of a **Methodology Paper (draft) outlining the proposed Scheme (PCAS)**. The rehabilitation plan (provided as Appendix B to this report) 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**.
- **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 Bog Group Integrated Pollution Control Licence
- Blackwater Bog Group Annual Environmental Reports

- Review of the National Biodiversity Data Centre (NBDC) webmapper
- Inland Fisheries Ireland (IFI) Reports
- Environmental Protection Agency database (www.epa.ie)
- EPA Guidance on Requests for Alterations to a Licensed Industrial or Waste Activity
- BirdWatch Ireland online data (including I-WeBS and CBS datasets; www.birdwatchireland.ie)
- Geological Survey of Ireland - National Draft Bedrock Aquifer map
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie)
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie)
- Water Framework Directive catchments.ie/maps/ Map Viewer (www.catchments.ie)
- OPW Indicative Flood Maps (www.floodmaps.ie)
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie)
- River Basin Management Plan for Ireland 2018 – 2021
- Bord na Móna Annual Report 2020
- Spatial data in respect of Article 17 reporting, available online at https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17

See the Rehabilitation plan included as Appendix B

- **Consultation**

A number of stakeholders were identified and contacted during the rehabilitation planning process for their views. See Appendix B.

- **Field Surveys**

See Section 1.1.1 above for an overview of the field surveys completed at Castlegar Bog that are used to inform the screening and Natura Impact Statement reporting for PCAS at Castlegar Bog.

Rehabilitation Packages

The key interventions to be applied for the restoration/rehabilitation of Castlegar Bog is re-wetting peat to encourage natural colonisation of typical vegetation and the development of *Sphagnum*-rich peat-forming vegetation communities. This requires managing water-levels close to the surface of the peat for most of the year (100mm ± 50mm). Several different approaches can be taken to this type of restoration/rehabilitation, and 12 rehabilitation prescriptions with different rehabilitation/restoration intensities to implement the PCAS at Castlegar Bog are proposed (see Table 2 which lists the rehabilitation prescriptions that will be implemented at Castlegar Bog):

**Table 2: Rehabilitation Categories**

| Type | 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 (max 7/100 m) + blocking outfalls and managing overflows |
| | DPT3 | More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows |
| | DPT4 | Berms and field re-profiling (45m x 60m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation |
| | DPT5 | Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation |
| | DCT2 | Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment |
| Marginal land | MLT1 | No work required |
| | MLT2 | More intensive drain blocking (max 7/100 m) |
| Riparian | | Measures to promote the formation of a natural riparian corridor along the route of the previously piped EPA blue line feature, such as blocking culverts/outfalls & raising pipes. |
| **Other** | | Silt-ponds |
| | | Constraints |
| | | Archaeology constraints |

The constituent methodologies which combine to form each respective rehabilitation package are further described below, namely:

1. Regular Drain Blocking (3/100m) (Speed Bump method using Dozer– DPT1 and DCT2)
2. Intensive Drain Blocking (max 7/100m) (Excavator -DPT2, DPT 3 and MLT2)
3. Modifying Outfalls (DPT1, DPT2, DPT3, DPT4, DPT5, DCT2, Riparian)
4. Managing Water levels (Overflow pipes/raised pipe culverts/blocking outfalls)
5. Field Reprofiling (DPT3 variations and variant on DPT4)
6. Berms and field reprofiling (45m x 60m cell) (Variant on DPT4)
7. Drainage channels
8. Cut and fill cell bunding (30m x 30m cell) (DPT5)
9. Sphagnum Inoculation (DPT4 and DPT5)

In addition, PCAS activities will include:

10. Riparian Measures
11. Silt Pond Cleaning
12. Retention of Hydraulic Breaks (DMP measure)

A suite of methodology drawings is further provided as Appendix D and should be read in conjunction with the following text.

1. Regular Drain Blocking (3/100m)

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement through the bog. 'Speed Bumps' allow for peat subsidence and to prevent water from flowing over the drain block and eroding it before it becomes stabilised.

Phase 1 begins with the creation of a 'key' on either side of the drain. The dozer cuts down and pushes out peat 0.5-1m from the edge of the drain, with an equivalent section on the other side of the drain.

The next step comprises forming the 'Speed Bump' itself. A strip of peat is taken from the central camber of the field, pushed into the drain and keyed area and compacted by a bull-dozer tracking over the drain block, to form an approximately 5m Wide 'Speed Bump'.

Fields are then completed with Speed Bumps (at an approximate ratio of 3 Per 100m). Speed bumps are profiled to ensure that the overall field profile is lower in the centre and higher over the drain blocks.

See Methodology Drawing PCAS-0100-001/ PCAS-0100-008 in Appendix D provides further details on the approach to peat blockages. Figure 7 indicates the locations where drain blocks will be provided.

2. Intensive Drain Blocking (max 7/100m)

Before building of dams, the sides and bottom of the ditch is cleaned using the excavator to remove dry degraded peat, to ensure a good peat-to-peat contact. If any vegetation is present, it is carefully removed and left aside for replacement at the end of the process.

A 'key' is then cut in either side of the drain approximately 500mm deep, and it is ensured that the width is wider than the actual drain. Approximately 500mm depth of peat is removed from the bottom of the drain also and placed behind the machine for replacement later.

An area is opened behind the machine to be used as a borrow pit. Using the surface layer of peat (i.e. the top 100-200mm) is avoided, as it is likely to be very permeable. Only the deeper, more compacted peat is used to build the dam. (again, if any vegetation is present, it is carefully removed and left aside for replacement at the end of the process).

Peat is then dug out from the borrow pit and placed into the drain compacting it in 300mm layers. The peat is compacted firmly using the excavator bucket before laying more peat from the borrow pit.

The dam is built up to a height at least 300mm-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries. Any vegetation taken in step 1 or step 3 is then placed on the top of the dam, to help bind and stabilise the drain block.)

The borrow pit is backfilled with the peat extracted from the bottom of the drain in step 2. The sides of the peat borrow hole are firmly pressed with the excavator bucket to grade the sides of the borrow pit.

This enhanced measure's main objective is to block drains with peat dams to raise water levels, re-wetting peat and slowing water movements through the bog. See Methodology Drawing PCAS-0100-002 in Appendix D. Figure 7 indicates the locations where drain blocks will be provided.

3 Modifying Outfalls and management of Water levels

The key objective from targeted blocking of outfalls within a bog is to re-wet peat but to manage water-levels at an appropriate level for the development of wetland and peatland vegetation. This measure optimises re-wetting of cutaway. This measure also has additional benefits of reducing fluvial carbon loss (via water) and also improving water quality leaving the site by reducing emissions of silt and ammonia.

Targeted blocking of outfalls is suitable for bogs or portions of bogs that have already had a period of natural colonisation, minimising disturbance to pioneer habitats that are already developing. It is also appropriate for locations where there is establishing habitats and where former drainage infrastructure is already starting to break down. Hydrological modelling and an understanding of site drainage is required to identify appropriate locations for targeted drain-blocking to maximise re-wetting. Drains are blocked at these locations using an excavator by lifting pipes and filling holes with peat or local sub-soils.

A description of a number of techniques in respect of outfall modification and management of water levels follows. Some, such as blocking of outfalls, are applicable across multiple rehabilitation prescriptions, whilst techniques such as the cutting of 'taps' are more applicable to those bogs which are subject to periodic inundation e.g. through rainfall or flooding and where water needs to be diverted from one part of the bog to another by way of management, or to create wetland areas.

The cutting of what is colloquially called a 'tap' in a high (production) field is described first. This is effectively a method for diverting standing water from one side of a high field to another, to manage the water level in both fields and eventually direct excess surface water towards an outfall. The blocking of outfalls is a measure to prevent water discharge from a bog through a pre-existing pathway or drainage feature, whilst the raising of pipes works similarly to produce

water flow at a higher invert level, within specified areas of the pre-existing drainage network. Both of these measures are essential to the management of water levels.

**'V' Tap Across High Field To Control Water Levels**

An excavator is used to Create a 'V'-Shaped Tap across a high field to allow water pass from a field with water to a field with little or none. The excavator approaches the proposed 'tap' location along the surface of the high field. It then proceeds to excavate a V-shaped trench or drain to the desired depth to permit water to flow between the fields to either side.

**Blocking of Outfall**

An Excavator is used to form a key on either side of the drain which forms the outfall from the bog or field. A strip of peat is taken from the centre of the adjacent field, pushed into the drain and compacted by the bull-dozer tracking over the drain block from the opposite side of the drain to the excavator. The approximate width of the block is 3-5 times the width of the drain. Blocks have to be wide enough to prevent water moving around the blockage and to prevent further leakage when the block subsides. Where possible and available, vegetation is used to cover the peat forming the outfall blockage. This measure is strongly linked with the next in respect of water level management.

**Raise Piped Culverts to control water levels**

The first step is to block the existing drain where the pipe exits to stop flows. A new transverse field drain and pipe is then placed above the route of the previously blocked and now redundant pipe, to a specified invert level. The drain holding the new, raised pipe, is filled in using an excavator or bulldozer as appropriate. See Methodology Drawing PCAS-0100-014, Appendix D.

**Managing water levels with overflow pipes**

This prescription is associated strongly with the blocking of outfalls. Following the blocking of outfalls, some high fields may require overflow pipes to be installed to manage water levels at the required height above peat surface and/or in instances where a series of high fields have been flooded using the cascade effect, the lowermost field may require the outfall to be piped and managed to facilitate access for example. Overflow pipes will typically be new, 100mm plastic pipes. Overflow pipes are installed using an excavator.

**Plate 1: Examples of installed overflow pipes**

4. Field Reprofiling

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth. Field re-profiling is developed as a technique to slow the surface water loss from the bog and to retain as much water as possible on the bog, at the required depth.

Field Reprofiling is described as a number of separate variations for Deep Peat measures DPT3A, DPT3B, DPT4A.

**DPT 3A**

This variation of the process, which uses a bull-dozer, can be described as a number of distinct phases.

Phase 1: Re-Profiling of Field Surface

The field is re-profiled using a bull-dozer making a total of 16 passes, with 8 passes up and 8 passes down the length of the former production field, flattening the camber in the centre.

Phase 2: Peat Dam Drain Blocking

Drain blocks are constructed using an excavator operating at a perpendicular direction to the field drains.

Initially, a key is cut in the drain approximately 500mm deep, ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.

An area behind the machine, within reach of the excavator arm, is selected is to be used as a borrow pit. Turf and degraded peat is removed from the surface. This material is placed close by to be used as cover later.

'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket, to form the drain block. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit. The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.

The borrow pit is then back filled with the peat extracted from the bottom of the drain. The sides of the borrow pit are pressed down and graded with the excavator bucket. (If any vegetation present, it is carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.)

The process is then repeated until there is a complete Shallow Field Profile with Regular Drain Blocks along adjacent field drains.

See Methodology Drawing PCAS-0100-003.

**DPT 3B**

This variation of the process, which uses a 'screw-leveller' can be described as a number of distinct phases.

Phase 1: Re-Profiling of Field Surface

The production field is re-profiled using a screw-leveller to remove the high central camber and deposit the peat on the lower-lying edges of the same production field.

The Screw-Leveller is towed using a tractor, with a level axis, and will run up one side of the production field and down the other side sufficiently offset from drain to ensure the peat does not enter the drain but forms a mound beside the drain, as the screw leveller passes.

Phase 2: Levelling of Loose Peat

Next a Bull-dozer will run up one edge side 1 of the production field and down the other side 2 flattening the loose peat mounds, ensuring a minimal amount of peat enters the drains.

Phase 3: Peat Dam Drain Blocking

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.

A 'key' is cut in the drain approximately 500mm deep, ensuring that it is wider than the actual drain. 500mm of peat is removed from the bottom of the drain and placed behind the machine for replacement later.

An area behind the machine, within reach of the excavator arm, is selected is to be used as a borrow pit. Turf and degraded peat is removed from the surface. This material is placed close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket, to form the drain block. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit. The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.

The borrow pit is then back filled with the peat extracted from the bottom of the drain. The sides of the borrow pit are pressed down and graded with the excavator bucket. (If any vegetation present, it is carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.

The process is then repeated until there is a complete Shallow Field Profile with Regular Drain Blocks along adjacent field drains.

See Methodology Drawing PCAS-0100-004.

**DPT4A**

This variation of the process, which uses a screw-leveller and bulldozer, can be described as a number of distinct phases.

Phase 1: Re-Profiling of Field Surface

The first operation in the re-profiling process begins with using a Screw-Leveller to remove the high central camber from individual production fields and deposit the peat on the lower-lying edges of the same production field. The Screw-Leveller, with a level axis, will run up the first side of the production field and down the other side close to the edge of the drain, resulting in some of the peat being tipped into the drain.

Phase 2: Infilling of Drains

Next the Bull-dozer will run up the first side of the production field and down the other side with the front blade at an angle placing the peat in the drain.

Phase 3: Final Levelling of Drains & Field

Next the Bull-dozer will track over the first of the infilled drains and then back down the other drain compacting and levelling the peat. It will also make a pass down the middle of field flattening any peat mounds left between Screw Leveller and Bulldozer runs.

Phase 4: Drain Blocking

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains. A key is cut in the drain approximately 500mm deep ensuring that it is wider than the actual drain. A 500mm depth of peat is removed from bottom of drain also and placed behind the machine for replacement later.

An area behind the machine, within reach of the excavator arm, is selected is to be used as a borrow pit. Turf and degraded peat is removed from the surface. This material is placed close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket, to form the drain block. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit. The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.

The borrow pit is then back filled with the peat extracted from the bottom of the drain. The sides of the borrow pit are pressed down and graded with the excavator bucket. (If any vegetation present, it is carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.

Phase 5: Cross Berm

Next the Bull-dozer is used to form peat transverse (i.e. across the production field, and perpendicular to the drain on either side) Cross Berms approximately 5.0m wide x 300mm high at given centres along the length of the production field. This reduces sheet flow of water.

See Methodology Drawing PCAS-0100-005.

Methodology drawings are included as Appendix D. Figure 7 shows the location of drain blocks and cross berms.

5. Berms and field reprofiling (45m x 60m cell – variant on DPT 4)

This measure seeks to create large flat areas or cells of shallow water on bare peat, across multiple fields that are enclosed by shallow berms to retain shallow surface water. The creation of cells will help retain surface water, keeping peat wet and will further slow water movement through the cutaway.

Phase 1: Drain Blocking and Re-Profiling of Fields Surface

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains. A key is cut in the drain approximately 500mm deep ensuring that it is wider than the actual drain. A 500mm depth of peat is removed from bottom of drain also and placed behind the machine for replacement later.

An area behind the machine, within reach of the excavator arm, is selected is to be used as a borrow pit. Turf and degraded peat is removed from the surface. This material is placed close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket, to form the drain block. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit. The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.

The borrow pit is then back filled with the peat extracted from the bottom of the drain. The sides of the borrow pit are pressed down and graded with the excavator bucket. (If any vegetation present, it is carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.

The centre of the cambered field is used as one side of the cell. A bulldozer is used to level and flatten the base of the cell and to infill the drains by removing the camber from the fields. Laser levels are mounted on bull-dozers to allow the machine drivers to move peat and create flat surfaces to the appropriate levels.

Phase 2: Formation of Surface Berms and Levelling Base of Cells

Berms are formed 45m in length and 60m across 4 fields to create an enclosed cell. The berms are relatively shallow (300mm high) and are 5.0 m wide.

The berms are constructed using a bull-dozer pushing the peat obtained from the original field camber to form mounds. The mounds of loose peat are then levelled and compacted using the machine's tracks to ensure that the berm retains shallow water in the cell. The top surface level of the berms is constructed with a high level of accuracy.

Phase 3: Final Profile

Drainage pipes are incorporated into the berm construction at specific locations to manage overflows and prevent berm erosion.

See Methodology Drawing PCAS-0100-006 provided in Appendix D. Figure 7 indicates the locations where cells will be created.

6. Drainage channels

New drainage channels are appropriate to help manage larger volumes of water at large sites during high rainfall events. The main objective is not to drain any residual peat but to manage excess water and prevent significant flooding.

At some Bord na Móna sites, once drains and pipes are blocked water can rise to inappropriate levels due to the localised topography (basins). Permanent deeper water can inhibit the development of wetland or peatland vegetation and large open bodies of water are not encouraged, where possible. At Castlegar bog an existing drainage flow path is proposed to be retained through the bog as a recommended measure to maintain conveyance of water inflowing to Castlegar which might otherwise back up and flood upstream, neighbouring lands. This will require upgrading using an excavator. Figure 7 shows the location of this drain.

7. Cut and fill cell bunding (30m x 30m cell)

This is an intensive engineering approach to peatland rehabilitation that looks to modify the topography substantially to optimise suitable hydrological conditions for the development of peat-forming communities. It will also have additional benefits of reducing fluvial carbon loss (via water) and also improving water quality leaving the site by reducing emissions of silt and ammonia.

The cut and fill cell bunding approach aims to create 'saucers' or flat bunded areas (cells) on peat with berms to hold shallow water at appropriate levels. Each cell is approximately 30 x 30 m and laser levels will be used on excavators and bulldozers to aid the construction of flat cells surrounded by slightly convex berms. As cells are constructed production field drains will be infilled with peat. Cells will be sized relatively small to prevent wave erosion affecting the development of moss growth.

Phase 1: Drain Blocking and Re-Profiling of Fields Surface

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains. A key is cut in the drain approximately 500mm deep ensuring that it is wider than the actual drain. A 500mm depth of peat is removed from bottom of drain also and placed behind the machine for replacement later.

An area behind the machine, within reach of the excavator arm, is selected is to be used as a borrow pit. Turf and degraded peat is removed from the surface. This material is placed close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket, to form the drain block. The peat is firmly compacted using the

machine bucket before laying more peat from the borrow pit. The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.

The borrow pit is then back filled with the peat extracted from the bottom of the drain. The sides of the borrow pit are pressed down and graded with the excavator bucket. (If any vegetation present, it is carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.

The centre of the cambered field is used as one side of the cell. A bulldozer is used to level and flatten the base of the cell and to infill the drains by removing the camber from the fields. Laser levels are mounted on bull-dozers to allow the machine drivers to move peat and create flat surfaces to the appropriate levels.

Phase 2: Formation of Surface Berms and Levelling Base of Cells
Berms are formed 30m in length and 30m across 3 fields to create an enclosed cell. The berms are relatively shallow (300mm high) and are 5.0 m wide.
The berms are constructed using a bull-dozer pushing the peat obtained from the original field camber to form mounds. The mounds of loose peat are then levelled and compacted using the machine's tracks to ensure that the berm retains shallow water in the cell. The top surface level of the berms is constructed with a high level of accuracy.

Phase 3**:** Final Profile
Drainage pipes are incorporated into the berm construction at specific locations to manage overflows and prevent berm erosion.

See Methodology Drawing PCAS-0100-007. Figure 7 indicates the locations of proposed cells.

8. *Sphagnum* Inoculation

The main objective of this enhanced rehabilitation intervention is to accelerate the rate of natural colonisation of Sphagnum moss at suitable sites by introducing donor material. The presence of Sphagnum-rich vegetation on peatlands brings significant benefits as this is considered a potential carbon sink.

There is potential to use Sphagnum inoculation to establish and diversify selected small areas on target sites with Sphagnum species, which in turn, and in combination with natural colonisation, can then naturally colonise the remaining deep peat cutover bog area. Sphagnum inoculation should only be used in appropriate environmental conditions (water-logged, deep peat with stable water levels and with more acidic water chemistry).

It is proposed to use locally sourced Sphagnum and procured donor material, sourced from older established Bord na Móna cutover bog sites where possible, to inoculate Bord na Móna deep peat cutover bogs. Small amounts (handfuls) will be distributed into the newly created cells on deep peat cutover bog. This material can be planted into the soft peat or scattered into shallow water. The use of significant volumes of Sphagnum donor material is constrained by the small amount of suitable donor material and donor sites. It is also proposed to use Sphagnum donor material developed in greenhouses (e.g. Beadaplugs), where suitable donor material can be made available, and where this is required.

There are significant benefits for climate action from establishing Sphagnum-rich peatland vegetation communities. These have been found to quickly develop as carbon sinks (> 10 year). This enhanced measure will be used in combination with some of the other enhanced re-wetting measures (cut and fill cell bunding) to accelerate and optimise the development of Sphagnum-rich vegetation on suitable deep peat cutaway sites.

9. Riparian Measure

There is a Riparian measure proposed at Castlegar which involves the blocking of an existing culvert that runs from the West to the East of the bog (containing an EPA blue line watercourse) which will be replaced with an open drain that will create a preferential surface water drainage path through the bog along the same line as the old culvert, this will be developed and maintained such that surface water flows can drain freely through the new drain and will be profiled towards the natural low point such that the runoff regime mimics the pre-drainage state. The creation of this new open drain allows the cells to connect into and establish the flow path to the discharge point.

10. Silt pond Cleaning

The cleaning procedure for Silt Ponds is as follows:

- If the silt pond system has a by-pass channel or a stand-by pond, then the drainage is diverted through these. If not, then the inlet to the pond is blocked or the supply pump switched off for the duration of the cleaning.
- If the outlet from the pond has a weir then the level is lowered to de-water the silt. If not, then the outlet pipe is blocked for the duration of the cleaning.
- The pond is cleaned from the inlet to the outlet either from one side, if the width allows or from both sides, if not.
- The silt is deposited as far back from the silt pond as possible with the excavator, or additionally with the aid of a dozer if space is limited.
- If necessary, a peat bund is left between the pond and the excavated silt to retain liquid sludge from flowing back into the pond.
- When the pond has been cleaned, the inlet is opened and the pond allowed to fill before lowering the outlet weir.

- If the drainage was diverted during the maintenance, then it is redirected back into the pond.
- Once cleaned, the date is entered on to the inspection log.

11. Retention of Hydraulic Breaks

To sustain hydrological continuity through the margins of the proposed rehabilitation and decommissioning site and to avoid flooding of adjacent lands, it is proposed to retain/create certain key hydraulic breaks (drains) along the margins of the bog site. These works will be completed to retain peripheral surface water drainage around the margins of the bog rehabilitation sites allowing hydrological flow from lands upstream of the site to areas downstream of the rehabilitation site. These works may require localised instream excavation, widening and regrading of existing drains with tracked excavators, and the removal of debris.

A breakdown of the extent of the rehabilitation prescriptions proposed at Castlegar Bog is provided in Table 3, below. See also Figure 6.

**Table 3 Extent of Rehabilitation proposed at Castlegar Bog.**

| **Deep Peat Cutover Bog** | | **Extent (Ha)** |
|---|---|---|
| DPT1 | Regular drain blocking (3/100 m) & blocking outfalls & managing water levels with overflow pipes | 22.4 |
| DPT2 | More intensive drain blocking (7/100 m) & blocking outfalls & managing overflows | 54.9 |
| DPT3 | More intensive drain blocking (7/100 m) & field reprofiling & blocking outfalls and managing overflows & Sphagnum inoculation | 68.3 |
| DPT4 | Berms and field re-profiling (45m x 60m cell) & blocking outfalls and managing overflows & drainage channels for excess water & Sphagnum inoculation | 92.9 |
| DPT5 | Cut and Fill cell bunding (30m x 30m cell) & blocking outfalls and managing overflows & drainage channels for excess water & Sphagnum inoculation | 61.7 |
| **Dry Cutaway** | | |
| DCT2 | Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment | 12.2 |
| **Marginal Land** | | |
| MLT1 | No works required | 65.7 |
| MLT2 | More intensive drain blocking (7/100 m) | 1.2 |
| **Other** | | |
| | Silt Ponds | 8.5 |

| Deep Peat Cutover Bog | | Extent (Ha) |
|---|---|---|
| | Riparian | 8.3 |
| | Archaeology | 3.3 |
| | Constraint | 3.9 |

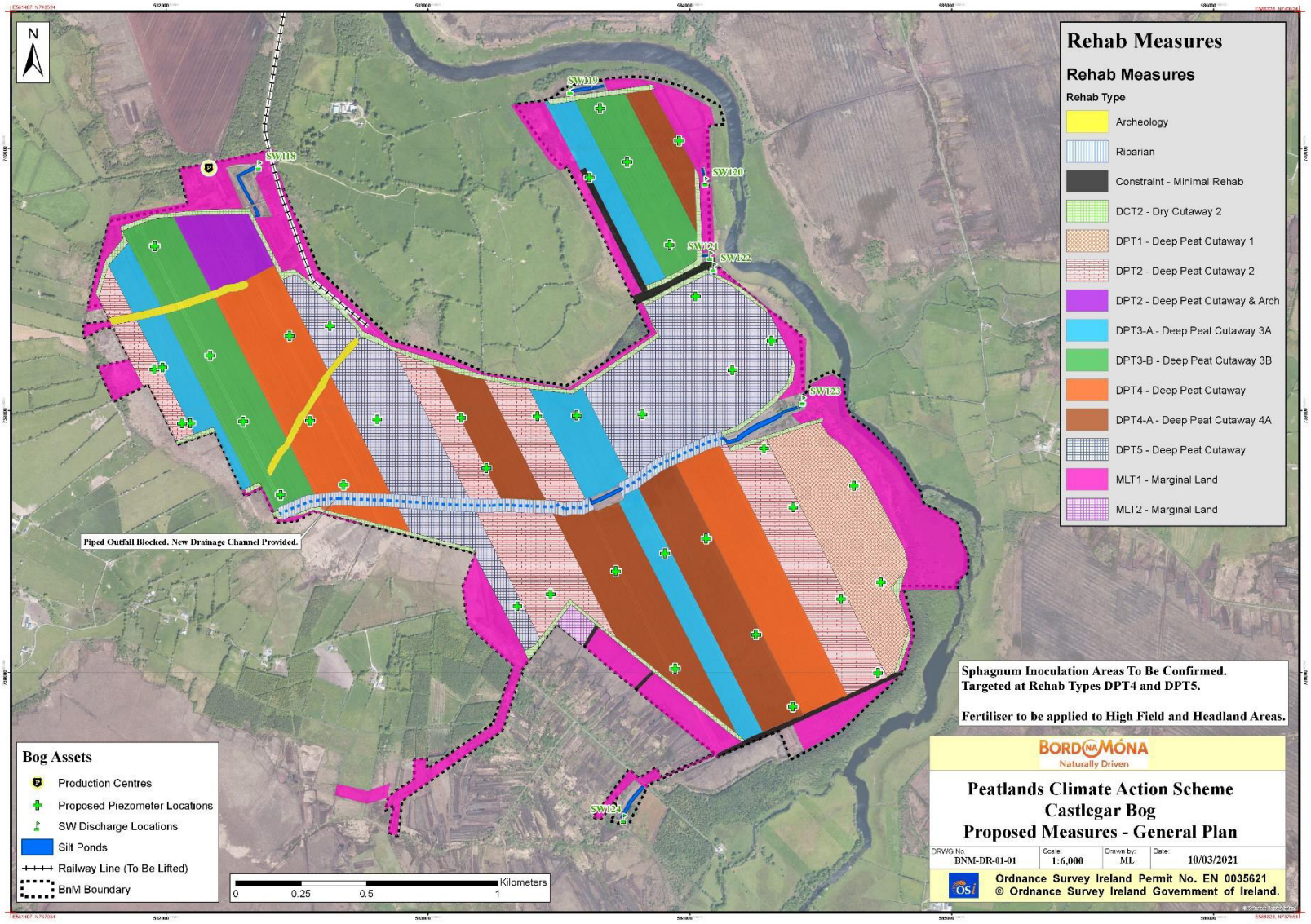



**Figure 6: Proposed Enhanced (PCAS) Rehabilitation Plan**

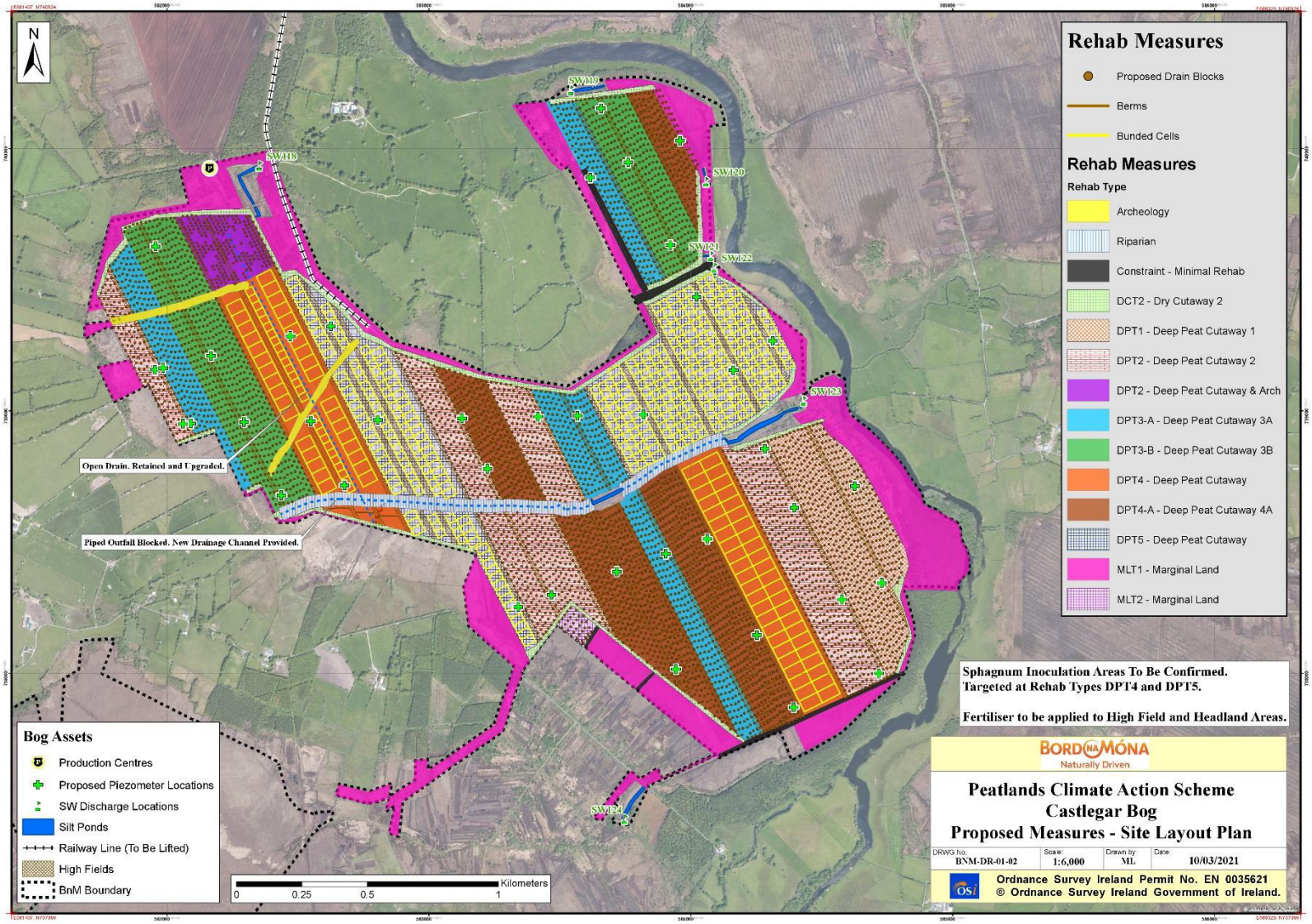



**Figure 7: Proposed Enhanced (PCAS) Detailed Rehabilitation Plan**

#### 2.4.3.4 Decommissioning and Rehabilitation Timescale and Resource Requirements

Duration

**Decommissioning** activities will be completed within a period of 12 months and are scheduled to be completed before the end of 2021.

**Rehabilitation** activities will be completed within a period of approximately 7 months. In general activities will be carried out between the months of April and October inclusive.

The duration of activities provided are approximate and may be slightly shorter or longer, depending on weather conditions and progress on rehabilitation prescriptions. Activities may cease for the winter months due to rainfall and poor ground conditions. In any case, the rehabilitation period will not be longer than 1 year.

##### 2.4.3.4.1 Hours of Work

Normal Decommissioning and Rehabilitation times will be daylight hours between 08.00 and 17.30hrs Monday to Friday.

#### 2.4.3.5 Use of Natural Resources

**Land Requirement:** There is no land requirement in respect of **decommissioning**. In total **rehabilitation** activities will take place on 280.8 hectares of land (note 121.2 hectares that will be treated as MLT1 will not require any rehabilitation activities. As rehabilitation through stabilisation and land cover change is the primary objective, no 'negative quality' land take is associated with Rehabilitation. No land take is required for e.g. the storage of vehicles – vehicles are typically left in situ at points of work or on 'headlands'.

**Water:** No additional water is required for either decommissioning or rehabilitation.

**Soils/Peat:**

Regarding **decommissioning** some peat or topsoil material which is contaminated may be removed in line with Schedule 2 of the IPC license. This is considered negligible in magnitude.

During **rehabilitation**, minor quantities of existing peat will be excavated from drainage trenches and/or an immediately adjacent borrow pit at peat block locations and immediately used to form peat blocks. Borrow pits are re-instated, as the final step in block creation, by the excavator driver profiling the surrounding peat/scraw into place over the excavated borrow pit. In each instance the magnitude of extracted peat is negligible. Similarly, the installation of overflow pipes may require excavation of minor quantities of peat, and/or subsoil dependant on location (Insertion of peat blockages/overflow pipes may interact with underlying subsoils where peat depths are shallow). All material used will be from the immediate vicinity and no transport of material will be required.

Existing bare peat surfaces will be re-profiled in line with pre-defined 'levels' where required to 'rewet' areas of currently dry peat. This may be through use of a dozer or a screw leveller. Dozers will be used to create 'speed bumps' or blocks across existing drainage channels adjacent to re-profiled areas, by 'dozing' peat displaced in re-profiling into place at pre-defined block locations. Dozers may also be used to infill drains with peat displaced by screw levelling. For any prescriptions such as the creation of bunded 'cells', certain fields will be re-profiled into a succession of tiered cells with separating bunds or blocks; in some instances, these may be 'keyed', to avoid sub-surface water flow, and ensure cells retain the target depth of water.

Peat will also be utilised to infill any blocked outfalls or raised drainage pipes.

**Hydrocarbons** will be used on-site during decommissioning and rehabilitation activities and will be limited to the diesel or petrol fuel and mechanical oils used by any onsite site machinery and equipment.

#### 2.4.3.6 Emissions & Wastes during Rehabilitation

**Dust, Noise, Vibration:** Dust, noise and localised vibration along access routes arising from the arrival and departure of **decommissioning** vehicles or **rehabilitation** machinery will be localised to the access tracks or rail line, occur in low volumes and last for a negligible duration – it is common practice on BnM working bogs to leave vehicles *in situ* once on site, therefore daily trips into and out of the bog are not expected. Dust and noise limits are currently set on IPC licenses.

Regarding rehabilitation, the extent of dust, noise and localised vibration from individual machines creating peat blocks to block drains or blocking outfalls is momentary in duration and therefore considered negligible in magnitude. Reprofiling the surfaces of exposed peat using a 'dozer' or 'screw leveller' and creating 'speed bump' blockages or infilling drains produces a higher potential for the release of dust in drier periods, however the duration of this is expected to be brief (i.e. with effects lasting less than a day). Enhanced measures where bunded cells are created may take longer duration.
Durations overall are expected over a 12-month period at Castlegar Bog or until rehabilitation is complete.

Fuel and some pipes may require to be delivered. No blasting or piling is required.

**Wastes:** General waste will arise from the presence of staff. Very small quantities of chemical waste will be generated, this waste is limited to solid waste oil, such as oily rags.

**Welfare Facilities:** Welfare facilities are available at Castlegar Bog in the form of an existing tea centre. Portaloos will be provided for site operatives during decommissioning and rehabilitation

works. All wastewater generated at portaloos will be held within the portaloos tanks and will be regularly serviced by a licenced contractor. All wastewater from the portaloos will be collected from the site and treated and disposed of at a suitably licenced facility.

2.4.4 Operational Stage

**Duration:** Once constructed and commissioned, the proposed Decommissioning and Rehabilitation will remain permanently in place.

**Operational Activities:** Operational activities will mainly comprise non-intrusive environmental & ecological monitoring (including surface water monitoring, vegetation monitoring but also the use of drones to provide catalogues of aerial photography), and may also include minimal works such as repairs to existing peat blockages, adjustment of overflow pipes (where required) and or fertilisation to increase successional rates. Maintenance of existing silt ponds to reduce emissions to local water bodies, as conditioned by the existing IPC license, will still be required. Monitoring of adjacent land will be undertaken during the operation phase and where required boundary drain maintenance and upgrades may be required beside low and moderate vulnerability land as identified in the Castlegar Bog Drainage Management Plan (RPS, 2021)

**Operational Access:** Operational access will be through the Castlegar Bog, where existing infrastructure is already in place via access tracks to facilitate the previous peat extraction.

**Timing of Operational Activities**: It is expected that scheduled inspection and maintenance activities will be carried out by a 2-4 person team, typically for 1 day per month, for the foreseeable future.

**Use of Natural Resources:** During the Operational Stage, there is limited requirement for the use of natural resources – negligible quantities of peat or subsoil may be used to repair existing or create additional drain blocks.

**Emissions & Wastes:** During the Operation Stage of Rehabilitation there will be negligible exhaust fumes, dust and noise emitted by maintenance vehicles and or other equipment such as drones during occasional maintenance works, such as to outflows.

Fugitive emissions to air

Collectively, ceasing industrial peat production, re-wetting and re-vegetating will minimise any risk of emission to air from dust. During the operational stage of Peatland Rehabilitation, typical emission of dust from exposed peat to air is expected to cease.

Carbon Emissions

Following rehabilitation and into the early operational stage Castlegar Bog may continue to be a carbon source, however as habitats stabilise following intervention, the bog is expected to, over time, become a carbon sink in part.

2.4.5 Other Projects and Plans with Potential to Cause In-Combination Effects

The location of the proposed Castlegar Bog decommissioning and rehabilitation does not overlap the footprint of any other existing projects or plans.

Other bogs within the larger Bog Group will also be subject to both decommissioning and rehabilitation to meet IPC license conditions. This has the potential to result in in-combination effects from the release of hydrocarbons, emissions to air and water.

Peat extraction through turbary occurs around the margins of Castlegar Bog and at other locations within 15km. This has the potential to result in in-combination effects from the release of hydrocarbons, emissions to air and water, and through modification to drainage regimes.

A planned solar farm has been consented and a subsequent application for an amendment to include a battery storage facility has also recently been consented at Rooaun, Co. Galway, approximately 5km to the south of Castlegar Bog.

A planning search of the National Planning Database found a number of proposed or consented developments within the vicinity of Castlegar Bog, including private dwellings or amendments to private dwellings, 2 no. applications in respect of forestry entrances to the south of Castlegar Bog in Addergoole North, and a number of agricultural led planning applications such has for slatted sheds/ amendments to existing farm infrastructure etc.

There are 2 no. local authority jurisdictions within 15km of Castlegar Bog (Roscommon County Council and Galway County Council). Both have County Development Plans and/or plans relating to Heritage and Biodiversity.

There is a current ongoing NPWS Raised Bog Restoration Project which is being implemented on a national scale at raised bog SACs. However no such SACs occur within the River Suck sub-catchment in which Castlegar Bog is located.

**2.4.5.1 Other BnM Bog Group Decommissioning and Rehabilitation**

Other BnM bogs within the larger Blackwater group will also be subject to decommissioning and rehabilitation to meet the various, pertinent, IPC license conditions, however, currently, the only known temporal overlap between these proposed activities elsewhere in the Blackwater group is at Belmont Bog; Derries Bog and Boora Bog, which are 23km, 34km and 35km to the

southeast of Castlegar Bog. The construction phase of decommissioning and rehabilitation at this bog may overlap with decommissioning and rehabilitation activities at the above three bogs. These three bogs are located within the River Shannon catchment and all three along with Castlegar Bog share connectivity to the Middle Shannon Callows SAC and SPA downstream.

The Operational stage of Castlegar Bog Decommissioning and Rehabilitation will overlap the Rehabilitation stage of other bogs within the Blackwater group however the expected magnitude of any effects from Castlegar Bog at this lifecycle stage are evaluated as insufficient to result in in-combination effects. The possibility of likely significant in-combination effects can reasonably be excluded on this basis.

The decommissioning and rehabilitation of any other bogs within the greater Blackwater Group will be subject to Appropriate Assessment and it is assumed the requisite mitigation will be in place should the potential for any adverse effects on European site integrity be identified as part of the Appropriate Assessment process. This should also identify the potential for any sequential in-combination pathways, in particular should temporal overlap exist.

#### 2.4.5.2 Turbary

Private turbary exists at Castlegar Bog where a limited area (7 plots comprising ca.3ha in total) is subject to licensed peat extraction annually. Licensed turbary occurs at various locations within 15km of Castlegar Bog, including several locations where the pathways for downstream in-combination effects on European Sites may exist, primarily via drainage to EPA blue line watercourses to facilitate turbary. Based upon a review of aerial imagery against the extent of licenced turbary occurring in the vicinity of Castlegar Bog it is likely that authorised private turbary also exists in the vicinity of the area of Castlegar Bog that is subject to the PCAS.

#### 2.4.5.3 Agricultural Activity

Given the proximity of Castlegar Bog to the River Suck, there is potential for agricultural activities and their respective emissions to air (noise as a source of disturbance) and water (sediment, runoff, deleterious materials) to combine with source effects from decommissioning and rehabilitation at Castlegar Bog. Most of these activities are not subject to Appropriate Assessment, and form part of the existing baseline environment.

#### 2.4.5.4 Local Authority Development Plans

The following development plans have been identified:

- Roscommon County Development Plan 2021 – 2027
- County Roscommon heritage Plan 2017-2021
- Galway County Development Plan 2015-2021
- Galway County Biodiversity and Heritage Plan 2017-2022

It is assumed that the above, or any other plans including those currently at draft status, will be subject to the requirement for Appropriate Assessment which can reasonably be assumed to provide mitigation to avoid adverse effects on European Sites.

#### 2.4.5.5 Proposed Solar Farm at Rooaun, Co. Galway

A solar farm comprising 31,069.69 sq. m of solar panels on ground mounted frames, 2 no. electrical control buildings, 2 no. inverter cabins, a temporary construction area and ancillary facilities, boundary security fence, a site entrance and access track, CCTV security system, and all associated works in the townland of Rooaun, has been consented by Galway County Council. The available planning information outlines mitigation which will be in place to avoid secondary effects such as adherence with a construction and environmental management plan (CEMP), good site practice around storage of oils, wastes and other potentially damaging materials, a fuel management plan, a sediment and erosion control plan, best practice culvert design and a regular programme of environmental auditing and monitoring of the constructed drainage and attenuation structures and drainage crossings to ensure attenuation performance to regulatory standards at the site. The application site is upstream of the River Suck Callows SPA but is described as 'not likely to be regularly used by SPA birds'. The planners report available online concludes that the development, by itself or in combination with other plans or projects, would not be likely to have a significant effect on any European Sites. Consent has been granted subject to the implementation of the above mitigation measures.

#### 2.4.5.6 Proposed Battery Storage Facility at Rooaun, Co. Galway

In April of 2020, Galway County Council granted permission for a modification/optimisation of the previously described, permitted solar array development to include the provision of an ancillary battery energy storage facility with a capacity of up to 10MW and all associated site works. The planners report available online includes an Appropriate Assessment by the Competent Authority that concludes that the proposed development, by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European Sites(s). Reliance was placed on the Appropriate Assessment reporting submitted with the parent permission.

#### 2.4.5.7 Other Projects or Activities

The likelihood of cumulative interaction with other plans or projects is considered low, due to limited temporal or spatial overlap; the absence of hydrological connectivity or shared hydrological catchment with many of the other plans or projects described, the separation distance or setback buffers between the described plans or projects and European Sites, and the requirement for Appropriate Assessment for other plans or projects, such as private dwellings, forestry entrances, slatted sheds, masts and amendments to existing planning consents, which can reasonably be assumed to provide mitigation to avoid adverse effects on European Sites. Nonetheless the possibility of secondary effects from activities forming part of decommissioning or rehabilitation at Castlegar Bog cannot be excluded – a precautionary approach is taken.

## 2.5 European Sites under Consideration

### 2.5.1 Distance of the Project to European Sites

For the proposed Castlegar Bog decommissioning and rehabilitation, a limited zone of potential impact is predicted, due to the relatively small scale, duration and localised nature of the activities proposed.

Nevertheless, a precautionary 15km distance was chosen to evaluate the potential for effects (alone and in-combination) on European Sites.

There are **14 European Sites** - 10 Special Areas of Conservation (SAC) and 4 Special Protection Area (SPA) - **within 15km of Castlegar Bog.** The locations of these European Sites are illustrated in **Figure 8: SPAs within 15km of Castlegar Bog and Figure 9: SACs within 15km of Castlegar Bog.**

**Table 4 lists the European Sites occurring within 15km of Castlegar Bog, specifies the distances to each of these European Sites and provides a comment on the presence or absence of hydrological connectivity between Castlegar Bog and each of the European Sites listed.**

**Table 4: Proximity of the proposed Castlegar Bog to European Sites**

| European Site (SAC or SPA) | Site Code | Distance from the Development* | Hydrological Connectivity (Y/N: If Yes Downstream or Upstream connectivity relative to Castlegar Bog) |
|---|---|---|---|
| Ballynamona Bog And Corkip Lough SAC | 002339 | 8.9km ENE | Y: Upstream |
| Lisduff Turlough SAC | 000609 | 14.6km N | N |
| Glenloughaun Esker SAC | 002213 | 9.3km SSW | Y: Upstream |
| Killeglan Grassland SAC | 002214 | 2.4km NE | N |
| Ballygar (Aghrane) Bog SAC | 002199 | 14.7km NNW | N |
| Lough Croan Turlough SAC | 000610 | 14.7km NE | N |
| Four Roads Turlough SAC | 001637 | 10.6km N | N |
| Castlesampson Esker SAC | 001625 | 6.7km E | Y: Upstream |
| Lough Funshinagh SAC | 000611 | 13.3km NE | N |
| River Shannon Callows SAC | 000216 | 14.8km SE; 27km downstream | Y:Downstream |
| Middle Shannon Callows SPA | 004096 | 14.8km SE; 27km downstream | Y: Downstream |
| Lough Croan Turlough SPA | 004139 | 9.6km NE | N |
| Four Roads Turlough SPA | 004140 | 10.6km N | N |
| River Suck Callows SPA | 004097 | 0km | Y: Downstream |

*All distances cited are the closest straight line distance as measured using GIS.

The Qualifying Interests/Special Conservation Interests and locational context for each of the fourteen European Sites examined in this Screening Report are provided in **Table 5.**

The Site Synopsis and Conservation Objectives for each site are available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites and references including date of access, are included in Section 3. Conservation Objectives were reviewed to inform the current appraisal – in particular to identify any possible sensitivities and resultant pathways for likely significant effects.

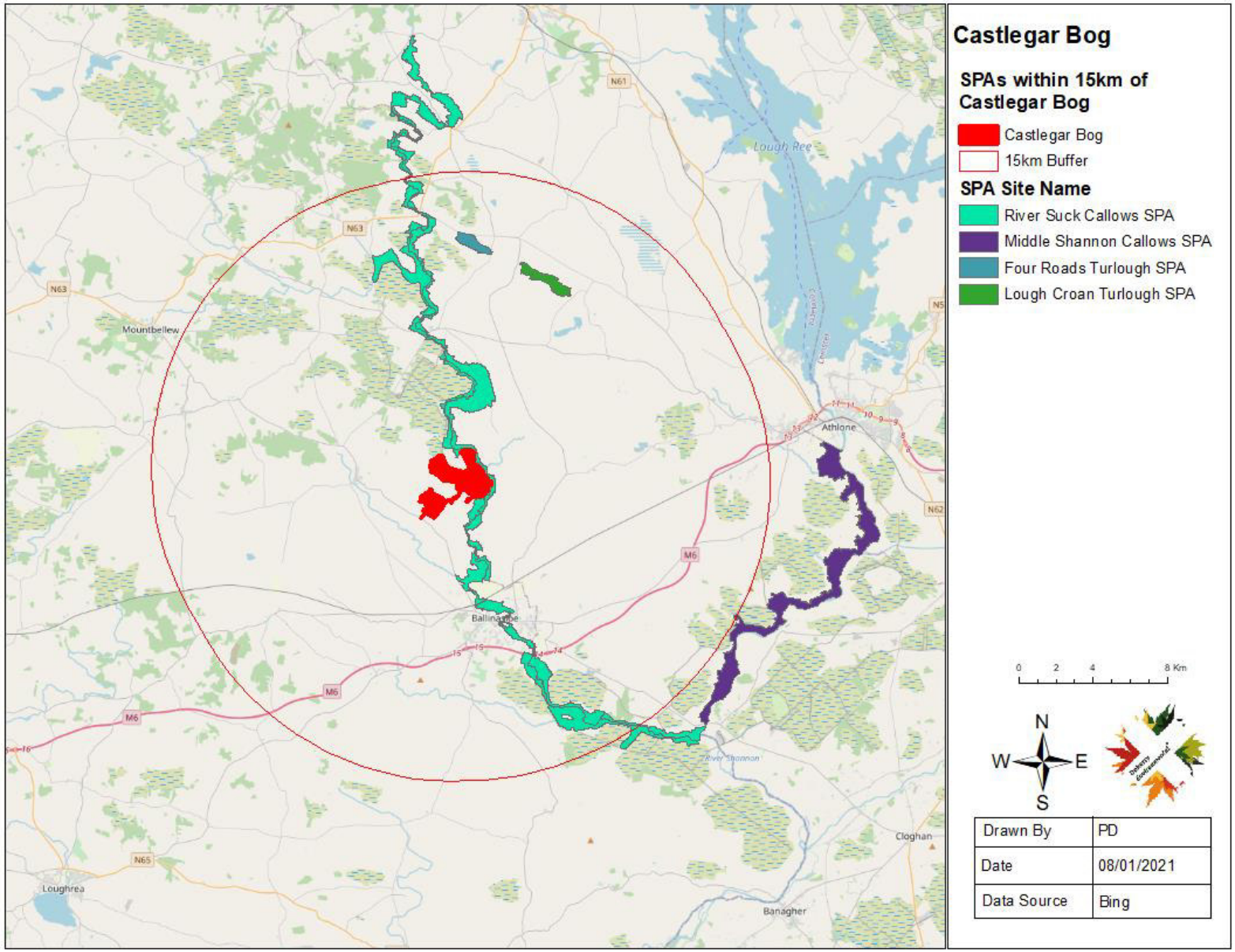



**Figure 8: SPAs within 15km of Castlegar Bog**

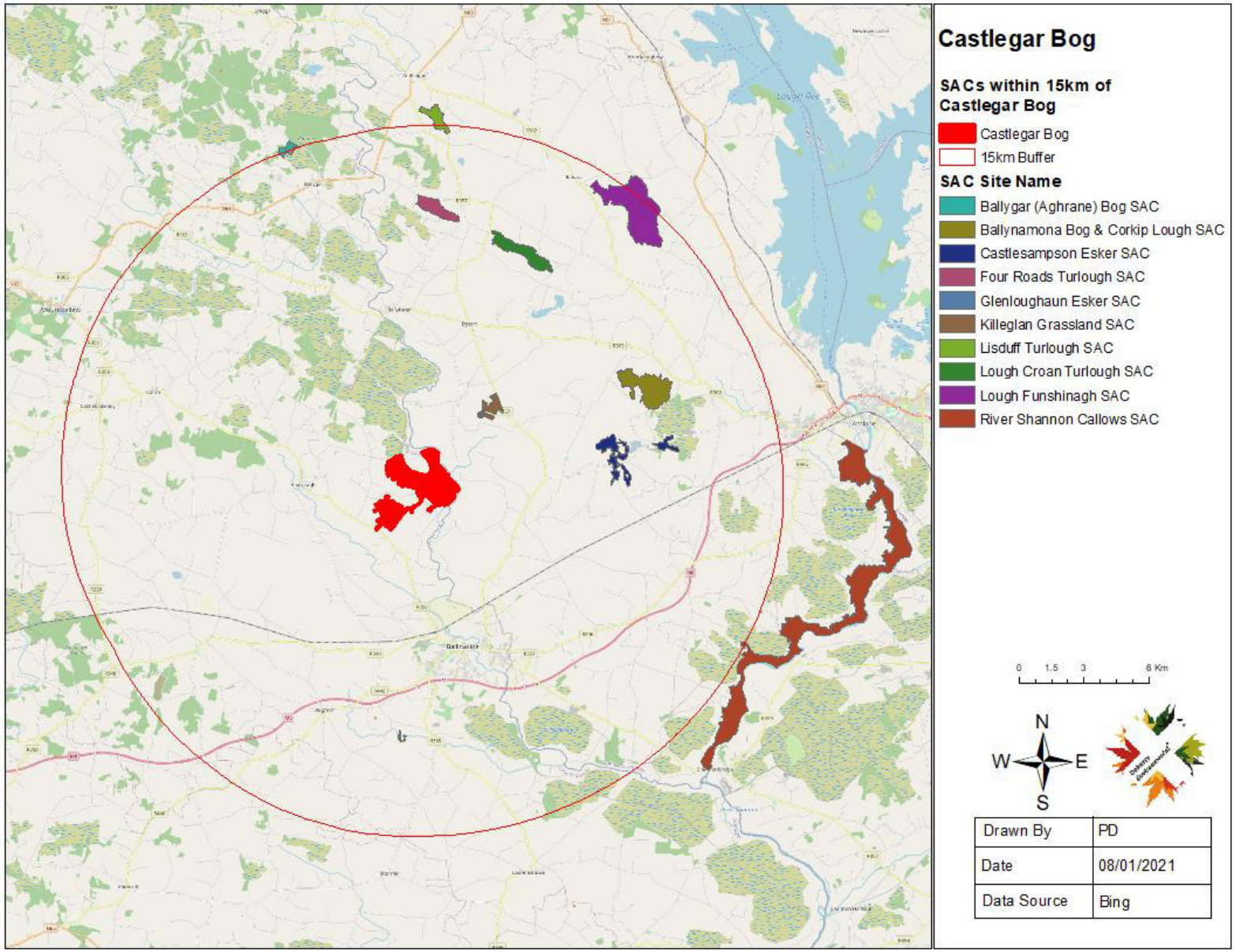



**Figure 9: SACs within 15km of Castlegar Bog**

**Table 5: Description of European Sites within a 15km radius of Castlegar Bog**

| No. | European Site Name and Code | Qualifying Interest / Special Conservation Interest and Code<br>*denotes a priority habitat | Summary Description (from Site Synopsis) | Data Source |
|---|---|---|---|---|
| 1 | Ballynamona Bog and Corkip Lough SAC (002339) | [3180] Turloughs*<br>[7110] Raised Bog (Active)*<br>[7120] Degraded Raised Bog<br>[7150] Rhynchosporion Vegetation<br>[91D0] Bog Woodland* | Ballynamona Bog and Corkip Lough is a site of considerable conservation significance as it consists of a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. Ireland has a high proportion of the total E.U. resource of raised bog (over 60%) and so has a special responsibility for its conservation at an international level. Active raised bog, bog woodland and turlough are listed as priority habitats on Annex I of the E.U. Habitats Directive. | NPWS (2014) Ballynamona Bog and Corkip Lough SAC 002339. Version dated 09.01.2014. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 30.07.2020 |
| 2 | Ballygar (Aghrane) Bog SAC (002199) | Active raised bogs [7110]<br>Degraded raised bogs still capable of natural regeneration [7120] | Ballygar (Aghrane) Bog SAC occurs within the larger raised bog system that is designated as Ballygar Bog NHA (000229). It is situated 2.0 km northwest of Ballygar in the townland of Aghrane, in Co. Galway. The site occurs on the north-western corner of a raised bog that includes both areas of high bog and cutover bog. Active Raised Bog comprises areas of high bog that are wet and actively peat-forming. Degraded Raised Bog corresponds to those areas of high bog whose hydrology has been adversely affected by peat cutting, drainage and other land use activities, but which are capable of regeneration to Active raised bog within 30 years. | NPWS (2016) Ballygar (Aghrane) Bog SAC 002199. Version dated 04.04.2016. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 15.01.2021 |
| 3 | Castlesampson Esker SAC (001637) | Turloughs [3180]<br>Semi-natural dry grasslands and | Castlesampson Esker is a complex site with esker, turlough and raised bog all found. The esker is the most | NPWS (2013) Castlesampson Esker SAC (001196). Version |

| No. | European Site Name and Code | Qualifying Interest / Special Conservation Interest and Code<br>*denotes a priority habitat | Summary Description (from Site Synopsis) | Data Source |
|---|---|---|---|---|
| | | scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] | westerly of an important group of eskers centred on Adrnacloon Hill in south-east Co. Roscommon, 9 km west of Athlone. The main turlough basin extends southwards into two arms that are separated by higher ground of glacial sediments. It includes areas dominated by Black Bog-rush and by Purple Moor-grass (Molinia caerulea), areas of wet grassland that hold a typical suite of turlough species and areas of marsh and fen. The esker grassland supports several species not often seen on eskers, e.g. Goldenrod (*Solidago virgaurea*) and Sea Plantain (Plantago maritima), as well as some regional rarities, e.g. Hedge Bedstraw (*Galium mollugo*). The grassland is also notable for the variety of orchids it supports, e.g. Early-purple Orchid (*Orchis mascula*), Pyramidal Orchid (*Anacamptis pyramidalis*), Common Spotted-orchid (*Dactylorhiza fuchsii*) and Fragrant Orchid (*Gymnadenia conopsea*). The Castlesampson Esker site is of high conservation for the proximity and juxtaposition of esker, raised bog and turlough. | dated 06.11.2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 15.01.2021 |
| 4 | Four Roads Turlough SAC (002213) | Turloughs [3180] | Four Roads Turlough is located south-west of Four Roads village, 2.5 km from the River Suck, in Co. Roscommon. The turlough has a relatively uniform vegetation structure, with the eastern part predominantly of grass, mostly Creeping Bent (*Agrostis stolonifera*), and the western part consisting | NPWS (2013) Four Roads Turlough SAC (002213) Version dated 06.11.2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. |

| No. | European Site Name and Code | Qualifying Interest / Special Conservation Interest and Code<br>*denotes a priority habitat | Summary Description (from Site Synopsis) | Data Source |
|---|---|---|---|---|
| | | | mainly of sedges, with Common Sedge (*Carex nigra*) most frequent. There are a few low-lying places where Bottle Sedge (*Carex rostrata*) and Bogbean (*Menyanthes trifoliata*) grow, and a few pools with Thread-leaved Water-crowfoot (*Ranunculus trichophyllus*), Lesser Water-plantain (*Baldellia ranunculoides*) and Lesser Marshwort (*Apium inundatum*). No oligotrophic fen vegetation occurs and only a few tufts of Black Bog-rush (*Schoenus nigricans*) are found. The soil is peaty, and there are occasional tree stumps. The site is very important as a refuge or feeding area for wildfowl and waders, some of which occur in numbers of national importance. | Accessed online 15.01.2021 |
| 5 | Glenloughaun Esker SAC (002213) | Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] | Situated approximately 5 km south-west of Ballinasloe in Co. Galway, this small site comprises a fine example of dry, mostly unimproved, orchid-rich calcareous grassland on an esker ridge. Of particular interest is the occurrence of a large population of Green-winged Orchid (*Orchis morio*), a scarce orchid of calcareous grassland which is listed in the Red Data Book. Early-purple Orchid (*Orchis mascula*) also occurs. Overall, this grassland site has an excellent species diversity and a very significant population of the scarce Green-winged Orchid. It is typical of the orchid-rich calcareous grassland habitat and is perhaps one of the best | NPWS (2014) Glenloughaun Esker SAC (002213). Version dated 03.01.2014. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 13.04.2021 |

| No. | European Site Name and Code | Qualifying Interest / Special Conservation Interest and Code<br>*denotes a priority habitat | Summary Description (from Site Synopsis) | Data Source |
|---|---|---|---|---|
| | | | remaining examples in the country. | |
| 6 | Killeglan Grassland SAC (002214) | Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] | Killeglan grassland is situated in Co. Roscommon, approximately 9.5 km north of Ballinasloe. Orchid species recorded from the site include the Red Data Book species, Greenwinged Orchid (*Orchis morio*) and Early-purple Orchid (*Orchis mascula*), Common Spotted-orchid (*Dactylorhiza fuchsii*), Fragrant Orchid (*Gymnadenia conopsea*), Pyramidal Orchid (*Anacamptis pyramidalis*), Lesser Butterfly-orchid (*Platanthera bifolia*) and Autumn Lady's-tresses (*Spiranthes spiralis*). Overall, the site is of outstanding quality and provides an excellent example of the Annex I priority habitat orchid-rich calcareous grasslands. It plays host to an important population of the Red Data Book plant species Green-winged Orchid, along with a number of Red Data Book mammals | NPWS (2014) Killeglan Grassland SAC (002214). Version dated 03.01.2014. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 13.04.2021 |
| 7 | Lisduff Turlough SAC (00609) | Turloughs [3180] | Lisduff Turlough is located just south of Athleague in Co. Roscommon, about 3 km from the River Suck. Lisduff Turlough has a good zonation of oligotrophic vegetation types, including some communities that are rare in | NPWS (2013) Lisduff Turlough SAC (00609) ) Version dated 04.09.2013. National Parks and Wildlife Service, Department of |

| No. | European Site Name and Code | Qualifying Interest / Special Conservation Interest and Code<br>*denotes a priority habitat | Summary Description (from Site Synopsis) | Data Source |
|---|---|---|---|---|
| | | | turloughs. It is of high ecological value as one of the few turloughs in near-pristine condition. The birdlife of the site adds significantly to its importance. | Arts, Heritage and the Gaeltacht. Accessed online 13.04.2021 |
| 8 | Lough Croan Turlough SAC (000610) | Turloughs [3180] | Lough Croan turlough is located south of the Athlone to Mount Talbot road in Co. Roscommon. It is an unusual wetland that contains fen, reedswamp and turlough vegetation communities in juxtaposition. The vegetation is highly diverse, with a total of 17 different communities occurring, several of which are rare or unusually large in extent. The site is notable for the presence of the rare, Northern Yellow-cress, which occurs frequently. The wintering waterfowl numbers are large and the site is especially useful to dabbling duck species. This is an important site because of its overall size, its birdlife and the rare plant communities and species it supports. Turloughs are rare and threatened habitats that are listed, with priority status, on Annex I of the E.U. Habitats Directive and, as such, are of considerable conservation significance. | NPWS (2013) Lough Croan Turlough SAC (000610. Version dated 04.09.2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 13.04.2021 |
| 9 | Lough Funshinagh SAC (000611) | Turloughs [3180]<br>Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270] | Lough Funshinagh is located approximately 12 km north-west of Athlone, in Co. Roscommon. Lough Funshinagh is of major ecological importance, both from a vegetation and ornithological viewpoint. Turloughs are listed as priority habitat on Annex I of the E.U. Habitats Directive. Lough | NPWS (2013) Lough Funshinagh SAC (000611). Version dated 23.11.2015. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. |

| No. | European Site Name and Code | Qualifying Interest / Special Conservation Interest and Code<br>*denotes a priority habitat | Summary Description (from Site Synopsis) | Data Source |
|---|---|---|---|---|
| | | | Funshinagh is a unique and atypical example of this habitat, and has a particular value in being relatively unmodified by grazing and modern agriculture. | Accessed online 13.04.2021 |
| 10 | River Shannon Callows SAC (000216) | Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410]<br>Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) [6510]<br>Limestone pavements [8240]<br>Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]<br>Lutra lutra (Otter) [1355] | The River Shannon Callows is a long and diverse site which consists of seasonally flooded, semi-natural, lowland wet grassland, along and beside the river between the towns of Athlone and Portumna. It has by far the largest area of lowland semi-natural grassland and associated aquatic habitats in Ireland, and one in which there is least disturbance of natural wetland processes. Botanically, it is extremely diverse with two legally protected species of plants and many scarce species. Excellent examples of two habitats listed on Annex I of the E.U. Habitats Directive occur within the site – Molinia meadows and lowland hay meadows with good examples of a further two Annex habitats (both with priority status). In winter the site is internationally important for numbers and species of waterfowl. In spring it feeds large numbers of birds on migration, and in summer it holds very large numbers of breeding waders, rare breeding birds and the endangered Corncrake, as well as a very wide variety of more common grassland and wetland birds. The presence of Otter, an Annex II species, adds further importance to the site. | NPWS (2020) River Shannon Callows SAC (000216). Version dated 22.10.2020. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 13.04.2021 |

| No. | European Site Name and Code | Qualifying Interest / Special Conservation Interest and Code<br>*denotes a priority habitat | Summary Description (from Site Synopsis) | Data Source |
|---|---|---|---|---|
| 11 | River Suck Callows SPA (004097) | Whooper Swan (Cygnus cygnus) [A038]<br>Wigeon (Anas penelope) [A050]<br>Golden Plover (Pluvialis apricaria) [A140]<br>Lapwing (Vanellus vanellus) [A142]<br>Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]<br>Wetland and Waterbirds [A999] | The River Suck Callows SPA is a linear, sinuous site comprising a section of the River Suck from Castlecoote, Co. Roscommon to its confluence with the River Shannon close to Shannonbridge, a distance of approximately 70 km along the course of the river. The River Suck Callows SPA is of considerable ornithological importance, in particular for the presence of nationally important populations of five species. Of note is that three of the species that occur regularly, i.e. Whooper Swan, Greenland White-fronted Goose and Golden Plover, are listed on Annex I of the E.U. Birds Directive. Part of the River Suck Callows SPA is a Wildfowl Sanctuary. | NPWS (2014) River Suck Callows SPA (004097) Version dated 31.10.2014. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 15.01.2021 |
| 12 | Middle Shannon Callows SPA (004096) | Whooper Swan (Cygnus cygnus) [A038]<br>Wigeon (Anas penelope) [A050]<br>Corncrake (Crex crex) [A122]<br>Golden Plover (Pluvialis apricaria) [A140]<br>Lapwing (Vanellus vanellus) [A142]<br>Black-tailed Godwit (Limosa limosa) [A156]<br>Black-headed Gull (Chroicocephalus ridibundus) [A179]<br>Wetland and Waterbirds [A999] | The Middle Shannon Callows SPA is a long and diverse site which extends for approximately 50 km from the town of Athlone to the town of Portumna; it lies within Counties Galway, Roscommon, Westmeath, Offaly and Tipperary. The Middle Shannon Callows SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of two species – Whooper Swan and Black-tailed Godwit. In addition, there are four species that have wintering populations of national importance. The site also supports a nationally important breeding population of Corncrake. Of particular note is that several of the | NPWS (2012) Middle Shannon Callows SPA (004096) Version dated 10.01.2012. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 15.01.2021 |

| No. | European Site Name and Code | Qualifying Interest / Special Conservation Interest and Code<br>*denotes a priority habitat | Summary Description (from Site Synopsis) | Data Source |
|---|---|---|---|---|
| | | | species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Corncrake and Golden Plover. | |
| 13 | Lough Croan Turlough SPA (004139) | Shoveler (Anas clypeata) [A056]<br>Golden Plover (Pluvialis apricaria) [A140]<br>Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]<br>Wetland and Waterbirds [A999] | Situated approximately 6 km east of the River Suck in Co. Roscommon, Lough Croan Turlough is a linear wetland, aligned north-west/south-east, which lies in a flattish area of glacial till. It is of high ornithological importance, primarily for its Greenland White-fronted Goose population, but also because of its nationally important Shoveler and Golden Plover populations. The presence of Greenland White-fronted Goose, Golden Plover and Whooper Swan is of particular note as these are listed on Annex I of the E.U. Birds Directive. Part of the site is a Wildfowl Sanctuary. | NPWS (2021) Lough Croan Turlough SPA (004139) Version dated 23.03.2021. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 23.03.2021 |
| 14 | Four Roads Turlough SPA (004140) | Golden Plover (Pluvialis apricaria) [A140]<br>Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]<br>Wetland and Waterbirds [A999] | Four Roads Turlough (also known as Cloonlaughnan Turlough) is located 6 km south of Athleague, Co. Roscommon and just over 2 km east of the River Suck. Four Roads Turlough SPA is of ornithological importance because it is regularly utilised by the nationally important River Suck Greenland White-fronted Goose flock. A nationally important population of Golden Plover also occurs at the site. The regular occurrence of these two species, which are listed on Annex I of the E.U. Birds Directive, is of note. | NPWS (2013) Four Roads Turlough SPA (004140) Version dated 10.06.2010. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 15.01.2021 |

## 2.6 Sources of Information & Consultation

### 2.6.1 Consultation

To inform the current Rehabilitation Plan, both national and local stakeholders, including neighbours whose land adjoins Castlegar Bog and local representatives of national bodies (such as Regional National Parks and Wildlife Service staff) and relevant offices in County Councils (such as the Heritage or Environmental Offices) have been contacted. Any identified local interest groups have been sought and informed of the opportunity to engage with this rehabilitation plan, and when identified have been invited to submit their comments or observations in relation to the proposed rehabilitation at Castlegar Bog. See Section 4 of the Rehabilitation Plan included as Appendix B for a full consultation report.

A process of engagement and Informal consultation was undertaken with NPWS regarding proposed Decommissioning and Rehabilitation Techniques. Due cognisance was given to information available on the NPWS website at: https://www.npws.ie/development-consultations#2. Consulting NPWS about environmental assessments.

In addition, two meetings were held with the EAU to discuss consultation with the Minister in accordance with Regulation 42(9) of the European Communities (Birds and Natural Habitats) Regulations, 2011.

### 2.6.2 Sources of Information

Other sources of Information, which were considered during this Screening evaluation, included both desktop studies and fieldwork:

Review of the Conservation Objectives, Site Synopsis and Site boundary information for the European Sites within with study area;

Review of OSI Discovery Mapping for the 15km study area around Castlegar Bog;

Review of EPA online mapping for watercourse features (https://gis.epa.ie/EPAMaps/);

Review of location and layout mapping for proposed Rehab;

Review of the detailed description of proposed Decommissioning and Rehabilitation measures, including methodologies specific to the main categories of land types under consideration, which occur in cutaway bogs;

Review of other plans and projects within 15km

Review of the results of previous Ecological Surveys of Castlegar Bog, along with recent confirmatory site visits; and

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

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 I 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 2019;
Spatial data in respect of Article 17 reporting, available online at https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17.
Spatial data in respect of Article 12 reporting, available online at https://www.npws.ie/maps-and-data/habitat-and-species-data/article-12-data.
Available data on Greenland White-fronted Geese such as annual reporting by the Greenland White-fronted Goose Study and National Parks and Wildlife Service.

Planning peatland rehabilitation 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):

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

- Mackin *et al*. (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al*. (2011). The Fen Management Handbook, (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised bog Special Areas of Conservation management plan 2017-2022. 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). BOGLA–D - 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. Dúch–s - 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.


## 2.7 Potential Sources, Pathways and Timing of Impacts to European Sites (SACs & SPAs)

### 2.7.1 Potential Sources, Pathways and Timing of Impacts to SACs

#### 2.7.1.1 Direct Impact to Habitats within the SAC *(no potential for this impact to occur)*

There is no spatial overlap between Castlegar Bog and any of the SAC's under consideration. It can therefore reasonably be concluded that there is no potential for direct impact/effects (such as habitat loss, or loss of habitat connectivity) on any SAC's from the proposed decommissioning and rehabilitation of Castlegar Bog. Possible pathways can only exist for indirect effects on SAC's either secondary, cross-factor or 'ex-situ'. Therefore, there is **no possibility of direct impacts to SAC** habitats, and this impact pathway is screened out from further evaluation. No potential for likely significant effects identified.

#### 2.7.1.2 Indirect loss or degradation of terrestrial or aquatic habitats within SAC boundaries

**Sources (all outside SAC boundaries):** Movement of soil or peat, machinery; earthworks, excavations, unforeseen events such as the failure of drain blocks and berms resulting in the release of silt-laden water to waterbodies, temporary overburden storage, works in or near water, re-grading of a boundary drain to the southwest of the bog, changes in local hydrological and hydrogeological conditions with downstream effects on SACs; cleaning of silt ponds, removal of waste and/or raw material, lifting of rail; use of fuels, chemicals or fertiliser.

**Pathway:** water runoff flow paths, watercourses, flooding/changes to hydrological regimes, air

**Potential Castlegar Decommissioning and Rehabilitation Impact/Pathway Connectivity:** The identified impact sources could possibly reduce water quality or aquatic habitat quality in the local context, where all works are located outside of and at a distance from any designated SAC. The closest SAC is Killeglan Grassland SAC which is 2.4km NE and hydrologically unconnected, whilst the closest but hydrologically connected SAC is the River Shannon Callows SAC which is 14.8km to the southeast (straight line distance) or approximately 27km downstream.

The current appraisal evaluates the possibility for any effects in downstream hydrologically connected SACs through sediment/contaminant/nutrient laden runoff, or the spread of invasive species, with regard to any indirect habitat loss, reduction in habitat extent, or degradation effects (i.e. to habitat quality) in respect of Qualifying Interests.

**Timing of Impacts:** The potential for impact sources arising from the project only relates to the stage (i.e. Decommissioning and Rehabilitation), when groundworks and use of machinery will take place for a limited duration -in this instance expected to be up to 12 months. Once decommissioning and rehabilitation are complete, the decommissioned and rehabilitated Castlegar Bog will require some monitoring, generally involving visual inspections of habitat succession, sometimes using drones, and any ongoing scheduled maintenance such as of silt ponds and where necesssary the upgrading of boundary drains. The maintenance of silt ponds and boundary drains during the operation phase could result in the mobilisation of suspended solids and their discharge downstream to the River Suck catchment.

#### 2.7.1.3 Indirect or ex-situ disturbance or displacement of Qualifying Interests

**Sources (all outside SAC boundaries):** Decommissioning and Rehabilitation activities; movement of construction machinery and vehicles including rail; presence of personnel; noise and vibration and/or visual intrusion from construction works and construction machinery.

**Pathway:** land cover, contact, air, visibility

**Potential Castlegar Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity:** The impact sources identified above may result in possible localised impacts occurring within the local context of the decommissioning and rehabilitation area during the construction phase. There are no SACs occurring within the wider locality of Castlegar Bog or in its vicinity downstream from the bog. The nearest SAC occurring downstream from the Castlegar Bog is the River Shannon Callows SAC. Otters are listed as a qualifying feature of interest for this SAC, which is located approximately 14.8km to the southeast and 27km downstream. There are no impact sources identified which would extend outside of the local extent of the works area which could indirectly result in disturbance or displacement of Qualifying Interests of any SAC or its qualifying species.

**Timing of Impacts:** As outlined above, the potential for effects only relates to the construction stage of decommissioning and rehabilitation. The scale and duration of any operational phase sources of disturbance or displacement are considered insufficient to result in likely significant effects.

#### 2.7.1.4 Indirect or ex-*situ mortality of Qualifying Interests*

**Sources (all outside SAC boundaries):** Decommissioning and Rehabilitation activities; movement of construction machinery and vehicles including rail; presence of personnel; noise and vibration and/or visual intrusion from construction works and construction machinery.

**Pathway:** contact

**Potential Castlegar Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity:** Given the absence of otter resting sites, such as holts and couches at Castlegar Bog there will be no potential for the rehabilitation works to result in contact with otters and the accidental mortality of this species.

#### 2.7.1.5 Other Projects with Potential to Cause Cumulative Impacts to SAC sites

**Sources (all outside SAC boundaries):** Decommissioning and Rehabilitation activities; movement of construction machinery and vehicles including rail; presence of personnel; noise and vibration and/or visual intrusion from construction works and construction machinery.

**Pathway:** land cover, contact, air, visibility

**Potential Castlegar Decommissioning and Rehabilitation Impact/Pathway Connectivity:** The identified impact sources could possibly reduce water quality or aquatic habitat quality in the local context, where all works are located outside of and at a distance from any designated SAC.

The current appraisal evaluates the possibility for any effects in downstream hydrologically connected SAC European Sites through sediment/contaminant/nutrient laden runoff, or the spread of invasive species, with regard to any indirect habitat loss, reduction in habitat extent, or degradation effects (i.e. to habitat quality) in respect of Qualifying Interests.

The disturbance related impact sources identified above may result in possible localised impacts occurring within the local context of the decommissioning and rehabilitation area during the works phase.

**Timing of Impacts:** It is considered that during the decommissioning and rehabilitation stages at Castlegar and during ongoing operation phase maintenance of silt ponds and boundary drains (where required), the possibility exists for any inadvertent release of silt or other degrading

materials to possibly combine with downstream effects from other projects. Such effects will be localised and limited in magnitude, such that they will not have the potential to negatively affect the conservation status of qualifying species (i.e. otters) of SACs (i.e. the River Shannon Callows SAC) at significant distances downstream.

2.7.2 Potential Sources, Pathways and Timing of Impacts to SPAs

**2.7.2.1 Direct Impacts to Habitats within SPAs**

Castlegar Bog overlaps River Suck Callows SPA as shown on Figure 8 above. The habitats occurring within this area of overlap include bog woodland, raised bog, degraded raised bog and wet woodland. These habitats, in particular the raised bog habitats shown on Figure 4, are representative of wetland habitat potentially utilised by some waterbird species. Wetland habitat is listed as a special conservation interest of the River Suck Callows SPA. The area of Castlegar Bog that overlaps within the River Suck Callows SPA and supports these habitats is representative of marginal land and for the purposes of the PCAS, the rehabilitation prescription that is to be applied to this area is MLT1. The application of the MLT1 prescription requires no works and is entirely a passive rehabilitation prescription and hence **there will be no potential for the rehabilitation works to result in direct impacts to the wetland habitats of the SPA**. Other SPAs can be excluded from consideration in respect of direct effects.

**2.7.2.2 Indirect loss, reduction or degradation of terrestrial or aquatic habitats within SPA sites**

**Sources (some but not all inside SPA boundaries):**

Movement of soil or peat, machinery; earthworks, excavations, unforeseen events such as the failure of drain blocks and berms resulting in the release of silt-laden water to waterbodies, temporary overburden storage, works in or near water, re-grading of a boundary drain to the southwest of the bog, changes in local hydrological and hydrogeological conditions with downstream effects on SACs; cleaning of silt ponds, removal of waste and/or raw material, lifting of rail; use of fuels, chemicals or fertiliser.

**Pathway:** water runoff flow paths, watercourses, flooding/changes to hydrological regimes, air

**Potential Castlegar Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity:** The identified impact sources could reduce water quality or aquatic habitat quality in the local context – with some of this potentially occurring within at least 1 no. SPA boundary, namely the River Suck Callows SPA. The current appraisal evaluates the possibility of any effects in overlapping or immediately adjacent SPA's in addition to downstream hydrologically connected SPAs through sediment/contaminant/nutrient laden runoff, changes to hydrological regimes or morphology of supporting watercourses, or through the spread of invasive species, regarding any indirect (effective) habitat loss or degradation effects to Special Conservation Interests.

The proposed Decommissioning and Rehabilitation at Castlegar bog overlaps the River Suck Callows SPA. Effects on this SPA are evaluated to determine the potential (or not) for significant

effects. One other SPA, namely the Middle Shannon Callows, is located approximately 14.8km to the southeast of Castlegar Bog and approximately 27km downstream. This SPA is located outside the local context of Castlegar Bog and will not be at risk of likely significant effects as a result of the discharge of sediment/contaminant/nutrient laden runoff from the bog to the River Suck and on downstream to this SPA. As such the evaluation of potential significant indirect effects is restricted to the River Suck Callows SPA.

**Timing of Impacts:** The potential for impact sources arising from the project relates to the Decommissioning and Rehabilitation Stage, when groundworks and use of machinery will take place for a limited duration -in this instance expected to be up to 12 months. Once decommissioning and rehabilitation are complete, the decommissioned and rehabilitated of Castlegar Bog will require minimal monitoring, generally involving visual inspections of habitat succession, sometimes using drones, and any ongoing scheduled maintenance such as of silt ponds. In addition, the Castlegar Bog Drainage Management Plan (RPS, 2021) has identified the potential need for the upgrade of boundary drains, following the results of operation phase monitoring. The ongoing maintenance of silt ponds and the upgrading of boundary drains, where required, could combine during the operation phase and result in the discharge of elevated suspended solids to the River Suck.

#### 2.7.2.3 Indirect, in-situ or ex-*situ disturbance/displacement of bird species of Special Conservation Interest*

**Sources (some but not all inside SPA boundaries):** Decommissioning and Rehabilitation activities; movement of construction machinery and vehicles including rail; presence of personnel; noise and vibration and/or visual intrusion from construction works and machinery.

**Pathway:** land cover, contact, air, visibility

**Potential Castlegar Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity:** The impact sources identified above, in addition to the impact pathways are evaluated with regard to potential in-situ or ex-situ disturbance or displacement effects on bird species listed as Special Conservation Interests of the SPA sites.

The proposed development is directly adjacent/overlapping the River Suck Callows SPA, 14.8 km northwest of or approximately 27km upstream of the Middle Shannon Callows SPA, 10.6km south of Four Roads Turlough SPA and 9.6km southwest of Lough Croan Turlough SPA.

Apart from the River Suck Callows SPA, the above three SPA's are too distant from sources of disturbance associated with the project under consideration for SCI species to be subject to disturbance or displacement related effects whilst in-situ, i.e. within the European Site. However, these three SPA's share some possible connectivity through SCI species of wildfowl, notably

Greenland white-fronted Goose, Golden Plover and the general category 'Wetlands and Waterbirds'.

**Timing of Impacts:** As outlined above, the potential for effects only relates to the decommissioning and rehabilitation Stage as source magnitude during any operational phase activities can be screened out. In terms of Timing of Effects, this is limited to the migratory (September to November for Autumn and March to mid-May for Spring) and winter period (October to March) when most of the SCI species for which these sites are designated are present[2].

#### 2.7.2.4 Other Projects with Potential to Cause Cumulative Impacts to SPA sites

The potential for the construction phase of the proposed Castlegar bog decommissioning and rehabilitation to cause cumulative effects with other plans or projects is evaluated with regard to impact pathways which may be connected to SPA sites within the zone of influence.

**Sources (all outside SPA boundaries):** Decommissioning and Rehabilitation activities; movement of construction machinery and vehicles including rail; presence of personnel; noise and vibration and/or visual intrusion from works and machinery.

**Pathway:** land cover, contact, air, visibility

**Potential Castlegar Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity:**

The identified impact sources could reduce water quality or aquatic habitat quality in the local context, where some works are located within an SPA, or in locations where pathways exist to downstream SPA's. The current assessment evaluates the possibility of any effects in adjacent or overlapping or downstream hydrologically connected SPAs through sediment/contaminant/nutrient laden runoff or through the spread of invasive species, regarding any indirect habitat loss or degradation effects to Special Conservation Interests, in combination with other plans or projects. Disturbance related impact sources identified above, in addition to the impact pathways are evaluated with regard to potential ex-situ disturbance or displacement effects on bird species listed as Special Conservation Interests of the SPA sites, specifically in terms of plans or projects which may act as sources of similar sources of effects and where similar pathways exist.

**Timing of Impacts:** The potential for in combination impact sources arising from the project only relates to the works stage (i.e. Decommissioning and Rehabilitation), when groundworks and use of machinery will take place for a limited duration -in this instance expected to be up to 4 months. For disturbance to SCI species, the potential for effects only relates to the works stage of

[2] Periods are as defined in the SNH document '*Survey Methods for use in assessing the impacts of onshore windfarms on bird communities'*. (2005). SNH, Battleby, Scotland.

decommissioning and rehabilitation as source magnitude during any operational phase activities can be screened out. In terms of Timing of Effects, this is limited to the migratory (September to November for Autumn and March to mid-May for Spring) and winter period (October to March) or breeding period, as applicable, when most of the SCI species for which these sites are designated are present.

## 2.8 Screening Evaluation of the Potential for Effects on European Sites (SACs & SPAs)

The Screening evaluation is based on a conceptual site model which identifies potential impact source-pathways between the described Castlegar Bog decommissioning and rehabilitation and each European Site. This allows for an assessment of any potential for significant effects on the Qualifying Interests / Special Conservation Interests and their respective Conservation Objectives. The relevant stage of the Castlegar Bog decommissioning and rehabilitation is the construction stage, no impact source-pathways are identified during the operational stage.

Section 2.7 above has identified the impact source-pathways arising from the rehabilitation plan. These impact-source pathways are summarised below and the potential for these to result in significant effects to the 10 SAC sites are evaluated in relation to any potential for significant effects (Table 6 below):

- Indirect loss or degradation of terrestrial or aquatic habitats within SAC sites, alone and in combination;
- Indirect or ex-situ disturbance or displacement of species of Qualifying Interest, alone and in combination.

The following impact source-pathways for the 4 SPA sites are evaluated in relation to any potential for significant effects (Table 7 below):

- Direct Impacts to Habitats within SPAs
- Indirect loss, reduction or degradation of terrestrial or aquatic habitats within SPA sites, alone and in combination;
- Indirect or ex-situ disturbance/ displacement of bird species listed as Special Conservation Interests, alone and in combination.

As described in Section 2.7.1.1 and 2.7.1.2, there is **no potential for direct effects to habitats** within SAC sites.

The evaluation of potential for in-combination effects with regard to Other Plans or Projects includes the plans or projects described in Section 2.4.5.

**Table 6: Evaluation of Possibly Significant Effects to the 10 SAC sites**

| | European Site | Separation Distance from Castlegar Bog | Hydrological Connection – Yes/No | Evaluation of the potential for Castlegar Bog decommissioning and rehabilitation, either alone or in-combination with other plans or projects, to cause either of the following effects to the 10 SAC Sites:<br>**1**. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site<br>**2.** Indirect/ex-situ disturbance or displacement of species of Qualifying Interest<br>**3.** Indirect or ex-situ mortality of Qualifying Interests |
|---|---|---|---|---|
| 1 | Ballynamona Bog and Corkip Lough SAC (002339) | 8.9km ENE | Yes: Upstream | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified.<br>**2: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.<br>**3: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect mortality at the distance of separation from proposed activities. |
| 2 | Ballygar (Aghrane) Bog SAC | 14.7km NNW | No | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified.<br>**2: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.<br>**3: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect mortality at the distance of separation from proposed activities. |
| 3 | Castlesampson Esker SAC | 6.7km E | Y: Upstream | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Due to the separation distance between proposed activities and this European Site, and the location of turlough habitats upstream no functional impact pathways for effects are identified.<br>**2: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.<br>**3: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect mortality at the distance of separation from proposed activities. |
| 4 | Four Roads Turlough SAC | 10.6km N | No | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified.<br>**2: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.<br>**3: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect mortality at the distance of separation from proposed activities. |
| 5 | Glenloughaun Esker SAC | 9.3km SSW | Y: Upstream | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified.<br>**2: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.<br>**3: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect mortality at the distance of separation from proposed activities. |
| 6 | Killeglan Grassland SAC | 2.4km NE | No | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. |

| | European Site | Separation Distance from Castlegar Bog | Hydrological Connection – Yes/No | Evaluation of the potential for Castlegar Bog decommissioning and rehabilitation, either alone or in-combination with other plans or projects, to cause either of the following effects to the 10 SAC Sites:<br>**1**. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site<br>**2.** Indirect/ex-situ disturbance or displacement of species of Qualifying Interest<br>**3.** Indirect or ex-situ mortality of Qualifying Interests |
|---|---|---|---|---|
| | | | | **2: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.<br>**3: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests**<br><br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect mortality at the distance of separation from proposed activities. |
| 7 | Lisduff Turlough SAC | 14.6km N | No | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified.<br>**2: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.<br>**3: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect mortality at the distance of separation from proposed activities. |
| 8 | Lough Croan Turlough SAC | 14.7km NE | No | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified.<br>**2: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.<br>**3: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect mortality at the distance of separation from proposed activities. |
| 9 | Lough Funshinagh SAC | 13.3km NE | No | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified.<br>**2: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.<br>**3: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests**<br>Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect mortality at the distance of separation from proposed activities. |
| 10 | River Shannon Callows SAC (Site Code 000216) | 14.8km SE | Yes: Downstream | **1: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC**<br>Notwithstanding downstream hydrological connectivity when considered in light of the dilution factor along both the main channel of River Suck and River Shannon, the depositing nature of these watercourses downstream of Castlegar Bog and the separation distance of over approximately 27km from proposed activities and this SAC and the Annex 1 qualifying habitats it supports, it is considered that the project will not have the potential to result in indirect impacts to these qualifying habitats.<br>.<br>**2: Screened Out - Possibility for indirect or ex-situ disturbance or displacement of species of Qualifying Interests**<br>Otters are the only qualifying species of this SAC. Notwithstanding downstream hydrological connectivity when considered in light of the dilution factor along both the main channel of River Suck and River Shannon, the depositing nature of these watercourses downstream of Castlegar Bog and the separation distance of over approximately 27km from proposed activities and this SAC and the otter population it supports, it is considered that the project will not have the potential to result in indirect impacts to the otter population of this SAC.<br>**3: Screened Out - Possibility for indirect or ex-situ mortality to species of Qualifying Interests**<br>Otters are the only qualifying species of this SAC, which is located approximately 27km downstream. Given this distance the project site is located outside of the home range of the otter population supported by this SAC. In addition, it is noted that the possibility for mortality to otters is restricted to the local population of otters occurring in the area surrounding Castlegar Bog. With |

| | European Site | Separation Distance from Castlegar Bog | Hydrological Connection – Yes/No | Evaluation of the potential for Castlegar Bog decommissioning and rehabilitation, either alone or in-combination with other plans or projects, to cause either of the following effects to the 10 SAC Sites:<br>**1**. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site<br>**2.** Indirect/ex-situ disturbance or displacement of species of Qualifying Interest<br>**3.** Indirect or ex-situ mortality of Qualifying Interests |
|---|---|---|---|---|
| | | | | regard to the risk posed to the local population it is noted that such risks will occur where holts are present and construction activities damage/destroy holts and the otters within them. Surveys of Castlegar Bog during December 2020 and March 2021 did not identify the presence of otter holts or couches within the bog and surrounding silt ponds, where works will be undertaken. Based on the absence of holts Castlegar Bog during baseline surveys mortality to otters will not arise. |

**Table7: Evaluation of Possibly Significant Effects to the 4 SPA sites**

| | European Site | Separation Distance from Castlegar Bog | Hydrological Connection – Yes/No | Evaluation of the potential for Castlegar Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 4 SPA Sites:<br>1. Direct Impacts to Habitats within SPAs<br>2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site;<br>3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. |
|---|---|---|---|---|
| 1 | Middle Shannon Callows SPA (004096) | 14.8km SE | Yes: Downstream | **1. Screened Out - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within the SPA**<br>Due to the separation distance to this SPA, possible pathways for direct effects can be excluded.<br><br>**2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA**<br>Notwithstanding downstream hydrological connectivity when considered in light of the dilution factor along both the main channel of River Suck and River Shannon, the depositing nature of these watercourses downstream of Castlegar Bog and the separation distance of over approximately 27km from proposed activities and this SPA and the wetland habitats it supports, it is considered that the project will not have the potential to result in indirect impacts to the wetland habitats of this SPA.<br><br>**3: Screened In and Out - Possibility for indirect or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest**<br><br>Bird species of Special Conservation Interests for this SPA include Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit and Black-headed Gull along with 'wetland and waterbirds'. Of the above species Corncrake is the only species that is listed as a special conservation interest breeding species. All other species are listed as special conservation interest winter (non-breeding) species of the SPA.<br><br>Regarding Corncrake, no breeding has occurred by this species within the Middle Shannon Callows and the former breeding population within the SPA is now considered extinct. In 2002, 2003, 2006, 2007, 2008 and 2012 heavy rainfall led to flooding events during the Corncrake breeding season. This contributed to an acute level of breeding failure and led to severe declines in Corncrake numbers; from 23 in 2005 to just one in 2011 and 2012. While 2013 saw an increase in the number of calling males to 2 (during the census period), just one calling male was recorded in 2014 and finally in 2015, for the first time no Corncrake was heard on the Shannon Callows[3]. The year 2018, was the fourth consecutive year in which no birds were recorded in the Shannon Callows[4]. Given the remaining population is focused heavily in two core areas of Donegal and West Connacht, with migration flyways to these likely to be coastal in nature (A. Copland personal communication) it is considered that pathways for effects to this species from any proposed activities at **Castlegar Bog** can reasonably be excluded and screened out.<br><br>The non-breeding special conservation interest bird species of the SPA that are known to utilise wetland habitats such as raised bogs and open water habitats (which are present at Castlegar Bog in the form of silt ponds) include Whooper Swan, Wigeon, Black-tailed Godwit, Golden Plover and Lapwing. IWeBS surveys in 2017/2018 have recorded the presence of Whooper Swan, Wigeon, Lapwing, Golden Plover and Black-headed Gull in the wider area of the River Suck adjacent to Castlegar Bog. Black-tailed Godwit have not been recorded at the River Suck during IWeBS surveys but were not recorded at or in the vicinity of Castlegar Bog during baseline surveys between 2012 and 2021. Based on this species absence from the bog and surrounding area it is not considered to occur in the vicinity of Castlegar Bog and will not be sensitive to disturbance or displacement. As such the potential for likely significant effects during the **non-breeding season** to Black-tailed Godwit is screened out.<br><br>Baseline surveys at Castlegar Bog have also shown that the bog and open water habitats within the bog's boundary are not relied upon by Whooper Swan, Golden Plover, Lapwing or Black-headed Gull. These species were not recorded on the bog during surveys in December 2020 and early March 2021. Given the absence of these species during baseline surveys, they do not rely on Castlegar Bog and will not be subject to any disturbance as a result of the proposed PCAS. As such, the potential for likely significant effects to these four species during the **non-breeding season** are 'screened out'. |

[3] NPWS (2015) A framework for Corncrake Conservation to 2022. National Parks and Wildlife Service, Department of Arts, Heritage & the Gaeltacht. Available online at: https://www.npws.ie/sites/default/files/publications/pdf/A%20Framework%20for%20Corncrake%20Conservation%20to%202022%20%28Nov2015%29.pdf
[4] Duffy, M. (2018) The Corncrake Conservation Project Annual Report. 2018. Available online at: https://www.npws.ie/sites/default/files/general/corncrake-report-2018.pdf

| | European Site | Separation Distance from Castlegar Bog | Hydrological Connection – Yes/No | Evaluation of the potential for Castlegar Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 4 SPA Sites:<br>1. Direct Impacts to Habitats within SPAs<br>2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site;<br>3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. |
|---|---|---|---|---|
| | | | | Wigeon has been recorded on Castlegar Bog. Other wetland bird species recorded on Castlegar Bog during surveys include Mallard, Water Rail, and Coot. These species have been recorded in low numbers on the bog and the results of baseline surveys do not suggest that the population of these species that are associated with this SPA rely on the bog as an over-wintering non-breeding habitat. Nevertheless, given the presence of these species and the presence of suitable wetland habitat for these species within the Castlegar Bog, and in view of the precautionary principle, the potential for proposed activities to result in disturbance to wigeon, which is a special conservation interest bird species of this SPA, and the three other wetland bird species listed above cannot be ruled out. These are 'screened in'. |
| 2 | Four Roads Turlough SPA | 10.6km N | No | **1. Screened Out - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within the SPA**<br>Due to the separation distance to this SPA, possible pathways for direct effects can be excluded.<br><br>**2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA**<br>Due to the separation distance to this SPA and the absence of hydrological connectivity between proposed activities and this European Site, possible pathways for such indirect effects can be excluded.<br><br>**3: Screened In - Possibility for indirect or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest**<br>Bird species of Special Conservation Interests for this SPA include wintering, non-breeding populations of Golden Plover and Greenland white-fronted geese along with 'wetland and waterbirds'.<br><br>Non-breeding Golden plover and Greenland white-fronted geese are known to utilise wetland habitats such as raised bogs and open water habitats (which are present at Castlegar Bog in the form of silt ponds). IWeBS surveys in 2017/2018 have recorded the presence of Greenland white-fronted geese and Golden Plover in the wider area of the River Suck adjacent to Castlegar Bog.<br><br>Baseline surveys at Castlegar Bog have also shown that the bog and open water habitats within the bog's boundary are not relied upon by Greenland white-fronted geese or Golden Plover.<br><br>Greenland white-fronted geese were not recorded on the bog during winter walkover surveys between 2013 and 2019, nor were they recorded utilising the bog during surveys in December 2020 and early March 2021. Consultation was undertaken with the NPWS (Alyn Walsh) regarding the River Suck Greenland white-fronted geese flock. the Geese now prefer the grasslands in the area, predominantly on the east bank. Mr Walsh noted that some formerly used feeding sites at Cloonagh are now overgrown with rushes and no longer used. Conversely, increases in sheep flocks in the Cloonagh and Dalysgrove areas since the early 1990's have rendered many fields unsuitable for Geese."<br><br>A summary of the River Suck flock prepared by Mr Walsh notes that "Geese have been recorded in the Ballyforan area on relatively few occasions in recent years, but when they have been seen they have continued to use the Cloonagh, Dalysgrove and Derrycahill areas. Geese that formerly relied on the Ballyforan area throughout much of the winter are now thought to be mostly using feeding sites further upstream."<br><br>It is further noted that the cutaway, bare peat bog habitat that dominates the bog surface is not representative of suitable roosting or foraging habitat for Greenland white-fronted geese with the area of suitable habitat at Castlegar Bog is limited to areas of marginal high bog, adjacent callows between the cutaway and the river, and as noted above Greenland white-fronted geese have not been observed using these areas during previous surveys.<br><br>Golden Plover were not recorded on the bog during winter walkover surveys between 2013 and 2019, nor were they recorded utilising the bog during surveys in December 2020 and early March 2021. Given the absence of both Greenland white-fronted geese and Golden Plover these species during baseline surveys, they do not rely on the cutaway at Castlegar Bog and will not be subject to any disturbance as a result of the proposed PCAS. As such, the potential for likely significant effects to these two species during the **non-breeding season** are 'screened out'. Given the absence of likely significant effects to these two species there will in turn be an absence of likely significant effects to this SPA and it is **screened out** from further examination. |
| 3 | Lough Croan Turlough SPA | 9.6km N | No | **1. Screened Out – Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within the SPA**<br>Due to the separation distance to this SPA, possible pathways for direct effects can be excluded.<br><br>**2: Screened Out – Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA**<br>Due to the separation distance to this SPA and the absence of hydrological connectivity between proposed activities and this European Site, possible pathways for such indirect effects can be excluded. |

| | European Site | Separation Distance from Castlegar Bog | Hydrological Connection – Yes/No | Evaluation of the potential for Castlegar Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 4 SPA Sites:<br>1. Direct Impacts to Habitats within SPAs<br>2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site;<br>3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. |
|---|---|---|---|---|
| | | | | **3: Screened In – Possibility for indirect or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest**<br>Bird species of Special Conservation Interests for this SPA include wintering, non-breeding populations of Shoveler, Golden Plover and Greenland white-fronted geese along with 'wetland and waterbirds'.<br><br>Non-breeding Shoveler, Golden plover and Greenland white-fronted geese are known to utilise wetland habitats such as raised bogs and open water habitats (which are present at Castlegar Bog in the form of silt ponds). IWeBS surveys in 2017/2018 have recorded the presence of Greenland white-fronted geese and Golden Plover in the wider area of the River Suck adjacent to Castlegar Bog.<br><br>Baseline surveys at Castlegar Bog have also shown that the bog and open water habitats within the bog's boundary are not relied upon by Shoveler, Greenland white-fronted geese or Golden Plover. These species were not recorded on the bog during winter walkover surveys between 2013 and 2019, nor were they recorded utilising the bog during surveys in December 2020 and early March 2021. See also further baseline information (detailed for the Four Road turlough SPA above) which indicates the absence of Greenland white-fronted geese from the Castlegar Bog area and supports the field survey results. Given the absence of these species during baseline surveys, they do not rely on Castlegar Bog and will not be subject to any disturbance as a result of the proposed PCAS. As such, the potential for likely significant effects to these three species during the **non-breeding season** are 'screened out'. Given the absence of likely significant effects to these two species there will in turn be an absence of likely significant effects to this SPA and it is **screened out** from further examination. |
| 4 | River Suck Callows SPA (004097) | 0km | Yes | **1: Screened In - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA**<br>Given that the area where this SPA overlaps Castlegar Bog will be subject to the rehabilitation measure MLT1, which will be entirely passive and will not involve any works or other activities, there will be no potential for the project to result in the direct loss, reduction or degradation of wetland habitat that forms part of this SPA. The wetland habitat special conservation interest of the SPA is **screened out**.<br><br>**2: Screened In - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA**<br>Due to proximity and the presence of hydrological connectivity between proposed activities and this European Site possible pathways for effects are identified.<br><br>**2: Screened In - Possibility for indirect or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest**<br>Bird species of Special Conservation Interests for this SPA include wintering, non-breeding populations of Whooper Swan, Wigeon, Golden Plover, Lapwing and Greenland White-fronted Goose and Wetland and Waterbirds.<br><br>The non-breeding populations of these special conservation interest bird species are known to utilise wetland habitats such as raised bogs and open water habitats (which are present at Castlegar Bog in the form of silt ponds). IWeBS surveys in 2017/2018 have recorded the presence of Whooper Swan, Wigeon, Lapwing, Golden Plover and Greenland white-fronted geese in the wider area of the River Suck adjacent to Castlegar Bog.<br><br>Baseline surveys at Castlegar Bog have shown that the bog and open water habitats within the bog's boundary are not relied upon by Whooper Swan, Golden Plover, Lapwing or Greenland white-fronted geese. These species were not recorded on the bog during winter walkover surveys between 2013 and 2019, nor were they recorded utilising the bog during surveys in December 2020 and early March 2021. Given the absence of these species during baseline surveys, they do not rely on Castlegar Bog and will not be subject to any disturbance as a result of the proposed PCAS. As such, the potential for likely significant effects to these four species during the **non-breeding season** are 'screened out'.<br><br>Wigeon has been recorded on Castlegar Bog. Other wetland bird species recorded on Castlegar Bog during surveys include Mallard, Water Rail, and Coot. These species have been recorded in low numbers on the bog and the results of baseline surveys do not suggest that the population of these species that are associated with this SPA rely on the bog as an over-wintering non-breeding habitat. Nevertheless, given the presence of these species and the presence of suitable wetland habitat for these species within the Castlegar Bog, and in view of the precautionary principle, the potential for proposed activities to result in disturbance to wigeon, which is a special conservation interest bird species of this SPA, and the three other wetland bird species listed above cannot be ruled out. |

## 2.9 Screening for Appropriate Assessment: Conclusion Statement

The Screening Evaluation provided herein has examined the potential for any effects arising via source pathway linkages with regard to connectivity to designated European Sites (SACs and SPAs) within the zone of influence of all predicted Project impacts. An extended buffer zone of 15km was further considered, in line with NPWS guidance (DoEHLG, 2009), for evaluation of effects on any European Site which may arise associated with the proposed decommissioning and rehabilitation of Castlegar Bog, as required. There is a total of 14 European sites located within the 15km zone of consideration:

**Table 8: 14 No. European Sites**

| No. | European Site | Site code |
|---|---|---|
| 1 | Ballynamona Bog And Corkip Lough SAC | 002339 |
| 2 | Ballygar (Aghrane) Bog SAC | 002199 |
| 3 | Castlesampson Esker SAC | 001625 |
| 4 | Four Roads Turlough SAC | 001637 |
| 5 | Glenloughaun Esker SAC | 002213 |
| 6 | Killeglan Grassland SAC | 002214 |
| 7 | Lisduff Turlough SAC | 000609 |
| 8 | Lough Croan Turlough SAC | 000610 |
| 9 | Lough Funshinagh SAC | 000611 |
| 10 | River Shannon Callows SAC | 000216 |
| 11 | Middle Shannon Callows SPA | 004096 |
| 12 | River Suck Callows SPA | 004097 |
| 13 | Lough Croan Turlough SPA | 004139 |
| 14 | Four Roads Turlough SPA | 004140 |

Following screening it can reasonably be concluded that **there is no likelihood of significant effects to 12 of the above European Sites** because of the proposed project, either alone or in-combination with other plans or projects. **Therefore, the potential for significant effects on 12 European Sites has been excluded, and have been 'Screened Out' from the Appropriate Assessment process and no Appropriate Assessment is required for these European Sites.**

Following screening it can reasonably be concluded that **there is likelihood of significant effects to 2 of the above European Sites** as a result of the proposed project, either alone or in-

combination with other plans or projects. **Therefore, the potential for significant effects on any European Sites has not been excluded, and Appropriate Assessment is required in respect of the following European Sites:**

**Table 9: European sites: likelihood of significant effects**

| No. | European Site | Site code |
|---|---|---|
| 1 | River Suck Callows SPA | 004097 |
| 2 | Middle Shannon Callows SPA | 004096 |

**A Stage 2 Appropriate Assessment Report follows in respect of the above European Sites.** A **Finding of No Significant Effects (FONSE) Report** is appended to this Report as **Appendix A.**

# 3 STAGE 2: NATURA IMPACT STATEMENT

## 3.1 Introduction to Stage 2

Following screening to inform the requirement for Appropriate Assessment, the potential for significant effects, could not be excluded, with regard to the following 2 European Sites:

1. River Suck Callows SPA (Site Code 004097)
2. Middle Shannon Callows SPA (Site Code 004096)

This section comprises a detailed appraisal of the impacts of the proposed Castlegar Bog Decommissioning and Rehabilitation (either directly or indirectly) or in-combination with other projects or plans, on the integrity of the above listed European Sites, and is considered with respect to their conservation objectives and to their structure and function.

An overview of Castlegar Bog proposed Decommissioning and Rehabilitation is provided in Section 2.2. and see also the document included as Appendix B of this report.

## 3.2 Receiving Environment

Castlegar Bog is located in east Co. Galway, just over 4km east of Ahascragh and 6km north of Ballinasloe. 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 Móna or been in industrial peat production. Bord Na Móna 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.

A habitat map is included as Figure 4, and the local context is further illustrated overleaf in Figure 10.

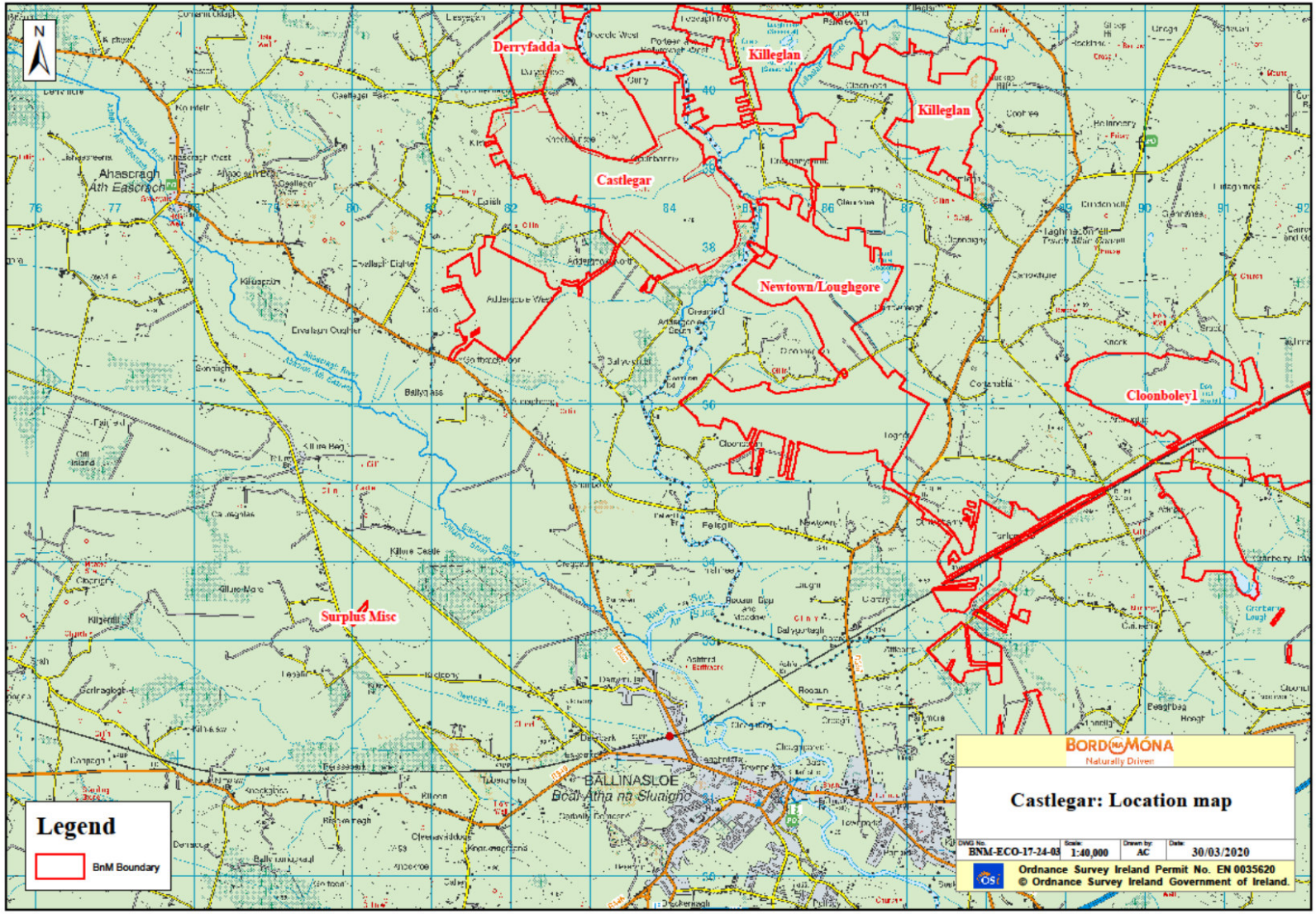



**Figure 10: Castlegar Bog Local Context, as reproduced from the Castlegar Decommissioning and Rehabilitation Plan 2021**

3.2.1 Current Status of the Special Conservation Interests of the European Sites under consideration

#### 3.2.1.1 River Suck Callows SPA & Middle Shannon Callows SPA

The same special conservation interests, namely Wigeon and wetlands and waterbirds, were screened in for both these SPAs. A summary of both interest features is provided below.

Wigeon (*Anas penelope*) [A050]

The latest Article 12 reporting data available from NPWS in respect of Wigeon relates to the period 2006-2011. The wintering population size for this period, based on a five-year mean was 56,350 of which 43,746 occurred within the SPA network. Trends, both short term (1999-2011) and long-term (1987-2011) were all negative and decreasing. The main pressures and threats comprise *outdoor sports and leisure activities, recreational activities*, *renewable abiotic energy use*, *marine and freshwater aquaculture*, *hunting and collection of wild animals* (terrestrial), *pollution to surface waters*, *marine water pollution*, *other forms of pollution, invasive non-native species*, *human induced changes in hydraulic conditions* and *other ecosystem modifications*.
Results of the Irish Wetland Bird Survey (IWeBS) for the winter period 2009/10 – 2015/16 report a population size (ROI) of 50,452 individuals of which 38,514 were associated with the SPA network and describes long term declines in the wintering population of Wigeon in Ireland. The peak count in the period 2011-15 for the Shannon Callows was 1,351; whilst for the River Suck in the same period, the peak count was 3385.

No species-specific guidance is available with which to establish connectivity distances to SPA's, however, a foraging distance of up to 16km is stated in Cramp 1977-1993. Wigeon are almost entirely vegetarian feeding on mainly leaves, stems, stolons, bulbils and rhizomes of plants. Suitable foraging and roosting habitat occurs adjacent to Castlegar Bog along the River Suck. Wigeon (a total of 7 individuals) were recorded at silt pond SW119 during a site survey in March 2021. In line with a precautionary approach, potential connectivity to the Middle Shannon Callows is assumed.

Wetland and Waterbirds [A999]

The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the wetland area contained in the SPA and the waterbirds that utilize this resource are of special conservation interest for 'Wetland & Waterbirds'. In addition to the Special Conservation Interests described above, the Site Synopsis for the Middle Shannon Callows SPA describes a wide range of species as utilizing the site, including Mute Swan, Teal, Tufted Duck, Dunlin, Curlew and Redshank. The callow grasslands present in the SPA provide optimum feeding grounds for these various species of waterfowl, while many of the birds also roost or rest within the (European) site. Wetland habitats do occur within the Castlegar Bog boundary, outside the peat extraction areas and adjacent to the River Suck, and as they occur within the River Suck SPA (also designated for wetland and waterbirds) and at the existing silt ponds within the bog site. Other wetland birds

that were recorded in these habitats and at silt ponds. The other wetland bird species recorded during site surveys were Mallard and Coot. These were restricted to silt pond SW119 during field surveys. Both Mallard and Coot are representative of the waterbirds that are included as part of the waterbird and wetland habitat special conservation interest of the SPA,.

**SPA Threats & Pressures**

The threats and pressures to the River Suck Callows SPA and Middle Shannon Callows SPA have been documented by the NPWS in the latest Natura 2000 Standard Data Return form for these SPAs (dated October, 2020). **Table 10** below lists these threats and pressures and examines their implication for the conservation status of the SPA's wetland bird populations that are examined as part of this Natura Impact Statement.

**Table 10: River Suck Callows SPA & Middle Shannon Callows SPA Threats & Pressures and associated examination of risk to the Special Conservation Interest Bird Species Wetland Birds**

| Threat Code | Threat | Threat Rank | Are Birds at Risk from Threat |
|---|---|---|---|
| A04 | Grazing | Medium | Yes, wetland birds of the SPA are a risk from excessive and inappropriate grazing levels. |
| I01 | Invasive non-native species | Medium | Yes, wetland birds of the SPA and particularly diving species are at risk of changes to lake ecology as a result of the introduction of non-native invasive species. |
| A08 | Fertilisation | Medium | Yes, this habitat is sensitive to inappropriate application of artificial fertilisation |
| G01.01 | Nautical sports | High | Yes, wetland bird species, and particularly aquatic species such as Wigeon, Water rail and Coot are at risk from disturbance associated with leisure fishing. |
| G01.02 | Walking, horse-riding and non-motorised vehicles | Medium | Yes, wetland birds are a risk of being routinely disturbed as a result of inappropriate walking, horse-riding and the use of non-motorised vehicles within or adjacent to the SPA. |

| Threat Code | Threat | Threat Rank | Are Birds at Risk from Threat |
|---|---|---|---|
| F03.01 | Hunting | Medium | Yes, wetland bird species are at risk from excessive hunting. |
| F02.03 | Leisure fishing | Medium | Yes, wetland bird species, and particularly aquatic species such as Wigeon, Water rail and Coot are at risk from disturbance associated with leisure fishing. |

3.2.2 Conservation Objectives for the relevant European Sites

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and;
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and;
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

**3.2.2.1 Middle Shannon Callows SPA (Site Code 004096)**

The generic conservation objectives of the River Suck Callows SPA aim to define favourable conservation condition for the particular habitat or species at that site. The latest generic conservation objectives for the SPA were published on the 23td March 2021. These objectives and conditions are summarised in Table 11 below in respect of special conservation interests of the River Suck Callows SPA which were screened in for further evaluation.

**Table 11: Conservation Objectives of Middle Shannon Callows SPA**

| | |
|---|---|
| **Objective #1** | To maintain or restore the favourable conservation condition of the wetland habitat at Middle Shannon Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. |
| **Objective #2** | To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA: |

#### 3.2.2.2 River Suck Callows SPA

The generic conservation objectives of the River Suck Callows SPA aim to define favourable conservation condition for the particular habitat or species at that site. The latest generic conservation objectives for the SPA were published on the 23td March 2021. These objectives and conditions are summarised in Table 12 below in respect of the Qualifying Interests of the River Suck Callows SPA which were screened in for further evaluation.

**Table 12: Conservation Objectives of River Suck Callows SPA**

| | | | |
|---|---|---|---|
| **Objective #1** | To maintain or restore the favourable conservation condition of the wetland habitat at River Suck Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. | | |
| **Objective #2** | To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA: | | |
| | **Species Code**<br>**A038**<br>**A050**<br>**A140**<br>**A142**<br>**A395** | **Common Name**<br>**Whooper swan**<br>**Wigeon**<br>**Golden plover**<br>**Lapwing**<br>**Greenland white-fronted geese** | **Scientific Name**<br>***Cygnus cygnus***<br>***Anas penelope***<br>***Pluvialis apricaria***<br>***Vanellus vanellus***<br>***Anser albifrons flavirostris*** |

### 3.3 Summary of Impact Pathways screened in for examination at Stage 2

The following impact pathways to Qualifying Interests/Special Conservation Interests are examined in relation to each of the 5 European Sites under consideration, in order to evaluate the effect of Castlegar Bog Decommissioning and Rehabilitation, if any, on the integrity of each of the five European Sites.

**Table 13: Qualifying Interests/Special Conservation Interests and Impact Pathways examined at Stage 2**

| European Site | Qualifying Interest/Special Conservation Interest for evaluation at Stage 2 | Impact examined at Stage 2 |
|---|---|---|
| Middle Shannon Callows SPA (Site Code 004096) | Wigeon (Anas penelope) [A050]<br>Wetland and Waterbirds [A999] | a) Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site<br>b) Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. |
| River Suck Callows SPA | Wigeon (Anas penelope) [A050]<br>Wetland and Waterbirds [A999] | A) Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site;<br>b) Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. |

## 3.4 Evaluation of potentially adverse impacts at Stage 2 (Alone & In-Combination)

The evaluation of potential adverse impacts are grouped between those which impact habitats (i.e. indirect based on where secondary habitat degradation) and species (i.e. disturbance and displacement). Disturbance or displacement to wigeon and other waterbirds that form part of the 'Wetland and Waterbirds' SCI is dealt with collectively. Potentially adverse secondary effects on wigeon and other waterbirds as part of 'Wetlands and waterbirds' are evaluated under 'Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest.'

The following evaluations are based on known sensitivities and best available scientific knowledge. Likely disturbance to wintering and passage wildfowl is based on flight initiation distances/Minimum Approach Distances (MADS) from peer reviewed publications.

In combination evaluations are based on the other plans or projects described in Section 2.4.5.

### 3.4.1 Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to SPAs

Pathways for this impact to arise occur between Castlegar Bog and the River Suck Callows SPA and the Middle Shannon Callows SPA. Potential impacts relating to the indirect loss, reduction or degradation of terrestrial habitats is restricted to the River Suck Callows SPA, which is the only SPA occurring within or in close proximity to Castlegar Bog. Terrestrial habitat in this instance refers to the habitats within and adjoining Castlegar bog. The results of field surveys and other supporting baseline data as detailed in Section 3.2.1 above have shown that the terrestrial habitat of Castlegar Bog is not relied upon by special conservation interest bird species or other waterbirds.

Potential degradation of aquatic habitats will have the potential to result in impacts to both the River Suck Callows SPA and the Middle Shannon Callows SPA, located downstream of Castlegar Bog. Aquatic habitat relates to instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including fisheries, and a diverse macroinvertebrate community which provides feeding resources for various fauna.

Decommissioning and Rehabilitation (hereafter D&R) at Castlegar Bog will require direct excavation of the banks and bed of the existing drainage channels (peat production drains), levelling of existing stock piles, movement of peat for the infilling of drains, field re-profiling and to create various blocks/speedbumps and cell bunds and excavations to lift or remove outfall pipes. It will require the use of machinery and involve the removal of waste, including raw material, potentially contaminated soils or peat, railway infrastructure, and fuel.

#### 3.4.1.1 Water quality effects due to sedimentation or the release of deleterious materials

Alone

Erosion and deposition are natural process in watercourses varying naturally throughout the year. However, additional sediment contributions entering the watercourse, such as from D&R in, adjacent to or upstream of individual watercourses, could have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels by sediment causing mortality impacts for salmonid eggs (affecting recruitment) and interfering with invertebrate life stages within gravel substrates (interstitial spaces). These impacts may be mobilised downstream and affect river reaches at a distance from the physical works. Effects on these receptors may in turn affect SCI species /waterbirds which utilise invertebrates as food resources. In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality.

The release of large volumes of sediment and /or deleterious materials to habitats adjacent to, within, or upstream from an SPA may reduce the quality of terrestrial and riparian habitats as foraging or roosting resources for SCI's, and/or result in effective habitat loss should SCI's cease to utilise degraded habitats.

Overall effects may reduce the suitability of the receiving waters as a resource for SCI's, thus affecting Site Integrity and/or Conservation Objectives – particularly those which seek to maintain or restore the favourable conservation condition of the wetland habitat at the designated SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

In combination

There is potential for cumulative effects from other plans or projects which may result in similar source-impact-pathways to waterbodies upstream of or within the SPA's under consideration.

The decommissioning and rehabilitation of Kellysgrove Bog by BnM, which is also within the River Suck catchment ,10km south of Castlegar Bog but also upstream of the Middle Shannon Callows SPA, may result in likely significant/potentially adverse effects on water quality; this project is known to temporally overlap works proposed for Castlegar Bog.

In the absence of mitigation measures to avoid/reduce harmful effects, the order of cumulative effects is that of both projects combined, notwithstanding that it is assumed that Appropriate Assessment and mitigation measures, if required, will be undertaken and put in place.

Various sources of water-quality related effects - with linkage to activities such as Agriculture or Turbary - within the SPA constitute activities requiring consent (ARC) of the minister and therefore are unlikely to result in in combination adverse effects.

All other plans or projects identified are subject to Appropriate Assessment/and or consented mitigation measures and it is assumed that in-combination effects are therefore unlikely, due to the requirement for mitigation if potentially adverse effects are identified.

Stage 2 Evaluation

In the absence of measures to avoid/reduce harmful effects, decommissioning and rehabilitation of Castlegar Bog, in-combination with other projects, such as the decommissioning and rehabilitation of other bog sites, will have the potential to result in adverse effects to the favourable conservation status of wetland habitats of the River Suck Callows SPA and the Middle Shannon Callows SPA.

#### 3.4.1.2 Alteration of flow regimes or changes to watercourse morphology

Alone

Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. In the absence of mitigation there is potential for sediment deposition at a scale which may alter tributary channel morphology within or ex-situ an SPA thus reducing the suitability of receiving habitats for SCI's, and affect Site Integrity and/or Conservation Objectives – particularly those which seek to maintain or restore the favourable conservation condition of the wetland habitat at the designated SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

In addition the decommissioning and rehabilitation at Castlegar Bog will have result in changes to local hydrogeological and hydrological conditions, with potential for downstream effects at the adjacent River Suck Callows SPA. Impacts to hydrogeology and hydrology may arise from:

a) increases in groundwater levels which may affect neighbouring lands across hydraulic gradients;
b) reductions in conveyance capacity around or through the BNM bog, or;
c) Marginal alteration of topographical catchments, also resulting in flooding as a result of increased run-off.

In combination

There is potential for cumulative effects from other plans or projects which may result in similar source-impact-pathways to waterbodies upstream of or within the SPA's under consideration.

The decommissioning and rehabilitation of Kellysgrove Bog by BnM, which is also within the River Suck catchment but 10km south of Castlegar Bog, and upstream of the Middle Shannon Callows SPA, may result in likely significant/potentially adverse effects on water quality; this project is known to temporally overlap works proposed for Castlegar Bog.

In the absence of mitigation measures to avoid/reduce harmful effects, the order of cumulative effects is that of both projects combined, notwithstanding that it is assumed that Appropriate Assessment and mitigation measures, if required, will be undertaken and put in place.

Various sources of flow regime or water morphology related effects, with linkage to activities such as Agriculture or Turbary, within the SPA constitute activities requiring consent (ARC) of the minister and therefore are unlikely to result in in combination adverse effects.

All other plans or projects identified are subject to Appropriate Assessment/and or consented mitigation measures and it is assumed that in-combination effects are therefore unlikely, due to the requirement for mitigation if potentially adverse effects are identified.

Stage 2 Evaluation

In the absence of measures to avoid/reduce harmful effects, decommissioning and rehabilitation of Castlegar Bog, in-combination with other projects, such as the decommissioning and rehabilitation of other bog sites, will have the potential to result in adverse effects to the favourable conservation status of wetland habitats of the River Suck Callows SPA.

#### 3.4.1.3 Spread of Invasive Species

Alone

Invasive aquatic species include non-native, terrestrial invasive species such as Japanese knotweed or Himalayan balsam, invasive riparian vegetation (such as Japanese knotweed) and also fish and mobile invertebrate fauna (such as Asian clam, Signal crayfish, or non-native shrimp species). Aquatic invasive species may be introduced to unaffected catchments or spread within infected watercourses to hydrologically connected SPA's during the course of instream works or transported via excavated material by site machinery.

Aquatic invasive species have the potential for significant ecosystem disturbance, disrupting the predator/prey balance or causing habitat disruption within aquatic systems. The spread of aquatic invasive species is not restricted in extent to the footprint of construction/instream works, but can be transported both upstream (mobile species and 3rd party transport) and downstream (hydrological transport) within a watercourse, potentially extending throughout the catchment.

Non-native, invasive species potentially affecting the aquatic environment can also include terrestrial species which compromise bank integrity, riparian structural diversity and riparian invertebrate production contributing to habitat diversity and feeding inputs within the aquatic system.

Were the impacts described above to occur within, in close proximity to, or upstream of an SPA watercourse it may result in adverse effects on SCI'S and Conservation objectives such as the resource status and favourable condition of SCI habitat, by virtue of effects to structure and composition of SCI habitat, an altered hydrological regime and through secondary effects on prey item species, affecting the supporting habitat quality for SCI Species.

In instances where this impact occurs it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for ecologically connected SCI's, thus affecting Site Integrity/Conservation Objectives similarly.

In combination

There is potential for cumulative effects from other plans or projects which may result in similar source-impact-pathways to the SPA's under consideration.

The decommissioning and rehabilitation of Kellysgrove Bog by BnM, which is also within the River Suck catchment but 10km south of Castlegar Bog, and upstream of the Middle Shannon Callows SPA, may result in likely significant/potentially adverse effects on supporting habitats similarly; this project is known to temporally overlap works proposed for Castlegar Bog.

In the absence of mitigation measures to avoid/reduce harmful effects, the order of cumulative effects is that of both projects combined, notwithstanding that it is assumed that Appropriate Assessment and mitigation measures, if required, will be undertaken and put in place.

Various sources of vectors for the introduction of invasive species, with linkage to activities such as Agriculture or Turbary, within the SPA constitute activities requiring consent (ARC) of the minister and therefore are unlikely to result in in combination adverse effects.

All other plans or projects identified are subject to Appropriate Assessment/and or consented mitigation measures and it is assumed that in-combination effects are therefore unlikely, due to the requirement for mitigation if potentially adverse effects are identified.

Stage 2 Evaluation

In the absence of measures to avoid/reduce harmful effects, the magnitude of effects (alone and in combination) is evaluated as high, with adverse effects on European Sites/Conservation Objectives evaluated as likely.

3.4.2 Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest

**3.4.2.1 Alone**

Disturbance/displacement can result in effective habitat loss, which, should it be permanent or irreparable and within the boundary of an SPA, is considered to adversely affect the integrity of the European Site(s) and its conservation objectives – particularly the maintenance or restoration of the favourable conservation condition of the bird species listed as Special Conservation Interests for these SPAs.

Short term disturbance events, or events which promote weak responses in SCI's outside the SPA, may be significant but dependant on availability of displacement habitat and specific species tolerance to disturbance, may not adversely affect an ecologically meaningful proportion of the SCI population and hence European Site integrity. However, a precautionary approach is taken throughout given the possible scale and extent of sources of disturbance (in the absence of mitigating measures such as timing works to avoid sensitive periods), and the presence of certain species for which sensitivity to disturbance is higher.

As the construction phase of decommissioning and rehabilitation will involve the use of heavy machinery, disturbance/displacement effects on waterbirds listed as Special Conservation Interests for the various SPA's to which possible connectivity has been established has been identified as a potential source impact pathway for likely significant effects, and in the absence of protective measures potentially adverse effects on European Site Integrity/Conservation Objectives.

Seeing as the construction phase is expected to be of a temporary to short-term duration, the disturbance effects are considered similarly temporary to short term in duration. Due however to

the proximity of suitable SCI habitat to the proposed works, and the possibility of works taking place during the winter/migration season, the potential for adverse effects through the disturbance/displacement of wintering or passage wildfowl is considered and examined herein.

To determine if disturbance effects are likely, a literature review looked at the tolerances of bird species to disturbance. Although these distances, often referred to as the Minimum Approach Distance (MAD; a function of observed Flight Initiation Distances (FID)) are not considered to be the best determinant of whether disturbance will affect birds, they nevertheless remain the most effective approach for establishing set-back distances (or buffers) to limit disturbance effects around areas where birds occur. Livezey et al. (2016) reviewed a substantial number of such studies between 2009 and 2015 where FIDs had been calculated for the species groups which are pertinent for the current appraisal, including non-breeding Anseriformes (wildfowl, including Wigeon and other waterbirds) and Charadriiformes (including other waders and gulls). As it offers the most comprehensive review currently available, the MADs presented in Livezey et al., (2016) in respect of motorized vehicles and/or pedestrians (with the highest MAD from either selected) were considered an appropriate basis for use in the current appraisal; these were 123.2m for Anseriformes and 42.2m in Charadriiformes.

An evaluation of the significant effects due to noise and disturbance resulting from the decommissioning and rehabilitation on SCI species potentially occurring at or in proximity to Castlegar Bog is presented in **Table 14**.

**Table 14 SCI Disturbance evaluation**

| SCI | MAD (m) | Sensitivity | Notes |
|---|---|---|---|
| Wigeon | 123.2 | Foraging/ Roosting | A small number (7 in total) of wigeon were observed at the silt pond SW119 during field surveys. This pond offers suitable habitat within 123.2m of works and usage cannot be precluded; significant disturbance effect. |
| Wetland and waterbirds | 123.2* | Foraging/Roosting | A small number of Mallard (max. no. of 3) and Coot (max. no. of 4) were observed at the silt pond SW119 during field surveys. This pond offers suitable habitat present and usage cannot be precluded; significant disturbance effect. |

* MAD for Anseriformes utilised as all Site Synopses include at least one other member of this order.

#### 3.4.2.2 In combination

There is potential for cumulative effects from other plans or projects which may result in similar source-impact-pathways to the SCIs under consideration, and their respective SPAs (i.e. Middle Shannon Callows and the River Suck Callows SPA).

The decommissioning and rehabilitation of Kellysgrove Bog by BnM, which is also within the River Suck catchment but 10km south of Castlegar Bog will overlap with the works at Castlegar Bog. The PCAS for Kellysgrove Bog has been screened for Appropriate Assessment and it has been found not to have the potential to result in likely significant effects to European Sites. As such works proposed for Kellysgrove Bog will not have the potential to combine with those at Castlegar Bog to result in cumulative adverse effects to European Sites.

In the absence of mitigation measures to avoid/reduce harmful effects, the order of cumulative effects is that of both projects combined, notwithstanding that it is assumed that Appropriate Assessment and mitigation measures, if required, will be undertaken and put in place.

Additional sources of disturbance such as baseline agricultural activities /turbary within or in close proximity to the SPAs under consideration, and in suitable habitat for SCIs, are considered in the large part unlikely to result in in combination adverse effects- primarily due to habituation to these background baseline activities. In instances where sources of disturbance greater than baseline levels occur within SPA's they may constitute Activities Requiring Consent and thus be regulated in terms of the likelihood of significant effects stemming from these.

All other plans or projects identified are subject to Appropriate Assessment and it is assumed that in-combination effects are therefore unlikely, due to the requirement for mitigation if potentially adverse effects are identified.

#### 3.4.2.3 Stage 2 Evaluation

In the absence of measures to avoid/reduce harmful effects, the magnitude of effects (alone and in combination) is evaluated as high, with adverse effects on European Sites/Conservation Objectives evaluated as likely.

It is acknowledged that, following decommissioning and rehabilitation, the presence of an undisturbed wetland habitat the size of Castlegar Bog, may provide foraging opportunities, attract wildfowl species as a refugium, and/or act as a disturbance buffer to birds utilising the River Suck corridor. These positive quality effects may ultimately positively impact the SCI's and benefit the Conservation Objectives of the adjacent SPA. For the avoidance of doubt however, this is not considered in the evaluation above, nor is any reliance placed on this in the consideration of effects.

## 3.5 Mitigation Measures

3.5.1 Description of the measure

### 3.5.1.1 Best Practice environmental Control Measures to be applied to Decommissioning and Rehabilitation Works

The following Best Practice Environmental Control measures are to be applied as standard to ensure compliance with IPC license Conditions:

- Bog restoration/rehabilitation works will be restricted to within the footprint of the proposed rehabilitation works area.
- The proposed rehabilitation works 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.
- A standard operating procedure overseen by the Project Ecologist will be in place for all PCAS activities to avoid any significant effects on breeding birds. This will include ground nesting birds and will apply to silt pond cleaning, and cutaway activities. Restriction zones will be in place to avoid effects on any identified ground nesting birds/waterfowl as appropriate.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- The proposed works 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, works will be halted.
- Works 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.
- All waste will be sorted by the works crews, managed within the site in designated waste disposal facilities, and removed to a licenced waste facility, in line with BnM Standard operating practice.
- 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.

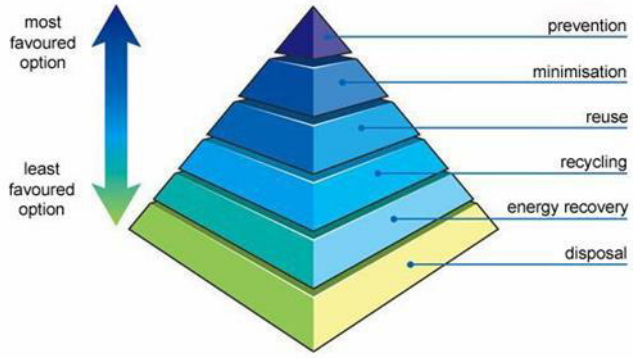
- All fuels required for machinery and equipment will be stored in a designated location, away from main traffic activity, at the nearest BnM Compound. All fuel will be stored in bunded, locked storage containers. Diesel or petrol fuel and mechanical oils will also be used by site vehicles.
- Mobile 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 works will be reduced by keeping spill kits and other appropriate equipment on-site.
- Site works will be carried out in accordance with 'best practice'. In order to ensure compliance and implementation of 'best practice', these measures will be communicated to relevant Bord na Móna staff and updated as required.
- All waste water will be removed by a licenced waste contractor to a licenced waste water treatment facility.
- Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
    1. The land is waterlogged
    2. The land is flooded, or it is likely to flood
    3. The land is frozen, or covered with snow
    4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann).
    5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- No fertiliser will be spread on land within 2 metres of a surface watercourse.
- Buffer zones in respect of waterbodies, as specified on https://www.epa.ie/about/faq/name,57156,en.html, will be adhered with at all times with regard to fertiliser application.

#### 3.5.1.2 Best Practice Measures around the treatment of Works

Condition 7 of the IPC licence for Peat Extraction at Castlegar Bog requires waste items to be disposed of or recovered as follows:

- 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.
- 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.

- 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:
    - The names of the agent and transporter of the waste.
    - The name of the persons responsible for the ultimate disposal/recovery of the
    - waste.
    - The ultimate destination of the waste.
    - Written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site.
    - 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.
    - 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, as agreed by the EPA, with waste records maintained as required for inspection by authorized persons of the EPA at all times.
- Where possible, Bord Na Móna will utilize the appropriate waste hierarchy to identify waste that can reused or recycled ahead of disposal.




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

#### 3.5.1.3 Best Practice & Biosecurity

The potential for importation or introduction of non-native plant species (such as Japanese Knotweed, Himalayan Balsam, etc.) has been identified. 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'.

Rehabilitation and decommissioning in the bog will have due regard to the relevant biosecurity measures outlined below:

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

- All water quality monitoring equipment which has been used in water will be treated with a disinfectant or a strong saline solution and then thoroughly dried (ideally over 24 hours) BEFORE being used in water again.
- Check, Clean, Dry protocol will be adhered with before and after visiting a river or lake for monitoring, in line with Best Practice[5] or for activities such as Sphagnum inoculation.
- Virkon Aquatic will be available as required.

#### 3.5.1.4 Silt Ponds

Silt Ponds – 8 no. Silt ponds with a total volume of 16,651m$^3$ are in place at Castlegar Bog and connected to the existing drainage network. These silt ponds, already stipulated and in use as mitigation measures in respect of Peat Extraction under IPC license, will continue to function as the primary intervention in terms of sediment release to receiving waterbodies. Regular cleaning and reporting on same already forms part of annual (AER) reporting submitted to EPA. All Silt Ponds at Castlegar Bog are currently compliant with EPA requirements. **Table 15** below, and Figure 11 overleaf summarise and illustrate the onsite Silt Pond locations, the latter also illustrates the current flow regime within the main drainage network (into which any other drains

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

also feed). Continued maintenance and reporting on same will be reported on annually until IPC license Surrender.

**Table 15 Silt Ponds in use at Castlegar Bog**

| Bog Name | IPC License Reference | Pond No. | Area ($m^2$) | Volume ($m^3$) |
|---|---|---|---|---|
| Castlegar Bog | 502 | CG236_7 | 1573 | 2359 |
| Castlegar Bog | 502 | CG235 | 1535 | 2302 |
| Castlegar Bog | 502 | CG235A | 4315 | 6472 |
| Castlegar Bog | 502 | CG229 | 2171 | 3256 |
| Castlegar Bog | 502 | CG230_1 | 1012 | 1518 |
| Castlegar Bog | 502 | CG232 | 209 | 314 |
| Castlegar Bog | 502 | CG233 | 139 | 208 |
| Castlegar Bog | 502 | CG234 | 148 | 222 |
| | | **Total** | **11101** | **16651** |

The above capacity is considered sufficient for the purposes of decommissioning and rehabilitation.

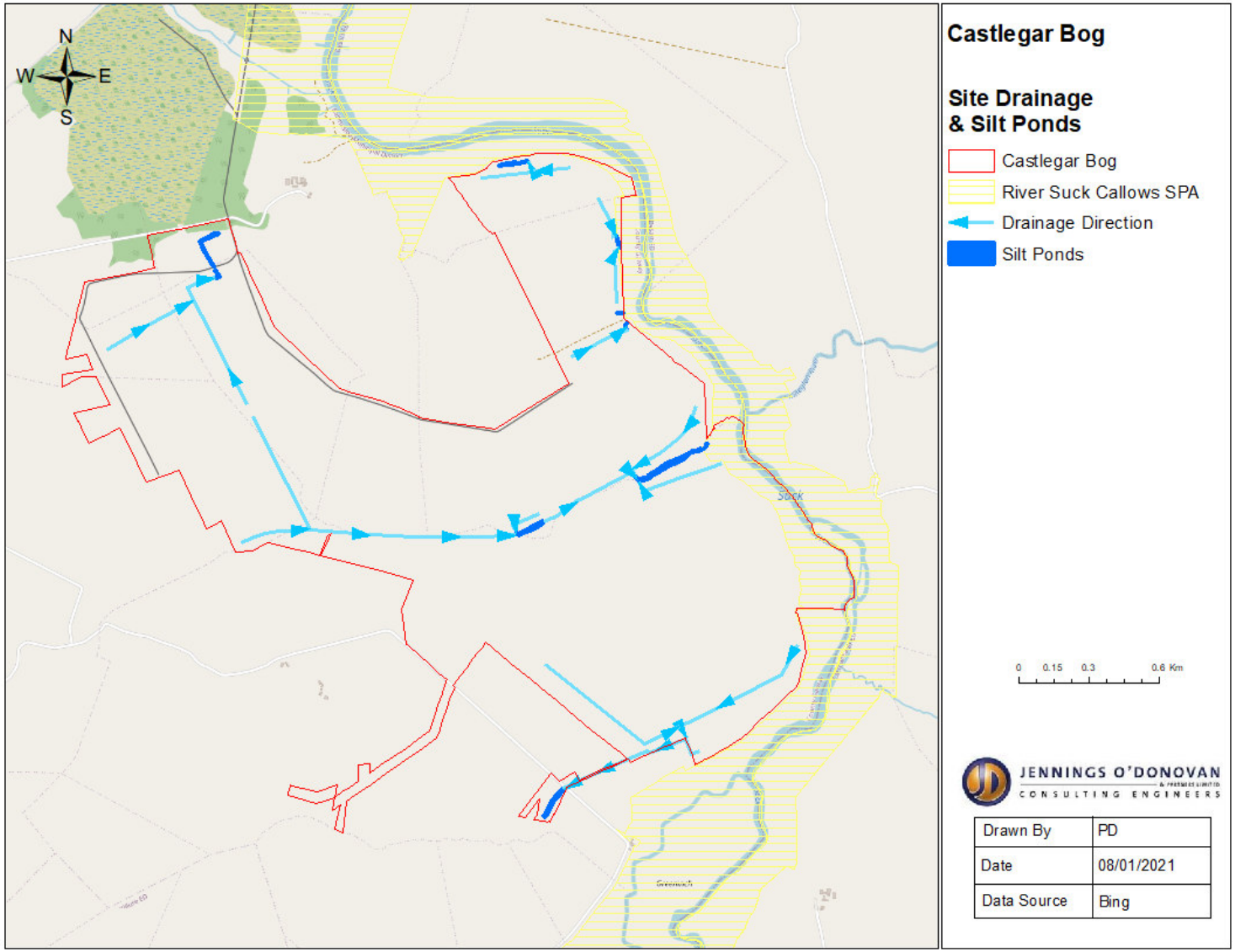



**Figure 11: Castlegar Bog Site Drainage and Silt Ponds**

#### 3.5.1.5 Cleaning Silt Ponds

Cleaning of silt ponds will follow the below best practice measures.

- Cleaning of silt ponds will align with best practice measures, including BnM Standard Operating Procedures (SOPs) for works within and near watercourses, works with hydrocarbons, biosecurity measures when working at and different watercourses and waterbodies..
- Cognisance of capture of non-target aquatic species (Crayfish, lamprey, small fish etc.) within the dredged material and the secure rescue and translocation of these species downstream of the pond cleaning works in line with IFI guidance. Cleaning of silt ponds will be completed under licence (following consultation with IFI) and in accordance with strict biosecurity measures. Silt ponds will be cleaned from the inlet point to the outlet point allowing fish and aquatic life to migrate downstream as the works progress. The silt pond cleaning works and species translocation efforts will be overseen by a suitably qualified Ecologist/Ecological Clerk of Works/Environmental Supervisor and ongoing monitoring undertaken by the project ecologist.
- Excavated silt material will be placed at least 20m away from the blue line feature and will be deposited into corralled berms and thereafter secured into the nearby ground with the back of the machine excavator bucket, to ensure particulate matter is not mobilised during or following rainfall events.

#### 3.5.1.6 Measures to avoid runoff when carrying out rewetting of peat

- All Silt ponds will be cleaned prior to the commencement of upstream drain blocking.
- When blocking drains, terminal blocks i.e. the blocks at the extremity of the drain and closest to any hydrologically connected watercourses, will be blocked first with AT MINIMUM 2 IN SERIES STANDARD BLOCKS, to prevent sediment release from subsequent block insertion.
- Blocks will be inspected during periods of dry weather to ensure no 'cracking' of peat has occurred which might allow for discharge.
- Discharge from all rehabilitated areas will be directed into silt ponds.
- Outfalls and overflow pipes from e.g. bunded cells will be directed into silt ponds.
- An Emergency Response Plan will be available in the event of any inadvertent release of a large volume of sediment.
- The above will be overseen by a suitably qualified Ecologist/Ecological Clerk of Works.

Implementation of the mitigation measures for the Decommissioning and Rehabilitation activities will be the responsibility of Bord na Móna Operations and supervision of the works will be carried out by this Bord na Móna Department incorporating Area leaders, Operations Managers and Project Supervisor Construction Stage (PSCS).

In addition, implementation of the mitigation measures will be monitored and inspected by Bord na Móna Environmental, Ecology and Engineering Departments, who are independent of Bord Na Móna Operations. Project Ecologists, Engineers and Environmental Compliance Officers will be appointed for each bog and they will ensure that measures are carried out in accordance with an Site-Specific Environmental Management Plan which sets out the required mitigation measures for each bog. The Ecologist, Environmental Compliance Officer, Engineer, H & S Manager, Site Supervisor and PSCS will have a 'stop works' authority.

#### 3.5.1.7 Measures to avoid changes to hydrological regime

- Peripheral drains will be maintained and where required, additional drains will be provided, to create hydraulic barriers
- Specified internal drains will be maintained to avoid flooding where required to maintain existing drainage of adjacent lands. In some instances this may include re-grading or widening of specific existing drains which currently act as preferential flow paths through the bog.
- Monitoring of adjacent lands will be undertaken during the operation phase of the PCAS.

#### 3.5.1.8 Measures to avoid polluted runoff in the event new drains are required or existing drains require upgrade

- Where existing drains require upgrading, barriers to control the flow of sediment downstream along the drain will be installed prior to the commencement of upgrade works.
- The barrier will comprise in the installation of at minimum 2 in series standard blocks at the downstream end of the stretch of drainage channel to be upgraded. The 2 standard blocks will be installed upstream of the receiving drainage network downstream of the channel that is to be upgraded.
- The two standard blocks will be installed during low, ebb flows in the drain prior to the commencement of upgrade works.
- The 2 drain blocks may need to be installed well in advance of the drainage channel upgrade works during ebb flows.
- The build-up of silt material upstream of the 2 standard blocks will be monitored during upgrade works and the silt material will be removed from the drainage channel during works as it builds up. The material will be compacted into the adjacent field, a minimum of 10m from the nearest drain.
- Blocks will be inspected during periods of dry weather to ensure no 'cracking' of peat has occurred which might allow for discharge.
- Upon completion of the upgrade works all silt will be removed from the drainage channel immediately upstream of the 2 standard drain blocks prior their removal. The 2 standard drain blocks will only be removed once all upgrade works are completed.
- Where a new drain is required, it will be formed and established prior to connecting the drainage channel to wider drainage network. Only once it has formed and become

established, with the bed and banks stabilised will it be connected to the wider drainage network. This approach will minimise to a negligible level the potential for suspend solids to be generated in waters within the new drainage channel and conveyed downstream to the River Suck Callows SPA.

- An Emergency Response Plan will be available in the event of any inadvertent release of a large volume of sediment.
- The above will be overseen by a suitably qualified Ecologist/Ecological Clerk of Works.

Implementation of the mitigation measures for the Decommissioning and Rehabilitation activities will be the responsibility of Bord Na Móna Operations and supervision of the works will be carried out by this Bord na Móna Department incorporating Area leaders, Operations Managers and Project Supervisor Construction Stage (PSCS).

In addition, implementation of the mitigation measures will be monitored and inspected by Bord na Móna Environmental, Ecology and Engineering Departments, who are independent of Bord Na Móna Operations. Project Ecologists, Engineers and Environmental Compliance Officers will be appointed for PCAS at Castlegar bog and they will ensure that measures are carried out in accordance with an Site-Specific Environmental Management Plan which sets out the required mitigation measures for each bog. The Ecologist, Environmental Compliance Officer, Engineer, H & S Manager, Site Supervisor and PSCS will have a 'stop works' authority.

#### 3.5.1.9 Measures to Ensure all Berms & Drain Blocks are Fit for Purpose

An engineering specification for berms and drain blocks has been prepared for the Castlegar Rehabilitation Plan is provided as Appendix E to this Natura Impact Statement. As noted in the engineering specification the berms to be provided at Castlegar Bog are shallow at 300mm and their failure has not been identified as a risk. The possible failure of drain blocks has been identified as a at Castlegar Bog with associated downstream risks to the River Suck..

As shown on Figure 7 above a 1m high berm will be provided to protect marginal lands in WLT-3. The risk of berm failure was identified during the screening of the Castlegar Bog PCAS. Mitigation measures through design and through maintenance and avoidance will be implemented in order to ensure berm failure is avoided at Castlegar Bog.

The following measures will be implemented as part of the mitigation through design:

- It is recognized that consistency of peat and or sub-soil and its compaction in layers is important, resulting in a robust trench and berm mitigating water seepage. It should be firm enough to be shaped and compacted. Adequate compaction of the peat will be ensured.
- Prior to infilling, any loose or dried out peat in the base or sides of the drain should be removed to ensure a tight seal mitigating water seepage.

- Peat Berms are constructed circa 1000mm higher than the adjacent ground level to protect marginal lands. They are not designed to hold significant volumes of deep water and water levels will be managed at an appropriate level using pipes. They are designed to a width of 5m to be robust strong structures.
- The berm installation process includes a key formation in the drains. A 500mm deep key is formed by taking a strip of peat from the field and pushing it in to the drain where it is compacted by the bulldozer ensuring a tight seal. The excavator trims and shapes the completed berm avoiding presence of loose material exposed to wind erosion.
- Operators assigned to this work element are familiar with the technique and process and provide effective robust berms. The operators are experienced and capable of adapting to the particular conditions encountered within the bog.
- Qualified, experienced Engineers overseeing the works during the installation phase ensure that quality procedures of the various elements are implemented and effectively meet the standards for quality service and performance.

The following measures will be implemented through maintenance and avoidance:

- A post construction lidar and imagery survey will capture the impact of the completed rehabilitation measures indicating if any appropriate remedial action is required or deemed necessary.
- As peat berms are designed to retain a shallow level of water on the cutover there will be a reduction in discharge into the boundary drains preventing any negative impacts on adjacent agricultural land. (See below 'Emergency Failure Response' outlining mitigation measures to be put in place should any risks of undesirable hydrological impacts occur).

***Emergency Response Plan***

The Emergency Response Procedure is included in Appendix B and outlines the procedures to be implemented in the event of a Peat Spillage as follows:

- Isolate the source of peat spillage the source of which could include a silt pond failed berm or failed drain block.
- Assess the extent of the peat spill and follow to local receiving waters.
- Switch off any associate bog pumps.
- Construct dry peat berms around extent of peat flow and monitor.
- If the peat spillage is assessed to have the potential to extend to a receiving water deploy a silt curtain on the receiving water.
- Continue clean as instructed by/under direction of Local Authority/ Inland Fisheries Ireland / EPA.

#### 3.5.1.10 Measures to avoid disturbance or displacement to SCI bird species

Birds

- An Ecological Restriction Zone will be in place which includes the area within 150m of the River Suck Callows SPA boundary and the main silt pond (Pond No. CG235A, where Wigeon, Mallard and Coot were observed) where pathways for effects to SCI's have been identified – See Figure 12 overleaf. It is noted that this ERZ distance of 150m is greater than the MAD noted for these species thus providing for a robust ERZ to ensure disturbance to these species are avoided.
- The implementation of the ERZ will be overseen by the Project Ecologist.
- Once the ERZ is operational, no PCAS scheme activities will take place within the prescribed zone. Travel and access within these sections of the site to undertake cleaning or maintenance activities may be permitted as they are likely to be intermittent, short term and of low intensity and duration. General usage will be restricted to use of existing rail (if present) and travel passes. All will be overseen by the Project Ecologist
- The timing restrictions associated with the ERZ will be communicated to staff through toolbox talks, incorporated into the EMP for the project and visual markers will be placed on the peat extraction area to delineate the avoidance zone.
- Locations of these restriction zones will also be presented to the machine drivers via the built-in GPS tablet and ESRI application and the machine drivers will use this technology to avoid entering any restricted areas.
- Conformance will be audited through compliance checks by the Project Ecologist (with 'stop-works' authority).

#### 3.5.1.11 Measures to avoid changes to hydrological regime

- Peripheral drains will be maintained and where required, additional drains will be provided, to create hydraulic barriers.
- Specified internal drains will be maintained to avoid flooding where required to maintain existing drainage of adjacent lands. In some instances this may include re-grading or widening of specific existing drains which currently act as preferential flow paths through the bog.
- Monitoring of adjacent lands will be undertaken during the operation phase of the PCAS.

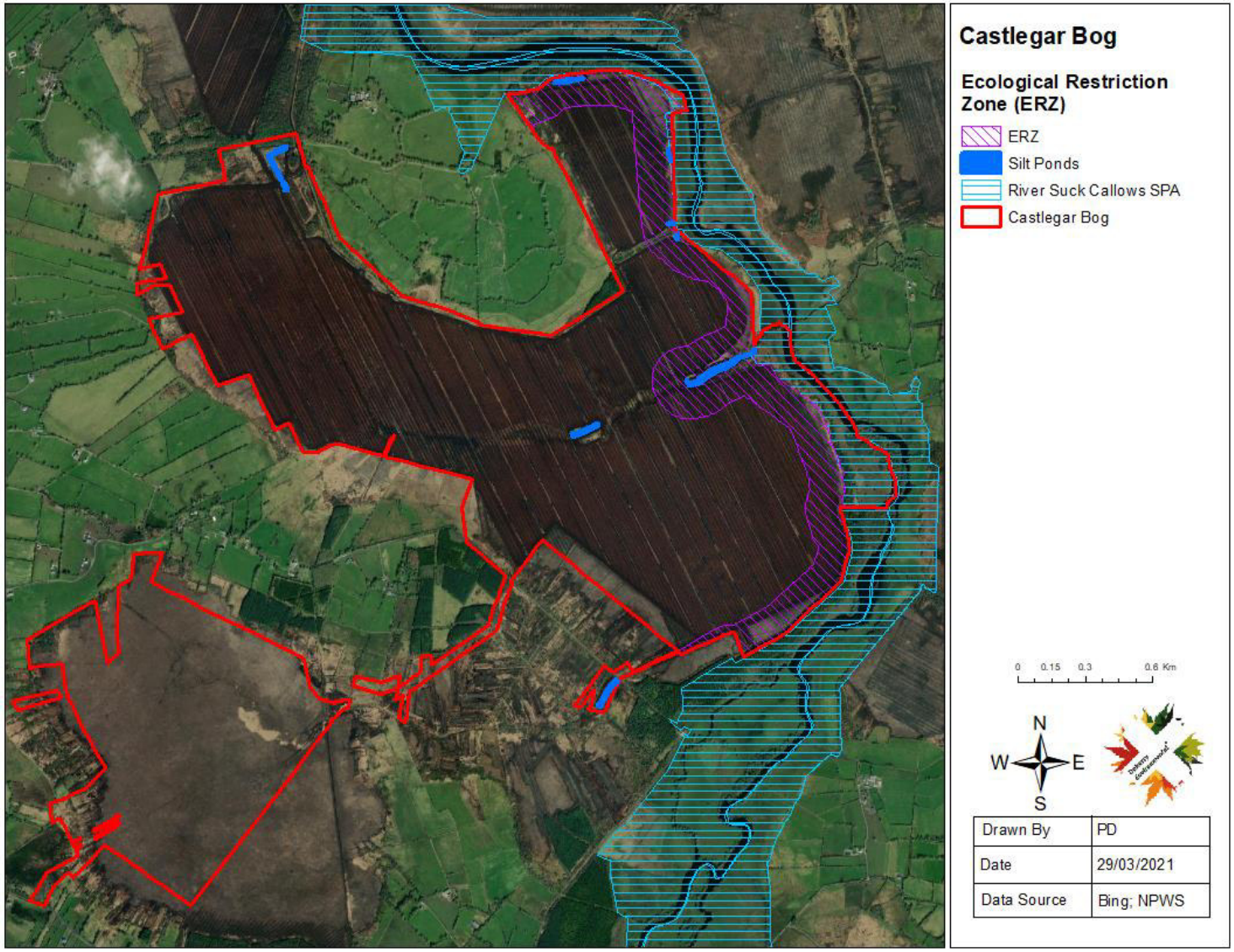



**Figure 12: Ecological Restriction Zone in respect of Birds**

3.5.2 Effectiveness of these measures

The Mitigation Measures (Project Design Measures, Management Plans, Environmental Emergency Response Measures and Best Practice Measures), listed in Section 3.5.1 above, have been developed by the hydrological/drainage and ecological expert members of the Decommissioning and Rehabilitation project team in Bord na Móna and use best practice water quality protection techniques which are tried and tested regularly across the country. Furthermore, Project Ecologists, Engineers and Environmental Compliance Officers will be appointed for PCAS at Castlegar bog and they will monitor the effectiveness of these measures throughout the implementation of the PCAS at Castlegar bog.

The watercourse crossing, drainage and water quality measures have been developed using relevant legislation, guidance and literature including:

#### 3.5.2.1 Watercourse crossing works and aquatic habitat protection guidance

- Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters;
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes; and,
- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.
- Brew, T. & Gillagan, N. (2019). Environmental Guidance: Drainage Maintenance and Construction
- EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems

#### 3.5.2.2 Pollution Prevention Guidance Notes (PPGs) & Guidance for Pollution Prevention (GPP)

- PPG 1: Understanding your environmental responsibilities - good environmental practices
- GPP 2: Above ground oil storage tanks
- PPG 3: Use and design of oil separators in surface water drainage systems
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer
- GPP 5: Works and maintenance in or near water
- PPG 6: Working at construction and demolition sites
- PPG 7: Safe storage - The safe operation of refuelling facilities
- GPP 8: Safe storage and disposal of used oils
- GPP 8: Safe storage and disposal of used oils
- GPP 8: Safe storage and disposal of used oils
- GPP 19: Vehicles: Service and Repair
- GPP 21: Pollution incident response planning
- GPP 22: Dealing with spills
- GPP 26 Safe storage - drums and intermediate bulk containers

- PPG 27: Installation, decommissioning and removal of underground storage tanks

#### 3.5.2.3 Construction Industry Research and Information Association (CIRIA)

- CIRIA Report C502 Environmental Good Practice on Site
- CIRIA Report C532 Control of Water Pollution from Construction Sites: Guidance for consultants and contractors
- CIRIA Report C648 Control of Pollution from Linear Construction Project; Technical Guidance
- CIRIA Handbook C650 Environmental good practice on site
- CIRIA Handbook C651 Environmental good practice on site checklist
- CIRIA Report C609 - SuDS – hydraulic, structural & water quality advice
- CIRIA Report C697 – The SuDS Manual

#### 3.5.2.4 Invasive Species Guidance

- Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)[6]
- NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2010)[7]
- Managing Invasive Non-native Plants in or near Freshwater, Environment Agency (2010)[8]
- Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*, Invasive Species Ireland (2015)
- IFI Biosecurity Protocol for Field Survey Work, Inland Fisheries Ireland (2010[9])

#### 3.5.2.5 Guidance relating to Bird Disturbance

- Livesey et al., (2016) Database of bird flight initiation distances to assist in estimating effects from human disturbance and delineating buffer areas. Journal of Fish and Wildlife Management 7: 181–191.
- Scottish National Heritage (2009) Monitoring the impact of onshore wind farms on birds - January 2009. Guidance Note.
- Scottish National Heritage (2016) Dealing with Construction and birds. Guidance Version 3.
- Scottish National Heritage (2017) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities. Version 2. https://www.nature.scot/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms
- Fox, T. & Stroud, D.A. (2002). The Greenland White-fronted Goose *Anser albifrons flavoristis.* BWP Update 4:65-88.

[6] http://cfinns.scrt.co.uk/wp-content/uploads/2014/06/2013-code-of-practice.pdf
[7] https://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf
[8] https://www.midsussex.gov.uk/media/1725/managing-invasive-non-native-plants.pdf
[9] https://www.fisheriesireland.ie/Biosecurity/biosecurity-protocol-for-field-survey-work.html

- Hayhow, D.B. *Consequences of winter habitat use in a migratory shorebird.* Thesis submitted for the degree of Doctor of Philosophy at the University of East Anglia, Norwich, 2009

3.5.3 Implementation of Mitigation Measures

The Mitigation Measures (Project Design measures, Management Plans, Environmental Emergency Procedures and Best Practice Measures) will be implemented by the Project Manager/PSCS and BnM Project Staff during the Decommissioning and Rehabilitation stage. Mitigation Measures will be implemented under an Environmental Management Plan for Castlegar Bog Decommissioning and Rehabilitation.

Project Ecologists, Engineers and Environmental Compliance Officers will be appointed for PCAS at Castlegar Bog and they will monitor the compliance with all mitigation measures through liaising with the Construction Site Manager/PSCS and the Project Manager, monitoring construction works on a regular basis and by carrying out regular audits on compliance with mitigation measures.

3.5.4 Degree of Confidence in the likely success of the mitigation measures

All protection measures have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. As such there is a very high degree of confidence in their likely success.

3.5.5 Monitoring of the Implementation and Effectiveness of the Mitigation Measures

A degree of Monitoring is required under Condition 10.1 of the IPC license under which Peat Extraction and now Decommissioning and Rehabilitation is to take place. This environmental monitoring carried out during the aftercare and maintenance period of Decommissioning and Rehabilitation, has to ensure no Environmental Pollution has been caused, and is subject to an Independent Closure Audit (ICA) followed by an EPA Exit Audit (EA) in order to facilitate IPC License surrender.

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

- There will be **initial quarterly monitoring assessments** of the site to determine the general status of the site, the condition of the silt-ponds, assess the condition of the rehabilitation work, monitoring of any potential impacts on neighbours land, general land security, boundary management, dumping and littering.
- The number of these site visits will reduce after 2 years to bi-annually and then after 5 years to annual visits.
- These monitoring visits will also consider any requirements, if required, for further 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, if required.
- A **water quality monitoring programme** at the bog will be established. The main objective of this water quality monitoring programme will be to establish a baseline and then monitor the impact of peatland rehabilitation on water quality from the bog. Monitoring of key environmental variables will include: Ammonia, Phosphorous, Suspended solids (silt), pH and conductivity. Water quality samples will be collected from the main drainage system from the bog at a designated point, before water leaves the site. Water quality samples will be collected at monthly intervals.
- Bird monitoring including breeding seasons transects and non-breeding period IweBS counts will be undertaken.
- If, after three years, key criteria for successful rehabilitation are being achieved and critical success factors are being met, then the water quality monitoring programme will be reviewed, with consideration of potential ongoing research on site. The water quality data, the drone surveys and the habitat mapping will be collated and will be submitted to the EPA as part of the final validation report.
- If, after three years, key criteria for successful rehabilitation have **not** been achieved and critical success factors have **not** been met, then the rehabilitation measures and status of the site will be evaluated and enhanced, where required. This evaluation may indicate no requirement for additional enhancement of rehabilitation measures but may demonstrate that more time is required before key criteria for rehabilitation has been achieved. Monitoring of water quality will then also continue for another period to be defined.
- Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the appropriate assessment process and planning procedures.

3.5.6 How any mitigation failure will be addressed

The Mitigation measures prepared specifically for this project have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and Best Practice. The Mitigation Measures are considered to be robust and proven measures which will avoid adverse effects to European Sites.

On this basis, it can be confidently concluded that failures in the mitigation measures and their prescribed outcomes will be avoided.

Nonetheless contingency measures will be in place for unforeseen events such as oil/fuel spillages, water pollution or any inadvertent release of sediment. This will ensure any unforeseen potentially adverse effects are identified in a timely manner and appropriate remedial action taken

immediately. The Project Ecologists, Engineers and Environmental Compliance Officers will will have a 'stop-works' authority to temporarily stop works over part of the site to avoid an infringement of the Environmental Commitments or an unforeseen environmental event. Works will not be allowed to re-commence until the issue is resolved.

## 3.6 Evaluation of the Impact of Castlegar Bog Decommissioning and Rehabilitation on the Integrity of the European Sites under consideration

Using the checklist in the Table below, the proposed Castlegar Bog Decommissioning and Rehabilitation Plan, as described in Appendix B, both alone and in-combination with other projects, for adverse impacts on the integrity of the European Sites under consideration is examined, following the implementation of the measures described herein.

**Table 12: Integrity of European Site checklist**

| *Does the project or plan have the potential to:* **Yes/No** | Middle Shannon Callows SPA | River Suck Callows SPA |
|---|---|---|
| - cause delays in progress towards achieving the conservation objectives of the site? | No | No |
| - interrupt progress towards achieving the conservation objectives of the site? | No | No |
| - disrupt those factors that help to maintain the favourable conditions of the site? | No | No |
| - interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site? | No | No |
| - change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site? | No | No |
| - interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)? | No | No |
| - reduce the area of key habitats? | No | No |
| - reduce the population of key species? | No | No |
| - change the balance between key species? | No | No |
| - reduce diversity of the site? | No | No |
| - result in disturbance that could affect population size or density or the balance between key species? | No | No |

## 3.7 Conclusion

This Natura Impact Statement has been prepared to provide sufficient objective scientific information in support of the proposed development, in order to allow an Appropriate Assessment determination in the context of Article 6(3) of the Habitats Directive. The report has been prepared in order to evaluate the significance of potential effects on European sites from the proposed decommissioning and rehabilitation of Castlegar Bog, as described in Appendix B, alone and in-combination with other developments.

Appropriate Assessment Stage One Screening of all European sites identified within a 15km radius of the proposed development evaluated that the potential for significant effects on the Special Conservation Interests or Qualifying Interests of 2 no. European Sites could not be excluded. In particular, the potential for indirect effects via a deterioration in water quality, and from disturbance to /displacement to fauna.

Thus, the respective elements were brought forward for further critical examination in the Natura Impact Statement Report to inform the Appropriate Assessment process.

Following examination and analysis, and taking account of the protective measures proposed, the potential for disturbance and displacement of SCI waterbird species occurring within the River Suck Callows SPA and the Middle Shannon Callows SPA, were found not to result in adverse effects due to the protective measures around timing and scheduling of works, such as the implementation of an exclusion zone during the period when SCI's may present. This exclusion zone (150m) is selected based on the largest Minimum Approach Distance or MAD for the SCI species under consideration and constitutes Best Available Scientific knowledge.

There are no significant effects identified which would adversely affect the special conservation interests or conservation objectives of the two SPAs under consideration with regard to the densities, range or conservation status of the waterbird species and their supporting wetland habitats.

The provisions of Article 6 of the 'Habitats' Directive 92/43/EC (2000) defines integrity as the 'coherence of the sites ecological structure and function, across its whole area, or the habitats, complex of habitats and/or population of species for which the site is classified'. It is clear that, given the application of prescribed protective measures for the avoidance of impacts and the implementation of the required mitigation measures, the proposed development will not give rise to adverse effects on the integrity of any of the identified European sites evaluated herein.

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# Appendix A: Finding of No Significant Effects (FONSE) Report

**Finding of No Significant Effects Report (FONSE)**

In accordance with the EC (2001) guidance document, *Assessment of plans and projects significantly affecting Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*, A Finding of No Significant Effects Report has been completed for the proposed Decommissioning and Rehabilitation Plan for Castlegar. The standard matrix for this report provided in Annex 2 of the guidance document was followed. Line items in italics are taken directly from the guidance document.

<table>
<tr><th colspan="2">Finding of No Significance Effects Report</th></tr>
<tr><td>Name and location of the Natura 2000 sites</td><td>The Screening Evaluation provided herein has examined the potential for any effects arising via source pathway linkages with regard to connectivity to designated European Sites (SACs and SPAs) within the zone of influence of all predicted Project impacts. An extended buffer zone of 15km was further considered, in line with NPWS guidance (DoEHLG, 2009), for evaluation of effects on any European Site which may arise associated with the proposed decommissioning and rehabilitation of Castlegar Bog, as required. There is a total of 14 European sites located within the 15km zone of consideration:<br><br>
<table>
<tr><th>No.</th><th>European Site</th><th>Site Code</th></tr>
<tr><td>1</td><td>Ballynamona Bog And Corkip Lough SAC</td><td>002339</td></tr>
<tr><td>2</td><td>Ballygar (Aghrane) Bog SAC</td><td>002199</td></tr>
<tr><td>3</td><td>Castlesampson Esker SAC</td><td>001625</td></tr>
<tr><td>4</td><td>Four Roads Turlough SAC</td><td>001637</td></tr>
<tr><td>5</td><td>Glenloughaun Esker SAC</td><td>002213</td></tr>
<tr><td>6</td><td>Killeglan Grassland SAC</td><td>002214</td></tr>
<tr><td>7</td><td>Lisduff Turlough SAC</td><td>000609</td></tr>
<tr><td>8</td><td>Lough Croan Turlough SAC</td><td>000610</td></tr>
<tr><td>9</td><td>Lough Funshinagh SAC</td><td>000611</td></tr>
<tr><td>10</td><td>River Shannon Callows SAC</td><td>000216</td></tr>
<tr><td>11</td><td>Middle Shannon Callows SPA</td><td>004096</td></tr>
<tr><td>12</td><td>River Suck Callows SPA</td><td>004097</td></tr>
<tr><td>13</td><td>Lough Croan Turlough SPA</td><td>004139</td></tr>
<tr><td>14</td><td>Four Roads Turlough SPA</td><td>004140</td></tr>
</table>
</td></tr>
<tr><td>Description of the project or plan</td><td><u>Overview:</u> Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. P0502-01). As part of Conditions 10.1 and 10.2 of this license, respectively, decommissioning and rehabilitation must be undertaken to ensure the permanent rehabilitation of the bog lands within the licensed area. Castlegar bog is part of the Blackwater bog group. Castlegar Bog is located in Co. Galway.<br><br>A document titled 'Castlegar Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2021' has been prepared specifically to describe the</td></tr>
</table>

<table>
<tr><th colspan="2">Finding of No Significance Effects Report</th></tr>
<tr><td></td><td>proposed decommissioning and rehabilitation measures at Castlegar Bog as appended to this document as Appendix B.<br><br><u>Purpose:</u> The decommissioning and Rehabilitation of Castlegar Bog as required under IPC license.</td></tr>
<tr><td>Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?</td><td>No</td></tr>
<tr><td>Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?</td><td>Yes: In addition to the proposed decommissioning and rehabilitation plan the following projects were considered:<br><br>1 Other BnM Bog Group Decommissioning and Rehabilitation<br>2 Turbary<br>3 Agriculture<br>4 Local Authority Development Plans</td></tr>
<tr><th colspan="2">The Assessment of Significant Effects</th></tr>
<tr><td>Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site</td><td>The results are that is there is no potential for the Decommissioning and Rehabilitation plan to cause any effects to the following 12 no. European Sites:<br><br>
<table>
<tr><th>No.</th><th>European Site</th><th>Site Code</th></tr>
<tr><td>1</td><td>Ballynamona Bog And Corkip Lough SAC</td><td>002339</td></tr>
<tr><td>2</td><td>Ballygar (Aghrane) Bog SAC</td><td>002199</td></tr>
<tr><td>3</td><td>Castlesampson Esker SAC</td><td>001625</td></tr>
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<tr><td>8</td><td>Lough Croan Turlough SAC</td><td>000610</td></tr>
<tr><td>9</td><td>Lough Funshinagh SAC</td><td>000611</td></tr>
<tr><td>10</td><td>River Shannon Callows SAC</td><td>000216</td></tr>
<tr><td>11</td><td>Lough Croan Turlough SPA</td><td>004139</td></tr>
<tr><td>12</td><td>Four Roads Turlough SPA</td><td>004140</td></tr>
</table>
<br>Therefore, these EU sites have been 'Screened Out' at Stage One of the Appropriate Assessment process.</td></tr>
<tr><td>Explain why these effects are not considered significant</td><td>Stage 1 Conceptual Models have been presented in respect of each European Site within the extended 15km study area. Within same, potential sources of effects have been examined. In respect of the European Sites listed above, the Potential for Significant Effects can be</td></tr>
</table>

| Finding of No Significance Effects Report | | | |
|---|---|---|---|
| | excluded, due to an absence of impact pathways and separation distance. We refer to Section 2.8 and 2.9 of the Appropriate Assessment Report for detailed examination. | | |
| **Name of Agency or Body Consulted** | **Summary of Response** | | |
| NPWS | We refer Section 2.6.1 of the Appropriate Assessment Report for details. | | |
| **Data Collected to Carry out the Assessment** | | | |
| *Who carried out the assessment* | *Sources of Data* | *Level of assessment completed* | *Where can the full results of the assessment be accessed and viewed* |
| **Jennings's O'Donovan Consulting Engineers.** | A combination of consultation, desktop studies and field surveys. | Following screening it can reasonably be concluded that there is no possibility of Significant Effects on 12 of these 14 European sites as a result of the proposed decommissioning and rehabilitation, as described in Appendix B.<br><br>With regard to the following listed EU Sites, Significant Effects, in the absence of mitigation (which is not considered at Screening Stage) are considered possible or likely via identified source-pathway linkages.<br><br>As a result, there is an obligation on the Competent Authority to carry out an Appropriate Assessment (i.e. Stage Two of the AA process) under Article 6 (3) of the Habitats Directive for this project, and in this context a Stage 2 Appropriate Assessment Report has been completed. | Bord Na Móna, Leabeg, Blueball, Tullamore, Co. Offaly, R35 P304. |

## Appendix B: Castlegar Bog: Cutaway Bog Decommissioning and Rehabilitation Plan 2021




# Castlegar Bog

## Cutaway Bog Decommissioning and Rehabilitation Plan 2021

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

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

*This licence condition requires Bord na Móna agree with the EPA the measures that will provide for rehabilitation, i.e. stabilisation of 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 fully ceased at Castlegar Bog. Bord na Móna have now announced the complete cessation of industrial peat production.*

*In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. P0502-01, due regard was also given to the proposed Peatlands Climate Action Scheme (PCAS) announced by the Minster. This Scheme will see the Minister support, via the Climate Action Fund, Bord na Móna in developing a package of measures, 'the proposed Scheme', for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme'. However, only the additional costs associated with the additional and enhanced rehabilitation, i.e., measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support. The additional costs of the proposed Scheme will be supported by Government through the Climate Action Fund, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator.*

*While this document outlines the enhanced rehabilitation measures planned for 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.*

## Document Control Sheet

| | |
|---|---|
| **Document Name:** | **Castlegar Bog Decommissioning and Rehabilitation Plan 2021** |
| **Document File Path:** | **https://bnmproject.sharepoint.com/:f:/t/ENERGY/DEC_RHB/EiYqDA7lKYFJvgGdJ9RKZbMBZN2TXHdykOdhaocfQibXDw** |
| **Document Status:** | **Draft** |

| **This document comprises :** | **DCS** | **TOC** | **Text (Body)** | **References** | **Maps** | **No. of Appendices** |
|---|---|---|---|---|---|---|
| | **1** | **1** | **56** | **4** | **11** | **12** |

| **Rev. 7** | **Author(s):** | **Checked By:** | **Approved By:** |
|---|---|---|---|
| **Name(s):** | **AC** | **CC** | **MMC** |
| **Date:** | **01/03/21** | **03/02/2021** | **04/02/21** |

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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:

- Meeting condition of the IPC licence;
- Stabilisation or improvement in water quality parameters (e.g. suspended solids);
- Optimising hydrological conditions for **climate action benefits as part of PCAS**. This will be achieved via **wetland creation and deep peat re-wetting**.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities in suitable deep residual peat areas.
- Optimising hydrological conditions for the development of wetland, Reed Swamp and fen habitats on shallow cutaway peats.
- 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* communities develop across the bog. It will also support Ireland's commitments towards Water Framework Directive and the National River Basin Management Plan 2018-2021 and future National River Basin Management Plans.
- Note that will take some time for stable naturally functioning peatland and wetland habitats to fully develop at Castlegar Bog.

**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 (PCAS)** includes enhanced measures which are designed to exceed/meet the standard stabilisation requirements as defined by the IPC Licence and to enhance the ecosystem services of the 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.

- Other constraints including archaeology and rights of way.
- Bord na Móna have identified the main land-use at this bog as **biodiversity and ecosystem services**.

**Criteria for successful rehabilitation:**

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

- Rewetting of deep peat in the former area of industrial peat production to slow water movement across the site to retain silt, encouraging development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat (IPC Licence validation). The target will be the delivery of rehabilitation measures and this will be measured by an aerial survey after rehabilitation is completed. (IPC Licence validation).
- Stabilising/improving key emissions to water (e.g. suspended solids). This will be measured via water quality monitoring (suspended solids and ammonia) for at least 2 years after the rehabilitation has been completed. (IPC Licence validation).
- Reducing pressure from peat production on the local river catchment (WFD) (IPC Licence validation). This will be measured by the EPA WFD monitoring programme.
- Optimising the extent of suitable hydrological conditions for climate action and setting the site on a trajectory towards establishment of a mosaic of compatible peatland and wetland habitats, and eventually towards a reduced carbon source/carbon sink (Climate action verification). This will be measured by an aerial survey and a bog condition assessment after rehabilitation has been completed.
- Reduction in carbon emissions (Climate action verification). Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Improvement in biodiversity and ecosystem services. (Climate action verification).

Monitoring climate action verification criteria after the Scheme is completed is dependent on support from the Climate Action Fund or other sources of funding.

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

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

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

**Summary of measures:**

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

- Planning actions, including developing a detailed site plan and carrying out a drainage and hydrology assessment.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation.
- Carry out proposed measures, which will be a combination of wetland measures, 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 seeding of targeted vegetation and inoculation of *Sphagnum* in suitable areas.
- Silt ponds will continue to be maintained during the rehabilitation and decommissioning phase.
- Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.

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

**Timeframe:**

- 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 statutory obligation on Bord na Móna not materialise, Bord na Móna will not carry out the enhanced decommissioning, rehabilitation and restoration measures described in this plan. Bord na Móna will instead plan to complete only the 'standard' decommissioning and rehabilitation required under Condition 10, see Appendix I, and for which financial provisions have been made, to comply with that element of the Licence.

**Monitoring, after-care and maintenance**

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

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

**Additional Monitoring:**

- The monitoring and validation of re-vegetation via natural colonisation and changes in bog condition will be carried out using an aerial remote sensing survey, after rehabilitation measures are implemented. It is proposed that sites can be monitored against this baseline in the future.

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

**Validation and IPC Licence surrender**

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

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

# 1. INTRODUCTION

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. P0502-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Castlegar 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 document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0502-01:

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

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

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

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme on peatlands previously used for energy production. Note this proposal is also known colloquially as the 'Peatlands Climate Action Scheme' (PCAS). 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. Bord na Móna have identified a footprint of 33,000 ha (a subset of the Bord na Móna 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 & IX) under existing EPA IPC licence conditions. Improvements supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. 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. Bord na Móna have now announced the complete cessation of industrial peat production across its estate (January 2021).

It is expected that the proposed Scheme (PCAS) will have benefits accruing from biodiversity provision, water quality and storage attenuation as well as increased carbon storage, reduced carbon emissions and acceleration

towards carbon sequestration. The Scheme will also facilitate monitoring of carbon fluxes (Greenhouse Gases and fluvial carbon) in selected areas (in addition to other established research programmes), to monitor changes in where the interventions will accelerate the trajectory towards a naturally functioning peatland ecosystem.

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

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

## 1.1 Constraints and Limitations

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

The future use of Edera Bog has not been defined by Bord na Móna but biodiversity and ecosystem services have been identified as the current primary land-use. Bord na Móna 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 2018. 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 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 rehabilitation plan considered potential impacts of these on the delivery of the stated objectives.

Rehabilitation in other areas of the bog may also be constrained due to other property issues or issues such as rights of way.

The 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 (PCAS). The development of this enhanced rehabilitation plan also considered **draft** guidance issued by the EPA in 2020 – **Guidance on the process of preparing and implementing a bog rehabilitation plan**.

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

- Experience of 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (Clarke, 2010; Bord na Móna, 2016);
- Significant international engagement during this period with other counties in relation to best-practise regarding peatland rehabilitation and after-use through the International Peat Society and the Society for Ecological Restoration (Joosten & Clarke, 2002; Clarke & Rieley, 2010; Gann *et al*., 2019);
- Consultation and engagement with internal and external stakeholders;
- GIS Mapping;
- BNM drainage surveys;
- Bog topography and LIDAR data:
- Hydrological modelling; and
- The development of a **Methodology Paper (draft) outlining the proposed Scheme (PCAS)**. This rehabilitation includes enhanced measures defined in the Methodology Paper which are designed to exceed the standard stabilisation requirements as defined by the IPC Licence and to enhance the ecosystem services of 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.
- Regan, et. al. (2020). Ecohydrology, Greenhouse Gas Dynamics and Restoration Guidelines for Degraded Raised Bogs. EPA Research Report. Prepared for the Environmental Protection Agency by Trinity College Dublin.
- Renou-Wilson *et al*. (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.
- Schouten (2002). Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies. Dúchas - The Heritage Service of the Department of the Environment and Local Government, Ireland;
- Thom (2019). Conserving Bogs – Management Handbook.
- Wheeler & Shaw (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction.
- Wittram *et al*. (2015). A Practitioners Guide to Sphagnum Reintroduction. Moors for the Future Partnership.


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

- Blackwater Integrated Pollution Control Licence
- Blackwater Annual Environmental Reports
- Review of the National Biodiversity Data Centre (NBDC) webmapper;
- Inland Fisheries Ireland (IFI) Reports;
- Environmental Protection Agency database (www.epa.ie);
- EPA Guidance on Requests for Alterations to a Licensed Industrial or Waste Activity
- BirdWatch Ireland online data (including I-WeBS and CBS datasets; www.birdwatchireland.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive catchments.ie/maps/ Map Viewer (www.catchments.ie);
- OPW Indicative Flood Maps (www.floodmaps.ie),
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie),
- River Basin Management Plan for Ireland 2018 – 2021,

- Bord na Móna Annual Report 2020;
- Spatial data in respect of Article 17 reporting, available online at https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17.

## 2.2 Consultation

A number of stakeholders have been identified during the course of Bord na Móna's rehabilitation and Biodiversity Action Plan activities and have been 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. 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 Figures 3.1 & 3.2). The surrounding landscape is a mosaic primarily consisting 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.

## 3.1 Status and Situation

### *3.1.1 Site history*

Castlegar Bog has only been in peat production in the last twenty years, with all commercial peat extraction ceasing on site in 2018. 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.

### *3.1.3 Socio-Economic conditions*

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

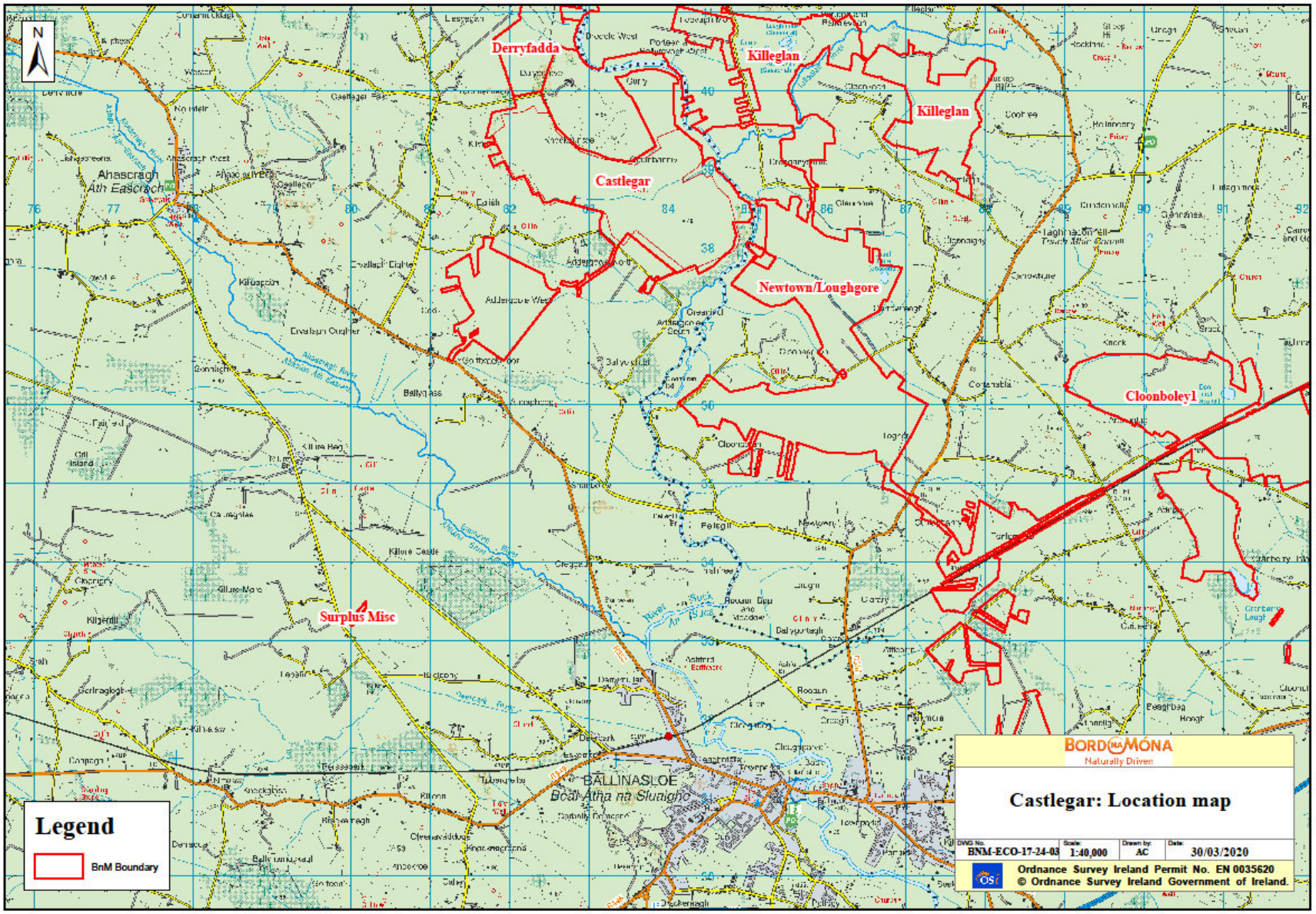



*Figure 3.1 Location of Castlegar in context to other Bord na Móna bogs and surrounding area*


*Figure 3.2 Aerial photo of Castlegar Bog.*

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

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

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

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

## 3.2 Geology and Peat Depths

### *3.2.1 Sub-soil geology*

The 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.

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

### *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.

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 PCAS are described here. No such instances are known at Castlegar Bog. A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs, and although spatial overlap with the PCAS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during PCAS activities (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 (see Figure 3.6). 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 Goose and Whooper Swan.

Some undeveloped and 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.

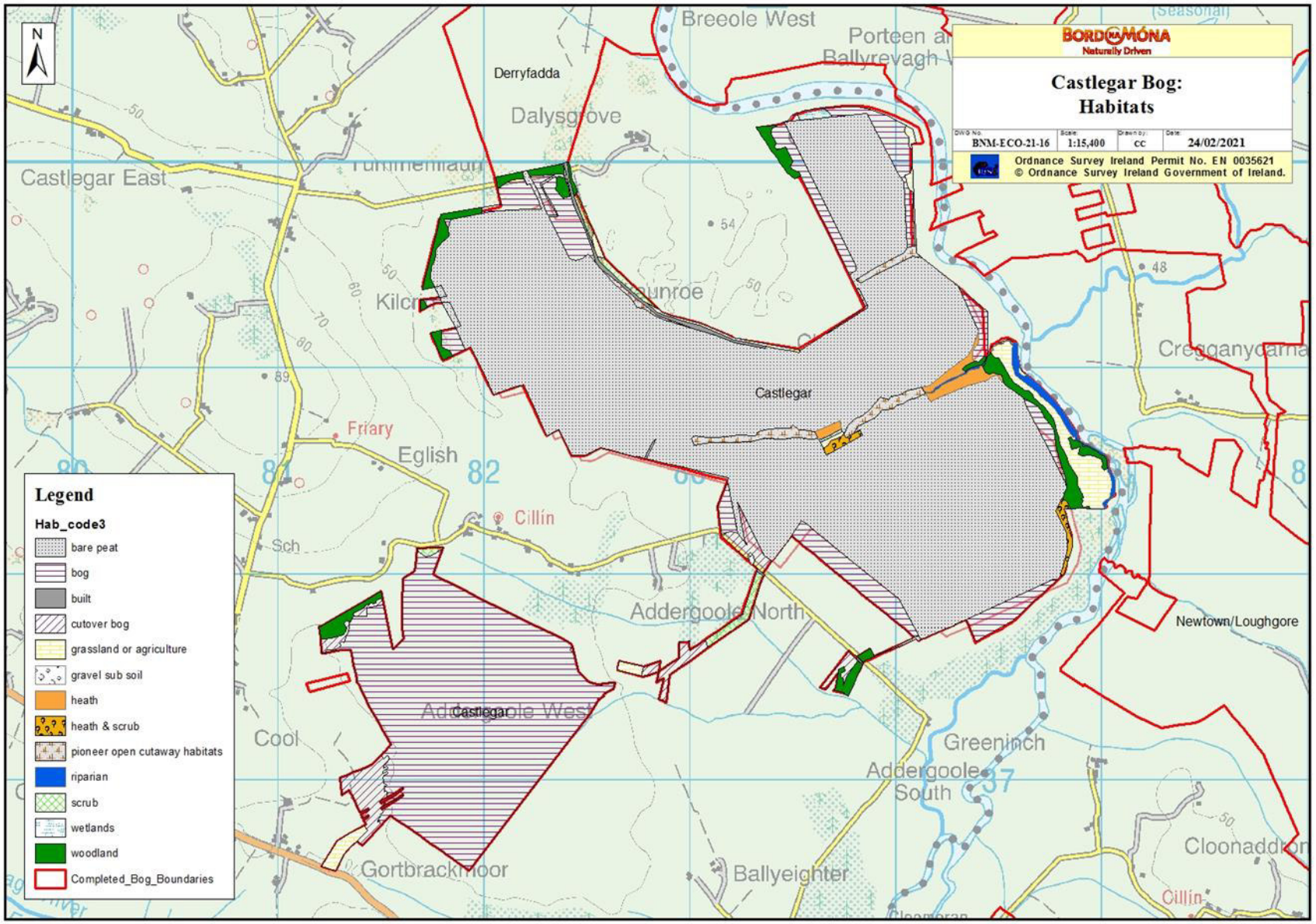



Figure 3.5. *Habitat map of Castlegar Bog showing Bord na Móna habitat categorisation*

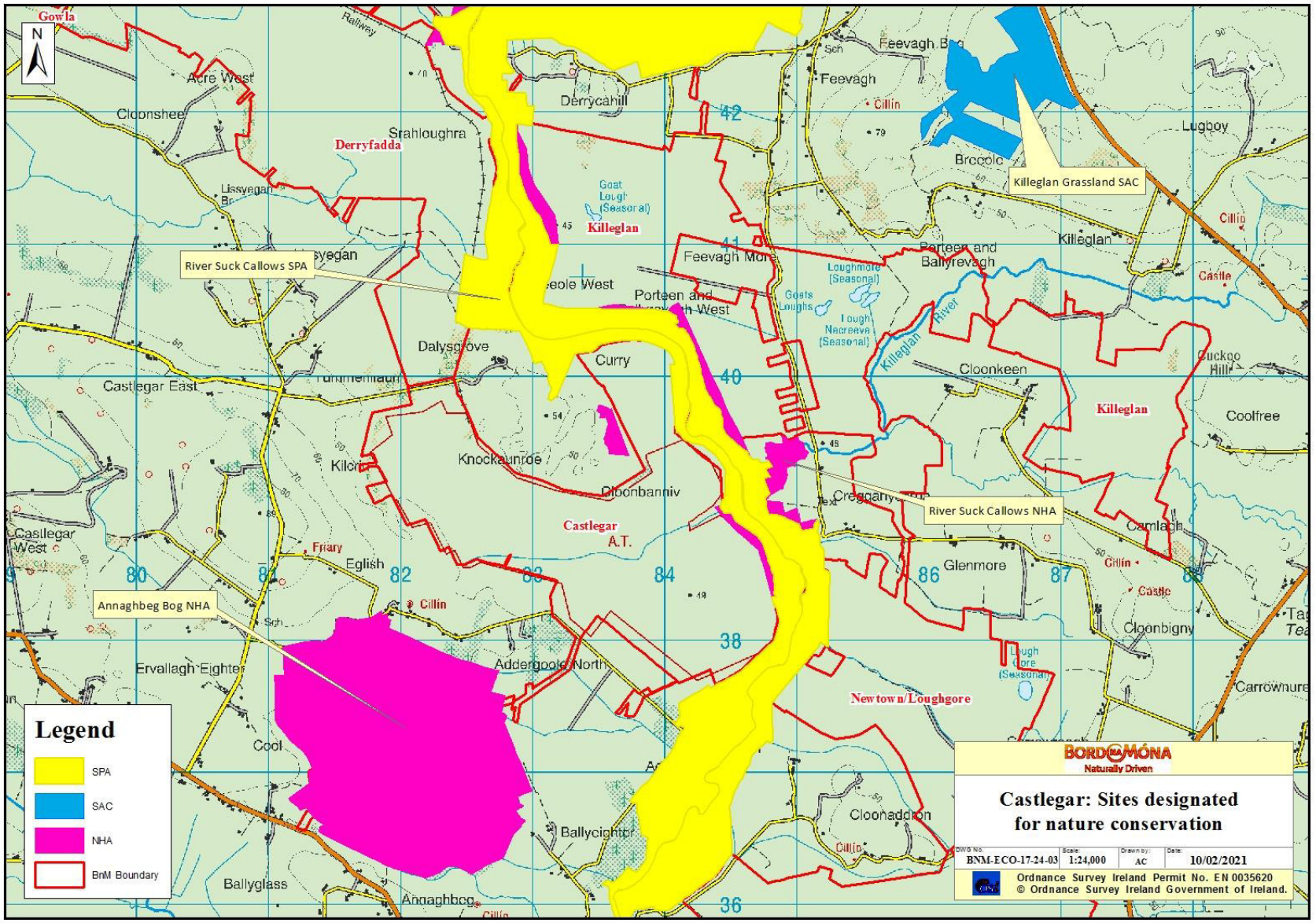



*Figure 3.6 Sites designated for nature conservation in the vicinity of Castlegar Bog*

### *3.4.1 Other Nature Conservation Designations*

The Ramsar Convention entered into force in Ireland on 15th March 1985. Ireland currently has 45 sites/wetlands designated as Wetlands of International Importance (Ramsar Sites). These cover a surface area of 66,994ha. There are no Ramsar Sites in the local vicinity of Castlegar Bog (i.e. within 3km) The closest Ramsar Sites to Castlegar Bog include Mongan Bog in Co. Offaly and Clara Bog in County Offaly.

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

## 3.5 Hydrology and Hydrogeology

Castlegar Bog has a gravity drainage regime and the majority of the bog has active functioning drains. Initial hydrological modelling indicates the bog has topographical basins that are expected to develop a mosaic of wetland habitats when rehabilitation is carried out and drains are blocked (Figure 8.3).

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.

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 remaining so in the third cycle, currently under preparation.

Details of silt ponds, associated surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed on the attached water quality map as Figure 3.8.

There is a robust monitoring program to track and verify any changes in baseline water quality conditions pre- and post-decommissioning and rehabilitation so that the success or otherwise can be tracked and verified for the National Parks & Wildlife Service, Environmental Protection Agency and Local Authority Water Program, amongst a range of stakeholders.

The main emission limit value associated with this bog is 35mg/l suspended solids, with trigger levels for ammonia of 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 ELV for SS and trigger level for ammonia and COD.

| 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 |

**Decommissioning and Rehabilitation Programme Water Quality Monitoring.**

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

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

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

In the preparation of this monitoring programme, Bord na Mona have been providing the Local Authority Water Programme (LAWPRO) with details of the surface water emissions points associated with this bog and will be amending some of the proposed monitoring locations on foot of this engagement. LAWPRO have in turn provided details of their 2021 monitoring programme and these are included in the WQ map as Figure 3.8.

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

This enhanced monitoring programme will aim to include up to 70% of a bogs drainage catchments, whatever number of surface water outlets these include.

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

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

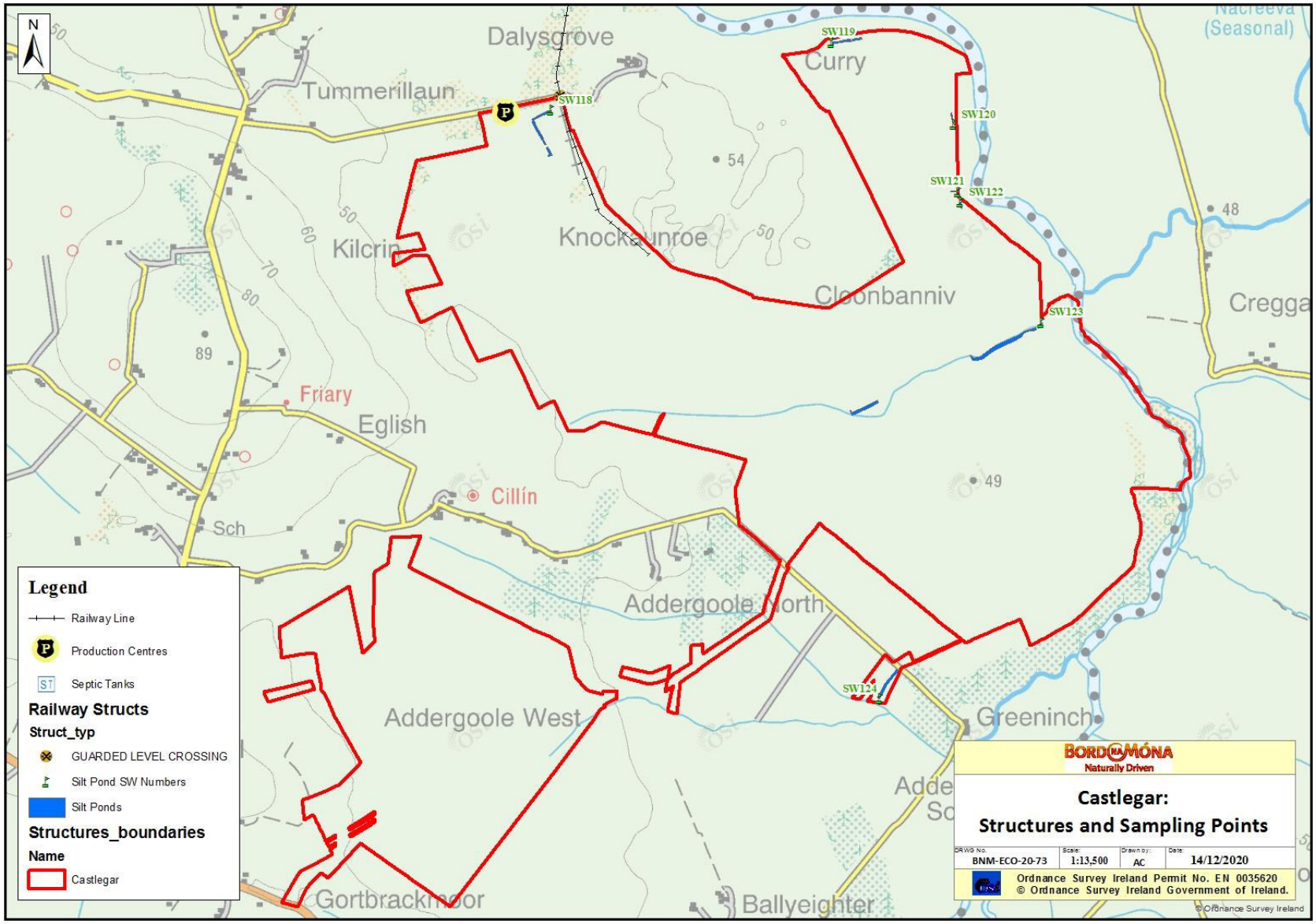



*Figure 3.7. Structures on Castlegar Bog*

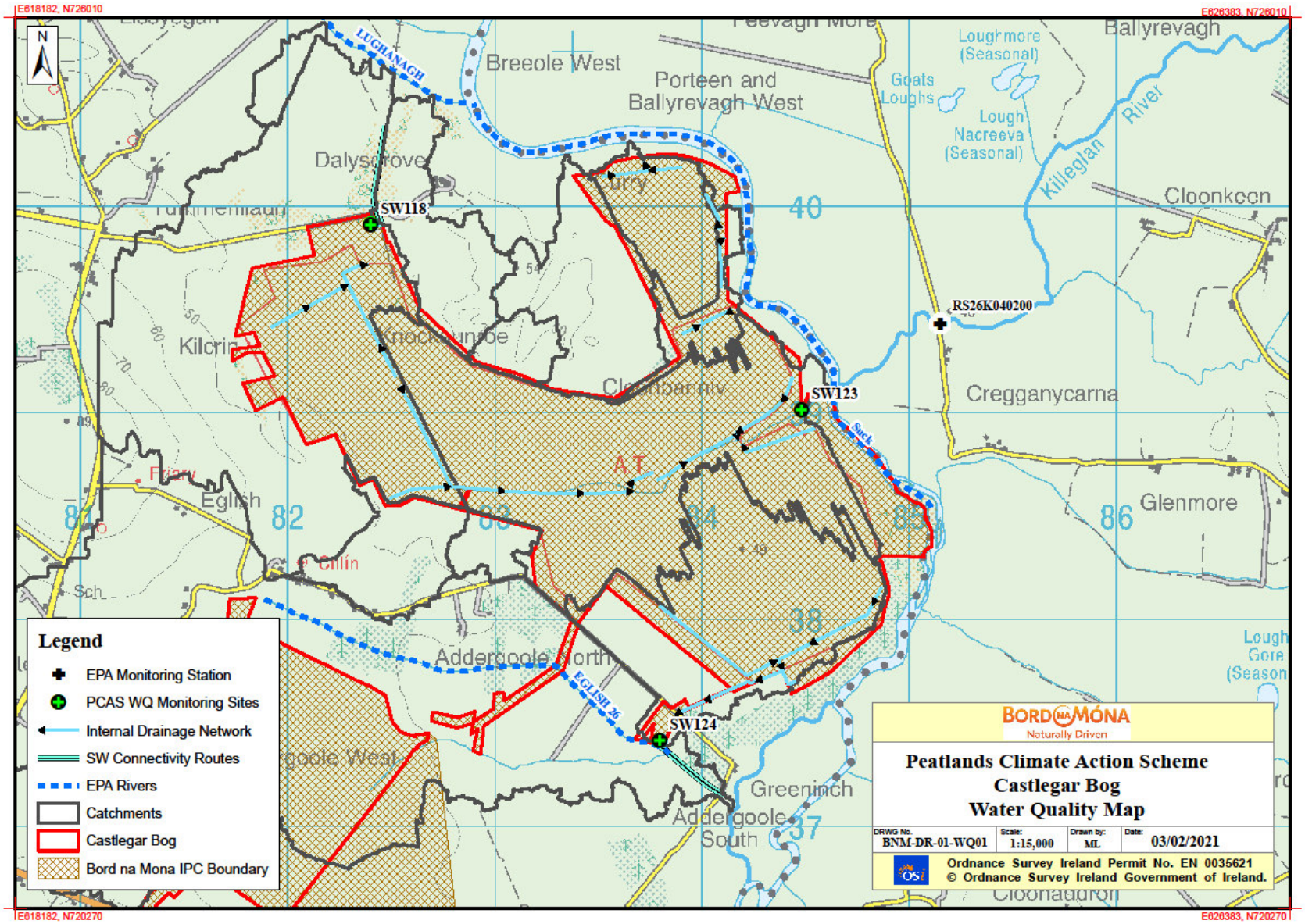



*Figure 3.8. Water management features and water quality monitoring points at Castlegar Bog.*

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

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

## 3.10 Castlegar Bog Characterisation Summary

Castlegar Bog is located in east Co. Galway, just over 4km east of Ahascragh and 6km north of Ballinasloe. Castlegar Bog only commenced peat production in the last 20 years, with all commercial peat extraction ceasing in 2018. The majority of the bog is therefore classed as deep peat cutover, as it has deep residual peat (>2 m)

Castegar Bog is located close to the River Suck Callows and the margin of Castlegar Bog partially overlaps this European protected site which occurs where the callows grasslands adjoin the eastern boundary.

The bog can be broadly divided into three categories:

- bog remnants;
- deep residual peat; and
- marginal and other dry areas of the former production area.

The bog is divided into these three areas to assist rehab planning. There are natural transitions between these areas where there are ecological and environmental gradients in relation to residual peat, etc. These are summarised further as follows.

(1) The majority of bog remnants are around the periphery of Castlegar Bog (see Figure 3.5) quite small, narrow and subject to ongoing turf cutting via turbary. Nevertheless, a small area in the south-west of Castlegar Bog has been identified for drain blocking to support bog restoration.
(2) A significant part of the former production area is residual deep peat. Ground-water is unlikely to have a significant influence on the development of vegetation. If this peat can be re-wetted, and a stable water level developed close to the peat surface, it is expected to develop an embryonic *Sphagnum*-rich vegetation. The topography of this area is variable. Some of this area is modelled as wet and should be relatively straight-forward to re-wet once drains are blocked. Some of this area is modelled as dry and more intensive deep peat measures with bunding, re-profiling and cell berms are proposed to optimise hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation.
(3) Some parts of the former production area will be relatively dry. This includes headlands and high fields. Drain-blocking and some fertiliser application is proposed. Birch woodland and other drier habitats are expected to develop.

There is a minor amount of former production area that is constrained from rehab due to archaeology or rights of way.

# 4. CONSULTATION

## 4.1 Consultation to date

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

There has been ongoing consultation about rehabilitation, biodiversity and other general issues over the years about 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.

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

In addition, provision for consultation with local residents and landowners in general (including any with turbary rights) has been facilitated by the distribution of letters to all houses within 1km of the boundary of Castlegar Bog. These letters included information about PCAS as well as contact details for further information. An advertisement about PCAS was also printed in the Connaught Tribune and Galway Advertiser in January 2021 (both area local newspapers that covers the Castlegar Bog area).

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

## 4.2 Issues raised by Consultees

To date, a number of issues have been raised by consultees during the consultation process for the current draft of the rehabilitation plan for Castlegar Bog – these are summarised below.

### *4.2.1 Assessments of rehabilitation*

Queries on rehabilitation assessments were raised by NPWS and the National Museum of Ireland in relation to Appropriate Assessment, Environmental Impact Assessment and Strategic Environmental Assessment.

Councillors from the Ballinasloe Municipal District of Co. Galway were keen to see these documents were made available for public view.

#### *4.2.2 Restoration scope*

The future status and management of Annaghbeg Bog NHA was queried by Butterfly Conservation Ireland, as well as the restoration/rehabilitation of marginal habitats as worthy of consideration within the rehabilitation measures to support biodiversity objectives.

#### *4.2.3 Monitoring*

Further details on monitoring of ecological metrics was raised by Butterfly Conservation Ireland, who suggested that monitoring of Large Heath butterfly be considered to assess the success of the proposed rehabilitation actions.

#### *4.2.4 Flooding*

Michael Fitzmaurice TD, Denis Naughten TD, Senator Dolan, IFA and ICMSA queried likely impacts arising from the proposed re-wetting associated with the rehabilitation in relation to flooding on adjoining lands and, specifically, with regards to the maintenance of drains. The IFA also raised the issue of Health and Safety in relation to raising water levels as well as possible impacts on land and property prices.

#### *4.2.5 Other issues*

Archaeological end of life survey of all the bogs were requested by National Museum of Ireland and National Monuments Unit.

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

### 4.3 Bord na Móna response to issues raised during consultation

#### *4.3.1 Assessments of rehabilitation*

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

An Archaeological Impact Assessment (AIA) is also being undertaken on all the bogs in PCAS. The aim for known archaeology on these bogs is to accomplish preservation in situ and we are taking steps to identify and avoid all known archaeology. We are doing this by including all known archaeology on our GIS from the AIA process, and either excluding or defining a buffer zone around these features, which will then be excluded from any ground works in these areas in the final plan. It is anticipated that any archaeology will benefit hugely from the ultimate remit of the rehabilitation, in that water tables will be raised thereby preserving in-situ. There is also an identified procedure for managing reports of stray finds that may arise during rehabilitation works.

An archaeological end of life survey of all the bogs as requested by National Museum of Ireland and National Monuments Unit is not part of the current scope of the scheme. Bord na Móna would be happy to assist such a survey, where possible.

All assessments undertaken as part of PCAS, including any future revisions to this plan or the Appropriate Assessment, will be available for public scrutiny once drafted.

### *4.3.2 Restoration scope*

Bord na Mona never carried out any activities or drainage work at Annaghbeg Bog. 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.

### *4.3.3 Monitoring*

As part of the PCAS, a monitoring and verification plan has been developed to support climate action and biodiversity objectives. This will include stratified monitoring of bog condition, habitats and biodiversity at several different scales. Some fauna monitoring (pollinator transect) is proposed as part of the monitoring and verification at Castlegar Bog during the period of the scheme (2021-2025). However, note that fauna typically take longer to respond to the changes in vegetation colonisation and habitats arising from the proposed rehabilitation measures identified for Castlegar Bog.

### *4.3.4 Flooding*

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

External consultants have been appointed to carry a hydrological assessment to identify any potential impacts to neighbouring lands and to mitigate against any such impacts.

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

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

### *4.3.6 Other issues (including amenity)*

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

# 5. REHABILITATION GOALS AND OUTCOMES

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

- Meeting conditions of IPC Licence.
- Stabilisation or reduction in water quality parameters of water discharging from the site (e.g. suspended solids).
- Optimising hydrological conditions for **climate action benefits as part of PCAS**. Optimising hydrology for the development of embryonic *Sphagnum*-rich vegetation communities on deep peat, and eventually naturally functioning and peatland habitats.
- Optimising hydrological conditions for the development of Reed Swamp and fen on shallow more alkaline peat and other subsoils.
- The main goal and outcome of this plan is the successful rehabilitation (environmental stabilisation) of peatlands used for industrial peat production at the bog in a manner that is acceptable to both external stakeholders and to Bord na Móna and which optimise climate action and other ecosystem service benefits.

The rehabilitation goals and outcomes take account of the following issues.

- It will take some time for stable naturally functioning habitats to fully develop at Castlegar Bog. This will happen over a longer time-frame than the implementation of this rehabilitation plan
- Re-wetting residual peat will initially maintain and enhance the carbon storage capacity of the bog. There is scientific consensus that restoration of hydrology in damaged bog can improve carbon storage, water storage and attenuation and help support biodiversity both on the site and in the catchment (Grand-Clement *et al*., 2015; Anderson *et al*., 2017; Minayeva *et al*., 2017, Gunther et al. 2020, See Section 3.8). This will reduce carbon emissions from the site from a larger carbon source to a smaller carbon source. In time, the site has the capacity to develop in part as a carbon sink. PCAS is expected to deliver significant contributions to Ireland's climate action.
- It is not expected that the site has the potential to develop active raised bog (ARB) analogous to the priority EU Habitats Directive Annex I habitat within the foreseeable future (c.50 years). Furthermore, only a proportion of the bog has potential to develop *Sphagnum*-rich habitats in this timeframe. Nevertheless, re-wetting across the entire bog, as part of the Scheme, will improve habitat conditions of the whole bog, making the overall bog wetter. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.
- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as such the development of new habitat to support biodiversity and local attenuation of water flows from the bog.

# 6. SCOPE OF REHABILITATION

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

- The area of Castlegar Bog (Figure 3.1).
- EPA IPC Licence - Ref. P0502-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area.
- The proposed rehabilitation is designed to exceed the requirements as defined by the IPC Licence. PCAS 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 will be accrued.
- The local environmental conditions of Castlegar Bog identify deep peat re-wetting as the most suitable rehabilitation approach for this site.
- 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 peat-forming (*Sphagnum*-rich) vegetation communities on deep peat.**
- 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.
- **Time frame.** Rehabilitation measures will be carried out during the period of PCAS (2020-2025). The surrender of the licence is likely to extend beyond the PCAS timeframe.
- No direct rehabilitation measures will be carried out in the small proportion of the margin of Castlegar Bog that overlaps with protected European sites (no measures proposed as there are no drains to target).

## 6.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, much of the peat mass has been removed at many sites, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status, etc.) and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland). 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, which need to be considered as part of the wider rehabilitation.
- **Surrounding landscape and neighbours.** Another key constraint is the interaction between the Bord na Móna sites and the surrounding landscape. Care will be taken that no active rehabilitation management is carried out that could negatively and knowingly impact on surrounding land. This includes the hydrology of neighbouring farmland, neighbouring turbary, 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. In general, marginal drains will **not be blocked**.
- **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.

- **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 is being carried out. Rehabilitation around archaeology will be avoided, minimised or amended (peat barriers located to avoid damage to any archaeological features) in response to the AIA (Figure 8.5, Appendix XII).

## 6.2 Key Assumptions

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

## 6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- The longer-term development of stable naturally functioning habitats to fully develop at Castlegar Bog. The plan covers the short-term rehabilitation **actions** and **an additional monitoring and after-care programme** to monitor the rehabilitation and to respond to any needs.
- This plan is not intended to be an after-use or future land-use plan for 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. potential silt run-off).

In addition, Bord na Móna wish to optimise climate action and other ecosystem service benefits via additional rehabilitation measures. These measures 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 establishment of embryonic *Sphagnum*-rich habitats on suitable deep peat areas and optimise water levels in the shallow cutaway areas for the development of Reed swamp and fen habitats.

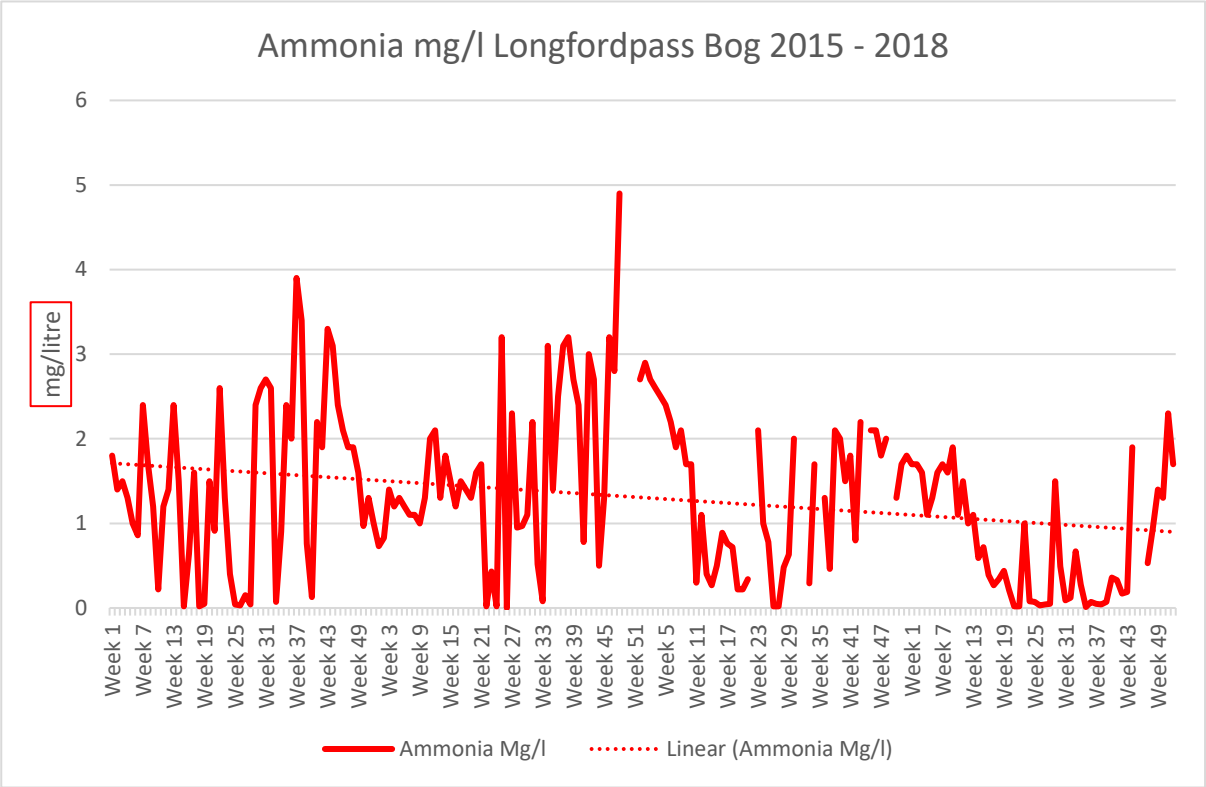
## 7.1. Criteria for successful rehabilitation to meet EPA IPC licence conditions:

- 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 through a combination of rehabilitation measures, and reducing the area of bare exposed peat. The target will be the delivery of measures and this will be measured by an aerial survey after rehabilitation is completed.
- That there is a stabilizing/improving concentration of suspended solids and ammonia in discharges from Bord na Móna sites, associated with the measures undertaken to stabilize the peat surface by the blocking of the internal drainage system and the maximized rewetting of the peat surface.
- Receiving water bodies have been classified under the River Basin Management Plan and this classification includes waters that are At Risk from peatlands and peat extraction. The success criteria will be that the At Risk classification will see improvements in the associated pressures from this peatland or if remaining At Risk, that there is an improving trajectory in the pressure from this peatland.

(See Table 7.1 for a summary of the criteria for successful rehabilitation and associated monitoring.)

With regard to predicting and estimating likely trends that might materialize or could be considered as a target, monitoring of surface water ammonia emissions from Longfordpass bog in Littleton over 3 yrs., post cessation of peat extraction with ongoing rehabilitation, were considered (see graphic below). These are indicating a downward trend in Ammonia concentrations. As the monthly monitoring program at Castlegar continues in 2021

during the rehabilitation works, and data from the 2020 monitoring program is compiled, further trending will be produced to verify any ongoing trends.




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

- Optimising the extent of suitable hydrological conditions to optimise climate action and other ecosystem service benefits (optimising and maximising 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 and eventually naturally functioning peatland habitats (heath, scrub, poor fen and embryonic *Sphagnum*-rich raised bog peatland communities, where conditions are suitable). These habitats will generally establish initially as pioneer vegetation. 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. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Reduction in carbon emissions. This will be demonstrated and measured via a combination of GHG flux measurement (tower and static chambers) and water quality monitoring (fluvial carbon). These data will be compared to estimations derived via a combination of habitat condition assessment and application of appropriate carbon emission factors derived from other sites. Baseline monitoring (habitat condition) will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.

- Improvement in biodiversity and ecosystem services. This will be demonstrated by metrics outlined in Section 9.1 that can be used to measure changes in ecosystem services (e.g. water quality parameters, development of pioneer habitats, breeding bird monitoring). This will be measured by collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.

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

| **Criteria type** | **Criteria** | **Target** | **Measured by** | **Expected Time-frame** |
|---|---|---|---|---|
| IPC validation | Rewetting of the drained high bog area | Delivery of planned rehabilitation measures.<br>This will be a combination of drain blocking, bunding and re-profiling<br>Minimum area of 261.8Ha rehabilitated following implementation of measures. | Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking) | 2021-2025 |
| IPC validation | Key water quality parameters<br>Ammonia, Phosphorous, Suspended solids, pH and conductivity | Stabilization Improvement of key water quality parameters<br>Trend at 6 monthly intervals downwards in nature. | Water quality monitoring. Started in advance of the proposed rehabilitation. | 2021-2023 |
| IPC validation | Reducing pressure from peat production on the local water body catchment (WFD) | At Risk classification will see improvements in the associated pressures from this peatland or if remaining At Risk, that there is an improving trajectory in the pressure from this peatland | EPA WFD monitoring programme | WFD schedule |

| | | | | |
|---|---|---|---|---|
| Climate action verification | Optimising the extent of suitable hydrological conditions to optimise climate action and setting the site on a trajectory towards establishment of a mosaic of compatible peatland habitats | Optimal extent of suitable hydrological conditions<br>Indicators of establishment of compatible cutaway habitats | Aerial photography, Cutaway bog condition map and Habitat mapping to map extent of suitable hydrological conditions.<br>Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline. | 2021-2025 |
| Climate action verification | Biodiversity and ecosystem services.<br>Habitat establishment<br>Presence of key species – Sphagnum<br>Breeding and wintering birds<br>Pollinators | Improvement in biodiversity and ecosystem services. | Metrics that relate to selected biodiversity and ecosystem services<br>Presence of key species – Sphagnum – Walkover survey<br>Breeding birds – Breeding bird survey<br>Pollinators – Pollinator walk<br>Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline. | 2021-2025 |

Meeting climate action verification criteria and monitoring of these criteria after the Scheme has been completed is dependent on support from the Climate Action Fund or other sources of funding. Note that monitoring and verification of the overall scheme will be stratified – not all these criteria will be measured at each individual site.

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

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

- **Funding to pay for resources required to deliver the planned rehabilitation (Bord na Móna and external).** Bord na Móna maintains a Provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence. It is expected that

additional costs of enhanced rehabilitation will be supported by Government through the Climate Action Fund.

- **Bord na Móna to have sufficient resources (staff and training) to deliver the planned rehabilitation with required associated skills and competencies.**
- **Bord na Móna to have sufficient resources (suitable machinery) and staff to maintain this machinery.**
- **Weather conditions to be within normal limits over the rehabilitation plan timeframe.** Long periods of wet weather have the capacity to significantly affect ground conditions and constrain the delivery of rehabilitation. The potential impact of wet weather on ground conditions can be reduced by appropriate planning and management. Bord na Móna have significant experience of managing these issues through 70 years of working in these peatland environments.
- **Rehabilitation measures to be effective.** The rehabilitation measures proposed in this plan are based on 40 years of Bord na Móna experience of peatland management and best practise applied internationally in peatland management. Measures proposed in this plan have already been shown to be affective at other sites. Bord na Móna will apply a flexible and adaptable approach to the more innovative rehabilitation measures proposed in this plan**.** If measures are not initially effective, Bord na Móna will review any requirement for additional practical rehabilitation.
- **Natural colonisation of vegetation to develop semi-natural habitats at a rate within the normal limits.** The development of naturally functioning semi-natural habitats on cutaway peatland takes time. Pioneer vegetation can develop relatively quickly (3-10 years) and wetland habitats can develop relatively quickly. Birch woodland make take 20-30 years to develop. However, it may take 50 years for active raised bog vegetation to re-develop on ground that was previously cutaway. Different environmental conditions will have a significant impact on the rate of natural colonisation, and as a result of the combination of different environmental conditions and the application of different rehabilitation measures, there will be a variety of habitat outcomes.
- Rehabilitation measures have been designed to accelerate and work with natural colonisation and other natural processes. Bord na Móna experience of rehabilitation has shown that re-wetting improves conditions for natural colonisation and that natural colonisation is accelerated where the environmental conditions are most suitable. Rehabilitation measures have been designed to modify the conditions of areas within sites where conditions are less suitable for natural colonisation (modifying hydrology, topography, nutrient status or availability of potential seed sources).
- **Monitoring to be robust and effective.** Rehabilitation Monitoring will be established to validate the success of rehabilitation as required by Condition 10 of the IPC Licence and to verify the benefits of the proposed enhanced measures to optimise climate action. This will focus on a collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services.

# 8. REHABILITATION ACTIONS AND TIME FRAME

Peatland rehabilitation requires detailed planning and the use of data from desktop surveys and field surveys. This data in association with topographical and hydrological modelling (Figures 8.1-8.4) 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 (see Figure 8.5)**:**

- A pilot programme to test some of the methodologies developed for the Scheme (PCAS) will be carried out. This will focus on the deep peat methodologies (DPT1-DPT5; See Table 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 8.5.
- Re-wetting the deep peat areas of the bog using berms, drain blocking and field re-profiling. This enhanced measure seeks to create large (c. 45m x 60m) flat areas or cells of shallow (< 10 cm) water conditions on bare peat, across multiple fields that are enclosed by shallow berms to retain shallow surface water;
- In some areas, a cut-and-fill cell bunding technique is proposed. The cut and fill cell bunding approach aims to create ‘saucers’ or flat bunded areas (cells) on peat with berms to hold shallow water at appropriate levels;
- Re-wetting some deep peat areas of the bog through regular more intensive drain blocking using an excavator to create up to a maximum of seven peat dams/blockages every 100 m along each field drain, along with field re-profiling and drain infilling if required;
- Re-alignment of piped drainage;
- Blocking drains in targeted marginal (degraded) high bog/cutaway areas and re-wetting, where possible, using an excavator to install peat blockages (up to a max of 7/100m). Some bog remnants are too small to benefit from this approach;
- Targeted fertiliser applications on bare peat areas to accelerate vegetation establishment on headlands and high fields.
- Seeding of vegetation and inoculation of *Sphagnum* in suitable deep residual peat;
- Modifying water levels at outfalls. This will further slow the movement of water through and out of Castlegar Bog.
- Water level management through blocking of outfalls, overflow management, field re-profiling, and the creation of berms to rewet cutaway.

- 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/or removed and a more natural drainage feature developed. 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).

## 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.

- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation, if needed, such as the presence of sensitive ground-nesting bird breeding species (e.g. Curlew) or larval webs of Marsh Fritillary butterfly, etc. The scheduling of rehabilitation operations will be adapted as mitigation;
- 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 drain blocking, peat field re-profiling, cell-bunding and fertiliser applications targeting headlands, high fields and other areas (where required). All rehabilitation will be carried out with regard to environmental control measures (Appendix IV);
- Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions;
- Carry out the proposed monitoring, as outlined.
- While natural colonisation is expected to commence almost immediately once peat production ceases, Phase 2 actions will be carried out in targeted areas to accelerate re-vegetation and colonisation of target species. Phase 2 actions may include seeding of targeted vegetation and inoculation of *Sphagnum*;
- Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent silt run-off from the site during the rehabilitation phase; and
- Submit an *ex post* report to the Scheme regulator to verify the eligible works 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;
- Evaluate opportunity for conservation grazing option post re-wetting including available resources for management and husbandry;
- Delivery of a monitoring, aftercare and maintenance programme (See section 10.2 below);
- Decommissioning of silt-ponds will be assessed and carried out, where required; and
- Reporting to the EPA will continue until the IPC License is surrendered.

## 8.4 Timeframe

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

## 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).

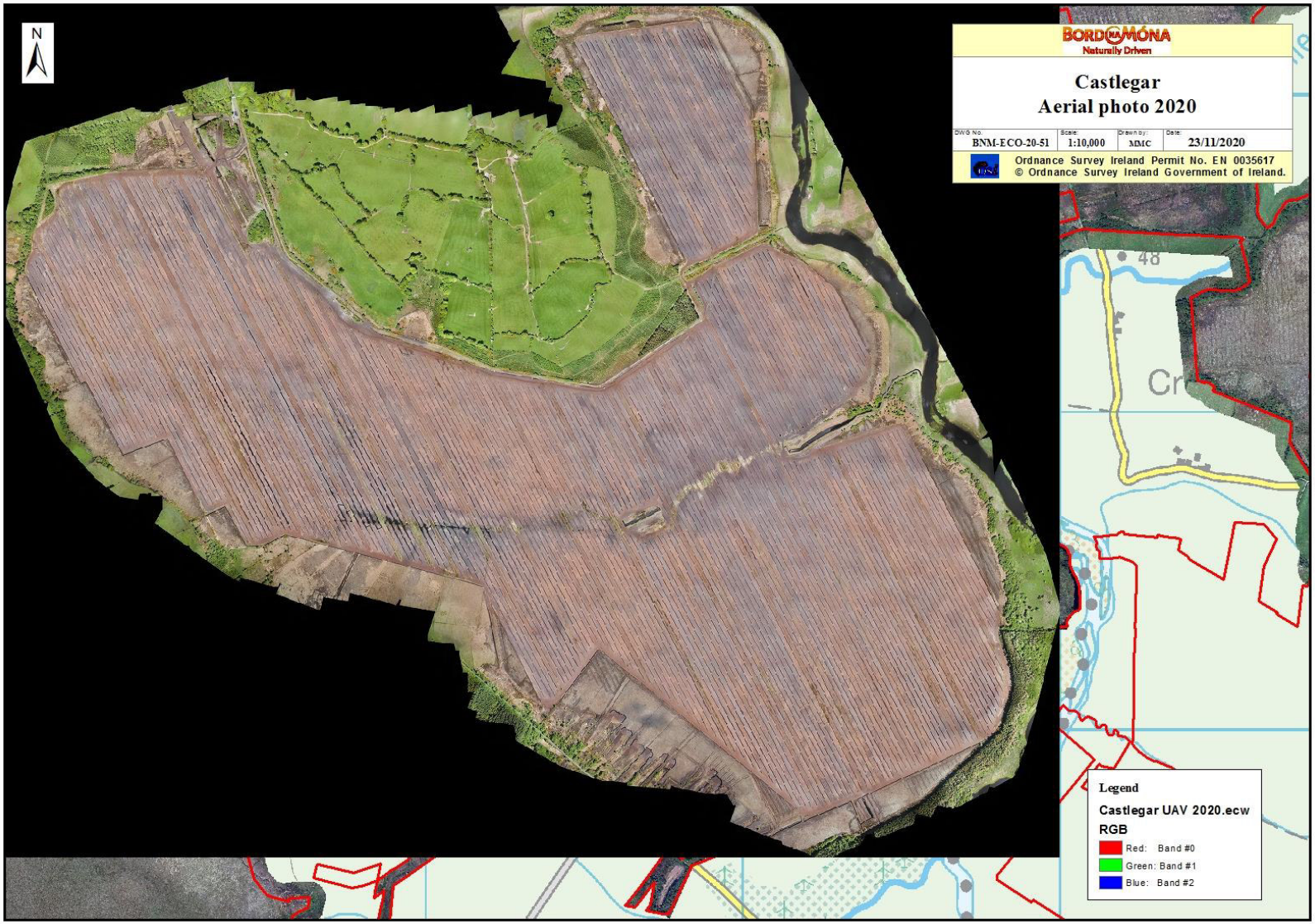



Figure 8.1. Aerial photo of Castlegar Bog. The production bog is bare peat.

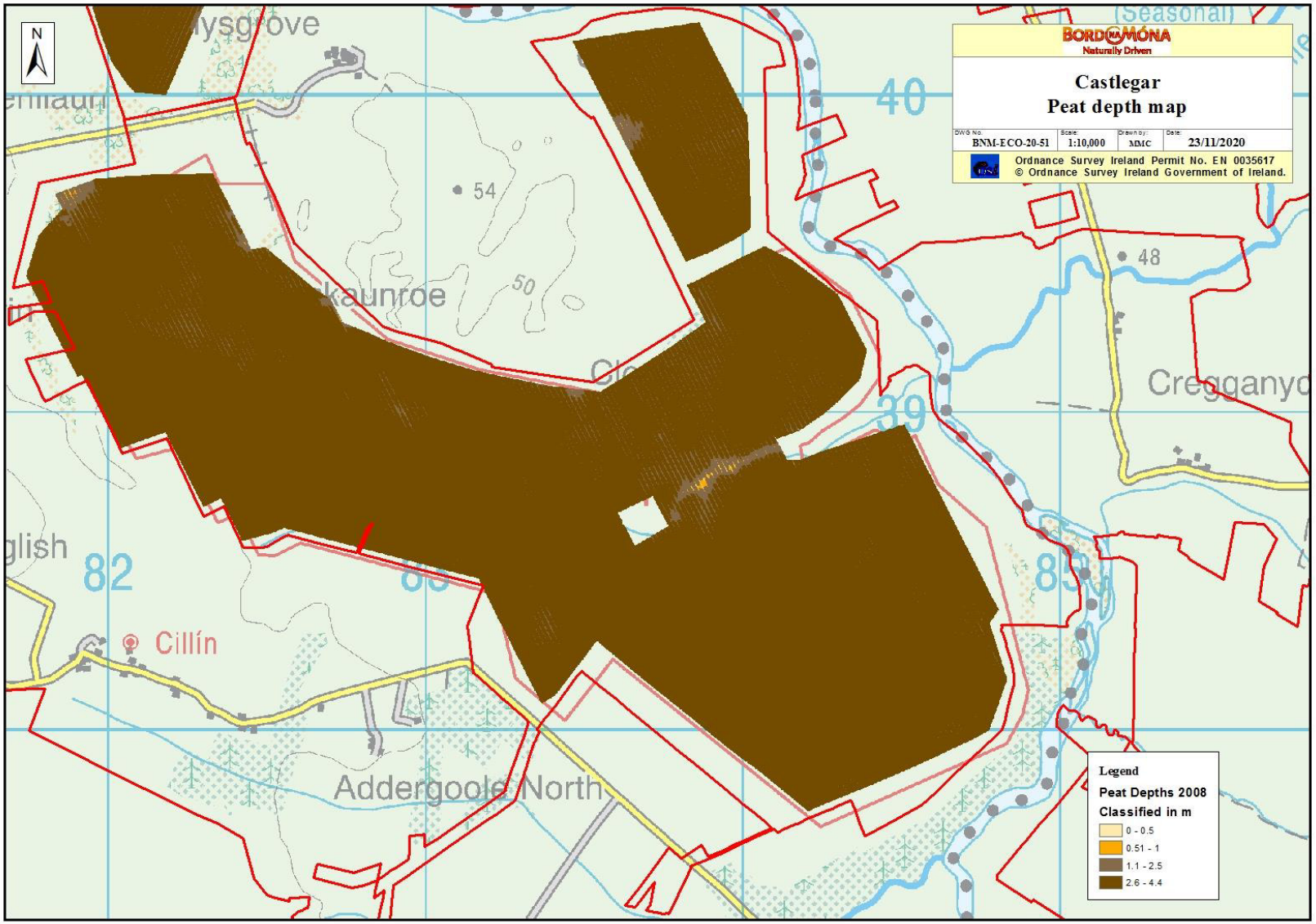



Figure 8.2. Peat depth map for Castlegar Bog. The majority of the bog is characterised as deep peat cutover bog.

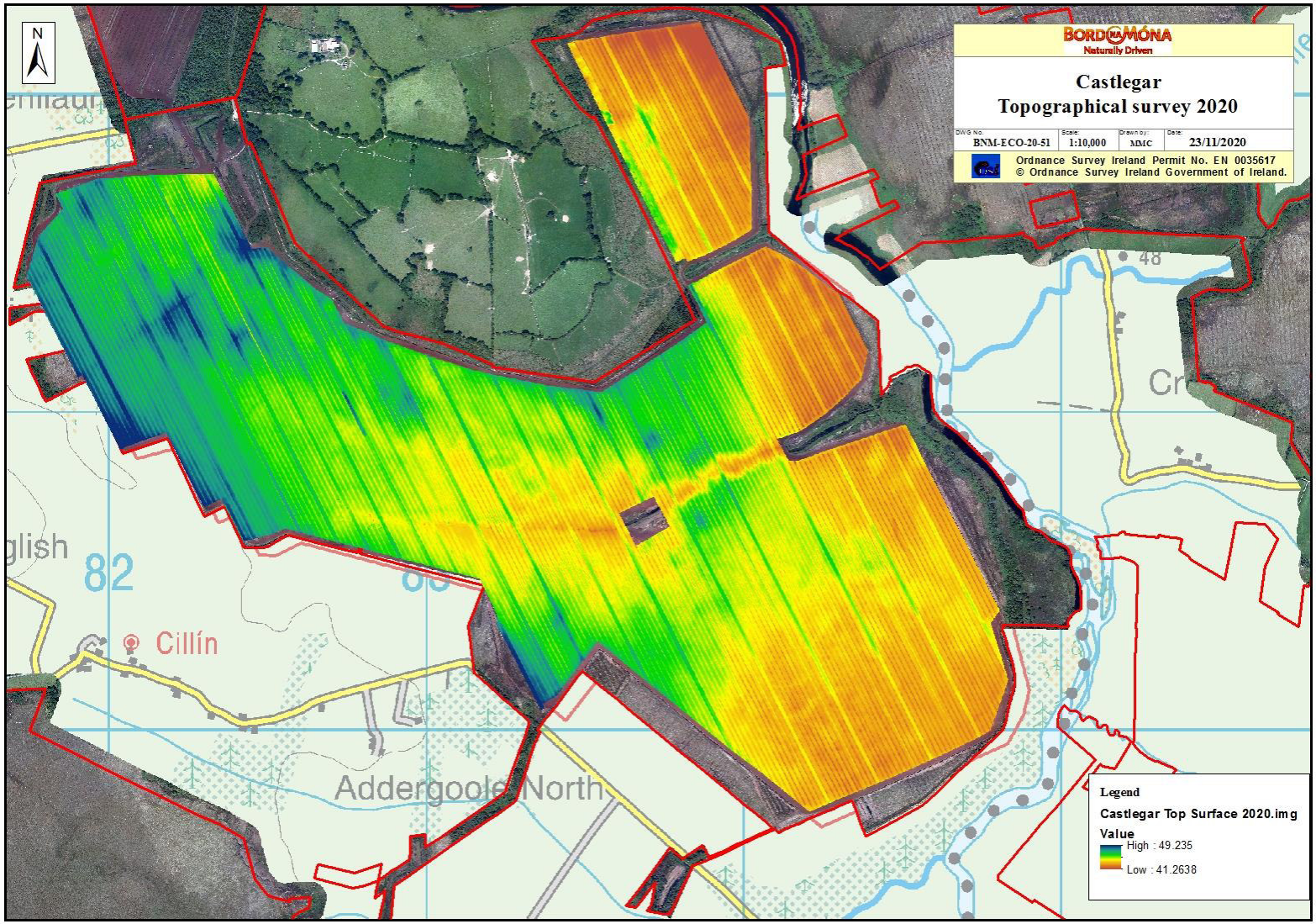



Figure 8.3. LIDAR topography map of Castlegar Bog. Low areas and basins are orange-yellow, more elevated areas are blue-green. The majority of the bog slopes towards a central main drainage channel.

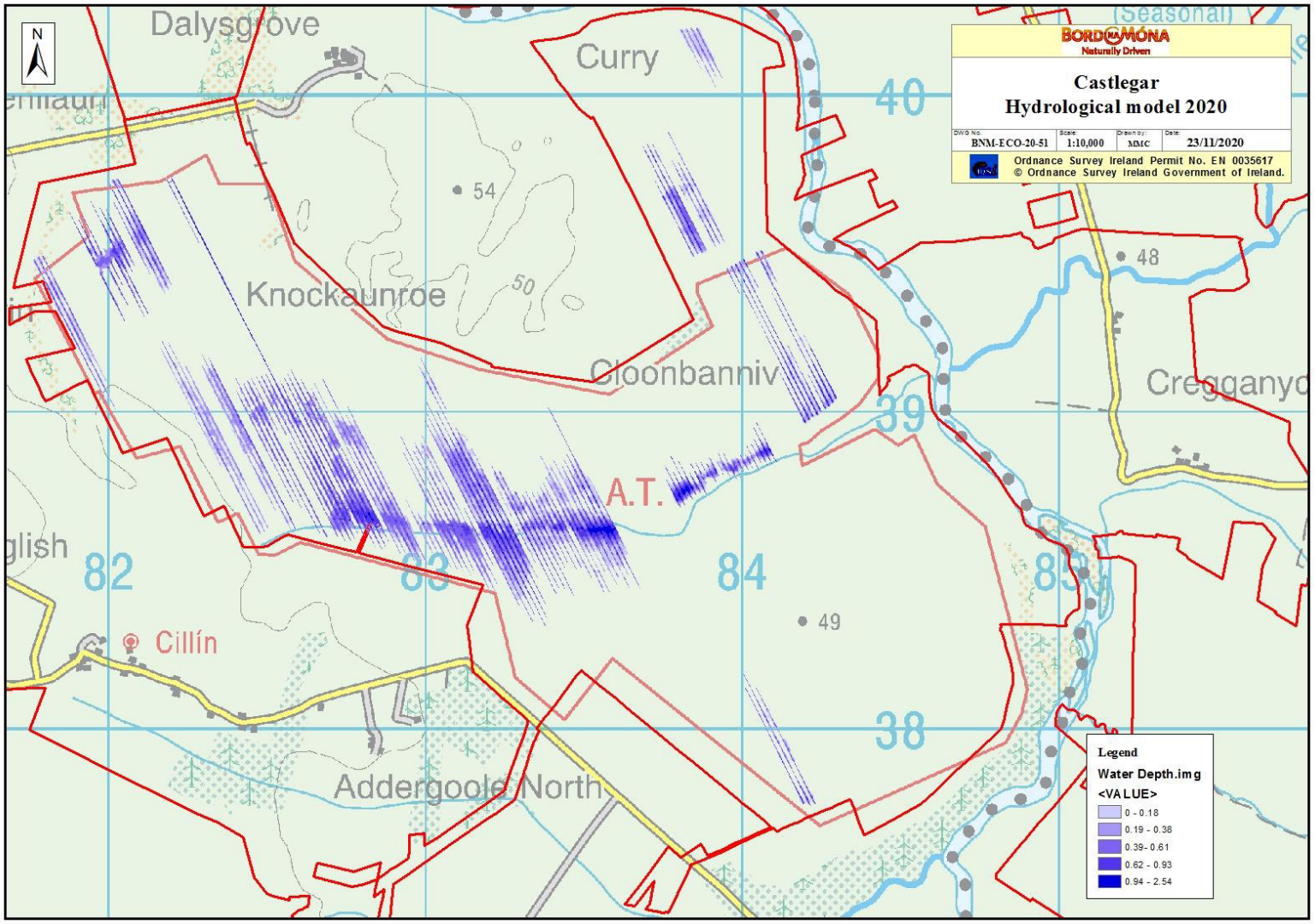



Figure 8.4. Hydrological modelling for Castlegar Bog showing range of expected water depths based on current topography.

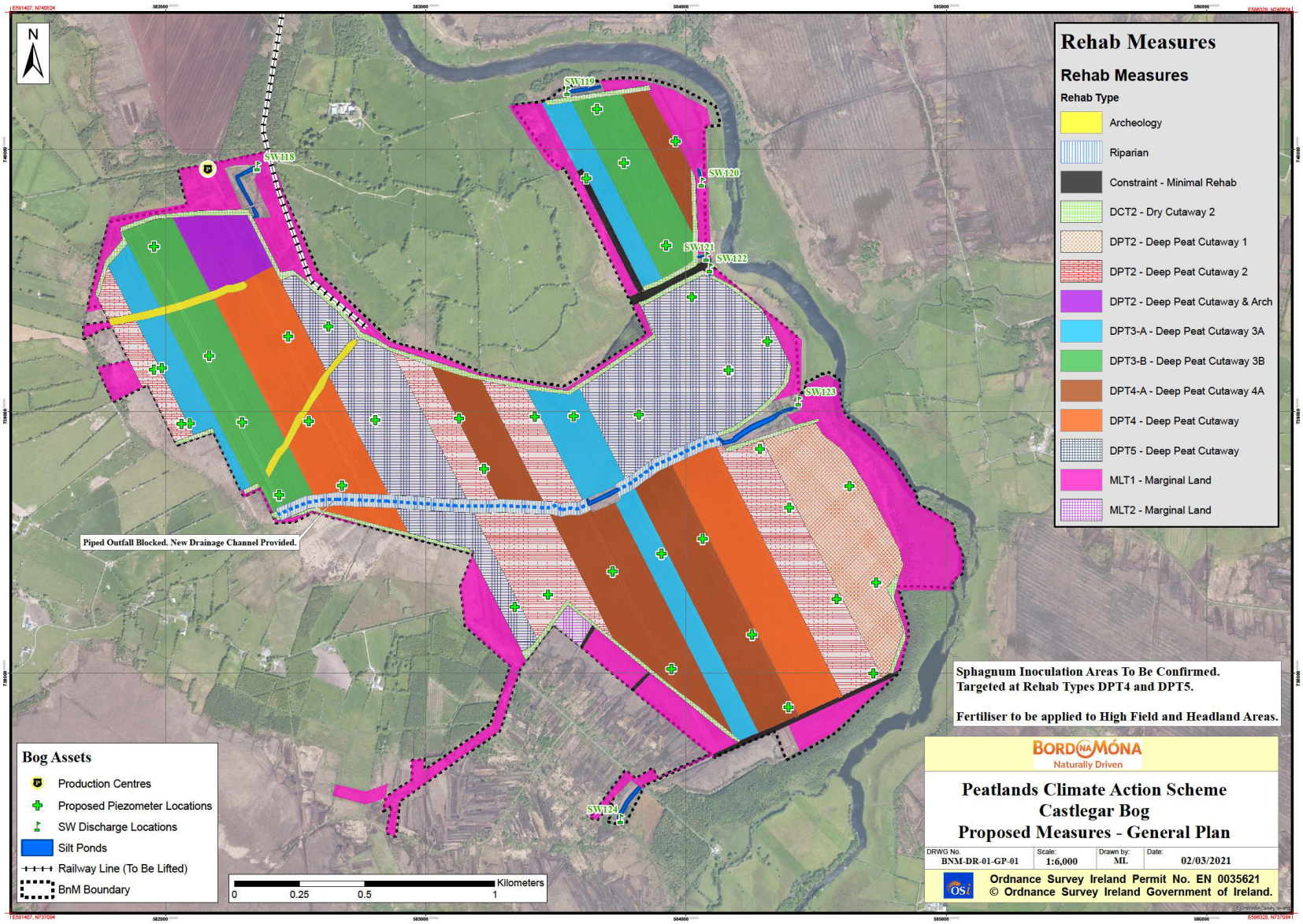



Figure 8.5. Indicative Enhanced Rehabilitation Plan for Castlegar Bog. Note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.

*Table 8.1 Enhanced rehabilitation measures and target area at 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.*

| 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 | 22.4 |
| | DPT2 | More intensive drain blocking (7/100 m) + blocking outfalls and managing overflows | 54.9 |
| | DPT3 | More intensive drain blocking (7/100 m), + field reprofiling + blocking outfalls and managing overflows | 68.3 |
| | DPT4 | Berms and field re-profiling (45m x 60m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation | 92.9 |
| | DPT5 | Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation | 61.7 |
| 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 | 12.2 |
| | DCT3 | More intensive drain blocking (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 + constructing larger berms to re-wet cutaway + transplanting Reeds and other rhizomes | |
| | WLT4 | More intensive drain blocking (7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes | |
| | WLT5 | More intensive drain blocking (7/100 m), + field reprofiling + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes | |
| Marginal land | MLT1 | No work required | 65.7 |
| | MLT2 | More intensive drain blocking (7/100 m) | 1.2 |
| | MLT3 | More intensive drain blocking (7/100 m) + blocking outfalls and managing overflows with + boundary berm | |
| **Other** | | Silt-ponds | 8.5 |
| | | Riparian | 8.3 |
| | | Constraints | 3.9 |
| | | Archaeology constraints | 3.3 |
| **Total** | | | 403.2 |

# 9. AFTERCARE AND MAINTENANCE

## 9.1 Programme for monitoring, aftercare and maintenance

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

- There will be **initial quarterly monitoring assessments** of the site to determine the general status of the site, the condition of the silt ponds, assess the condition of the rehabilitation work, monitoring of any potential impacts on neighbours land, general land security, boundary management, dumping and littering.
- The number of these site visits will reduce after 2 years to bi-annually and then after 5 years to annual visits.
- These monitoring visits will also consider any requirements for further practical rehabilitation measures.
- The **baseline condition of the site will be established** post-rehabilitation implementation by using an aerial survey to take an up to date aerial photo, when rehabilitation is completed. This will be used to verify completion of rehabilitation measures. The extent of bare peat will be assessed using this baseline data, and habitat maps will be updated, if required.
- **Water quality monitoring** at the bog will be established. The main objective of this water quality monitoring will be to establish a baseline and then monitor the impact of peatland rehabilitation on water quality from the bog.
- In order to assist in monitoring surface water quality from this bog, it is planned to increase the existing licence monitoring requirements to sampling for the same parameters to every month during the scheduled activities and for a period up to 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.
- Enhanced water quality monitoring will aim to include up to 70% of a bogs drainage catchments.
- Monitoring results will be maintained, trended and reported on each year as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, which will be available in April each year at www.epa.ie.
- The parameters to be included (as per condition 6.2 of the IPC Licence) include monthly monitoring for pH, 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. In addition, DOC will be included as a parameter to try and identify any changes in carbon in the surface water.
- If, after two years, key criteria for successful rehabilitation are being achieved and key targets are being met, then the water quality monitoring will be reviewed, with consideration of potential ongoing research on site. The water quality data, the aerial surveys and the habitat mapping will be collated and will be submitted to the EPA as part of the final validation report.
- If, after two years, key criteria for successful rehabilitation have **not** been achieved and key targets have **not** been met, then the rehabilitation measures and status of the site will be evaluated and enhanced, where required. This evaluation may indicate no requirement for additional enhancement of rehabilitation measures, but may demonstrate that more time is required before key criteria for

rehabilitation has been achieved. Monitoring of water quality will then also continue for another period to be defined.

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

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

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

## 10. REFERENCES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# APPENDIX I: A STANDARD PEATLAND REHABILITATION PLAN TO MEET CONDITIONS OF THE IPC LICENCE

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

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

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

**Scope of rehabilitation**

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

- The area of Castlegar Bog (Figure 3.1).
- 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.
- To minimise 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 wetland creation and deep peat re-wetting. This is defined as:

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

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

**Criteria for successful rehabilitation:**

- Rewetting of deep peat and shallow cutaway 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 blockages and re-wetting). This will be demonstrated by a post rehab aerial 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) towards what would be typical of a re-wetted cutaway bog. This will be demonstrated by water quality monitoring results.

**Rehabilitation measures: (see Figure Ap-1)**

- Blocking field drains in the former industrial production area using a dozer/excavator to create regular peat blockages (three blockages per 100 m) along each field drain;
- Creation of a low berm to retain water on site between former production area and Bilberry River.
- Re-alignment of piped drainage.
- No measures are planned for the other surrounding marginal peatland habitats.
- Silt ponds will continue to be maintained during the rehabilitation and decommissioning phase.
- Evaluate success of short-term rehabilitation measures and enhance where necessary.
- Decommissioning of silt-ponds will be assessed and carried out, where required.

**Timeframe:**

- 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 needed. These will be determined by ongoing monitoring.
- 2023-2024. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- 2023-2024. Decommission silt-ponds, if necessary.

**Budget and Costing**

- Bord na Móna maintains a Provision on its balance sheet to pay for the future costs of rehabilitation and decommissioning when industrial peat extraction ceases. This is updated every year. For more information see the Bord na Móna Annual Report (Bord na Móna 2020). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.
- At this time, a basic rehabilitation provision has been allocated to the site based on the area degraded raised bog 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 | 260.6 |
| 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 | |
| Silt Pond | | | 8.5 |
| | MLT1 | No work required (Marginal land including Silt Ponds) | 121.2 |
| Archaeology | | | 9.1 |
| Constraint | | | 2.6 |
| **Total** | | | **403.2** |

**Monitoring, after-care and maintenance**

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

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

**Validation and IPC Licence surrender**

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

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

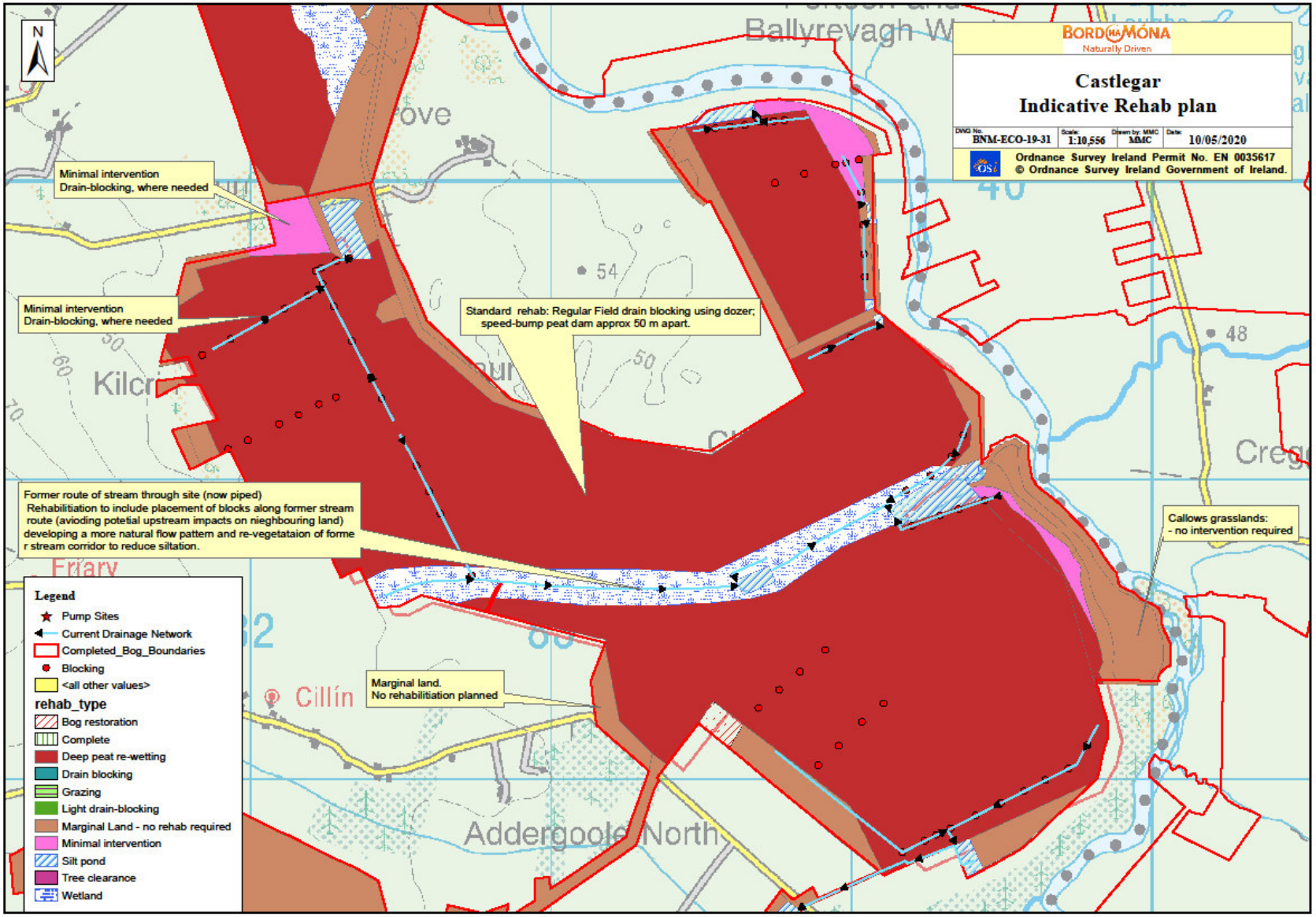



Figure Ap-1. Indicative adapted standard rehabilitation plan for Castlegar Bog.

## 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 ceased in 2019. Remaining milled peat stocks were supplied to Shannonbridge (WOP) and Lanesborough (LRP) during 2020. Both power stations closed at 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.

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

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

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

| Bog Name | Area (ha) | Stage of development | Land-Use and History | Peat Production Cessation | Rehab Plan Status |
|---|---|---|---|---|---|
| Attymon | 336 | Cutover Bog<br>Industrial peat production commenced at Attymon Bog in 1941 and ceased in 2019. Attymon is a deep peat cutover bog. | Attymon Bog formerly supplied fuel sod peat.<br>Coillte have developed a portion of the former production area for conifer forestry.<br>Some rehabilitation was carried out in 2019/2020. | 2109 | Finalised 2018 |
| Cloonkeen | 252 | Cutover Bog<br>Industrial peat production commenced at Cloonkeen Bog in 1953 and ceased in 2019. Cloonkeen Bog is a deep peat cutover bog. | Cloonkeen Bog formerly supplied fuel sod peat.<br>Coillte have developed a portion of the former production area for conifer forestry.<br>Some rehabilitation was carried out in 2019/2020. | 2019 | Finalised 2018 |
| Derrydoo-Woodlough | 452 | Development Bog<br>Derrydoo-Woodlough Bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place. | Bog restoration was carried out in 2013-2014<br>Rehabilitation (bog restoration) now complete. | N/A | Finalised 2012 |
| Tirrur-Derrymore | 422 | Development Bog<br>This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place. | This bog has significant raised bog restoration potential.<br>Section leased to NPWS as a SAC turf-cutting relocation site. | N/A | Updated 2020 |
| Newtown-Loughgore | 448 | Development Bog<br>This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place. | Some sod turf production<br>Bog restoration was carried out in 2019-2020<br>Rehabilitation (bog restoration) nearly complete. | 2020 | Finalised 2012 |
| Killeglan | 581 | Development Bog<br>This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place. | Bog restoration was carried out in 2013-2014<br>Rehabilitation (raised bog restoration) complete | N/A | Finalised 2016 |
| Cloonboley 1 | 675 | Development Bog<br>This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place on the main section. | A small sub-section has been used for sod turf production.<br>Bog restoration was carried out in 2013-2014<br>Rehabilitation (raised bog restoration) complete | 2020 | Finalised 2014 |
| Cloonboley2 | 203 | Development Bog<br>This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place. | Bog restoration was carried out in 2013-2014<br>Rehabilitation (raised bog restoration) complete | N/A | Finalised 2016 |

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

| Bog Name | Area (ha) | Stage of development | Land-Use and History | Peat Production Cessation | Rehab Plan Status |
|---|---|---|---|---|---|
| Ballaghhurt | 597 | Cutaway Bog<br>Industrial peat production commenced at Ballaghhurt Bog in 1981. The majority of the site is cutaway with some residual deeper peat | Ballaghhurt Bog formerly supplied a range of commercial functions including horticultural peat and fuel peat.<br>Pioneer cutaway vegetation communities are naturally developing on some cutaway areas. | 2020 | Draft 2017 |
| Belmont | 316 | Cutaway Bog<br>Industrial peat production commenced at Belmont Bog during the 1950's. The majority of the site is cutaway. | There are some areas of pioneer cutaway vegetation communities naturally colonising cutaway sections.<br>Coilte have developed a portion of the bog for forestry. | 2020 | Draft 2021 |
| Blackwater | 2,303 | Cutaway Bog<br>Industrial peat production commenced at Blackwater Bog during the 1950's. The majority of the site is cutaway. | Bloomhill Bog formerly supplied milled horticultural peat and fuel peat.<br>There is extensive development of emergent cutaway vegetation communities across the former production area.<br>The site has been used for experimental forestry (BOGFOR) and other conifer plantations.<br>Part of the site was rehabilitated with lake and wetland creation.<br>An ash facility took ash from Shannonbridge Power station | 2020 | Draft 2017 |
| Bloomhill | 883 | Cutover Bog<br>Industrial peat production commenced at Bloomhill Bog during 1981. The majority of the site still has relatively deep residual peat. | Bloomhill Bog formerly supplied milled horticultural peat and fuel peat.<br>Much of the former peat production area is bare peat. | 2020 | Draft 2017 |
| Bunahinly-Kilgarvan | 389 | Cutover Bog<br>Industrial peat production commenced at Bunahinly-Kilgarvan Bog during the 1990's. Residual Deep peat remains on these bogs. | Bunahinly-Kilgarvan formerly supplied milled horticultural peat and fuel peat.<br>Much of the former production area is bare peat.<br>Part of Bunihinly has been re-wetted. | 2020 | Draft 2017 |
| Glebe | 132 | Cutover Bog<br>Industrial peat production commenced at Glebe Bog during the 1990's. Residual deep peat remains on these bogs. | Glebe Bog formerly supplied milled; horticultural peat and fuel peat.<br>Glebe bog is still listed as a pNHA.<br>Much of the former production area is bare peat. | 2020 | Draft 2017 |
| Clooniff | 523 | Cutover & cutaway Bog<br>Industrial peat production commenced at Clooniff Bog during the 1970's. A mosaic of variable peat depths remains on this bog. | Clooniff Bog formerly milled fuel peat.<br>Much of the former production area is bare peat or wetland.<br>Some emergent vegetation communities are naturally colonising cutaway areas. Reduced pumping has created a large wetland in one area. | 2020 | Draft 2021 |

| | | | | | |
|---|---|---|---|---|---|
| Cornafulla | 460 | Cutover Bog<br>Industrial peat production commenced at Cornafulla Bog in 1987. This bog still retains relatively deep residual peat. | Cornafulla Bog formerly supplied milled horticultural peat and fuel peat.<br>Much of the former production area or cutaway is bare peat. | 2020 | Draft 2017 |
| Cornaveagh | 492 | Cutover Bog<br>Industrial peat production commenced at Cornaveagh Bog in 1970's and ceased in 2020. This bog still retains relatively deep residual peat. | Cornaveagh Bog formerly supplied milled horticultural peat and fuel peat.<br>Much of the former production area footprint or cutaway is bare peat. | 2020 | Draft 2017 |
| Culliaghmore | 442 | Cutover Bog<br>Industrial peat production commenced at Culliaghmore Bog in 1960's and ceased in 2020. Much of this bog is cutaway, with some pockets of deeper residual peat. | Culliaghmore Bog formerly supplied milled horticultural peat and fuel peat.<br>Much of the former production area footprint or cutaway is bare peat.<br>Some pioneer cutaway vegetation communities are naturally colonising cutaway areas. | 2020 | Draft 2017 |
| Garryduff | 970 | Cutaway Bog<br>Industrial peat production commenced at Garryduff Bog in 1960's. The majority of this bog is cutaway. | Much of the former production area footprint or cutaway is bare peat.<br>Extensive natural development of pioneer cutaway vegetation communities is present on cutaway areas. | 2020 | Draft 2021 |
| Kellysgrove | 201 | Development Bog<br>Kellysgrove Bog was drained in the 1980s in anticipation of industrial peat production. No peat harvesting ever took place. | The site retains degraded raised bog vegetation.<br>Kellysgrove Bog retains significant raised bog restoration potential.<br>A way-marked walking trail is positioned along the old Ballinasloe Canal. | 2020 | Draft 2021 |
| Kilmacshane | 1,294 | Cutaway Bog<br>Industrial peat production commenced at Kilmacshane Bog in 1960's. The majority of this bog is cutaway with some pockets of deeper peat remaining. | Kilmacshane Bog formerly supplied milled horticultural peat and fuel peat.<br>Some pioneer cutaway vegetation communities are naturally colonising cutaway areas and water levels have risen as pumping reduced, creating wetlands. | 2014 | Draft 2021 |
| Lismanny | 449 | Cutaway Bog<br>Industrial peat production commenced at Lismanny Bog in 1960's. The majority of this bog is cutaway with some pockets of deeper peat remaining. | Lismanny Bog formerly supplied milled horticultural peat and fuel peat.<br>Much of the former production area footprint is bare peat.<br>Some pioneer cutaway vegetation communities are naturally colonising cutaway areas. | 2020 | Draft 2021 |

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

| Bog Name | Area (ha) | Stage of development | Land-Use and History | Peat Production Cessation | Rehab Plan Status |
|---|---|---|---|---|---|
| Derryfadda | 610 | Cutover bog<br>Industrial peat production commenced at Derryfadda Bog in 1980's. This bog still retains residual deep peat. | Derryfadda Bog formerly supplied milled horticultural peat and fuel peat.<br>Much of the former production area is bare peat. | 2020 | Draft 2017 |

| | | | | | |
|---|---|---|---|---|---|
| | | | Some pioneer cutaway vegetation communities are naturally colonising cutaway areas. | | |
| Boughill | 415 | Cutover bog<br>Industrial peat production commenced at Boughill Bog in 2008. This bog still retains residual deep peat. | Boughill Bog formerly supplied milled horticultural peat and fuel peat.<br>Much of the former production area footprint or cutaway is bare peat. | 2020 | Draft 2017 |
| Castlegar | 517 | Cutover bog<br>Industrial peat production commenced at Castlegar Bog in 2001. This bog still retains residual deep peat. | Castlegar Bog formerly supplied milled horticultural peat and fuel peat.<br>Much of the former production area is bare peat.<br>The adjacent Annaghbeg Bog NHA is an intact undrained raised bog | 2019 | Draft 2021 |
| Gowla | 650 | Cutover bog<br>Industrial peat production by BnM commenced at Gowla Bog in 1970's. Development for sugar production was in place at Gowla since the 1950's. This bog still retains residual deep peat. | Gowla Bog formerly supplied milled horticultural peat and fuel peat.<br>Much of the former production area footprint is bare peat. | 2020 | Draft 2017 |

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

# 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 works area.

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

In addition to the above, Best Practise measures around the prevention and spread of Crayfish plague[3] and any other Aquatic Invasive Alien Species will be adhered with throughout all rehabilitation measures 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 have now announced the complete cessation of industrial peat production across its estate (January 2021).

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. 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 bog is part of the Mount Dillon Bog group. This regulatory requirement is the main driver of the development of this rehabilitation plan.

## 2 The Peatlands Climate Action Scheme (PCAS)

Bord na Móna (BnM) appreciates the Minister's intention to support, via the Climate Action Fund, Bord na Móna in developing a package of measures, 'the proposed Scheme', for the enhanced decommissioning, rehabilitation and restoration of cutaway peatlands, referred to as the 'Peatlands Climate Action Scheme'. The proposed Scheme includes lands previously used to supply peat for electricity generation within the State. The enhanced decommissioning, rehabilitation and restoration of the peatlands funded by the proposed Scheme will deliver benefits across climate action (GHG mitigation through reduced carbon emissions and acceleration towards carbon sequestration), enrich the State's natural capital, increase eco-system services, strengthen biodiversity, improve water quality and storage attenuation as well as developing the amenity potential of the peatlands.

It is envisaged that Bord na Móna carry out an enhanced decommissioning, rehabilitation and restoration scheme, (PCAS), across a footprint of 33,000 ha (a subset of the BnM estate that has been used for energy production). This proposed scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Interventions and measures supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly,

significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. *However, only the costs associated with the additional and enhanced measures, i.e., those which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10, will be eligible for support under the proposed Scheme.*

The proposed enhanced rehabilitation measures detailed in this document, are predicated on the understanding that the element of the rehabilitation, over and above the 'standard' measures necessary to comply with pre-existing Condition 10 IPC Licence requirements, will be deemed eligible costs for the Scheme regulator.

For the avoidance of doubt, should the proposed Scheme and the associated statutory obligation on Bord na Móna not materialise, Bord na Móna will not carry out the enhanced decommissioning, rehabilitation and restoration measures described in this plan. Bord na Móna will instead plan to complete an adapted standard decommissioning and rehabilitation measures required under Condition 10 and outlined in Appendix I.

## 3 National Climate Policy

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

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

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

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

## 4 National Peatlands Strategy

The National Peatlands Strategy (2015) contains a comprehensive list of actions, necessary to ensure that Ireland's peatlands are preserved, nurtured and become living assets within the communities that live beside them. It sets out a cross-governmental approach to managing issues that relate to peatlands, including compliance with EU environmental law, climate change, forestry, flood control, energy, nature conservation, planning, and agriculture. The Strategy has been developed in partnership between relevant Government Departments/State bodies and key stakeholders through the Peatlands Council.

The strategy recognises that Ireland's peatlands will continue to contribute to a wide variety of human needs and to be put to many uses. It aims to ensure that Ireland's peatlands are sustainably managed so that their benefits

can be enjoyed responsibly. It aims to inform appropriate regulatory systems to facilitate good decision making in support of responsible use. It also aims to inform the provision of appropriate incentives, financial supports and disincentives where required. The strategy attempts to strike an appropriate balance between different needs, including local stakeholders like turf-cutters and semi-state bodies such as Bord na Móna.

In line with a National Peatlands Strategy recommendation, a Peatlands Strategy Implementation Group (PSIG), was established, assisted in the finalisation of the Strategy, is overseeing subsequent implementation and will report to Government on an annual basis on the implementation of the actions and principles contained within the Strategy.

Bord na Móna is a key stakeholder in the National Peatlands Strategy and the Peatlands Strategy Implementation Group. The strategy recognises the potential for some Bord na Móna sites to be restored and to contribute to the national SAC and NHA network of protected raised bog sites. The strategy also recognises the various different values of cutaway bog and developed six key principles (with Bord na Móna) for the after-use of cutaway bog.

- Bord na Móna will continue to assess and evaluate the potential of the company's land bank, using a land use review system. The assessment will help prepare a set of evidence-based management plans for the various areas of peatland. These plans will also inform its cutaway bog rehabilitation.
- The policy of Bord na Móna is not to open up any undrained new bogs for peat production.
- Lands identified by Bord na Móna as having high biodiversity value and/or priority habitats will be reserved for these purposes as the principal future land use.
- Generally, Bord na Móna cutaway bogs that flood naturally will be permitted to flood unless there is a clear environmental and/or economic case to maintain pumped drainage.
- In deciding on the most appropriate afteruse of cutaway peatlands, consideration shall be given to encouraging, where possible, the return to a natural functioning peatland ecosystem.
- This will require re-wetting of the cutaway peatlands which may lead in time to the restoration of the peatland ecosystem.
- Environmentally, socially and economically viable options should be analysed to plan the future use of industrial cutaway peatlands, in conjunction with limiting factors as outlined in Bord na Móna's Strategic Framework for the Future Use of Peatlands.

The National Peatlands Strategy highlights the importance and value of developing peatland rehabilitation plans for Bord na Móna cutaway sites and implementing this peatland rehabilitation.

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

The National River Basin Management Plan (2018-2021) (Department of Housing, Planning, Community and Local Government 2017) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD). In broad terms, the objectives of the WFD are (1) to prevent the deterioration of water bodies and to protect, enhance and restore them with the aim of achieving at least good status and (2) to achieve compliance with the requirements for designated protected areas.

The NRBMP outlines how peat extraction can be a potentially significant pressure on various water quality parameters. Peatland rehabilitation of Bord na Móna cutaway (in addition to other measures) is part of the WFD (2018-2021) programme of measures. The NRBMP takes account of the fact that Bord na Móna is in the process of phasing out the extraction of peat for energy production, that it set a target to rehabilitate 9,000 ha of cutaway

bogs (covering 25 peatlands) by 2021 (in 2018) and will look to implement best-available mitigation measures to further reduce water quality impacts caused by peat extraction while the phasing-out process is taking place. This NRBMP rehabilitation target is set to be superseded by the acceleration of the Bord na Móna de-carbonisation programme and PCAS.

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

## 6 National Biodiversity Action Plan 2016-2021

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

## 7 National conservation designations

Bord na Móna operates in a wider landscape that also includes a network of European and National nature conservation sites (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), National Heritage Areas (NHAs, cNHAs) and National Nature Reserves). Bord na Móna will take account of this network of conservation objectives and their conservation objectives when developing these rehabilitation plans. It is expected that peatland rehabilitation will, in general, benefit the conservation objectives of this network of nature conservation sites.

Castlegar Bog is situated in close proximity to, or overlaps a number of lands designated for conservation. 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 (see Figure 3.6). 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 Goose and Whooper Swan.

Some undeveloped and 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.

## 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.

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

- BNM must ensure that any monuments or archaeological objects discovered during peat extraction are protected in an appropriate manner by following the Archaeological Protection Procedures.
- BNM must ensure that any newly discovered monuments on Bord na Móna lands are reported in a timely manner to the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht.
- BNM must ensure that any archaeological objects discovered on Bord na Móna lands are reported immediately to the Duty Officer of the National Museum of Ireland.
- Bord na Móna will endeavour to adhere to this code of practise during the peatland rehabilitation phase and appropriate archaeology mitigation is carried out before and during cutaway peatland rehabilitation. An Archaeological Impact Assessment is being carried out for the proposed rehabilitation at this site (Appendix XII). The recommendations of this assessment will be incorporated into the rehabilitation plan to minimise impacts on known archaeology. In addition, Bord na Móna will adhere to the Archaeology Code of Practise relating to management of stray archaeological finds that may arise during cutaway peatland rehabilitation and decommissioning.

## 12 Bord na Móna Biodiversity Action Plan 2016-2021

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

One example of a key CBD target is:

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

The EUs headline target for progress by 2020 is to:

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

The Kellysgrove 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. Bord na Móna have now announced the complete cessation of industrial peat production across its estate (January 2021). Rehabilitation measures will continue to be carried out with the focus on re-wetting and rehabilitation of cutover and cutaway areas in line with national policies (such as the National Peatland Strategy, the National Biodiversity Action Plan, the Climate Action Plan 2019, the Water Framework Directive, etc.) and rehabilitation guidelines set down by the Environmental Protection Agency. To date, 15,000 hectares of cutaway and cutover bog have been rehabilitated using this approach with 5,000 hectares in active rehabilitation.

In line with Bord na Móna's accelerated decarbonisation programme, the company has also committed to a significantly larger rehabilitation target. This is reflected in our plans to rehabilitate a further 20,000 hectares of cutaway and cutover bog to wetland and woodland mosaics by 2025. In addition, we plan to restore a further 1,000 hectares of raised bog habitat by 2025. These targets are significant in both timing and scale and are indicative of Bord na Móna's increased new ambition in this area.

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

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

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

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

# APPENDIX VII. DECOMMISSIONING

## 1. Condition 10 Decommissioning

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

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

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

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

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

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

| Item | Description | Castlegar Decommissioning Plan |
|---|---|---|
| **1** | Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices | Not Applicable |
| **2** | Cleaning Silt Ponds | Not Applicable |
| **3** | Decommissioning Peat Stockpiles | Not Applicable |
| **4** | Decommissioning or Removal of Buildings and Compounds | Not Applicable |
| **5** | Decommissioning Fuel Tanks and associated facilities | Not Applicable |
| **6** | Decommissioning and Removal of Bog Pump Sites | Not Applicable |
| **7** | Decommissioning or Removal of Septic Tanks | Not Applicable |

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

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

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

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

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

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

waste.

7.3.3 The ultimate destination of the waste.

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

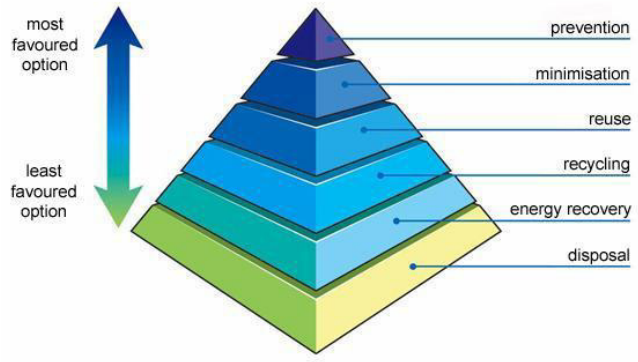
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

7.3.6 Details of any rejected consignments.

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

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

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



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

**2. Enhanced Decommissioning.**

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

| Item | Enhanced Decommissioning Type | Castlegar Decommissioning Plan |
|---|---|---|
| **1** | Removal of Railway Lines | Applicable |
| **2** | Decommissioning Bridges and Underpasses | Not Applicable |
| **3** | Decommissioning Railway Level Crossing | Not Applicable |
| **4** | Restricting Access (bog and silt pondss) | Restricting Access to Bog. |
| **5** | Removal of High Voltage Power Lines | Not Applicable |

## APPENDIX VIII. GLOSSARY

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

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

**Dry cutaway bog:** Cutaway bog is categorised as dry cutaway where it is not practical or feasible to re-wet these areas completely. It is inevitable that some areas of cutaway will remain relatively dry due to the heterogenous topography of the cutaway, as well as requirements for continued drainage on site for identified after-uses, or off site in relation to neighbouring lands or other infrastructure. Ridges and mounds of glacial deposits can become exposed during peat extraction and form a heterogenous topographical mosaic separated by basins. Dry cutaway may have very thin or no residual peat where ridges and mounds have been exposed. The exposed sub-soils are a mix of glacial gravels, muds and tills that can be quite free-draining. Dry cutaway may also have deeper residual peat but in a location (ie. at the margin) where the peat can not be re-wetted due to boundary constraints. Dry cutaway may also develop in situations where there a relatively steep slope that inhibits re-wetting. The majority of dry cutaway will develop towards grassland, heath, scrub and dry woodland habitats.

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

**Enhanced rehabilitation:** This is defined as rehabilitation carried out under proposed Scheme, which is proposed to be externally funded. It is proposed by Government that Bord na Móna be obligated to carry out enhanced decommissioning, rehabilitation and restoration on peatlands. This proposed Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Interventions and activities supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. *However, only the costs associated with the additional, enhanced and accelerated measures, i.e., those interventions which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support under the proposed Scheme.*

**Environmental stabilisation**: The key objective of peatland rehabilitation is **environmental stabilisation** of the former industrial peat production areas and the stabilisation of any potential emissions from the bog that related to the former industrial peat extraction activities.

Environmental stabilisation is defined as:

- Carrying out planned peatland rehabilitation.

- Setting former bare peat industrial peat production areas on a trajectory towards naturally functioning peatland habitats, via planned peatland rehabilitation, the restoration of wetter hydrological conditions and encouragement of natural colonisation.
- Stabilisation or downward trajectory of key water quality parameters (e.g. suspended solids, ammonia),
- Meeting IPC Licence conditions.

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

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

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

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

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

**Wetland cutaway bog.** Wetland cutaway bog is defined as former raised bogs that have been in industrial peat production, where production has ceased and the majority of peat has been cutaway, and where this cutaway has the potential to be re-wetted. A significant number of Bord na Móna sites have pumped drainage and these sites are likely to develop a mosaic of wetland habitats when pumping in reduced or stopped. The water chemistry of wetland cutaway frequently is strongly influenced by the more alkaline sub-soils that have been exposed during peat production. This means that pioneer vegetation is more typical of fen and wetland, rather than raised bog. Wetland cutaway will have a broad range of hydrological conditions depending on the local

topography. In some cases, these wetlands may form deep water (> 0.5 m) whilst other areas may have the water table at or just below the surface of the ground.

# APPENDIX IX. EXTRACTIVE WASTE MANAGEMENT PLAN

## (Minimisation, treatment, recovery and disposal)

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

**Scope:**
This plan covers IPPC Licence's P0502-01, Blackwater Group of Bogs in Counties Roscommon, Galway, Offaly and Westmeath,

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

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

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

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

**2.0 P0502-01 IPPC Licence Extractive Waste Conditions**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**7.0 Extractive Waste Management Plan**

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

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

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

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

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

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

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

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

**Classification in accordance Annex II.**

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

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

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

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

10.2 Cutaway Bog Rehabilitation Plan:

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

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

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

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

**Review.**
This plan will be reviewed every five years, the first review to take place in September 2017. This review will entail an inspection of these waste facilities to ensure their placing, management, maintenance and stability comply with the requirements of the Extractive Waste Management requirements and condition 7.5, 7.6 and 7.7 of the Blackwater IPPC Licence P0502-01.

# APPENDIX X. MITIGATION MEASURES FOR THE APPLICATION OF FERTILISER

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

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

# APPENDIX XI. CONSULTATION SUMMARIES

**Table APXI -1 Consultees contacted**

| Contact Organisation | Contact Name | Date of Issue | Communication Format | Date Response Received | Response format |
|---|---|---|---|---|---|
| Galway County Councillors - Ballinasloe District | Cllr. Dr. Evelyn Francis Parsons | 01/12/2020 | E-mail | | |
| Galway County Council Environmental Department | environment@GalwayCoCo.ie | 01/12/2020 | E-mail | 02/12/2020 | E-mail |
| TD Roscommon - Galway | Michael Fitzmaurice | 01/12/2020 | E-mail | 01/02/2020 | E-mail |
| TD Roscommon - Galway | Claire Kerrane | 04/12/2020 | E-mail | | |
| TD Roscommon - Galway | Denis Naughten | 04/12/2020 | E-mail | 09/12/2020 | E-mail |
| Senator Roscommon Mayo | Aisling Dolan | 10/12/2020 | E-mail | 29/12/2020 | E-mail |
| Environmental Protection Agency | Brian Meeney | 04/12/2020 | E-mail | 18/01/2021 | E-mail |
| National Parks and Wildlife Service | Brian Lucas | 04/12/2020 | E-mail | 03-07/12/2020 | E-mail |

| | | | | | |
|---|---|---|---|---|---|
| NPWS Regional Network | District Conservation Officer (Galway East) | 04/12/2020 | E-mail | | |
| Dept of the Housing Local Government and Heritage | Malcom Noonan (Minister of State at the Department of Housing, Local Government and Heritage) | 03/12/2020 | E-mail | | |
| National Monuments Service | Margaret Keane | 04/12/2020 | E-mail | 25/01/2021 | E-mail |
| National Museum of Ireland (Irish Antiquities Division) | Isabella Mulhall | 04/12/2020 | E-mail | 28/12/2020 | E-mail |
| Minister for Environment, Climate and Communications | Minister - Eamon Ryan | 02/12/2020 | E-mail | | |
| Dept of Environment, Climate and Communications | Noel Regan | 04/12/2020 | E-mail | | |
| Minister for Rural and Community Development | Minister - Heather Humpreys | 04/12/2020 | E-mail | | |
| Office of Public Works | info@opw.ie | 01/12/2020 | E-mail | 11/12/2020 | E-mail |
| Minister of state for Agriculture with responsibility for Land use and Biodiversity | Pippa Hackett Minister of State for Land Use and Biodiversity) | 03/12/2020 | E-mail | | |
| Inland Fisheries Ireland | General e-mail contact | 01/12/2020 | E-mail | | |

| | | | | | |
|---|---|---|---|---|---|
| Waterways Ireland | General e-mail contact | 03/12/2020 | E-mail | | |
| The Heritage Council | Lorcan Scott | 04/12/2020 | E-mail | | |
| Western Development Commission | info@wdc.ie | 04/12/2020 | E-mail | | |
| An Forum Uisce (The Water Forum) | General e-mail contact | 02/12/2020 | E-mail | | |
| Local Authority Waters Programme | Bernadette White \| Catchment Manager Western Region | 01/12/2020 | E-mail | 01/02/2021 | E-mail |
| An Taisce | General e-mail contact | 01/12/2020 | E-mail | | |
| Birdwatch Ireland | General e-mail contact | 01/12/2020 | E-mail | 03/12/2020 | |
| Irish Peatlands Conservation Council | General email contact | info@foe.ie | E-mail | 07/12/2020 | E-mail |
| Irish Wildlife Trust | General email contact | 04/12/2020 | E-mail | | |
| Bat Conservation Ireland | | 04/12/2020 | E-mail | | |
| Woodlands of Ireland | | 04/12/2020 | E-mail | | |
| Butterfly Conservation Ireland | Jesmond Harding | info@iwt.ie | E-mail | 12/12/2020 | E-mail |
| Community Wetlands Forum (part of Irish Rural link) | General e-mail contact | 04/01/2021 | E-mail | | |

| | | | | | |
|---|---|---|---|---|---|
| Turf Cutters and Contractors Association | | 15/01/2021 | Post | | |
| Galway Public Participation Network (PPN) | General e-mail contact | 01/12/2020 | E-mail | | |
| Sustainable Water Action Network (SWAN) | http://www.swanireland.ie/ | 04/12/2020 | E-mail | | |
| Irish Farmers Association (Galway and Mayo Office) | Roy O'Brien | 04/12/2020 | E-mail | 03/02/2021 | E-mail |
| Irish Farmers Association (Head Office) | General e-mail contact | 04/12/2020 | E-mail | 08/12/2020 | E-mail |
| National Association of Regional Game Councils | Email - nargc@nargc.ie | 01/12/2020 | E-mail | | |
| ICMSA (Irish Creamery Milk Suppliers Association) | General email contact | galway@ifa.ie | E-mail | 07/12/2020 | E-mail |
| ICSA (Irish Cattle and Sheep Farmers Association | General email contact | 04/12/2020 | E-mail | | |
| Midlands & East Regional WFD | Ray Spain Co-ordinator Local Authority Water Programme | 01/12/2020 | E-mail | 03-07\12\2020 | E-mail |

| | | | | | |
|---|---|---|---|---|---|
| Operational Committee | | | | | |
| Shannon Flood Risk State Agency Co-ordination Working Group | Jackie Stewart | 01/12/2020 | E-mail | | |
| Ballydangan Bog Red Grouse Project | moore3@gmail.com | 04/12/2020 | E-mail | | |
| CARO (Climate Action Regional Office) Atlantic and Seaboard North | David Mellet | | | | |
| Just Transition Commissioner | Kieran Mulvey | 04/12/2020 | E-mail | | |
| Ballinasloe Tidy towns Committee | Tom Madden | 04/12/2020 | E-mail | | |
| Ballinasloe Walks and Trails | Valerie Dolan | 04/12/2020 | E-mail | | |
| Ballydangan Red Grouse Porject | Pat Feehily | 04/12/2020 | E-mail | | |
| BACD Ltd | Lyn Donnelly | 04/12/2020 | E-mail | | |
| Williamstown Tidy towns | Noel Finnegan | 04/12/2020 | E-mail | | |

## Table APXI -2 Response summary from Consultees contacted

| Organisation | Summary of Response by Stakeholder | BnM Response |
|---|---|---|
| | | |
| Galway County Councillors - Ballinasloe District- Dr. Evelyn Francis Parsons | A meeting was also held with BnM representatives and Dr. Evelyn Francis Parsons, Cllr. Tim Brodrick, Liam Hanrahan (Galway Co.Co.) on 18/12/2020 | BnM acknowledged and will give due cognisance to all points within the rehabilitation plan for Castlegar Bog. BnM raised responded via e-mail. |
| TD Roscommon - Galway - Michael Fitzmaurice TD | Conor Finnerty contacted on behalf of Deputy Fitzmaurice to request a meeting to discuss re-wetting and boundary drains | BnM acknowledged and will give due cognisance to all points within the rehabilitation plan for Castlegar Bog. BnM raised responded via e-mail. |
| TD Roscommon - Galway. Denis Naughten | E-mail response on 09/12/2020 to request a full hydrological assessment and to expand the project to include a submission to develop Kellysgrove Bpg as part of a Ballinasloe Parkland Project. | BnM acknowledged and will give due cognisance to all points within the rehabilitation plan for Castlegar Bog. BnM raised responded via e-mail. |
| Senator Aisling Dolan | Senator Dolan replied via e-mail 18/01/2021 and suggested a number of amenity developments that could be incorporated into the PCAS scheme and request clarification on a number of issues such as hydrological risk assessments and protection for existing rights of way. | BnM acknowledged and will give due cognisance to all points within the rehabilitation plan for Castlegar Bog. BnM raised responded via e-mail. |
| National Parks and Wildlife Service | Responded through e-mail thread on the 02, 03,07,09/12/2020. Points discussed were;<br>1) To advise of the requirement to investigate if assessment under the SEA and birds directives for each site. | |
| National Museum of Ireland (Irish Antiquities Division) | Responded through e-mail 28/12/2020, Issues raised were;<br>1) The request that due diligence be taken during works to protect any archaeologically significant findings or areas<br>2) The NMI reiterated the importance of peatlands for the preservation of archaeology and requested they be consulted as part of any EIA undertaken | |
| Office of Public Works | Responded via e-mail 01/12/2020 querying the reason for inclusion of OPW in the stakeholders list. | |
| Local Authority Waters Programme | To advise of dual roles within law-pro and request shape files of bogs where works would be conducted. | |
| Butterfly Conservation Ireland | Responded to consultation via e-mail on 11/12/2020 with submission on Castlegar. Concerns raised were:<br>1) Alterations to the text of the rehab plan.<br>2) Request for all turf cutting on BnM land to end.<br>3) Raised concerns over the status and designation of Annaghbeg Bog.<br>4) Suggest monitoring for Large Heath Butterfly or food plant Hare's-tail Cottongrass.<br>5) Suggested alterations to habitat design in rehab plan to further connect regional high bog habitats.<br>6) Raised concerns over future land use. | |
| Irish Farmers Association | Responded to consultation regarding Castlegar and the PCAS project at large on multiple dates throughout ongoing discourse. Concerns raised were:<br>1) Potential for flooding on adjacent lands.<br>2) Health and Safety<br>3) Perceived potentially detrimental impact of PCAS on property value | |
| Irish Farmers Association (Galway and Mayo Office) | Submitted correspondence re-iterating concerns over land value, potential flooding and hydro issues | |

| | | |
|---|---|---|
| ICMSA (Irish Creamery Milk Suppliers Association) | Responded through e-mail 07/12/2020 to request meeting on the potential impacts of PCAS on neighbouring farmlands. A meeting was held with BnM representatives the IMCSA represented by Meabh Dore, Denis Drennan, Pat O'Brien, Michael Guinan and John Enright on 17/12/2020 | |
| Midlands & East Regional WFD Operational Committee | Responded via e-mail on 03-07/12/2020 to voice support for PCAS and provide a list potentially supportive NGOs | |
| Irish Peatlands Conservation Council | Responded to consultation through e-mail on 07/12/2020. Among issues raised were;<br>1. Request for a list of the 80 sites involved in the enhanced rehabilitation programme.<br>2. Request for details of the logistics of the 350 employees benefitting from this scheme and the roles which they will play.<br>3. Request for a breakdown of the budget for each rehabilitation site. | |
| Lorcán Scott (The Heritage Council) | Responded to consultation via e-mail on 04/01/2021 asking for more information on PCAS and looking to be involved in any seminar or information events. | BnM responded via phone conversation 11/01/2021. |

# APPENDIX XII. ARCHAEOLOGY

## Role of the Archaeological Liaison Officer

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

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

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

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

Code of Practice

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# Code of Practice

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

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

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

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

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

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

| BORD NA MÓNA 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**

**Dr. Charles Mount**

**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).

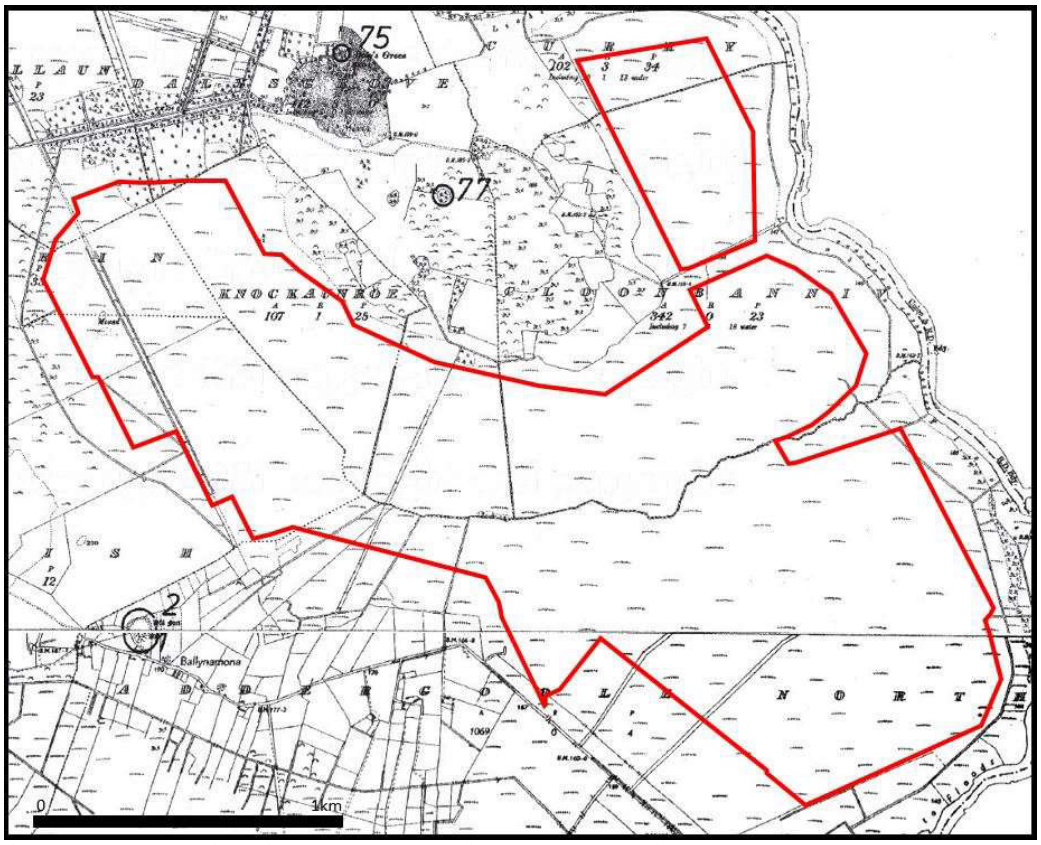



Fig. 1. Castlegar Bog, Co. Galway, detail of the Record of Monuments and Places maps sheet Nos. 61 and 74. The proposed rehabilitation area is outlined with the redline .There are no Recorded Monuments in the area.

**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.

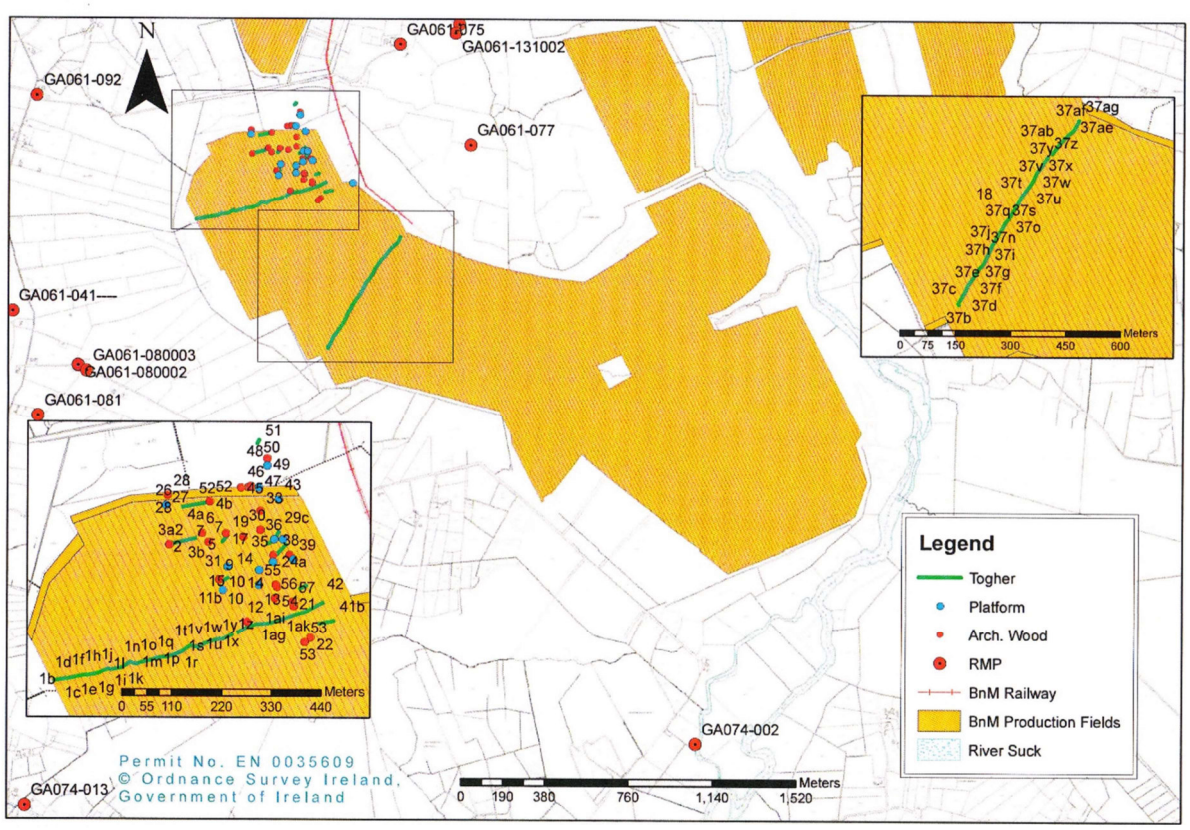



Fig. 2. Castlegar Bog, Co. Galway, sites and monuments identified during the Peatland Survey 2007 & 2008 (From Rohan 2009).

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.

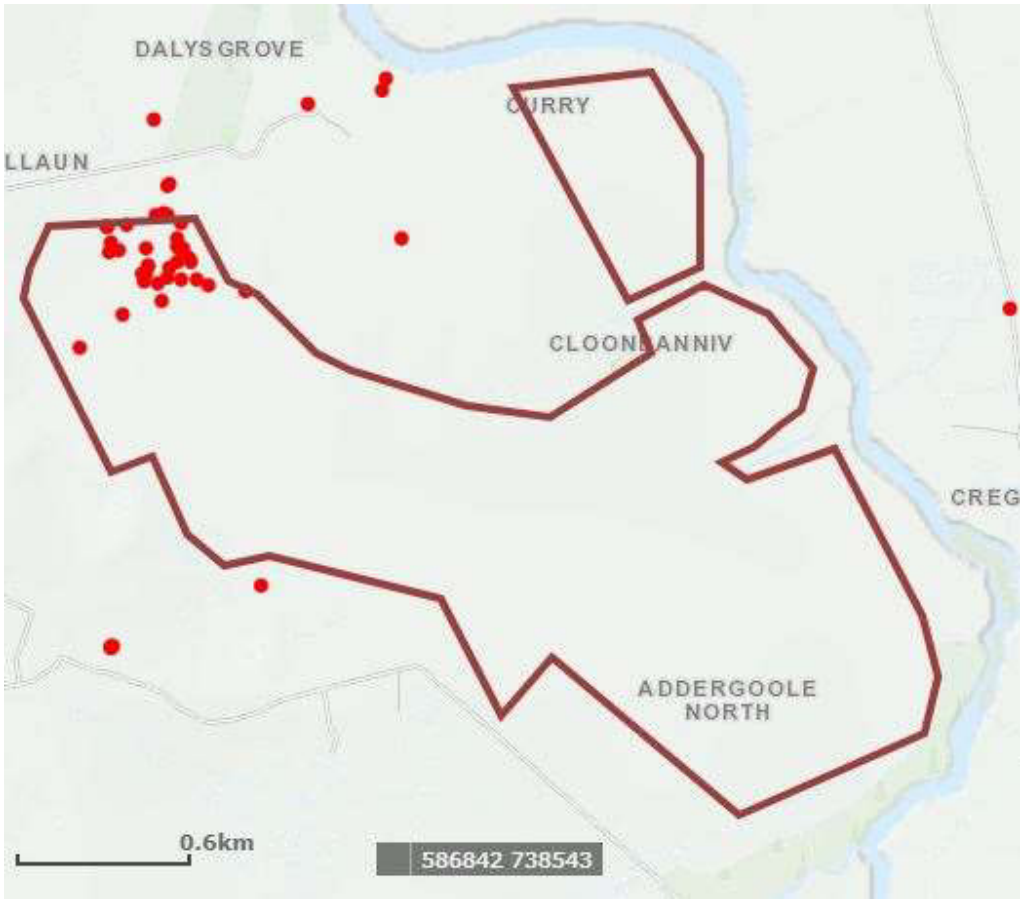



Fig. 3. Castlegar Bog, Co. Galway, detail of the Sites and Monuments Record. The proposed rehabilitation area is outlined with the redline .There are no Recorded Monuments in the area.

# 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

# Appendix C: Site Synopses

# SITE SYNOPSIS

## SITE NAME: RIVER SUCK CALLOWS SPA

## SITE CODE: 004097

The River Suck Callows SPA is a linear, sinuous site comprising a section of the River Suck from Castlecoote, Co. Roscommon to its confluence with the River Shannon close to Shannonbridge, a distance of approximately 70 km along the course of the river. The river forms part of the boundary between Counties Galway and Roscommon. The site includes the River Suck itself and the adjacent areas of seasonally-flooded semi-natural lowland wet callow grassland. The River Suck is the largest tributary of the River Shannon.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Greenland White-fronted Goose, Wigeon, Golden Plover and Lapwing. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The River Suck Callows SPA is an important site for wintering waterfowl. Of particular note is the nationally important Greenland White-fronted Goose flock (293 – five year mean peak for the period 1994/95 to 1998/99) which congregates mainly in the middle reaches of the river. Four other species occur in populations of national importance, i.e. Whooper Swan (164), Wigeon (3,232), Golden Plover (2,241) and Lapwing (3,906) – all figures are five year mean peaks from aerial surveys between 2001/02 and 2005/06. Other species present include Mute Swan (122), Teal (402), Mallard (70), Black-tailed Godwit (24), Curlew (22) and Black-headed Gull (86).

The River Suck Callows SPA is of considerable ornithological importance, in particular for the presence of nationally important populations of five species. Of note is that three of the species that occur regularly, i.e. Whooper Swan, Greenland White-fronted Goose and Golden Plover, are listed on Annex I of the E.U. Birds Directive. Part of the River Suck Callows SPA is a Wildfowl Sanctuary.

31.10.2014

# SITE SYNOPSIS

## SITE NAME: MIDDLE SHANNON CALLOWS SPA

## SITE CODE: 004096

The Middle Shannon Callows SPA is a long and diverse site which extends for approximately 50 km from the town of Athlone to the town of Portumna; it lies within Counties Galway, Roscommon, Westmeath, Offaly and Tipperary. The site averages about 0.75 km in width though in places is up to 1.5 km wide. Water levels on the site are greatly influenced by the very small fall between Athlone and Portumna and by the weir at Meelick. The site has extensive areas of callow, or seasonally flooded, semi-natural, lowland wet grassland, along both sides of the river. The callows are mainly too soft for intensive farming but are used for hay or silage or for summer grazing. Other habitats of smaller area which occur alongside the river include lowland dry grassland, freshwater marshes, reedbeds and wet woodland. The diversity of semi-natural habitats present and the sheer size of the site attract an excellent diversity of bird species, including significant populations of several.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit and Black-Headed Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The Middle Shannon Callows qualifies as a site of international importance as it regularly supports in excess of 20,000 wintering waterbirds (23,656 – four year mean peak for four of the winters between 1995/96 and 1999/2000). The site also supports internationally important populations of Whooper Swan (305 – five year mean peak for the period 1995/96 to 1999/2000) and Black-tailed Godwit (485 – four year mean peak for four of the winters between 1995/96 and 1999/2000). Four further species of wintering waterbird occur in numbers of national importance, i.e. Wigeon (3,059), Golden Plover (4,133) , Lapwing (13,240) and Black-headed Gull (1,209) – all figures are four year mean peaks for four of the winters between 1995/96 and 1999/2000.

The Shannon Callows is the largest site monitored as part of I-WeBS and many parts of it are inaccessible on the ground. Annual monitoring of the wintering waterbirds of the Shannon Callows is undertaken by aerial surveys in January/February with some areas also covered by ground counts. The importance of the site for some species may have been underestimated if count coverage missed the brief spring peaks for these species, e.g. peak counts of Lapwing (23,409) and Black-tailed Godwit (1,096) recorded in the baseline period (1995/96 to 1999/2000) have been considerably higher than the four year means. . A wide range of other species occurs within the site, including Mute Swan (407), Teal (88), Tufted Duck (41), Dunlin

(335), Curlew (162) and Redshank (39). Small numbers of Greenland White-fronted Goose use the Shannon Callows (peak 55 in 1998/99) and these are generally associated with larger flocks which occur on the adjacent Little Brosna Callows and River Suck Callows. The callow grasslands provide optimum feeding grounds for these various species of waterfowl, while many of the birds also roost or rest within the site.

The Shannon Callows is also an important site for breeding waders with the total population on the Shannon and Little Brosna Callows being one of three major concentrations in Ireland and Britain in 1987. Numbers of some species have declined since then but a survey of the Shannon Callows in 2002 recorded the following breeding waders - Lapwing (63 pairs), Redshank (116 pairs), Snipe (139 drumming birds) and Curlew (8 pairs). Black-tailed Godwit, a very rare breeding species in Ireland, nests or attempts to nest in small numbers each year within the site. A further scarce breeding species, Shoveler, also nests in small numbers each year (an estimated 12 pairs in 1987).

The Middle Shannon Callows SPA supports a breeding population of Corncrake (19 pairs - five year mean peak between 2003 and 2007, based on records of calling males).

Corncrake winter in southern and eastern Africa, migrating northwards to arrive on their breeding grounds from early April onwards, departing again in August and September. They require the cover of tall vegetation throughout their breeding cycle and are strongly associated with meadows which are harvested annually, where they nest and feed. Annual cutting of these meadows creates a sward which is easy for the birds to move through. Other habitats, which can provide cover for Corncrake in the early and late stages of the breeding season, are also important for this species.

Corncrake is listed on the 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Species. This is due to population and range declines of more than 50% in the last 25 years across significant parts of its range.

Quail, a related, scarce species, is also known to breed within the callow grasslands.

A good variety of other bird species are attracted to the site. Birds of prey, including scarce species such as Merlin and wintering Hen Harrier have been recorded hunting over the callows. A range of passerine species associated with grassland and swamp vegetation breed, including Sedge Warbler, Grasshopper Warbler, Skylark and Reed Bunting. Kingfisher is also known to occur within the site. Whinchat, an uncommon breeding species, occurs in small numbers.

The Middle Shannon Callows SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of two species - Whooper Swan and Black-tailed Godwit. In addition, there are four species that have wintering populations of national importance. The site also supports a nationally important breeding population of Corncrake. Of particular note is that several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Corncrake and Golden Plover.

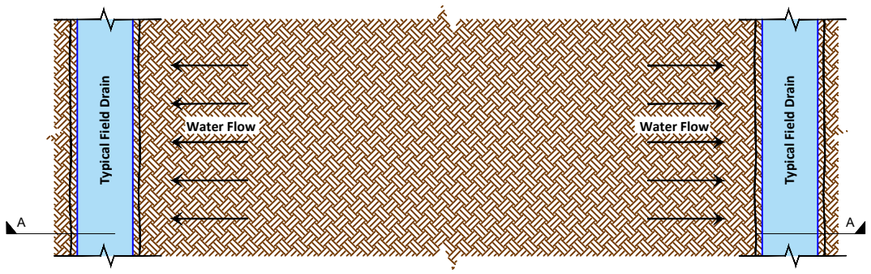
10.1.2012

# Appendix D: Methodology Drawings

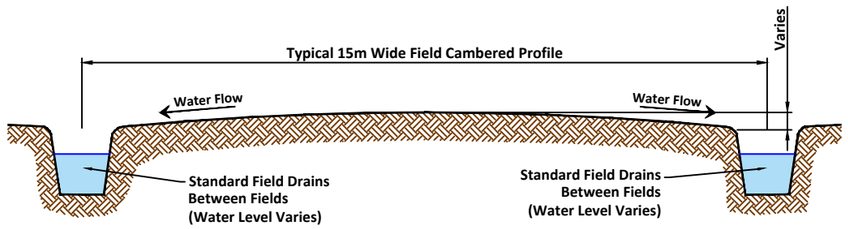
# DPT 1: 'Speed Bump' Peat Dams to Re-Wet Measure

## Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.
The concept of drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement through the bog.



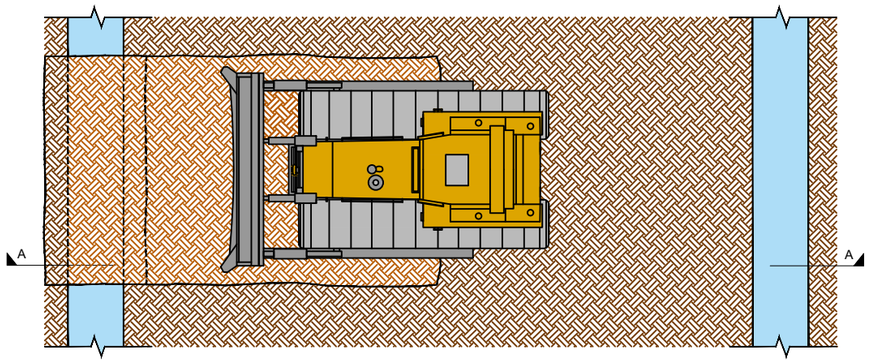

Plan View
(N.T.S.)



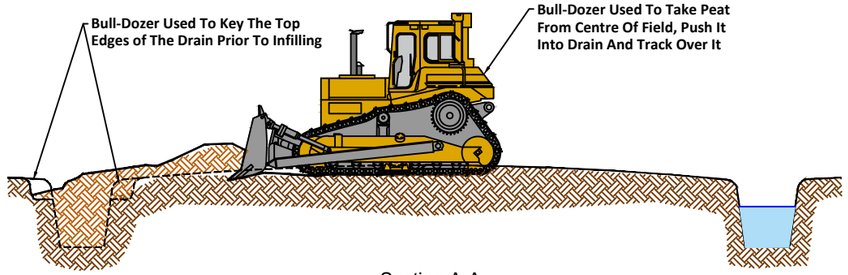

Section A-A
(N.T.S.)

## Phase 1
Forming 'Speed Bump'

The Bull-dozer is used to create a 5m Length key along both edges of the drain, approximately 500mm Wide x 500mm Deep.
Next a strip of peat is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block, to form an approximately 5m Wide 'Speed Bump'.



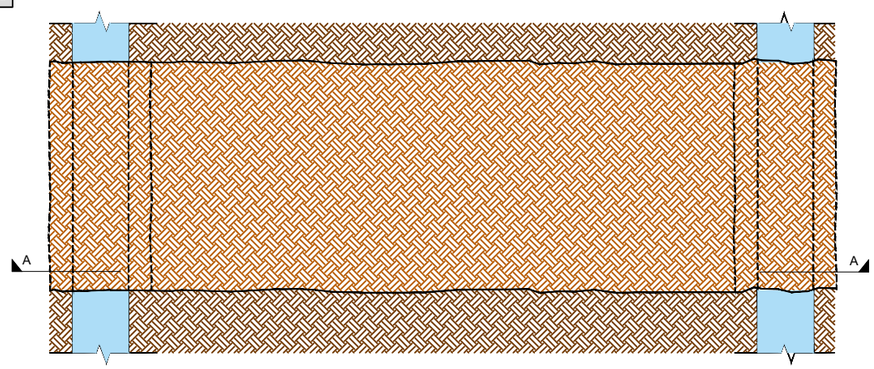

Plan View
(N.T.S.)



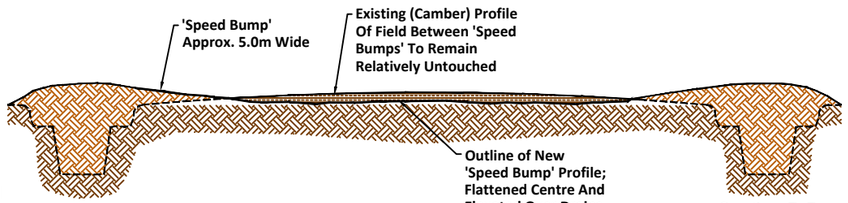

Section A-A
(N.T.S.)

## Complete Fields With Speed Bump (3 Per 100m)

'Speed Bumps' are created to allow for peat subsidence and to prevent water from flowing over the drain block and eroding it before it becomes stabilised.




Plan View
(N.T.S.)




Section A-A
(N.T.S.)

Section B-B
(N.T.S.)

**NOTES:**

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

DRAFT 09/02/21

STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| . | | . | . |
| . | | . | . |
| c | 'Key' Added To Top Edges Of Drain At Drain Block Locations | P.K. | 09/02/21 |
| b | Intensive Drain Block Phase Removed | P.K. | 28/01/21 |
| a | Issued For Information | P.K. | 18/12/20 |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PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DPT 1
'Speed Bump' Peat Dam

| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | - | D.K. | P.N. | P.N. |
| Date: 18/12/20 | | Scale : Not to Scale | A3 | Stage: Information |
| Drawing No.: PCAS-0100-001 | | | | Rev: c |

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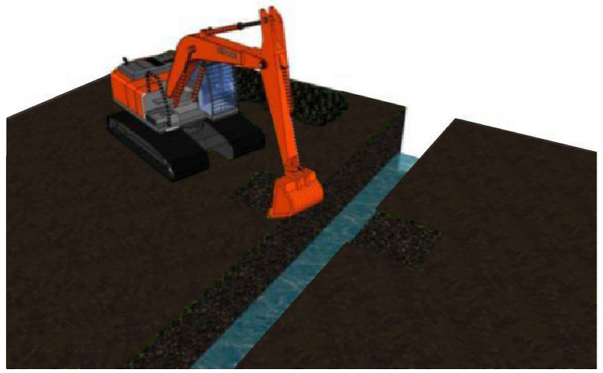
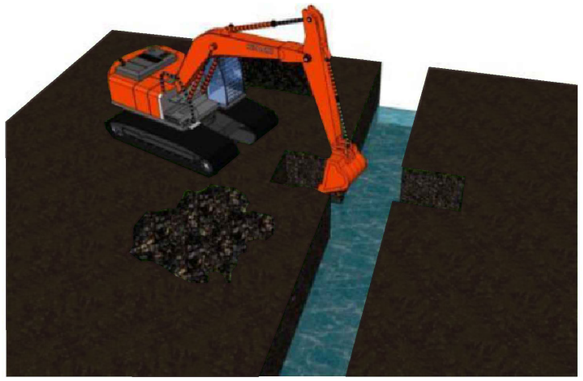
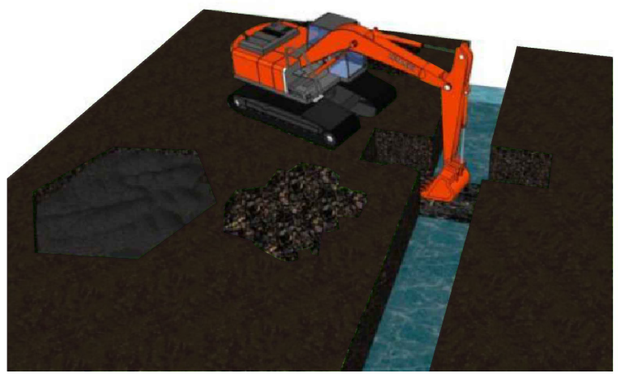
1. Before building drain block, the sides and bottom of the ditch is cleaned using the excavator to remove dry degraded peat, to ensure a good peat-to-peat contact.
( If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process. )

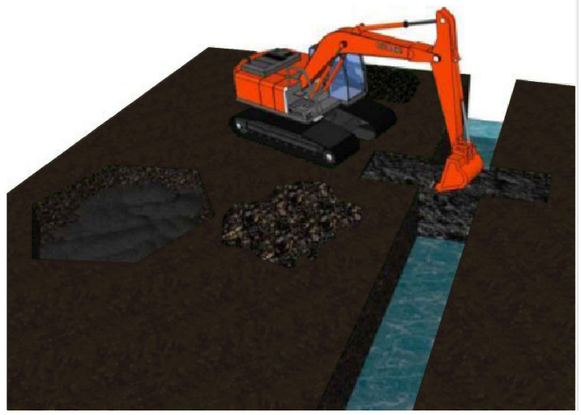




2. Cut key in either side of the drain approximately 500mm deep, and ensure that it is wider than the actual drain.
Remove 500mm of peat from bottom of the drain also and place behind the machine for replacement later.

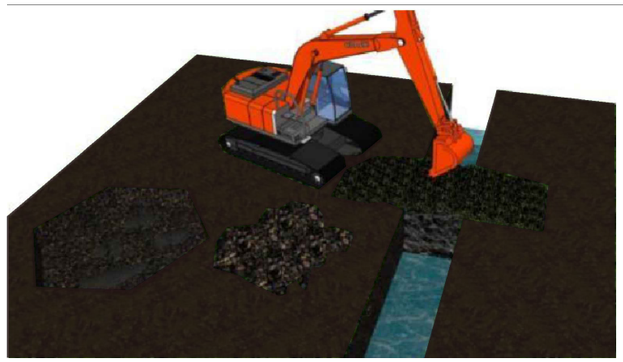
3. Open an area behind machine to be used as a borrow pit. Avoid using the surface layer of peat (top 100-200mm) which is likely to be very permeable. Only use the deeper, more compacted peat to build the drain block.
( If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process. )

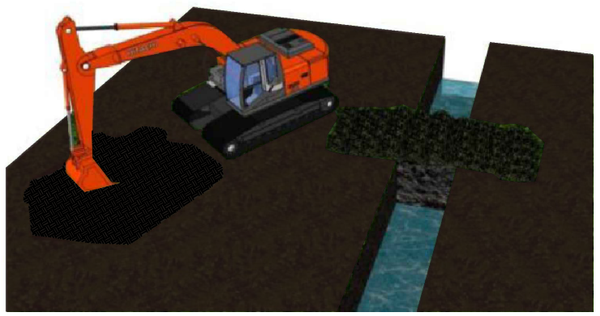




4. Dig out peat from the borrow pit and place into the drain compacting in 300mm layers. Compact the peat firmly using the excavator bucket before laying more peat from the borrow pit.

5. Build the drain block up at least 300mm-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
( Take any vegetation removed in step 1 and step 3 and place on the top of the dam, to help bind and stabilise the drain block. )





6. Backfill the borrow pit with the peat extracted from the bottom of the drain in step 2. Press down on the sides of the peat borrow hole with the excavator bucket to grade the sides of the borrow pit.

This enhanced measure's main objective is to block drains with peat drain blocks to raise water levels, re-wetting peat and slowing water movements through the bog.

**NOTES:**

1. FIGURED DIMS ONLY TO BE TAKEN FROM THIS DRAWING.
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.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STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| b | For Approval | P.K. | 03/03/21 |
| a | Issued for Information | P.K. | 18/12/20 |

PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DPT 2
Peat Drain Blocking

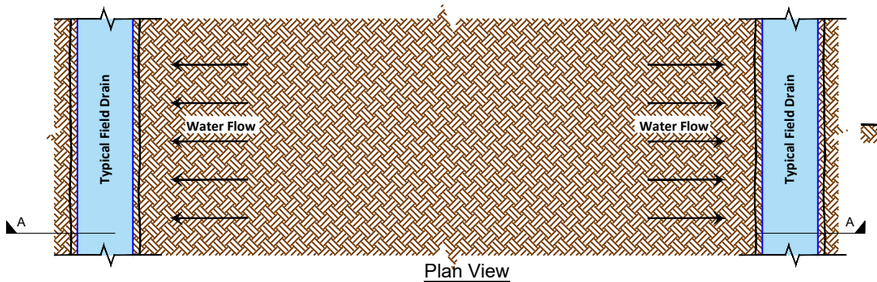
| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | | D.K. | P.N. | P.N. |

Date: 18/12/20 | Scale : N.T.S. A3 | Stage: For Approval

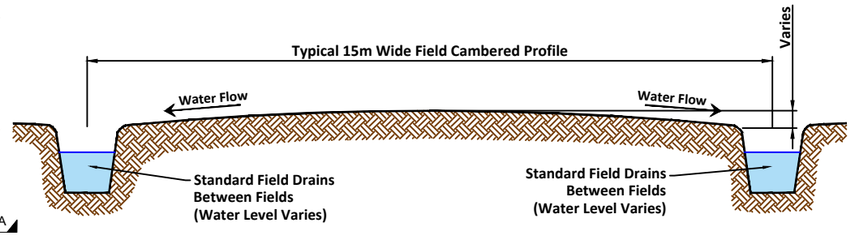
Drawing No.: PCAS-0100-002 | Rev: b

## Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth.



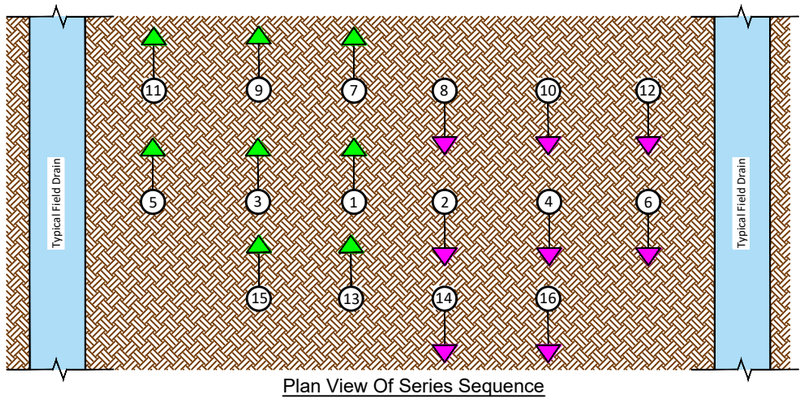

Plan View
(N.T.S.)



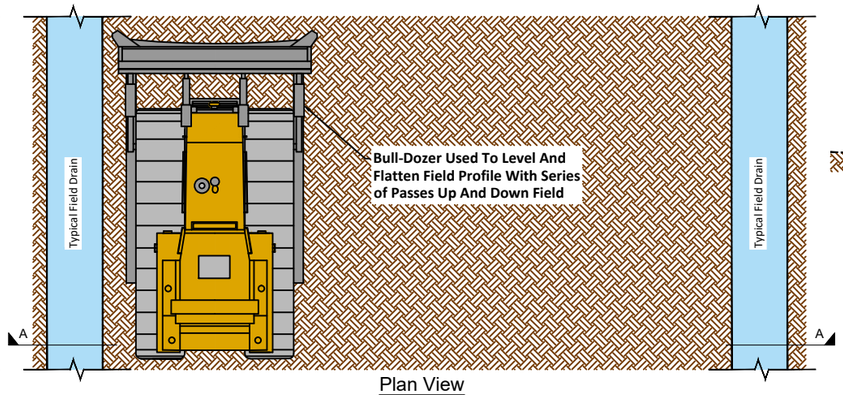

Section A-A
(N.T.S.)

## Phase 1
Re-Profiling of Field Surface

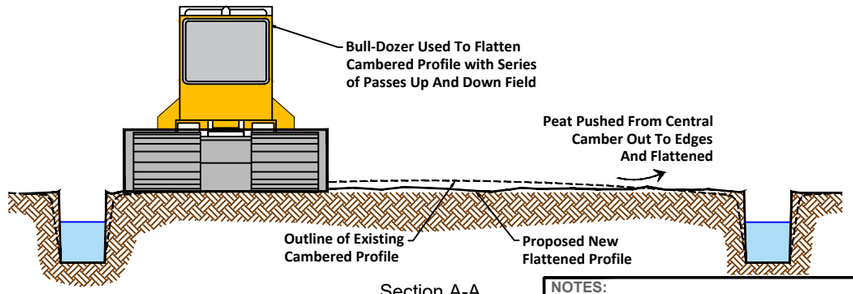
Field to be re-profiled using bull-dozer making a total of 16 passes, 8 passes up and 8 passes down, flattening the camber on the production field. (Sequence of runs shown below)




Plan View Of Series Sequence
(N.T.S.)



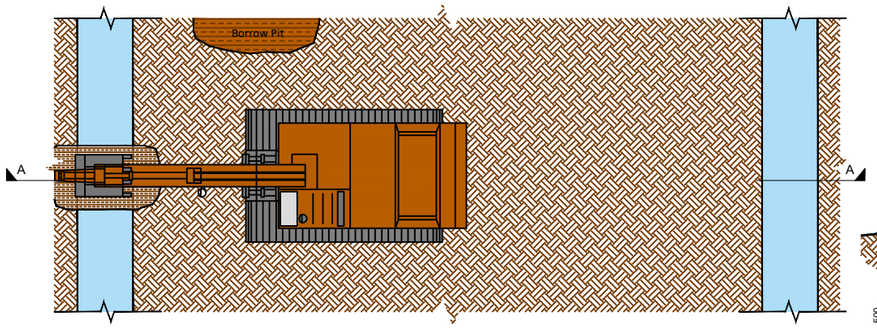

Plan View
(N.T.S.)



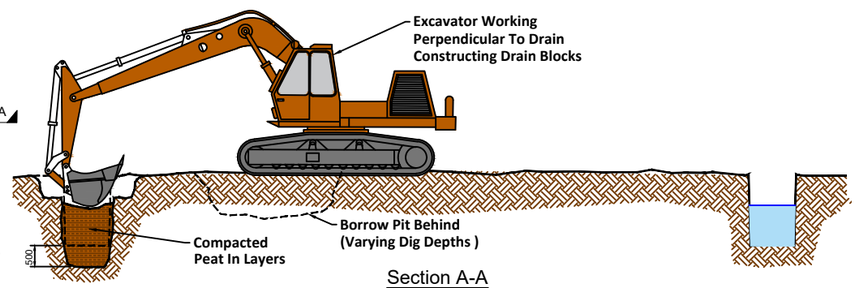

Section A-A
(N.T.S.)

## Phase 2
Peat Drain Blocking

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.
Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket.
The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.
The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.
(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block. )



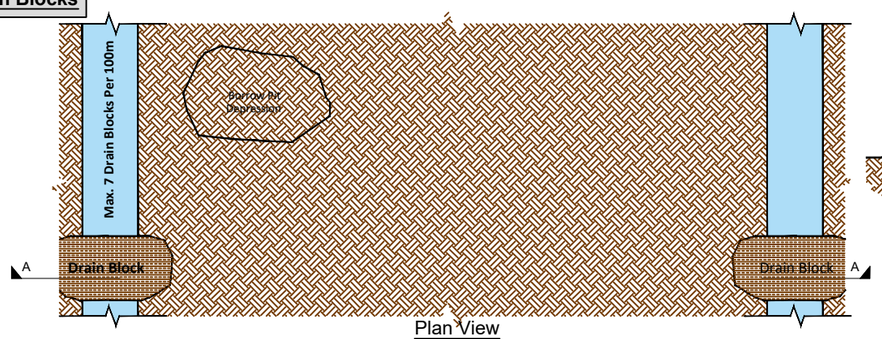

Plan View
(N.T.S.)



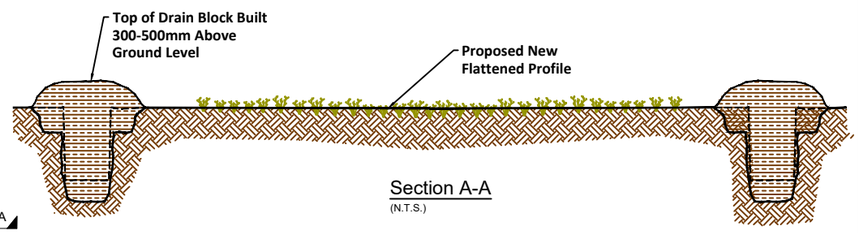

Section A-A
(N.T.S.)

## Complete Shallow Field Profile with Regular Drain Blocks

Field re-profiling is developed as a technique to slow the surface water loss from the bog and to retain as much water as possible on the bog, at the required depth.




Plan View
(N.T.S.)




Section A-A
(N.T.S.)

**NOTES:**

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| . | | . | . |
| . | | . | . |
| . | | . | . |
| b | Issued For Approval | P.K. | 25/02/21 |
| a | Issued For Information | P.K. | 29/01/21 |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PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DPT 3A
Field Re-profiling

| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | - | D.K. | P.N. | P.N. |

Date: 18/12/20 | Scale: Not to Scale A3 | Stage: For Approval

Drawing No.: PCAS-0100-003 | Rev: b

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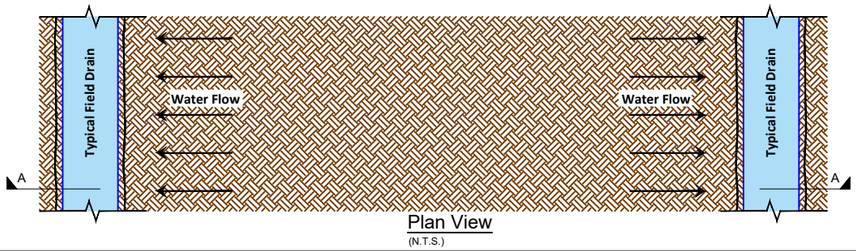
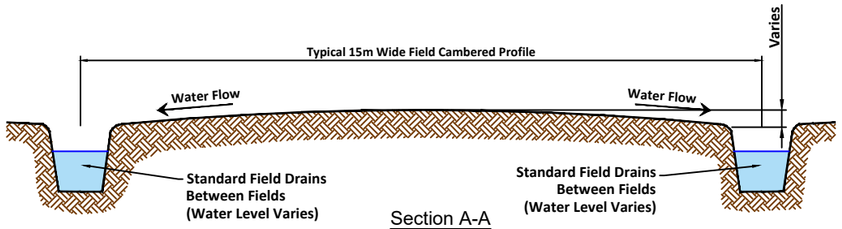
## Existing Typical Field Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.
The concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth.



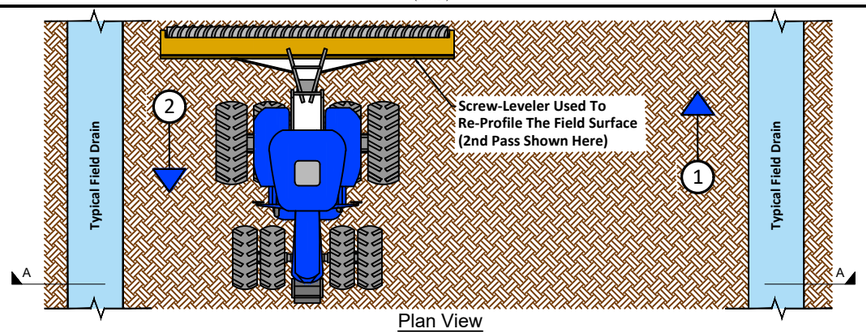

Plan View
(N.T.S.)



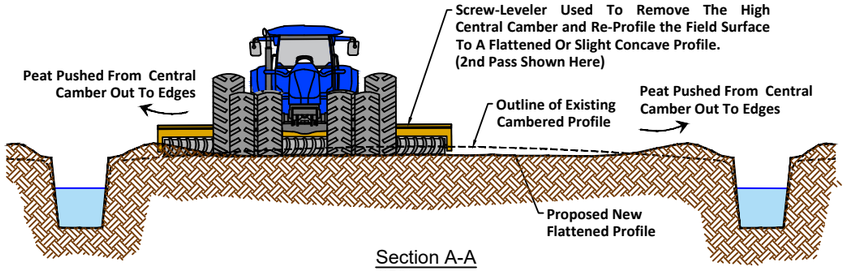

Section A-A
(N.T.S.)

## Phase 1
Re-Profiling of Field Surface

The production field is re-profiled using a screw-leveler to remove the high central camber from individual production fields and deposit the peat on the lower-lying edges of the same production field.
The Screw-Leveler is towed using a tractor, with a level axis, will run up one side ① of the production field and down the other side ②, sufficiently offset from drain to ensure the peat does not enter the drain but forms a mound beside the drain.



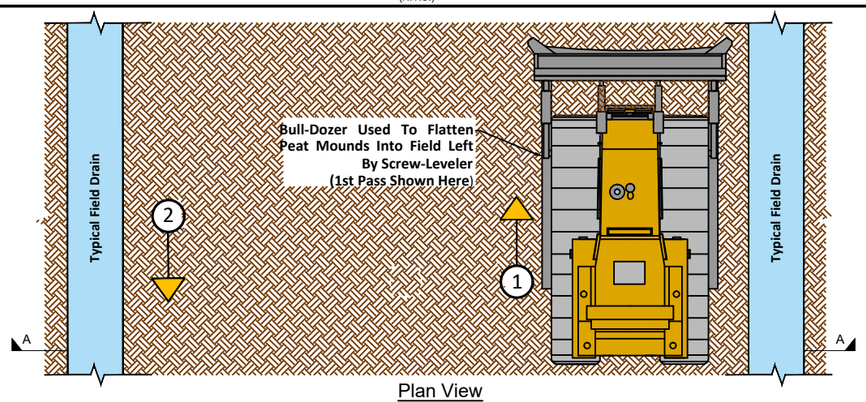

Plan View
(N.T.S.)



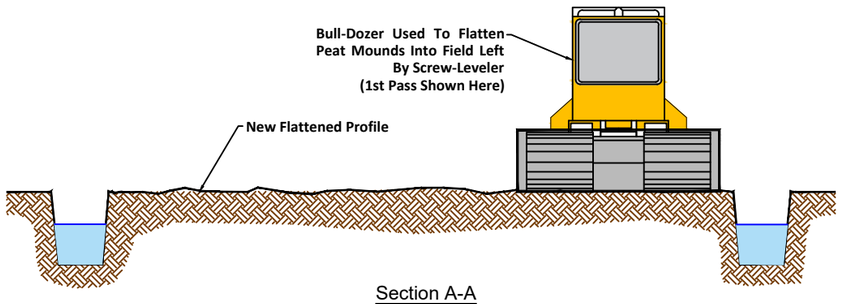

Section A-A
(N.T.S.)

## Phase 2
Leveling of Loose Peat

Next the Bull-dozer will run up one edge side ① of the production field and down the other side ② flattening the loose peat mounds, ensuring a minimal amount of peat enters the drains.



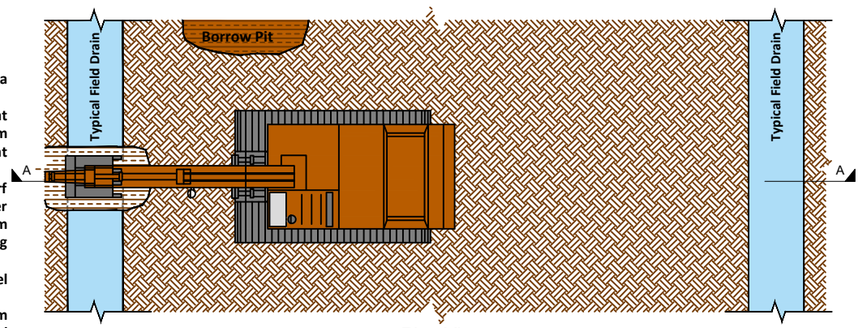

Plan View
(N.T.S.)



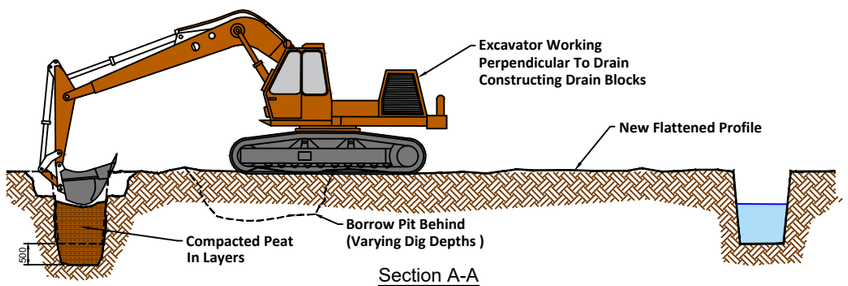

Section A-A
(N.T.S.)

## Phase 3
Peat Drain Blocking

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.
Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.
The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.
(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block. )



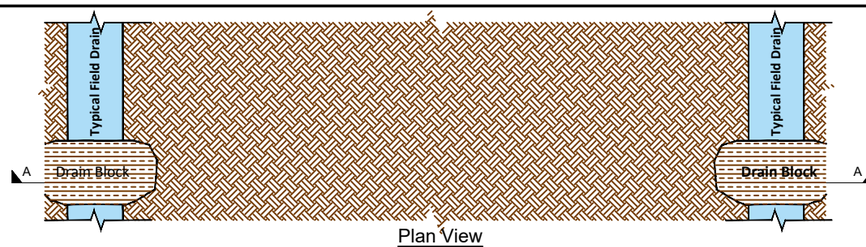

Plan View
(N.T.S.)



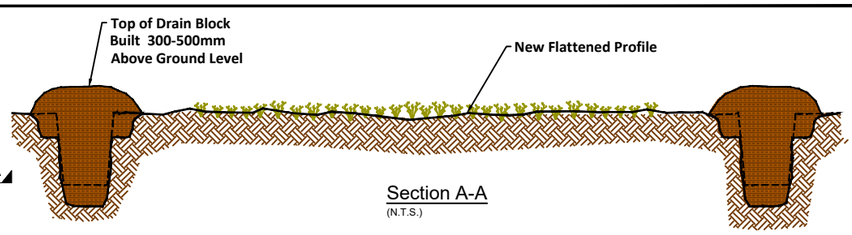

Section A-A
(N.T.S.)

## Complete Flattened Field Profile

Field re-profiling is developed as a technique to slow the surface water loss from the bog and to retain as much water as possible on the site. Each re-profiled field will hold a shallow layer of water. In time, these shallows have been shown to quickly infill with peatland vegetation.




Plan View
(N.T.S.)




Section A-A
(N.T.S.)

### NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| . | . | . | . |
| . | . | . | . |
| . | . | . | . |
| b | For Approval | P.K. | 03/03/21 |
| a | Issued For Information | P.K. | 07/01/21 |


BORD NA MÓNA
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Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160


PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DPT 3B
Field Re-profiling

| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | - | D.K. | P.N. | P.N. |

Date: 18/12/20 | Scale : Not to Scale A3 | Stage: For Approval

Drawing No.: PCAS-0100-004 | Rev: b

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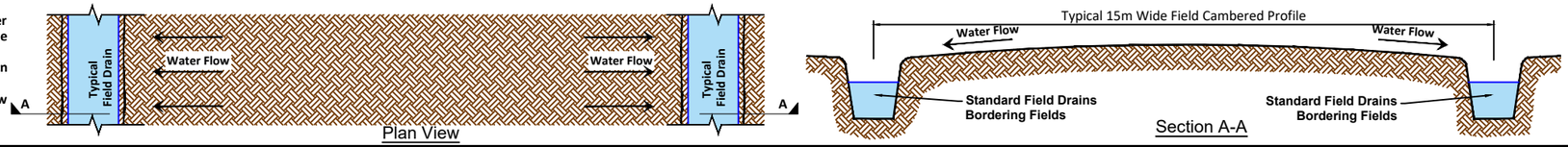
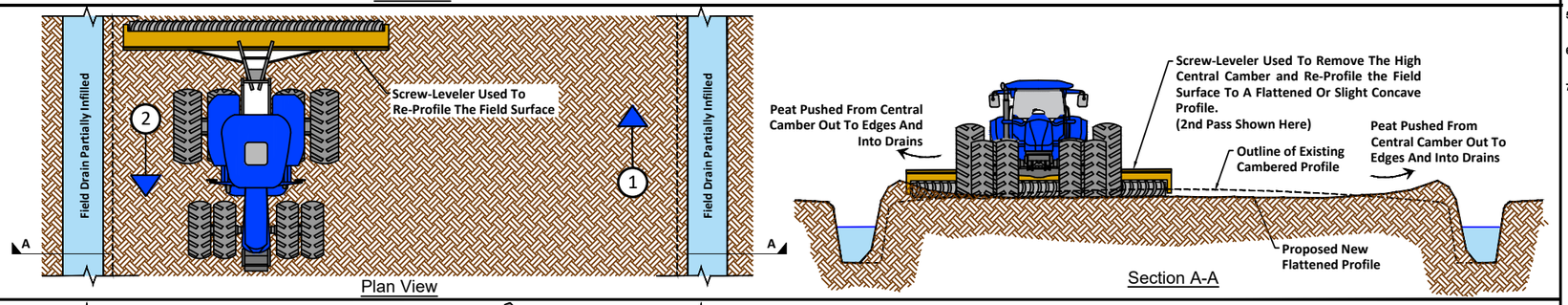
## Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.
The concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth.
On peatlands with increased slopes it will be more advantageous to create shallow depressions.



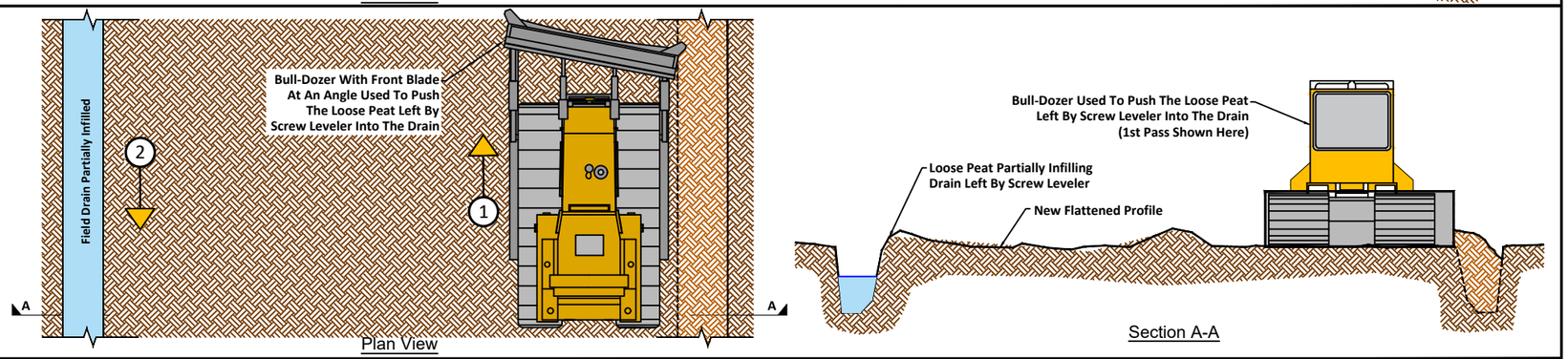

## Phase 1
Re-Profiling of Field Surface

The first operation in the re-profiling process begins with using a Screw-Leveler to remove the high central camber from individual production fields and deposit the peat on the lower-lying edges of the same production field.
The Screw-Leveler, with a level axis, will run up the first side ① of the production field and down the other side ② close to the edge of the drain, resulting in some of the peat being tipped into the drain.



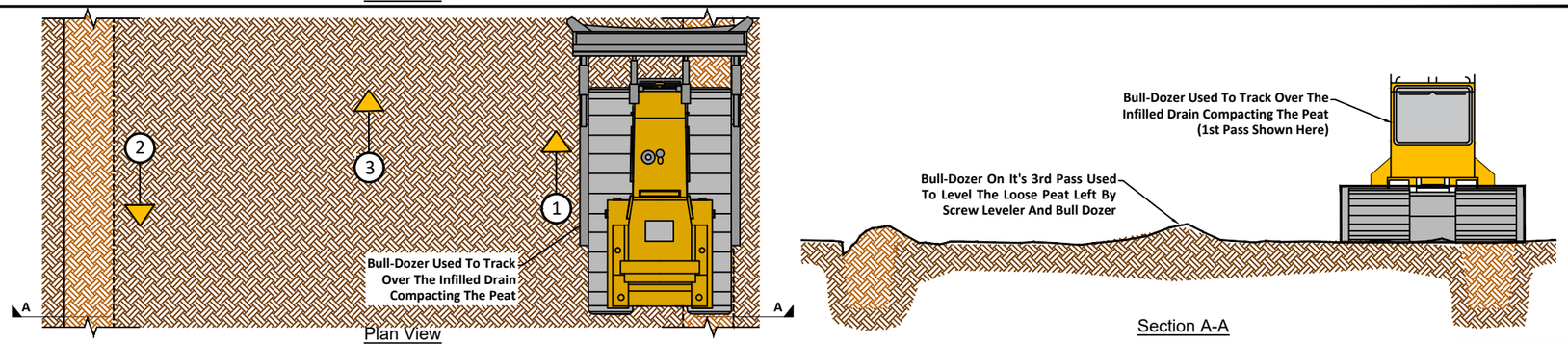

## Phase 2
Infilling Of Drains

Next the Bull-dozer will run up the first side ① of the production field and down the other side ② with the front blade at an angle placing the peat in the drain.



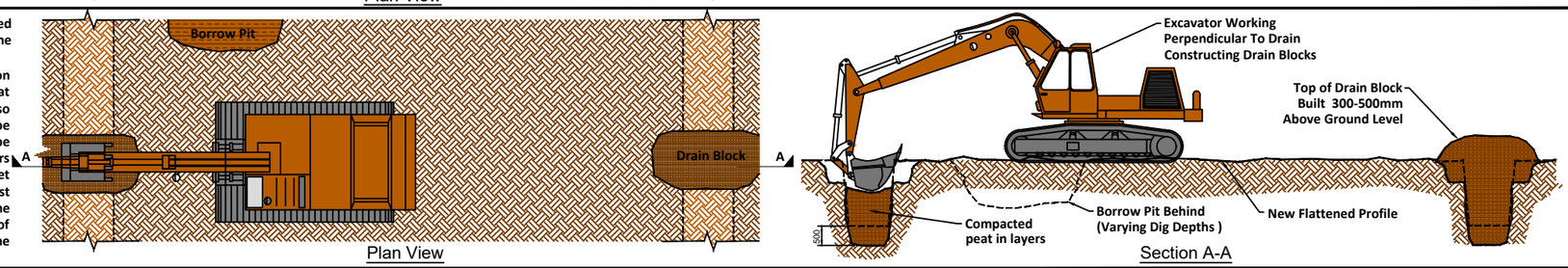

## Phase 3
Final Leveling Of Drains & Field

Next the Bull-dozer will track over the first of the infilled drains ① and then back down the other drain ② compacting and leveling the peat.
It will also make a pass down the middle of field ③ flattening peat mounds left between Screw Leveler and Bull dozer runs.



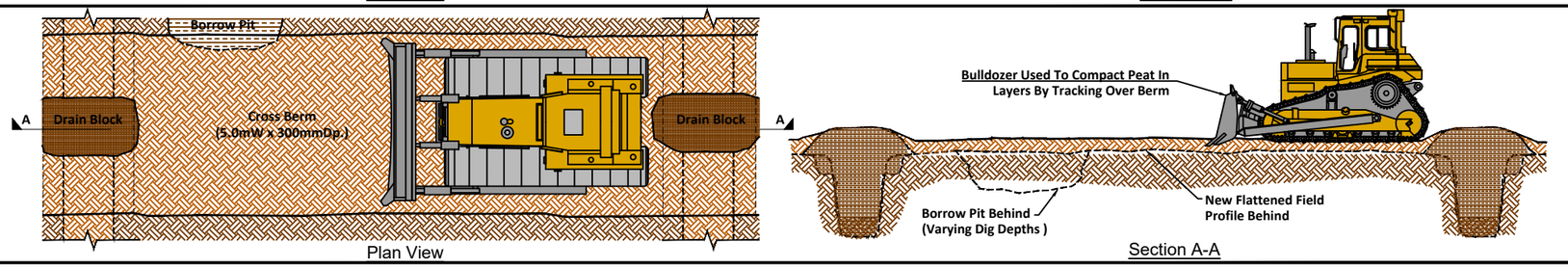

## Phase 4
Drain Blocking

(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block. )
Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains. Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later. Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit. The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries. The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.




## Phase 5
Cross Berm

An Excavator is used to form a key(5m long) in the drain's edges where the berm crosses.
A strip of peat(5m wide) is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block.
Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form an approximately 5m Wide x 300mm High Cross Berm.
The peat material in the berm is compacted by the dozer tracking over it in layers.
Berm edge profile is shaped by using the bucket of the excavator.




### NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
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STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| . | | . | . |
| . | | . | . |
| c | For Approval | P.K. | 25/01/21 |
| b | Methodology Type Changed To 4A And Cross Berm Added | P.K. | 29/01/21 |
| a | Issued For Information | P.K. | 07/01/21 |


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PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitaion Method DPT 4A
Field Re-profiling

| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | - | D.K. | P.N. | P.N. |
| Date: 18/12/20 | | Scale : Not to Scale | A3 | Stage: For Approval |
| Drawing No.: PCAS-0100-005 | | | | Rev: c |

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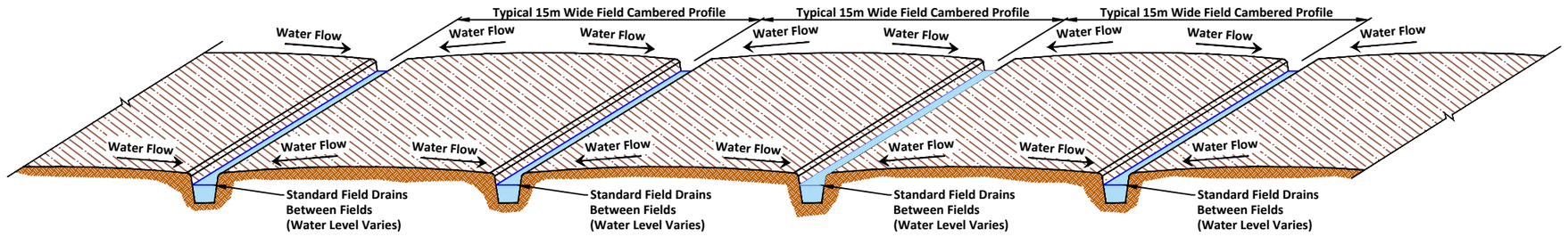
## Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.




NOTES:

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2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
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4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
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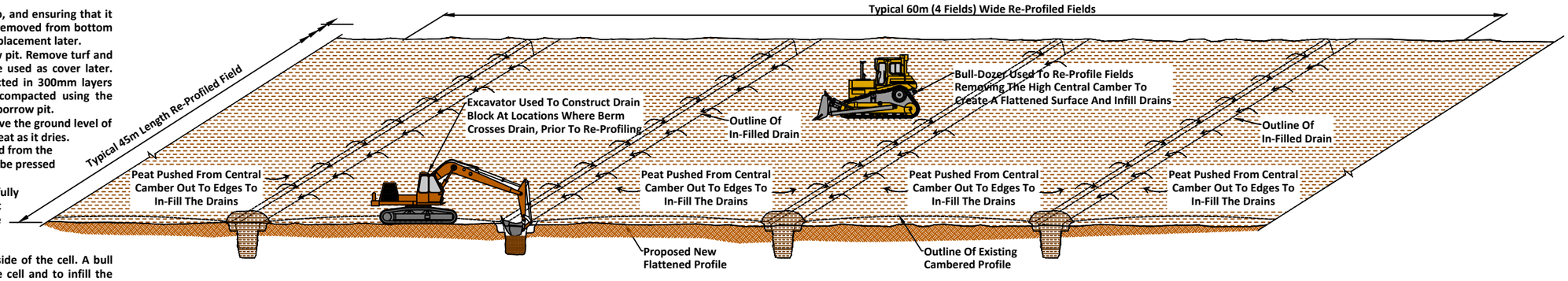
## Phase 1
Drain Blocking And Re-Profiling of Fields Surface

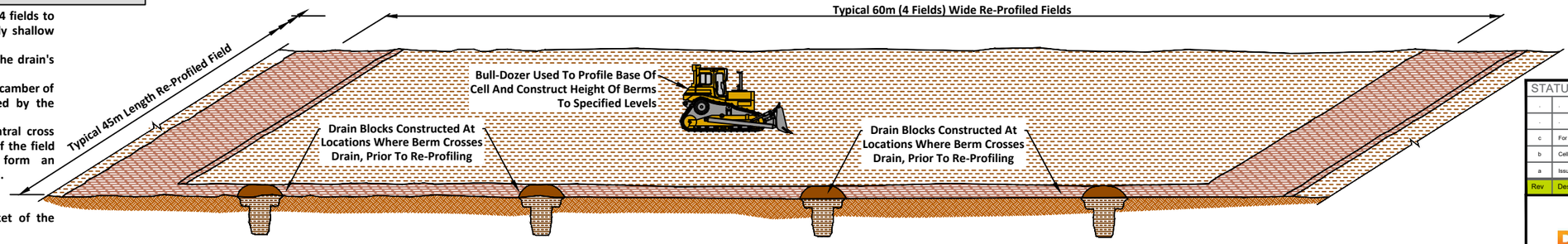
Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.
Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.
The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.
(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block. )

The centre of the cambered field is used as one side of the cell. A bull dozer is used to level and flatten the base of the cell and to infill the drains by removing the camber from the fields. Laser levels are mounted on bull-dozers to allow the machine drivers to move peat and create flat surfaces to the appropriate levels.




## Phase 2
Formation of Surface Berms And Levelling Base of Cells

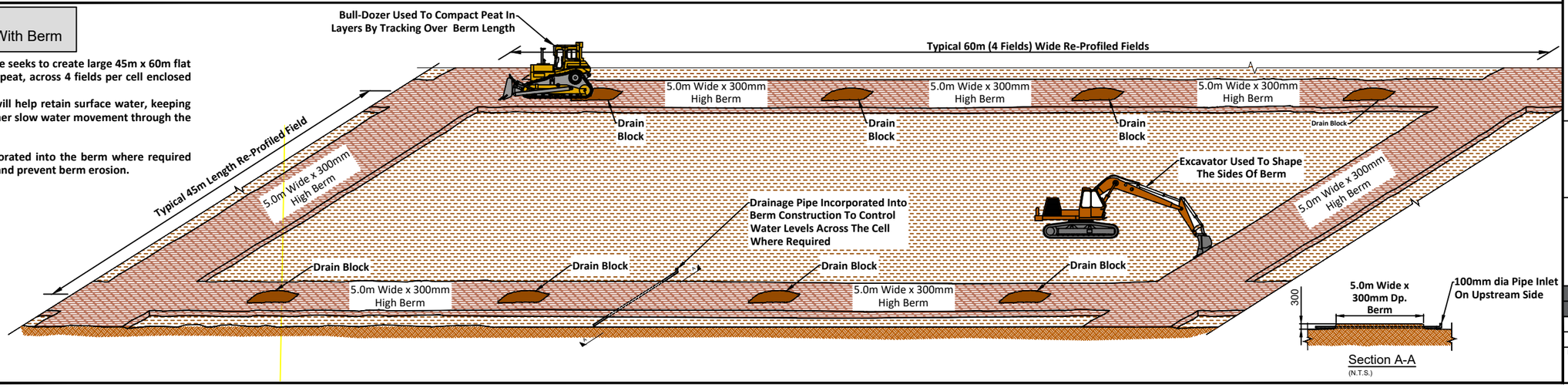
Berms are formed 45m in length and 60m across 4 fields to create an enclosed cell. The berms are relatively shallow (300mm high) and are 5.0 m wide.
An Excavator is used to form a key(5m long) in the drain's edges where the berm crosses.
A strip of peat(5m wide) is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block.
Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form an approximately 5m Wide x 300mm High Cross Berm.
The peat material in the berm is compacted in layers by the dozer tracking over it.
Berm edge profile is shaped by using the bucket of the excavator.




## Final Profile:
45m x 60m Cell With Berm

This enhanced measure seeks to create large 45m x 60m flat areas or cells on bare peat, across 4 fields per cell enclosed by shallow berms.
The creation of cells will help retain surface water, keeping peat wet and will further slow water movement through the bog.

Drainage pipes incorporated into the berm where required to manage overflows and prevent berm erosion.




STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| . | . | . | . |
| . | . | . | . |
| c | For Approval | P.K. | 24/02/21 |
| b | Cell Size Text Amended | P.K. | 28/01/21 |
| a | Issued For Information | P.K. | 07/01/21 |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Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
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Fax. 057 9345160


PROJECT:
Peatland Climate Action Scheme (PCAS)

TITLE:
Rehabilitation Method DPT 4
45m x 60m Cell With Berms

| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | - | D.K. | P.N. | P.N. |

Date: 22/12/20 | Scale: Not to Scale A3 | Stage: For Approval

Drawing No.: PCAS-0100-006 | Rev: c

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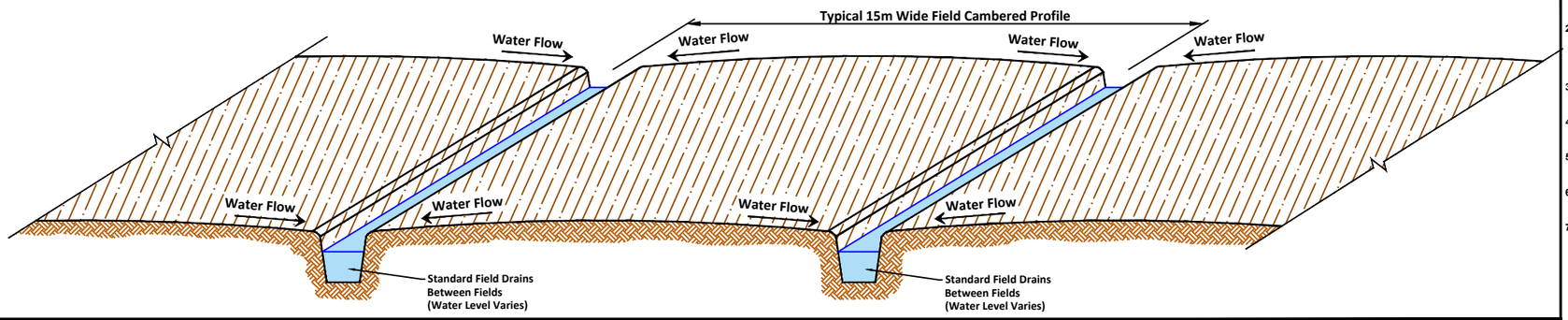
## Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.




## Phase 1
Drain Blocking And Re-Profiling of Fields Surface

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.
Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.
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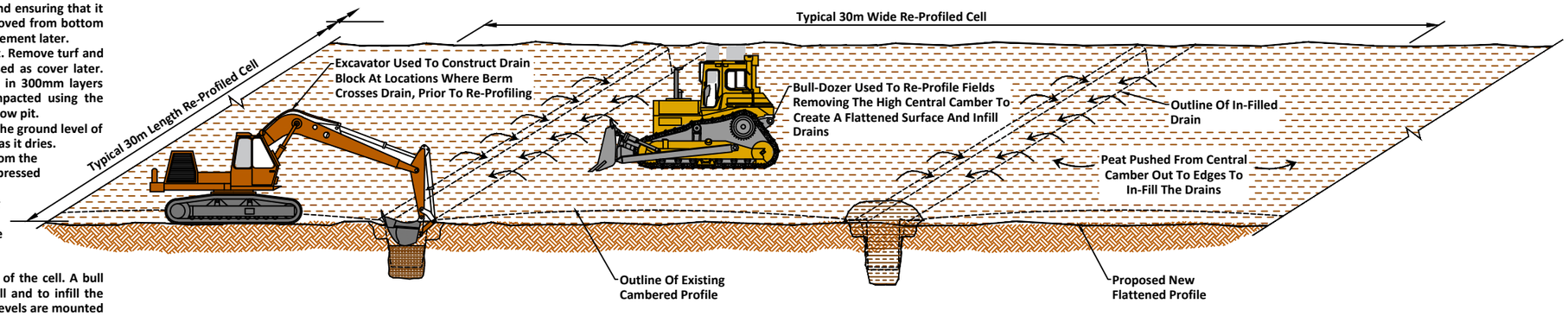
The centre of the cambered field is used as one side of the cell. A bull dozer is used to level and flatten the base of the cell and to infill the drains by removing the camber from the fields. Laser levels are mounted on bull-dozers to allow the machine drivers to move peat and create flat surfaces to the appropriate levels.




## Phase 2
Formation of Surface Berms And Levelling Base of Cells

Berms are formed 45m in length and 60m across 4 fields to create an enclosed cell. The berms are relatively shallow (300mm high) and are 5.0 m wide.
An Excavator is used to form a key(5m long) in the drain's edges where the berm crosses.
A strip of peat(5m wide) is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block.
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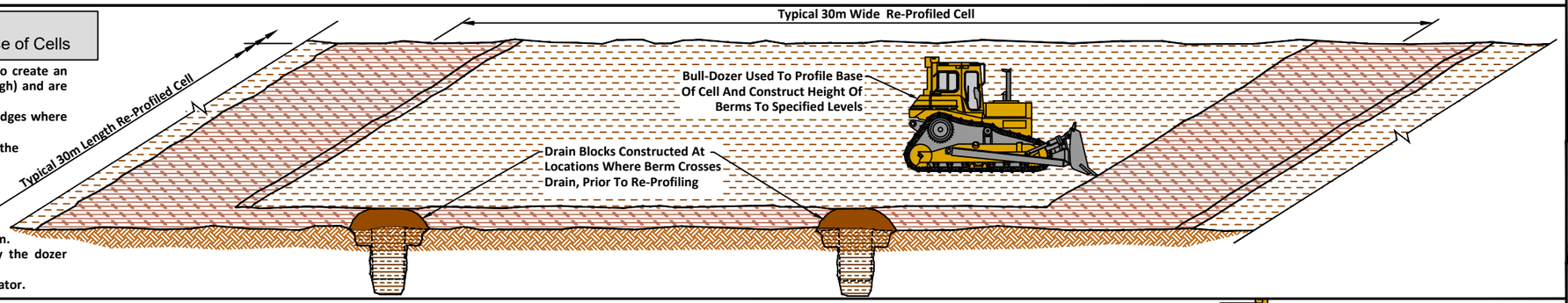
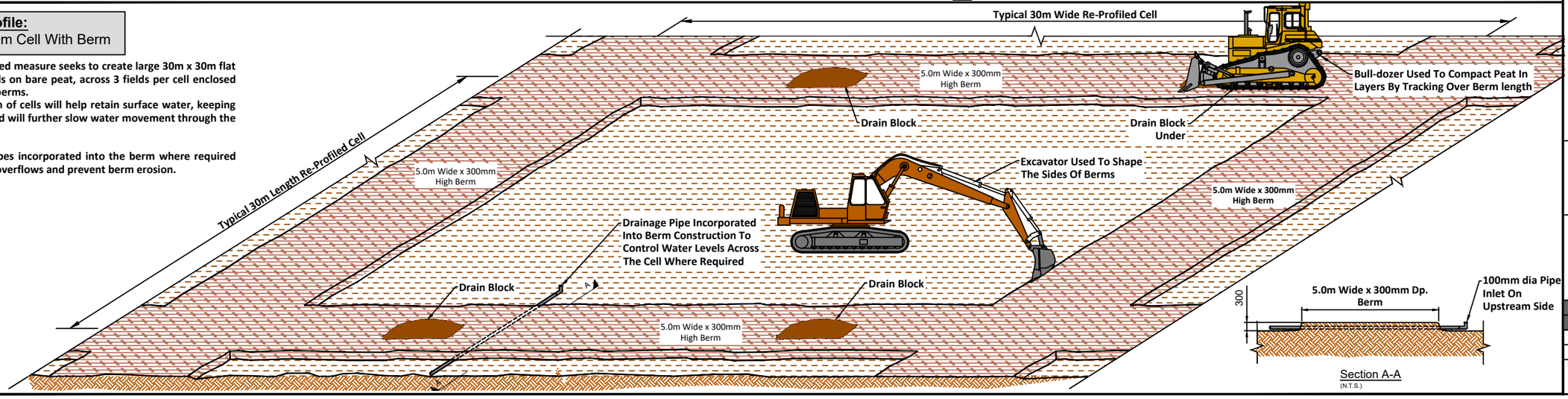
Berm edge profile is shaped by using the bucket of the excavator.




## Final Profile:
30m x 30m Cell With Berm

This enhanced measure seeks to create large 30m x 30m flat areas or cells on bare peat, across 3 fields per cell enclosed by shallow berms.
The creation of cells will help retain surface water, keeping peat wet and will further slow water movement through the bog.

Drainage pipes incorporated into the berm where required to manage overflows and prevent berm erosion.




## NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
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6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| . | . | . | . |
| . | . | . | . |
| . | . | . | . |
| b | For Approval | P.K. | 25/02/21 |
| a | Issued For Information | P.K. | 28/01/21 |


BORD NA MÓNA
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Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
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PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DPT 5
30m x 30m Cell With Berms

| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | - | D.K. | P.N. | P.N. |

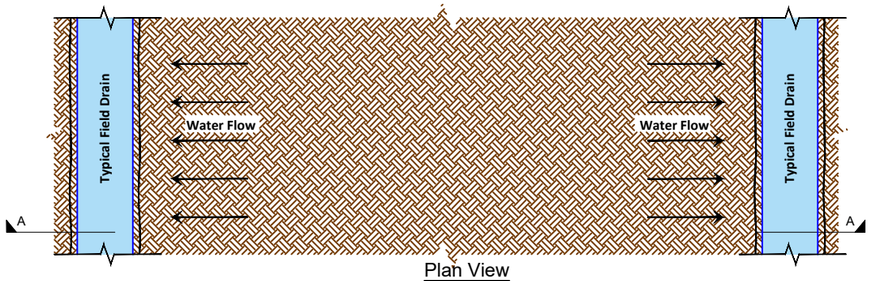
Date: 18/12/20 | Scale : Not to Scale A3 | Stage: For Approval
Drawing No.: PCAS-0100-007 | Rev: b

C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-007b_DPT_5_30x30CellWithBerms.dwg

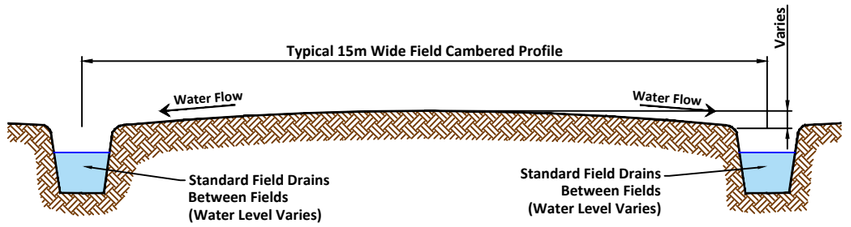
# DCT 2: 'Speed Bump' Peat Dams to Re-Wet Measure

## Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.
The concept of drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement through the bog.



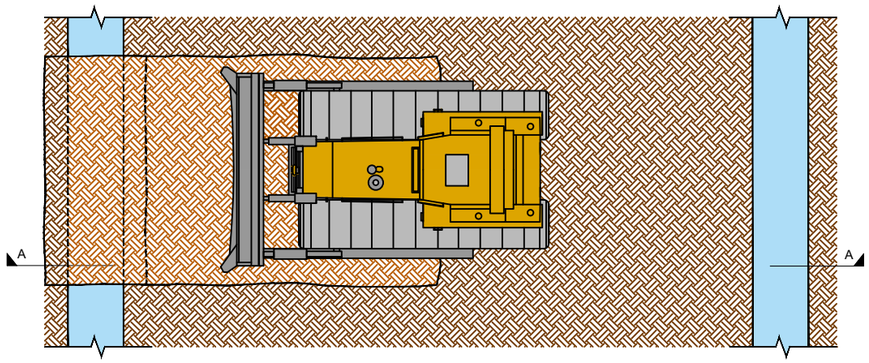

Plan View
(N.T.S.)



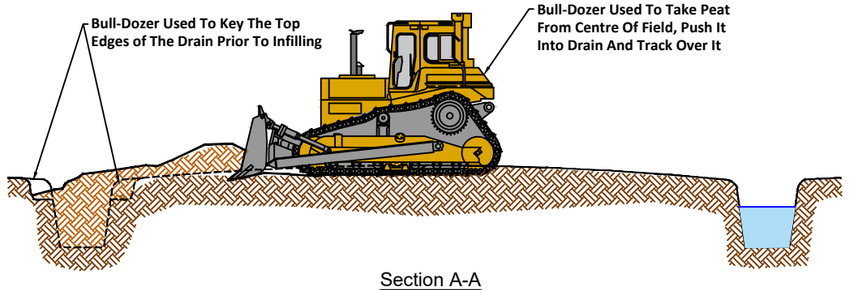

Section A-A
(N.T.S.)

## Phase 1
Forming 'Speed Bump'

The Bull-dozer is used to create a 5m Length key along both edges of the drain, approximately 500mm Wide x 500mm Deep.
Next a strip of peat is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block, to form an approximately 5m Wide 'Speed Bump'.



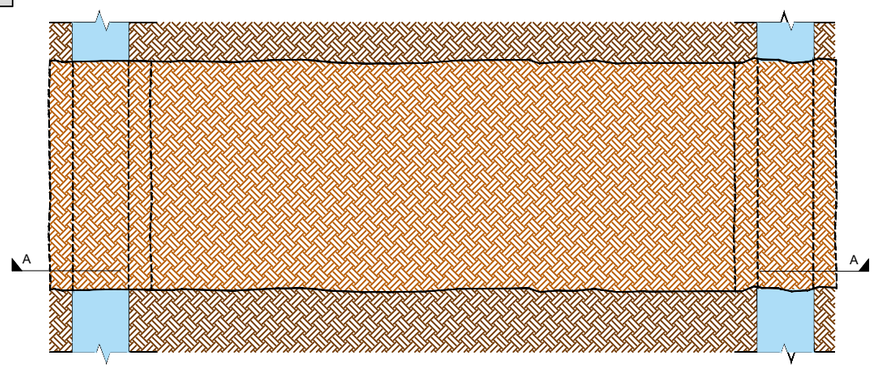

Plan View
(N.T.S.)



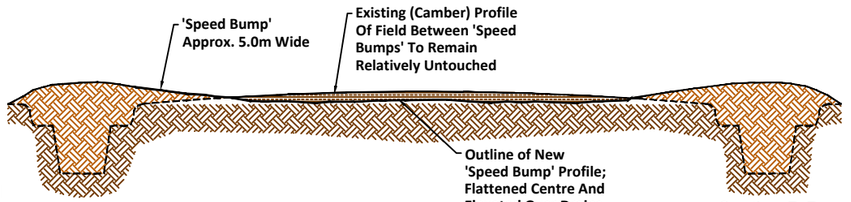

Section A-A
(N.T.S.)

## Complete Fields With Speed Bump (3 Per 100m)

'Speed Bumps' are created to allow for peat subsidence and to prevent water from flowing over the drain block and eroding it before it becomes stabilised.




Plan View
(N.T.S.)




Section B-B
(N.T.S.)

Section A-A
(N.T.S.)

## NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

DRAFT 09/02/21

STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| . | . | . | . |
| . | . | . | . |
| . | . | . | . |
| b | 'Key' Added To Top Edges Of Drain at Drain Block Locations | P.K. | 09/02/21 |
| a | Issued For Information | P.K. | 29/01/21 |


BORD NA MÓNA
Naturally Driven
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LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160


PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DCT 2
'Speed Bump' Peat Dam

| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | - | D.K. | P.N. | P.N. |
| Date: 13/01/21 | | Scale : Not to Scale | A3 | Stage: Draft |
| Drawing No.: PCAS-0100-008 | | | | Rev: b |

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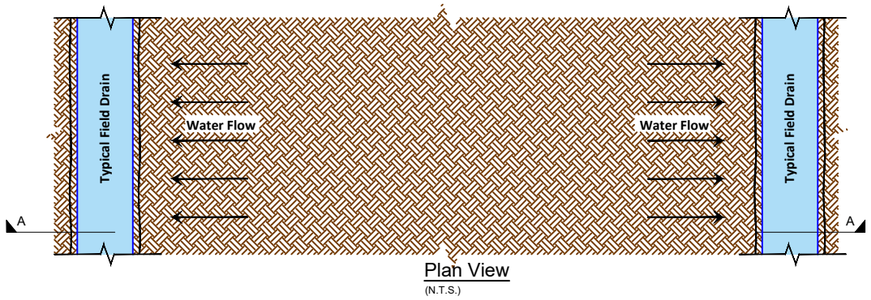
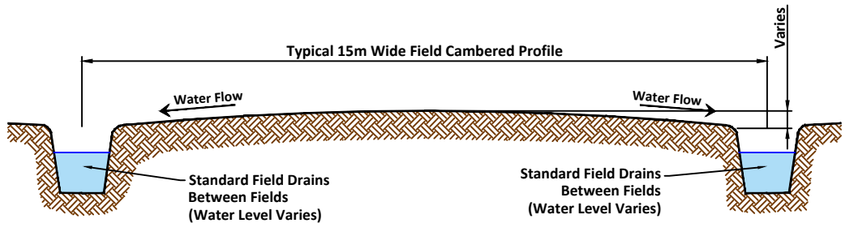
## Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.
The concept of drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement through the bog.



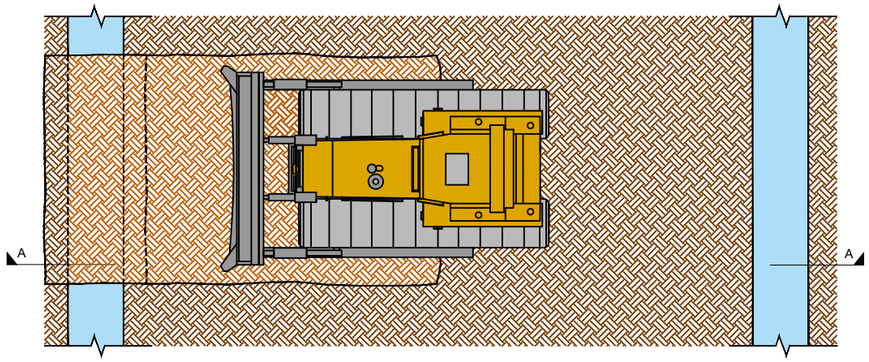

Plan View
(N.T.S.)



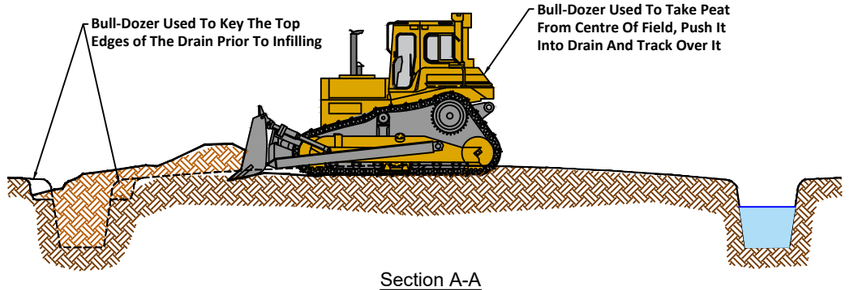

Section A-A
(N.T.S.)

## Phase 1
Forming 'Speed Bump'

The Bull-dozer is used to create a 5m Length key along both edges of the drain, approximately 500mm Wide x 500mm Deep.
Next a strip of peat is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block, to form an approximately 5m Wide 'Speed Bump'.



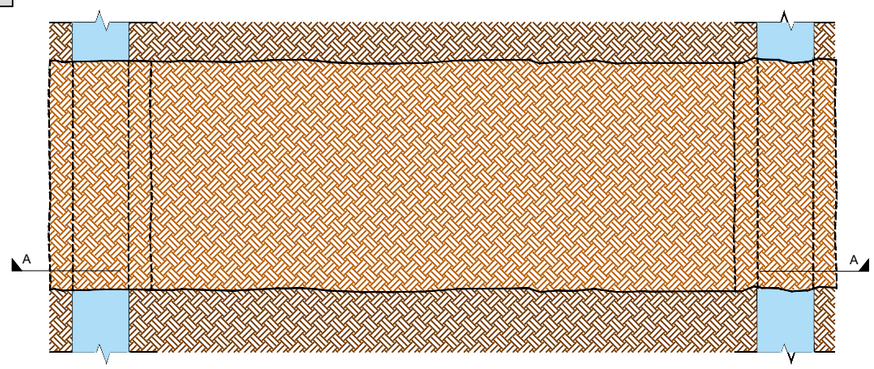

Plan View
(N.T.S.)



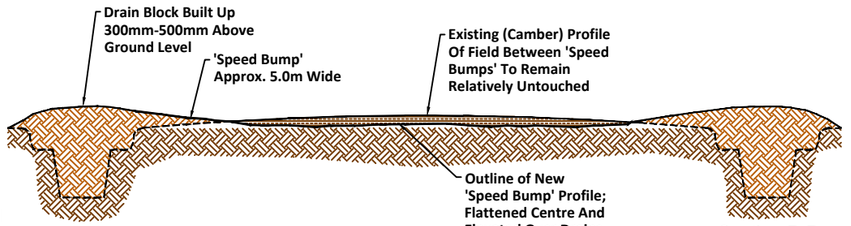

Section A-A
(N.T.S.)

## Complete Fields With Speed Bump (3 Per 100m)

Drain Blocks are built up at least 300mm-500mm above the existing ground level to allow for peat subsidence and to prevent water from flowing over the drain block and eroding it before it becomes stabilised.




Plan View
(N.T.S.)




Section A-A
(N.T.S.)

Section B-B
(N.T.S.)

### NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
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STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| . | | . | . |
| . | | . | . |
| c | For Approval | P.K. | 03/03/21 |
| b | 'Key' Added To Top Edges Of Drain at Drain Block Locations | P.K. | 09/02/21 |
| a | Issued For Information | P.K. | 29/01/21 |


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PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DCT 2
'Speed Bump' Peat Drain Block

| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | - | D.K. | P.N. | P.N. |

Date: 13/01/21 | Scale : Not to Scale A3 | Stage: For Approval
Drawing No.: PCAS-0100-008 | Rev: c

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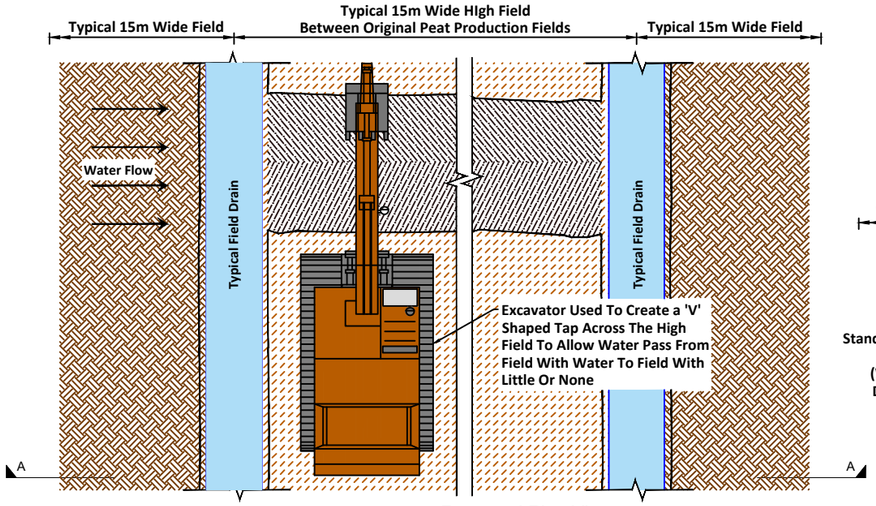
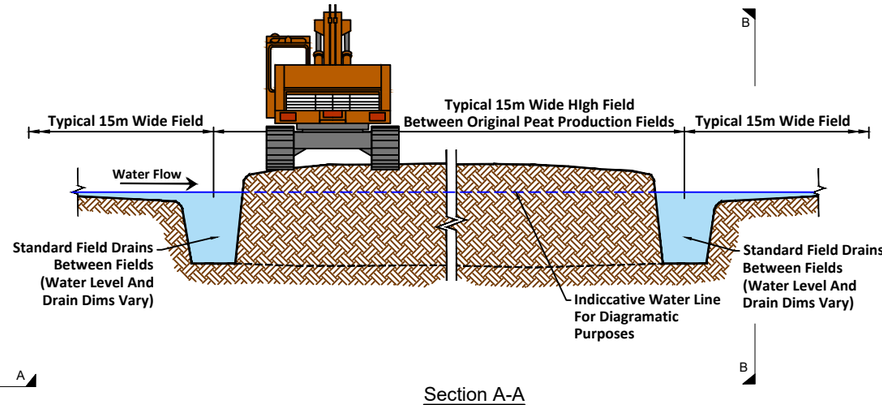
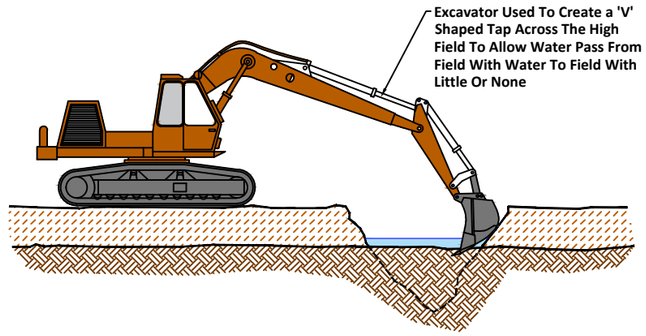
## 'V' Tap Across High Field To Control Water Levels




Proposed Plan View
(N.T.S.)



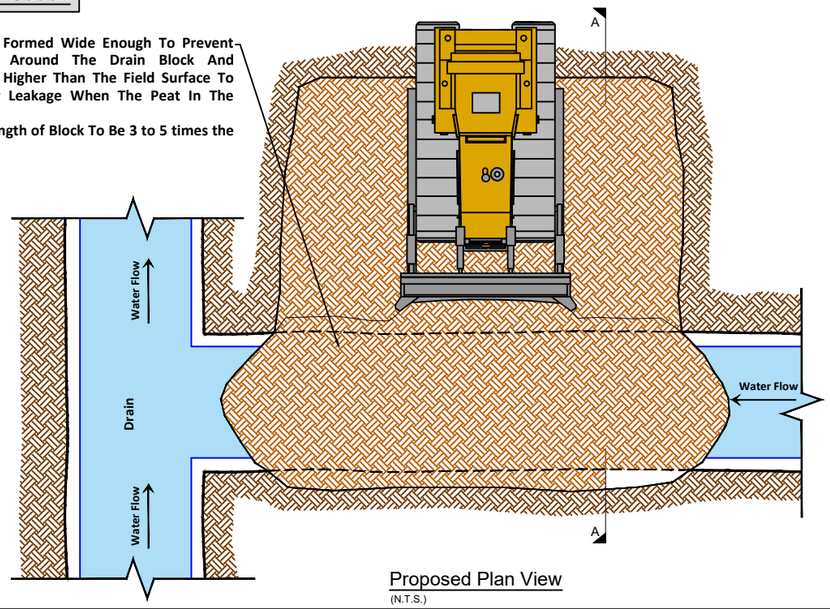

Section A-A
(N.T.S.)



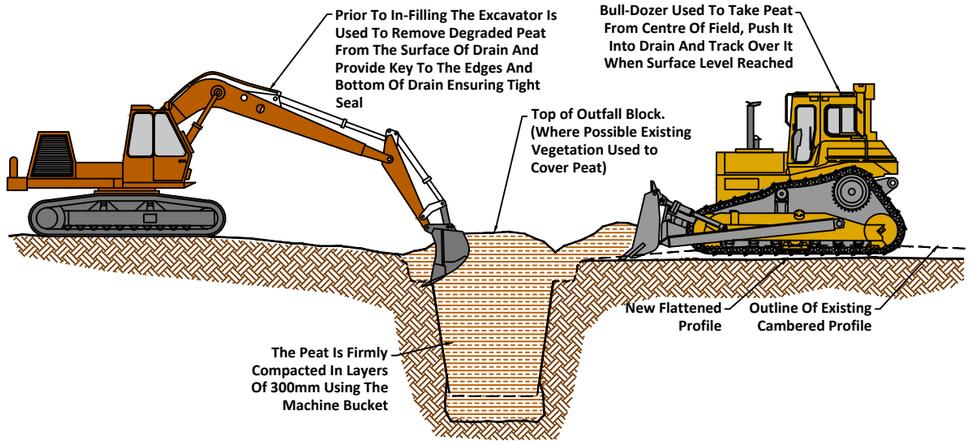

Section B-B
(N.T.S.)

## Blocking Of Outfall

The Blocks Are Formed Wide Enough To Prevent Water Moving Around The Drain Block And 300mm-500mm Higher Than The Field Surface To Prevent Further Leakage When The Peat In The Blocks Subsides.
Approximate Length of Block To Be 3 to 5 times the Width Of Drain

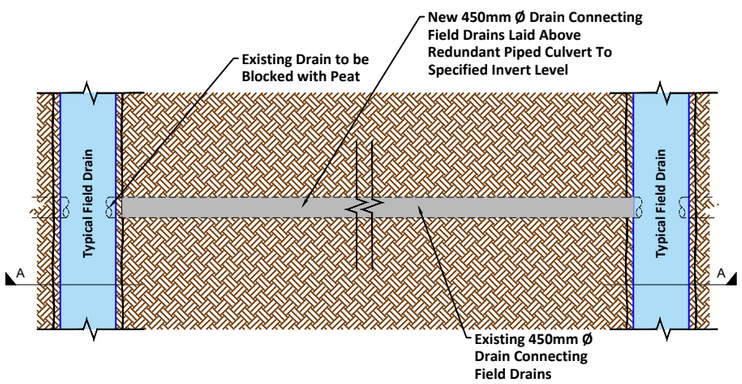



Proposed Plan View
(N.T.S.)

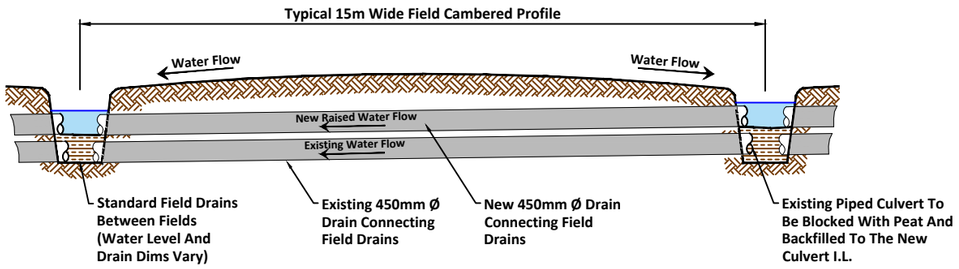



Section A-A
(N.T.S.)

## Raise Piped Culverts To Control Water Levels




Proposed Plan View
(N.T.S.)




Section A-A
(N.T.S.)

**NOTES:**

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
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STATUS

| Rev | Description | Issued By | Date |
|---|---|---|---|
| . | | . | . |
| . | | . | . |
| c | 'Key' Added to Base Of Drain For Blocking Of Outfall Control Measure | P.K. | 03/03/21 |
| b | For Approval | P.K. | 25/02/21 |
| a | Issued For Information | P.K. | 29/01/21 |


BORD NA MÓNA
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PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Modifying of Outfalls
& Managing Water Levels

| Drawn By: | | Checked By: | | Approved: |
|---|---|---|---|---|
| CAD | Designer | Discip. Lead | Design Lead | Design Manager |
| P.K. | - | D.K. | P.N. | P.N. |

Date: 20/01/21 | Scale : Not to Scale A3 | Stage: For Approval

Drawing No.: PCAS-0100-014 | Rev: c

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# Appendix E: Castlegar Rehabilitation Measures: Engineering and Rehabilitation Design Specification

# BORD NA MÓNA - CASTLEGAR BOG

## Drainage Management Plan

IBE1803
Rp01
January 2021

rpsgroup.com

## Document status

| Version | Purpose of document | Authored by | Reviewed by | Approved by | Review date |
|---|---|---|---|---|---|
| D01 | Draft | Various | Brendan Quigley | Grace Glasgow | 11/12/20 |
| D02 | Draft | Various | Brendan Quigley | Grace Glasgow | 12/01/21 |
| F01 | Draft | Various | Brendan Quigley | Grace Glasgow | 26/01/21 |

## Approval for issue

| | | |
|---|---|---|
| Grace Glasgow |  | 26 January 2021 |



Prepared by:

**RPS**

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# Contents



## Tables



## Figures

# EXECUTIVE SUMMARY

The Castlegar bog sits on the western bank of the River Suck, a major tributary of the Shannon system known to have an extensive and prolonged floodplain. The levels of the Castlegar bog are such that it is largely elevated out of this floodplain with only lands to the north and immediately adjacent to the banks of the Suck subject to fluvial flood risk from the River Suck itself.

The catchments which lie upstream of the Suck and drain through the bog have been delineated. These catchments are a mixture of bog, pastures and transitional cutover / woodland areas. The catchments have relatively poorly draining soils underlain by permeable bedrock layers. The area is drained by a gravity drainage system, much of it maintained by Bord na Móna without the need for pumping.

The rehabilitation measures will generally result in reduced runoff and drainage from the existing peat fields through a mixture of techniques including drain blocking, cell bunding and re-profiling. It is assumed that these measures will not significantly alter the existing topographical catchments and that the spine of the drainage networks, those which the upstream catchments drain through, will be retained by Bord na Móna.

Three potential impacts were considered: the potential to reduce the drainage function to upstream lands, the potential for increased flows downstream and the potential for increased groundwater levels impacting adjacent lands. There is no potential for increased flows downstream and the rehabilitation of Castlegar Bog, based on evidence from other bogs, will reduce the runoff from the bog by returning the peatlands towards its natural water retention function. The avoidance of reduced drainage function to upstream lands depends on Bord na Móna actively retaining the drainage routes which traverse the bog upon which drainage of adjacent and upstream lands is dependent.

The potential for increased groundwater levels and to a lesser extent marginal alteration of the topographical catchments has been assessed based on a precautionary approach. With gravity drainage routes retained it is assumed that groundwater levels will reach the surface of the re-profiled peat fields but no higher than this. In this scenario adjacent lands which are at a lower level than the bog could potentially be impacted and the vulnerable area has been defined through a zone of influence approach.

Each of the land parcels has been assessed based on its vulnerability to increased groundwater levels within the bog. In all cases there exists a boundary drain separating the rehabilitation area from the potentially vulnerable lands. Best evidence has shown that these drains provide a positive gravity drainage function and through retaining them they will prevent any groundwater impacts on adjacent lands due to the hydrogeological break / cut-off they provide.

There are some limitations with this approach namely the effect of backwater levels and the lack of detailed survey of the boundary drainage network. Given the low level of risk at Castlegar it is appropriate in most cases that the DMP measures involve survey, monitoring and continued retention of the boundary drainage network. A suite of measures is identified in order to mitigate any deterioration in the drainage to adjacent lands should monitoring of these lands indicate a groundwater or drainage impact on these lands. In one instance, namely the drain which serves lands to the south west of the bog it is recommended that re-grading of the drain is undertaken to ensure a gravity drainage outfall to the upstream lands is provided. Together with

the retention of the boundary drainage network these measures will ensure the rehabilitation measures do not negatively impact the adjacent lands.

# 1 INTRODUCTION

Castlegar Bog is part of the Blackwater Bog Group. Bord na Móna operated peat extraction within the Blackwater Bog Group under IPC Licence (Ref. P0502-01) issued and administered by the EPA. Condition 10.2 of this licence requires the preparation of a Rehabilitation Plan for permanent rehabilitation of the boglands within the licensed area.

It is proposed by Government that Bord na Móna carry out enhanced decommissioning, rehabilitation and restoration under the Peatlands Climate Action Scheme on peatlands previously used for energy production. This proposed Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Improvements supported by the Scheme will ensure that environmental stabilisation is achieved and significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered.

A key issue for Bord na Móna is the potential hydrological impact rehabilitation of this bog may have on the bog, surrounding lands and lands downstream which may be hydrologically linked to the bog. Rehabilitation measures generally seek to increase groundwater levels and surface water retention such that they are closer to the surface to encourage peat formation, the associated ecological benefits and carbon sequestration capacity. While in general terms this will reduce the volume of water released from the bog following a rainfall event, the impact on flood run-off is not well understood. Furthermore the increase in the local water table could result in negative impacts to surrounding lands if mitigation measures are not applied (e.g. to agriculture).

This Drainage Management Plan (DMP) for Castlegar Bog seeks to establish the baseline hydrological performance of the bog and the surrounding drainage network. The plan sets out the characterisation of the bog and surrounding lands, the existing performance of the drainage network and the level of flood risk. The plan identifies the potential hydrological zone of influence of the bog and the objectives, risks and opportunities associated with the rehabilitation of the bog. The plan assesses the potential impact of the various rehabilitation measures which are proposed on the local drainage network and flood risk. It sets out, where necessary, mitigation measures required to reduce impacts. The plan sets out the measures which are required to be delivered in advance or in parallel with the rehabilitation plan as well as the long term operation and retention of the drainage network and associated infrastructure. The plan assesses the level of residual risk, the potential impact due to climate change and the adaptability of measures in response to these climate change impacts.

## 1.1 Bog Details

Castlegar Bog is located approximately 4 km to the east of Ahascragh and 6km north of Ballinasloe in County Galway. Annaghbeg Bog to the south-west is part of the Bord na Móna Castlegar property but has not been drained by Bord na Mona or been in industrial peat production. Apart from its' acquisition, Bord na Móna has not carried out drainage, bog development or industrial peat production activities on this part of Castlegar bog,

The bog is bordered by The River Suck to the eastern and southern edge with a band of scrub land and wet grassland separating the two. Sections of Birch woodland and wet grassland are located along the remaining margins of the bog.

This bog was drained and developed for industrial peat production in the 1990s and has been in active peat production since 2004. Industrial peat production ceased prior to 2019. The fuel peat harvested from here was used to supply Lough Ree and West Offaly Power stations in Co. Longford and Co. Offaly respectively. The area within the IPC Licence boundary is approximately 519 Ha, while the area identified for rehabilitation comprises of 330Ha approximately.

A rail line runs around the northern side of the bog. Prior to production commencing on the bog, a stream was present around the centre of the production area. This stream is now almost entirely contained within underground pipes. The stream flows into the River Suck at the eastern boundary of the bog and the last 500m is above ground.

The former peat production areas are drained by production field drains that are typically spaced at 15 metres centres.

There is a tea centre at the entrance from the road to the north-west part of the bog. This tea centre area includes welfare facilities, car parking and storage area. The main access point to the bog is off the public road, R358, into the tea centre.

Castlegar bog consist of a larger northern bog basin and smaller basin located to the southwest (called Annaghbeg Bog).

No change is being proposed for Annaghbeg Bog which was never subject to industrial peat extraction and is therefore not the focus of this DMP as it is outside the scope of the current scheme. The impact of the changes to the northern bog, hereafter referred to as Castlegar Bog, will be considered within this DMP.

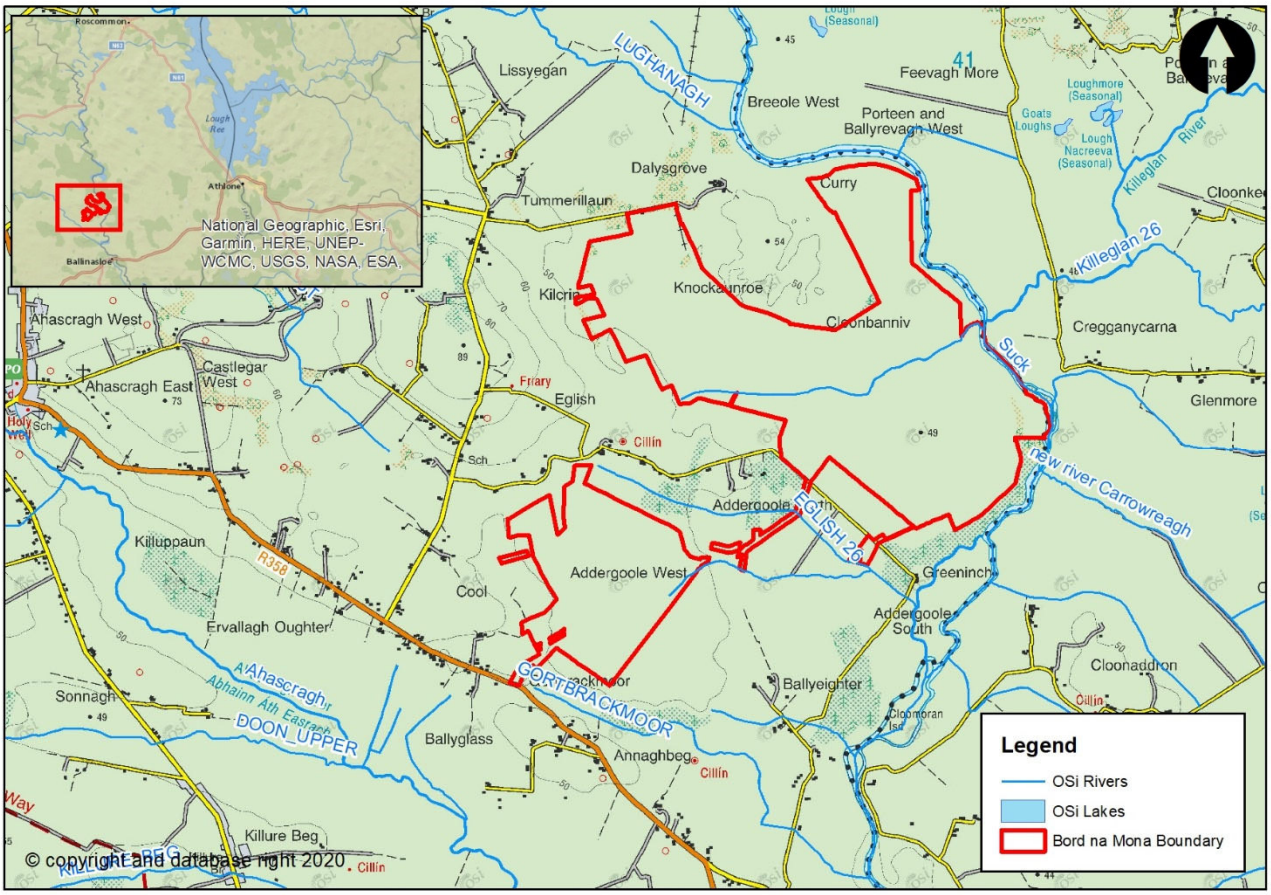


**Figure 1.1 Location of Castlegar Bog**

# 2 BASELINE ASSESSMENT

Through cessation of peat extraction and implementation of the Castlegar Bog rehabilitation plan there is the potential to impact the adjacent land. The extent of the impact will depend on the existing baseline characteristics of the catchments which drain the bog and the adjacent lands.

The purpose of characterising the catchment area is to develop an understanding of how the catchment currently operates and drains. The characterisation also investigates the risks, constraints and opportunities to the operation and drainage.

## 2.1 Study Area

To characterise the catchments a study area was determined encompassing the total catchment area draining the bog and adjacent lands through the bog. The drainage under the influence of Castlegar Bog discharges into external drains or directly into the River Suck at various locations. In addition to these discharge points there is one inflow location where the adjacent agricultural land drains into Castlegar Bog. A review was carried out to delineate the external drains around the bog as presented in Figure 2.1 along with their associated hydrological catchment area.

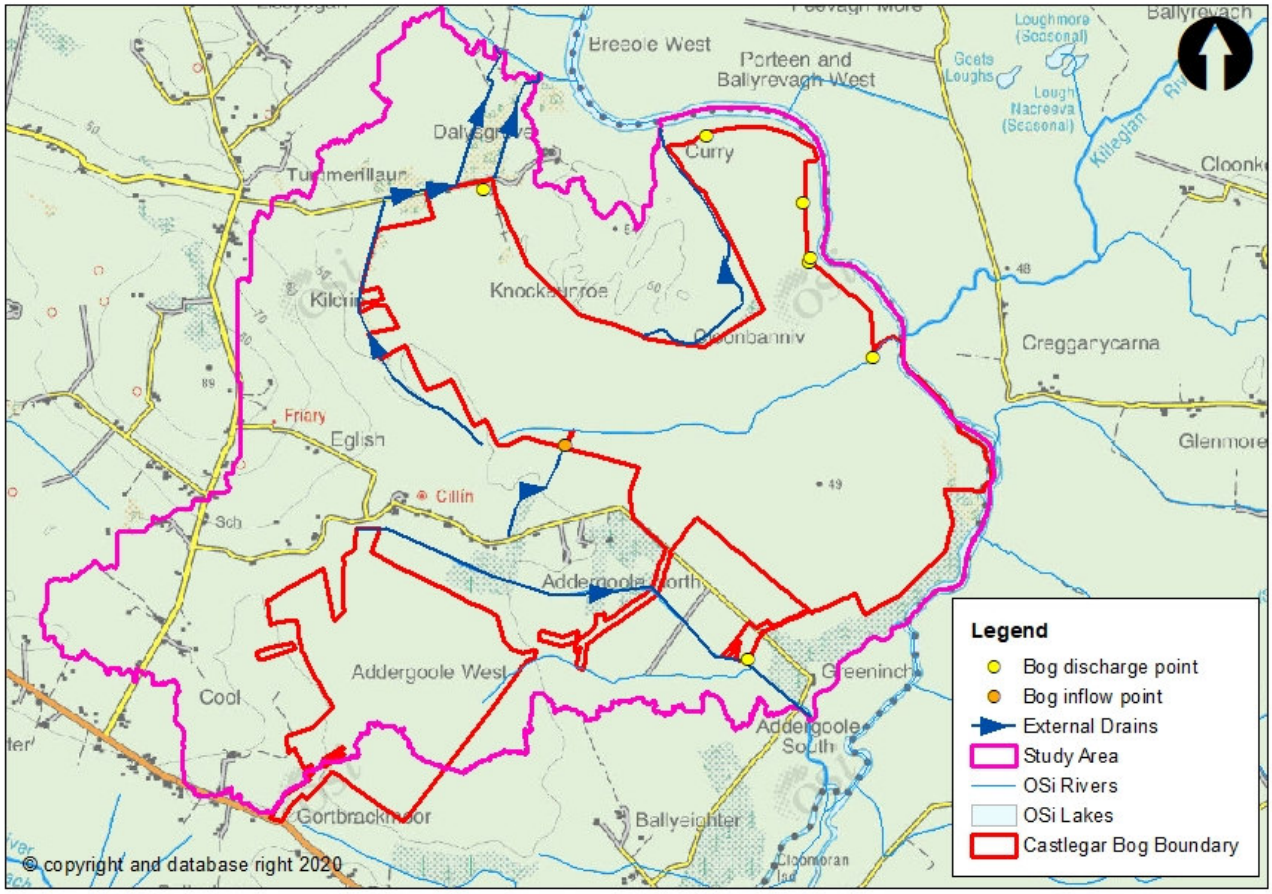


**Figure 2.1 Study Area for Castlegar Bog**

## 2.2 Catchment Runoff Characterisation

A hydrological analysis was carried out within the study area to delineate the sub catchments of the bog drains and the external drains. The recent Bord na Móna drainage survey was reviewed, and the bog sub-catchments confirmed. Sub-catchments of the external drains were identified using ARC GIS tools. The sub catchments are presented in Figure 2.2.

The FSU catchment characteristics provide an overview of how much rain a catchment receives, how impermeable the catchment is and how quickly the water will runoff the catchment due to topography and drainage. Table 2.1 summarises the FSU catchment descriptors for the sub-catchments identified in Figure 2.2.

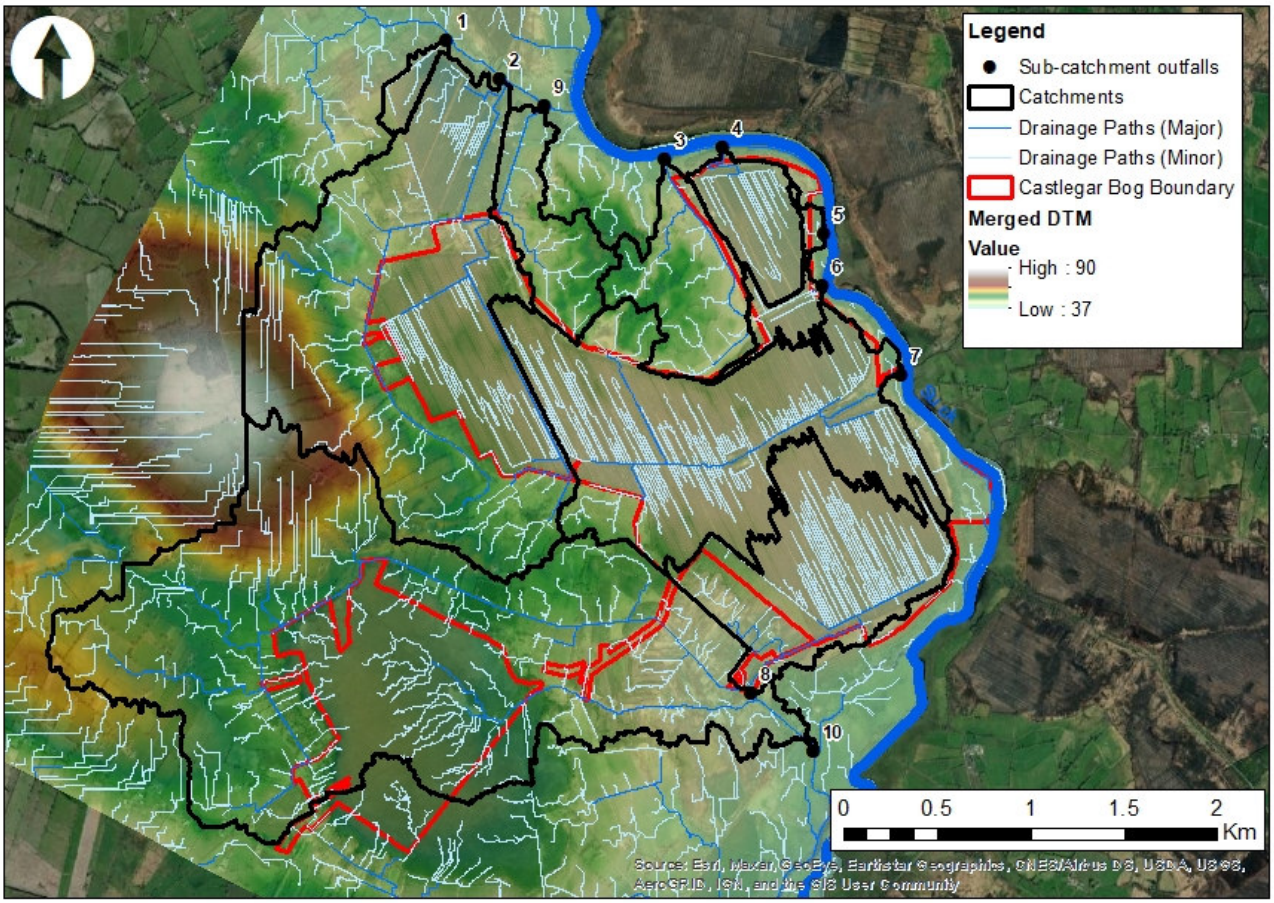


**Figure 2.2 Drainage Networks and Sub-Catchments Draining Castlegar Bog**

There are ten sub-catchments draining Castlegar Bog and adjacent lands ranging in area from 0.034 km$^2$ to 5.48 km$^2$. The catchments are all subject to moderate / low amounts of annual average rainfall. The Baseflow Index for all of the catchments has been taken as 0.553 representing a fairly permeable catchment. The catchments range from very flat to moderately flat.

The Index Flood Flow ($Q_{med}$) values, which represent the typical peak flood flow which might be anticipated (a 50% chance of being exceeded in any given year), for each of the sub-catchments have been calculated. This is based on two different methods, the Flood Studies Update (FSU) 5 variable equation designed for small and

/ or urbanised catchments in Ireland, and the RPS derived Peat $Q_{med}$ equation, derived in support of the Drainage Management Plan project for SAC sites on behalf of NPWS. Both methods result in very similar $Q_{med}$ values where the proportion of arterial drainage (ARTDRAIN2) is assumed to match the proportion of the catchment managed by Bord na Móna (drained).

**Table 2.1 Physical Catchment Descriptors of Sub-Catchments Draining the Bog**

| Sub-Catchment Number | Area ($km^2$) | SAAR (mm) | BFI | FARL | ARTDRAIN2 | PEAT (%) | S1085 (m/km) | FSU5 $Q_{MED}$ ($m^3/s$) | Peat $Q_{MED}$ ($m^3/s$) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.076 | 981.91 | 0.553 | 1.00 | 1.00 | 100 | 5.99 | 0.032 | **0.036** |
| 2 | 2.840 | 981.91 | 0.553 | 1.00 | 0.57 | 57.2 | 3.24 | **0.793** | 0.737 |
| 3 | 0.520 | 978.45 | 0.553 | 1.00 | 0.35 | 34.9 | 3.62 | **0.169** | 0.150 |
| 4 | 0.301 | 978.45 | 0.553 | 1.00 | 1.00 | 100 | 1.17 | 0.077 | **0.119** |
| 5 | 0.034 | 976.72 | 0.553 | 1.00 | 1.00 | 100 | 9.19 | 0.017 | **0.018** |
| 6 | 0.124 | 976.72 | 0.553 | 1.00 | 1.00 | 100 | 6.42 | 0.052 | **0.055** |
| 7 | 1.871 | 974.99 | 0.553 | 1.00 | 0.95 | 94.7 | 1.87 | 0.465 | **0.575** |
| 8 | 1.036 | 972.53 | 0.553 | 1.00 | 1.00 | 100 | 2.46 | 0.288 | **0.348** |
| 9 | 0.397 | 980.20 | 0.553 | 1.00 | 0.39 | 39.2 | 3.71 | **0.133** | 0.122 |
| 10 | 5.485 | 972.46 | 0.553 | 1.00 | 0.00 | 41.7 | 4.95 | **1.602** | 0.966 |

## 2.3 Hydrogeological & Soil Characterisation

Castlegar Bog and the surrounding area are underlain by Visean limestone bedrock which represents a regionally important, karstified aquifer. Geological Survey of Ireland (GSI) tracing of karst features has not identified any significant features such as springs, swallow holes or turloughs in close proximity to the bog. Nevertheless the bedrock underlying Castlegar has potential to facilitate relatively high rates of baseflow / groundwater transfer. The soils covering the catchments are primarily peat, with some peaty gleys outside the extent of the bog and some grey brown podzols to the west of the bog. All of these soils would be considered to be moderately impermeable.

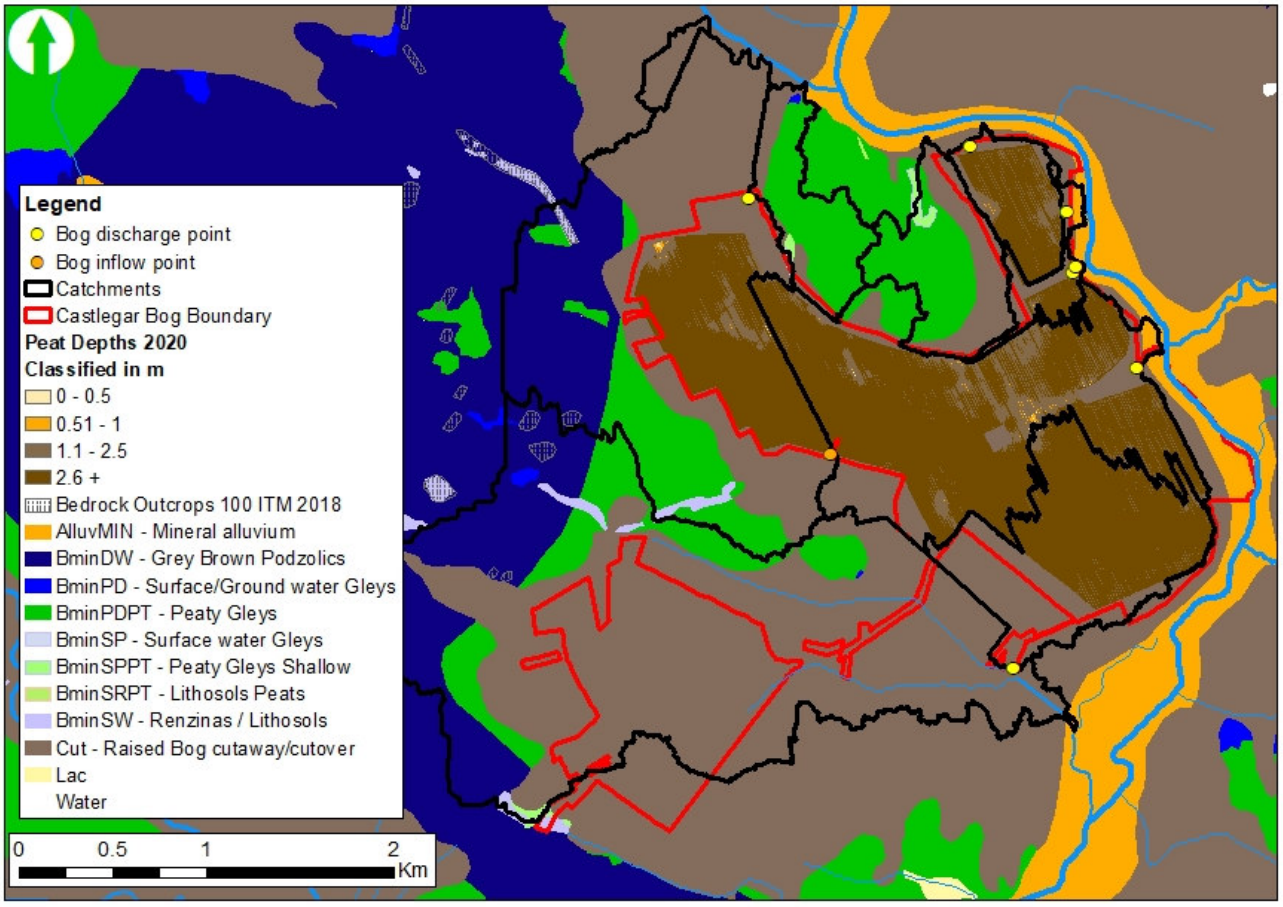


**Figure 2.3 Hydrogeological and Soil Characteristics of Castlegar Bog**

## 2.4 Morphological and Hydraulic Characterisation

A desk top review was carried out of bog drains and external drains. Morphological and hydraulic features were identified.

The external drains are generally small with gentle bed slopes. Aerial photography shows no signs of erosion or deposition however given that the drains are considered small with gentle bed slopes there would be a risk of deposition, and therefore reduced land drainage efficiency. Risk of deposition would occur where there is potential for an erosion or debris source from the surrounding land and where there is potential head loss in

the channel due to instream features. Figure 2.4 details the reaches of the external drains where there are potential erosion or debris sources and where instream features may facilitate deposition. The figure shows that due to the location of commercial forests, woodlands and disturbed peat in the surrounding lands there are existing potential sediment sources that could enter the external drains. Given the presence of culverts, sharp bends and inflows along the external drains there would be a potential of sediment settling and deposition occurring. The potential for Castlegar bog being a sediment source to the external drains is considered low due to the presence of silt ponds at all discharge points and that peat extraction activities have ceased.

A review of the bog drains was carried out. The Bord na Móna drainage survey details the open drains, pipes, settlement silt ponds and discharge points. All known discharge points have a silt pond located upstream which will reduce the amount of silt leaving the bog as water is drained. The drains in the bog have very gentle bed slopes and pass through numerous pipes before discharging from the bog. It would be expected that the bog drainage network would be sensitive to drain and pipe alterations and the drain which receives an inflow from the adjacent land, as shown in Figure 2.4, needs careful consideration. A reduction in this drain's capacity has the potential to impact on the agricultural land that drain into the bog.

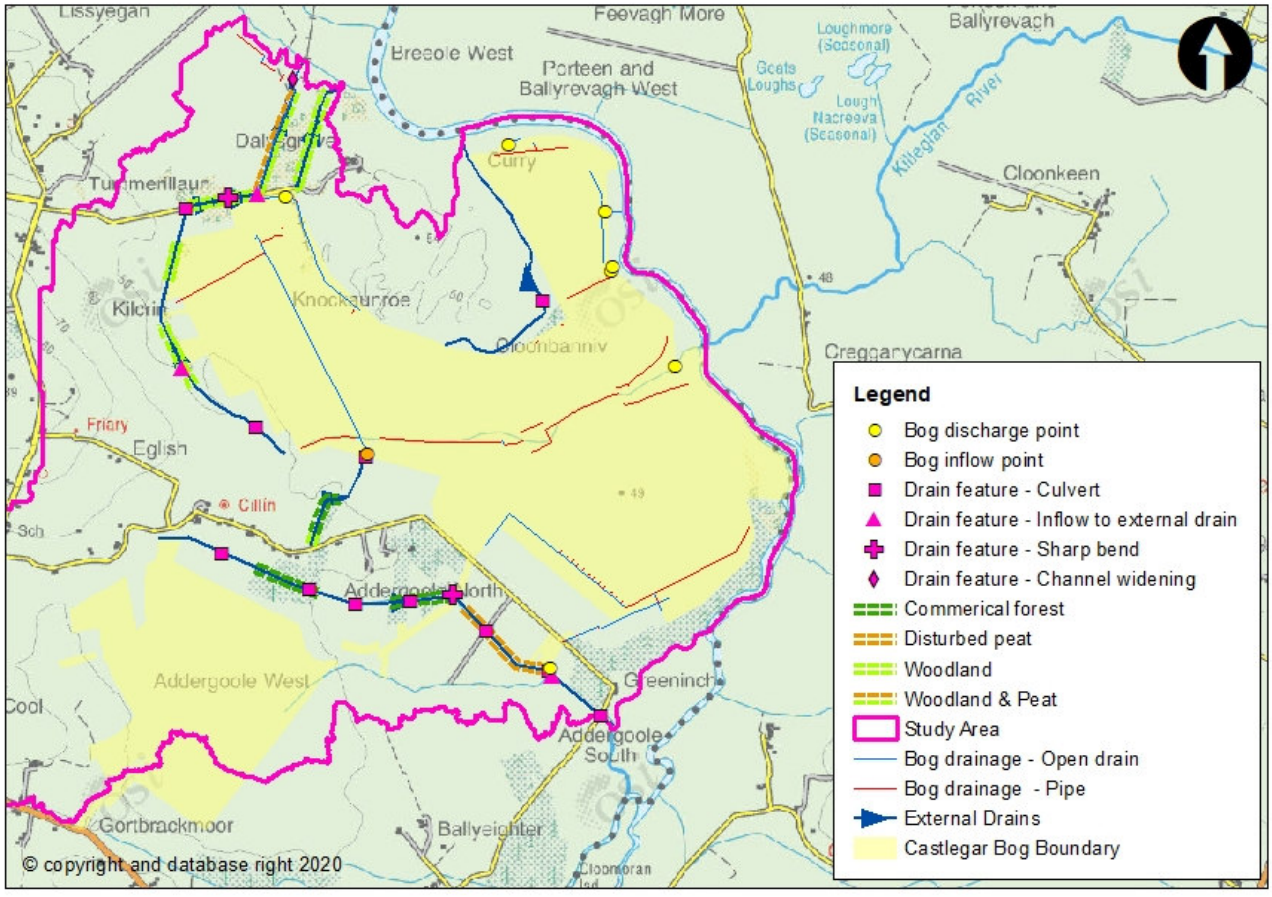


**Figure 2.4 Morphological and Hydraulic Characteristics of Castlegar Bog and environs**

## 2.5 Land Use Character

The majority of the land within the study area is peat bog and pasture. The remaining areas of the study area consist of less productive agricultural land with natural vegetation and commercial forest. The CORINE land use dataset was used to identify landuse types. This dataset was then reviewed using aerial photography to establish landuse amendments or land use alterations. The review found that additional commercial forests and woodland areas are located in the study areas and some peat bog and pasture land have been improved with land drains. There are some minor roads located in the study area also.

The pasture land is mainly used for livestock which provides food production. The commercial forests provide for timber production. The majority of the peat bog outside the Bord na Móna bog shows evidence of being harvested for domestic fuel production. Other areas of peat bog are undisturbed which contribute to carbon storage and biodiversity. The woodland areas are likewise providing carbon storage and biodiversity albeit as a different habitat to the peat bogs. The minor roads within the study areas service individual properties and provide access to the pastures, forests and peat bogs.

In addition to the land use the River Suck corridor runs adjacent to the Bog.

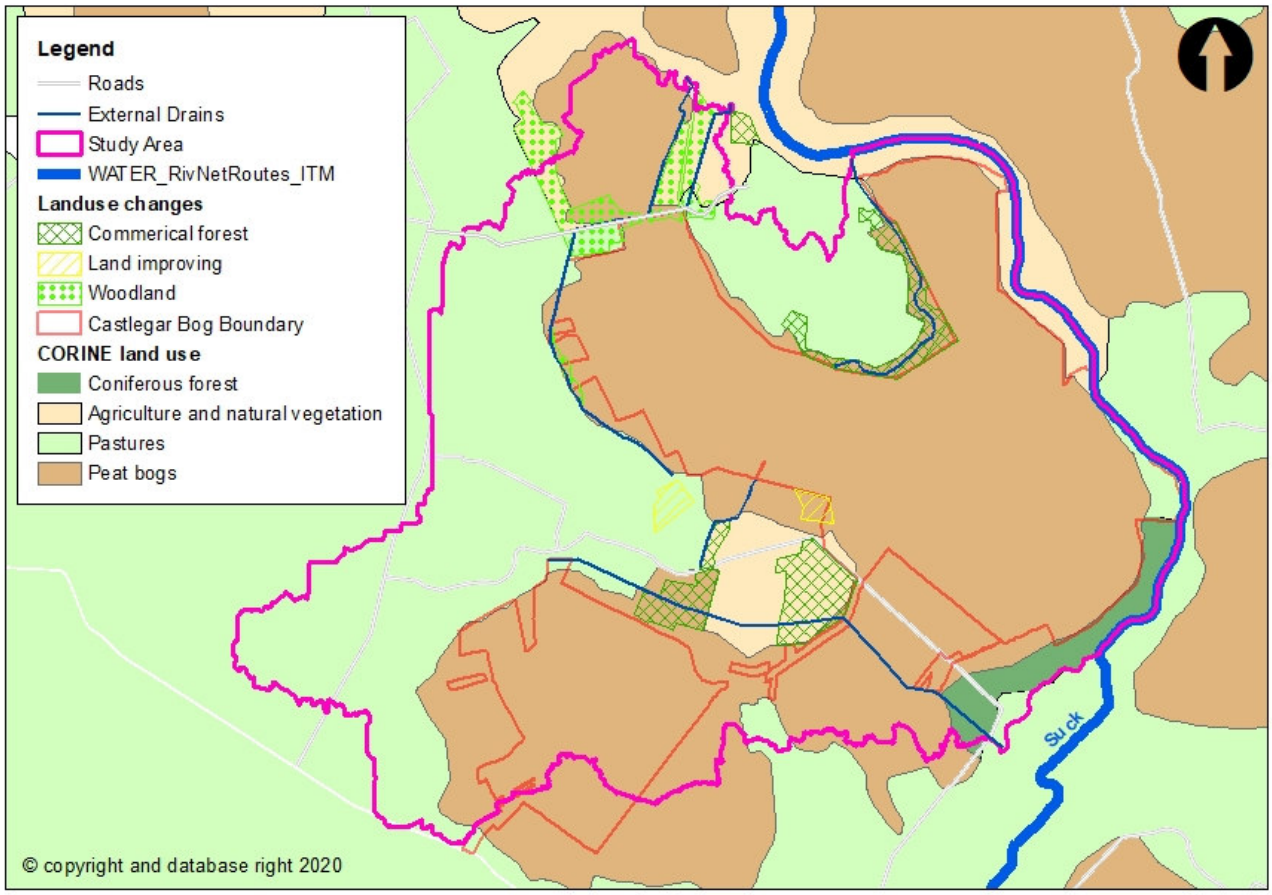


**Figure 2.5 Land Use Characteristics of Castlegar Bog and environs**

## 2.6 Flood Risk

A number of sources of flood risk information are available, both predicted and simulated, in proximity to Castlegar Bog. These include:

- CFRAM Study maps setting out the predicted fluvial 10%, 1% and 0.1% Annual Exceedence Probability (AEP) fluvial flood scenarios for the River Suck
- GSI predicted groundwater flood maps for high, medium and low probability events
- Mapped fluvial flood extents for the 2009 flood event
- Mapped flood extents for the 2015 flood event (from Sentinel-1 satellite imagery) and a GSI surface water flooding dataset for the same event
- Anecdotal evidence from Bord na Móna

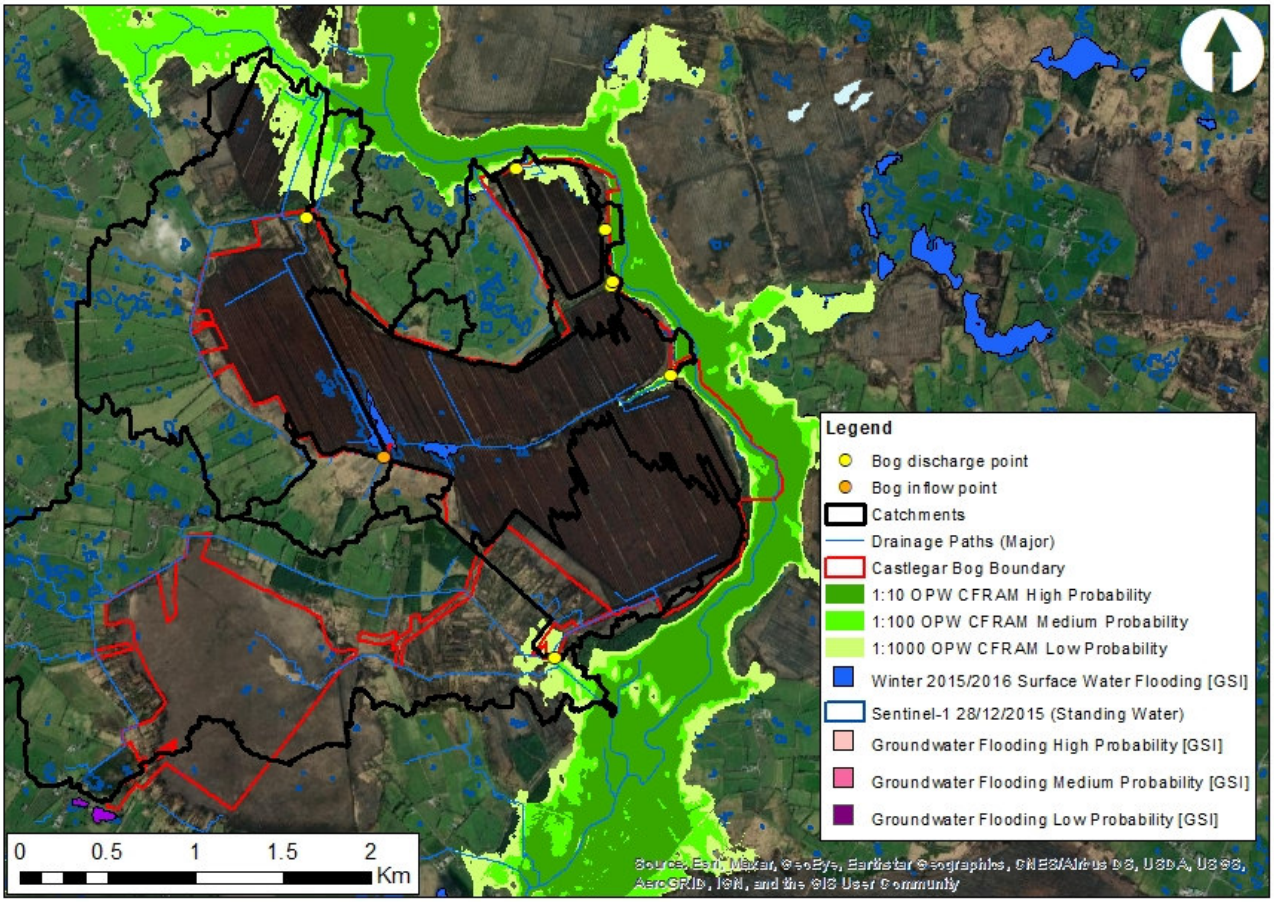


**Figure 2.6 Flood Risk at Castlegar Bog**

The 2009 and 2015 events are estimated to have had a flood return period of around a 1 in 100 year flood return period which matches well with the predicted flood extents from the CFRAM Study.

Aside from a portion of 1 in 1000 year flood predicted for the north of the bog there is no significant fluvial flood risk to the bog from the River Suck. It should be noted this analysis did not consider the fluvial flood risk from the smaller watercourses which drain to the Suck through the Castlegar Bog. Historical anecdotal evidence was reviewed to ascertain if there are any known flooding or drainage issues from these smaller watercourses

to the bog or adjacent land. No drainage issues have been identified along the Castlegar Bog boundary drains. Data from the 2015/16 flood event indicates flooding west of the centre of the main peat field and this is consistent with the local knowledge from Bord na Móna operatives familiar with Castlegar Bog.

There is no predicted groundwater flooding to the bog indicated on the GSI datasets.

## 2.7 Summary

The drainage network sub-catchments within Castlegar Bog and its environs were used to delineate the study area for the Castlegar Drainage Management Plan. The overall catchment area was characterised within the context of hydrology, hydrogeology, morphology, landuse and flood risk.

A detailed drainage network delineation was carried out. Drains within the bog and external drains were identified. The assessment showed that the north east section of the bog discharges to the River Suck. The north west and southern sections of the bog discharge to drains which flow to tributaries of the River Suck.

The catchment area is considered to be relatively small, flat, fairly permeable with a low to moderate annual rainfall. Peak flood flows range from around 0.3 – 0.5 $m^3/s$ per square kilometre (3 – 5 l/s per hectare) for the $Q_{med}$ event to 0.8 – 1.5 $m^3/s$ per square kilometre (8 – 15 l/s per hectare) for the $Q_{100}$ year plus climate change event.

The bedrock within the catchment is limestone, however no karst features were identified in GSI records which could influence groundwater movement and flooding. The soil on top of the bed rock is mainly peat with some other soils in the higher ground. All soil types are relatively impermeable which would restrict groundwater movement.

The morphological and hydraulic characteristics of the external drains were assessed. No signs of erosion of deposition could be observed. Areas of deposition risk were identified along each drain. Culverts, bends, inflows, channel widening were identified as potential factors for sediment deposition. Woodlands and bare peat adjacent to the drains were identified as potential sources of sediment. Given that the drains are relatively flat the risk of deposition in the external drains is considered high.

The land use was assessed within the study area. The majority of land is peat bog, some of which has been drained for agricultural purposes. Pasture land makes up a significant proportion of the study area also. The remaining land is made up of less productive agricultural land with natural vegetation and commercial forest. The land provides important services such as food production, timber production, domestic turf cutting, carbon storage, biodiversity and habitat creation.

Table 2.6 summarises the constraints, risks and opportunities identified as part of the baseline assessment.

**Table 2.2 Potential Opportunities / Constraints**

| Land Parcel / Feature | Risk or Opportunity? | Details |
|---|---|---|
| Agricultural land | Constraint | It is important to maintain the productivity of agricultural land surrounding the bog |

| | | |
|---|---|---|
| Peat bog | Constraint | Where turf is still being extracted from other bogs adjacent to Castlegar Bog conditions should be not be made worse. |
| Roads | Constraint | Two minor roads are located in the study area providing access to a dwelling, agricultural land and peat bogs. Access to these roads should be maintained. |
| River Suck | Constraint | The River Suck corridor runs adjacent to the bog. No activity should adversely impact this area. |
| External drains | Risk | Risk of deposition in the drains is considered high due to potential sediment sources in adjacent lands and features within the external drains. External drains may be sensitive to change. |
| Bog rehabilitation plan | Opportunity | To improve water quality discharging from the bog; stabilisation or improvement in water quality parameters (e.g. suspended solids) |
| Bog rehabilitation plan | Opportunity | To reduce carbon emissions from the bog and to set bog on a trajectory towards naturally functioning peatlands habitats. Castlegar has potential to develop embryonic Sphagnum-rich vegetation that has potential to be a carbon sink. |
| Bog rehabilitation plan | Opportunity | To improve biodiversity by vegetating bare peat and creating more habitat for flora and fauna. |
| Bog rehabilitation plan | Opportunity | To reduce runoff and restore a more natural runoff regime, thus contributing to flood risk management. |

# 3 BOG REHABILITATION PLAN

The Castlegar Bog rehabilitation plan[1] consists of the following measures as summarised in Table 3.1 and presented in Figure 3.1.

**Table 3.1 Castlegar Bog rehabilitation measures**

| Restoration | Description of measures |
|---|---|
| Deep peat restoration | Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes |
| Other | Maintain silt ponds<br>Re-alignment of piped drainage.<br>Realignment of gravity outfalls (where needed).<br>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). |

[1] For further details see Castlegar Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2020 report

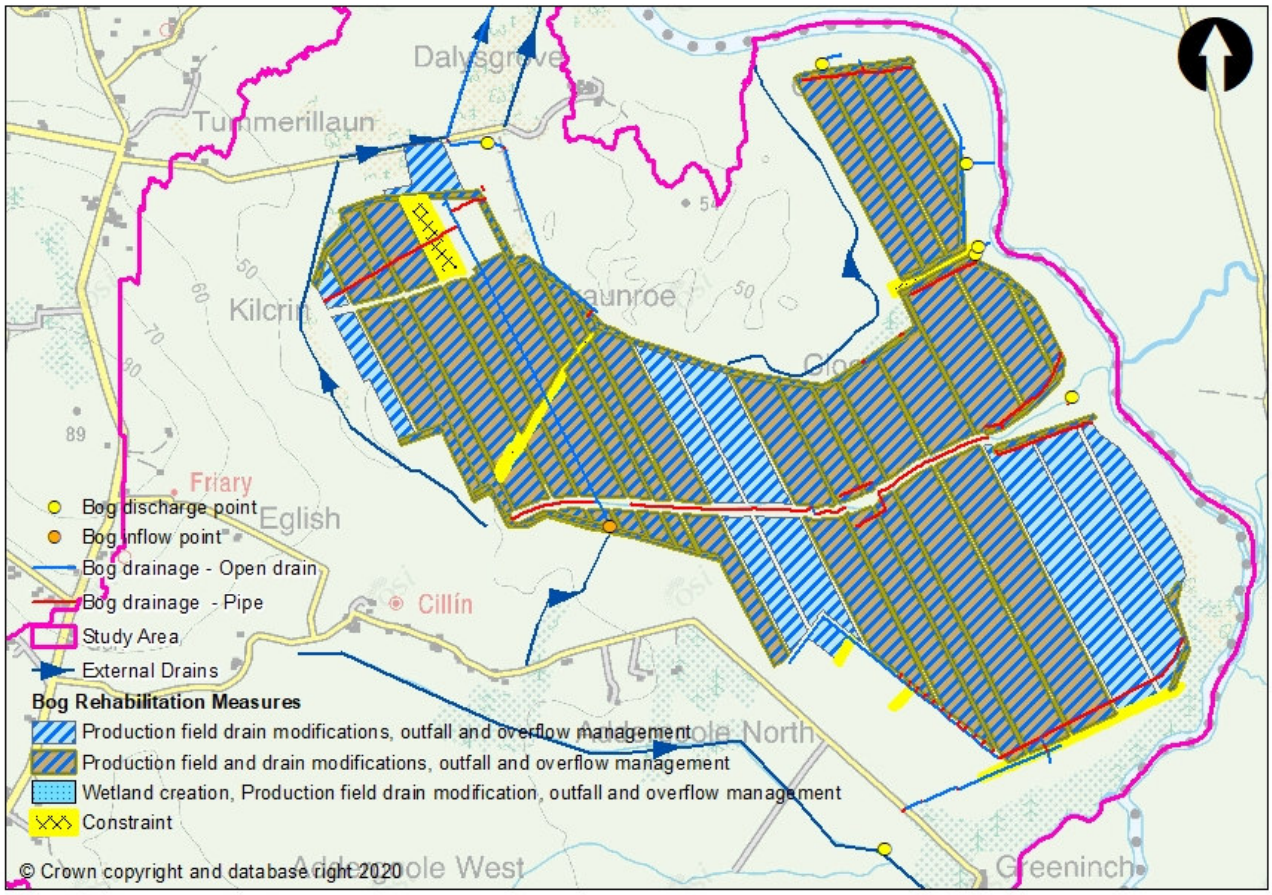


**Figure 3.1 Castlegar Bog Rehabilitation Plan**

Each measure while designed to promote the rehabilitation and re-wetting of the bog will have a potentially positive and/or negative impact on the adjacent land. This section identifies and assesses these potential impacts.

## 3.1 Impact Screening

Table 3.2 summarises the rehabilitation measures proposed for the Castlegar Bog and their potential impact to adjacent land.

**Table 3.2 BRP measures proposed at Castlegar Bog**

| BnM rehabilitation measure | Description | Potential Impact | Potential Impact Description |
|---|---|---|---|
| Drain blocking, cell blocking, berm and field re-profiling | Existing production field drains within the bog areas that convey surface water away from the former peat production fields towards the bog discharge points will be modified to reduce conveyance or removed altogether by infilling. | Positive and negative | Reduced runoff from the bog discharge points resulting in less flow in the external drains located downstream.<br>Reduced conveyance at bog inflow point resulting in increased water volume in external drain located |

| | | | |
|---|---|---|---|
| | Surface water runoff through the bog will be slowed allowing the bog to store more water | | upstream if conveyance channels through the bog are blocked. |
| Blocking outfalls | Most production field drain systems drain into a headland pipe running perpendicular to the peat field. The location of the ditch/pipe intersection is known as an outfall.<br><br>By blocking the outfalls each production field drain will be prevented from operating resulting in the ditch storing water and raising the groundwater level in the bog. This will allow the bog to store more water and bring the groundwater level to the surface. | Positive and negative | Reduced runoff from the bog discharge points resulting in less flow in the external drains located downstream.<br><br>Raised groundwater levels to the bog surface will create a hydraulic gradient across the bog into the adjacent land. Ground water levels in lands within this hydraulic gradient will potentially rise. The effect will be greatest immediately beside the bog. |
| Managing overflows with overflow pipes | This measure is usually combined with blocking outfalls which cause groundwater levels to rise. As the bog fills up it will want to overtop at the lowest part of the bog boundary. Overflow pipes control the location this occurs and where the overtopping water is discharged to. | Neutral | The control features will determine the location of the discharge from the bog. However the flow leaving the bog once it is full will be the same as prior to remedial works.<br><br>Overall the volume of water discharging from the bog will be reduced but will contribute to raised groundwater levels within the bog and potentially within the zone of influence (subject to mitigation). |
| Drainage channel for excess water | This measure will work in conjunction with the overflow structures. Where suitable drainage channels do not exist or are of insufficient capacity along the bog boundary, a new or upgraded drainage channel will be provided.<br><br>These drainage channels will convey all flows from the bog to suitable watercourses. | Positive | Drainage channels of sufficient capacity will ensure any overtopping water from the bog does not enter adjacent land. Drainage channels will also act as a hydraulic break in groundwater limiting the impact of bog measures to the groundwater in adjacent lands. |
| Sphagnum moss inoculation | This measure will propagate sphagnum moss within the bog. Sphagnum moss will cause bog regeneration as it grows and layers. | Positive | Sphagnum moss can hold up to 10 times its weight in water. As such this measure will store water reducing the runoff from the bog into the exterior drains. This will help retain the external drainage efficiency which adjacent land relies on.<br><br>This measure may also contribute to runoff reduction and wider catchment FRM goals but in a piecemeal way. |

| | | | |
|---|---|---|---|
| Silt ponds | Existing silt ponds will be maintained to store runoff water from the bog and allow any suspended peat to settle out of the water before it is discharge to the external drains. | Neutral | Maintained capacity from the bog discharge points to the external drains and river located downstream.<br><br>Maintained quality of water being discharged from the bogs into the external drains or river. |

## 3.2 Impact Assessment

Three potential impact sources were identified; groundwater rise, increased runoff from the bog and reduced drainage capacity into the bog. These impact sources have the potential to make the adjacent land wetter and drain less efficiently. An assessment was carried out to delineate the zone of influence resulting from these potential impact sources. Figure 3.2 presents the areas which are at potential risk.

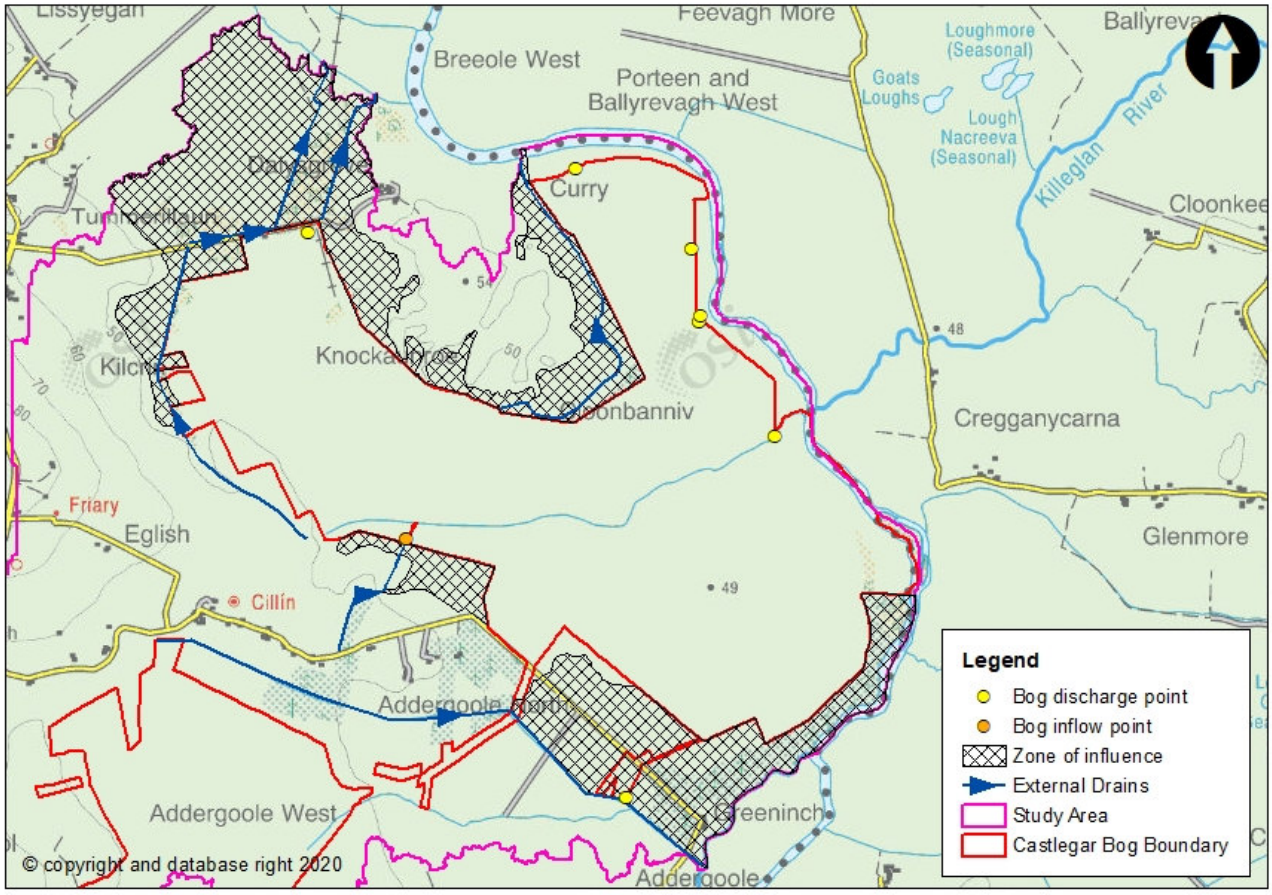


**Figure 3.2 Castlegar Bog Rehabilitation Plan – Zone of influence**

### 3.2.1 Groundwater Impact

The impact of rehabilitation measures on groundwater levels within and adjacent to the bog is difficult to assess quantitatively in the absence of long term monitoring data and hydro-geological models of the bog. Nevertheless it can be assumed that groundwater levels will rise within the bog itself given that this is an objective of the rehabilitation measures – to restore the hydrological conditions for peat formation. It can also be assumed that the maximum level which groundwater will reach is the surface of the peat fields post-rehabilitation. This is because topographical flow paths for surface water out of the bog (by gravity) will be retained and the bog is not dependent on a pumping regime to ensure ponding does not occur.

Groundwater rise in lands adjacent to the Castlegar Bog was assessed firstly by estimating the potential rise in groundwater within the bog. The drainage system in the bog is, on average, 1.5m deep. It can be expected

that groundwater would rise by 1.5m to bring it to the surface. As the groundwater rises in the bog to ground surface level a head water difference will be created between the bog and adjacent land forming a hydraulic gradient (see Figure 3.3a and 3.3b). Groundwater will flow across the hydraulic gradient. This flow will be dependent on the porosity of the ground it flows through and the head difference. This will determine the extent of the zone of influence and the area of potentially wetter ground. Where external drains are located in the zone of influence they will act as a hydraulic break or groundwater cut-off and reduce the zone of influence (see Figure 3.3c). This however is dependent on the drain's ability to convey water away. Drains that are inefficient with high water levels (independent from the bog rehabilitation measures) will also raise the groundwater and the adjacent lands to the bog would be wet (see Figure 3.3d). The avoidance of the drain full condition is dependent on maintenance of a positive gravity drainage function of the boundary drains through monitoring and maintenance.

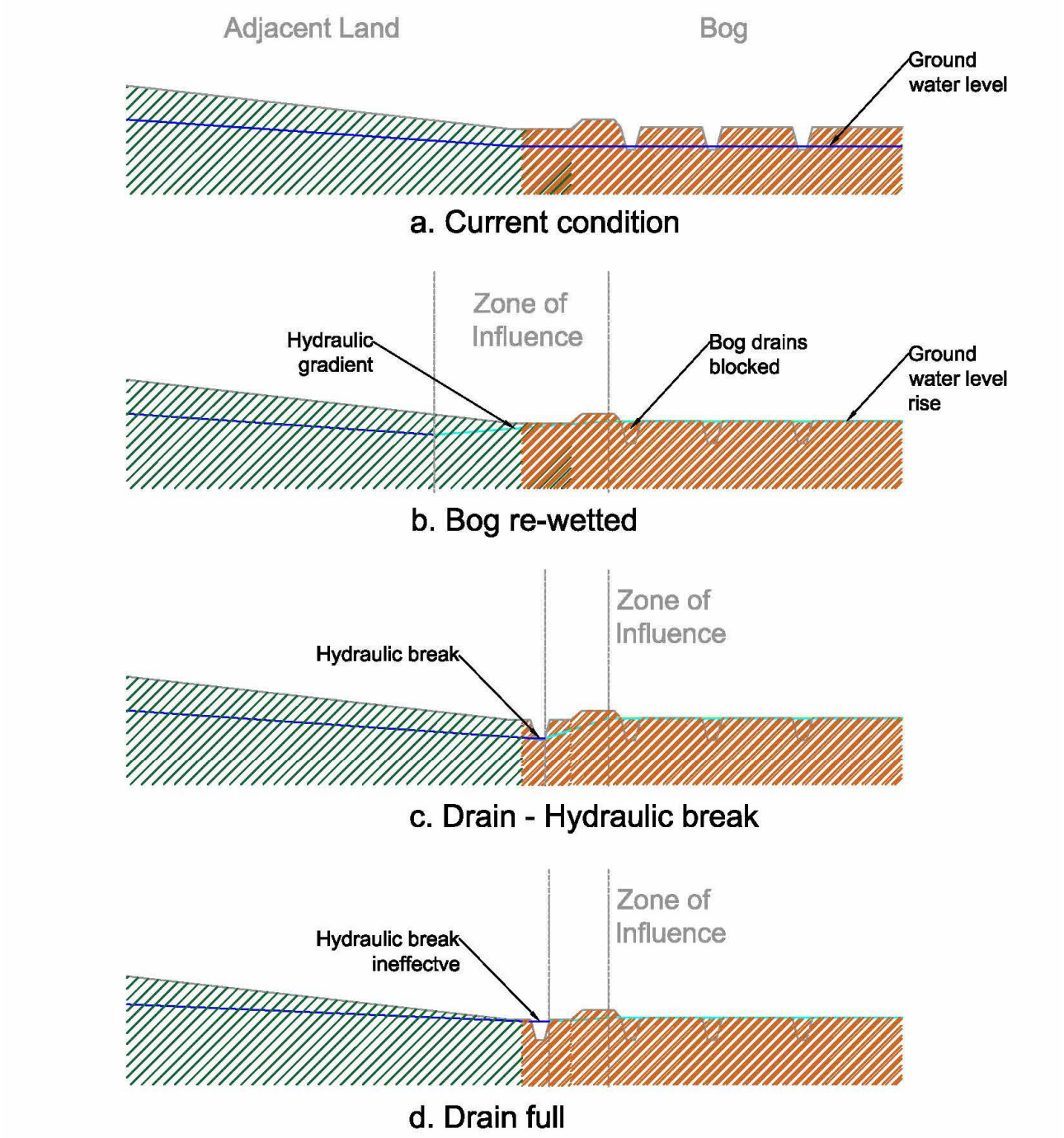


**Figure 3.3 Conditions affecting groundwater**

A complete survey of the boundary and external drains which provide the groundwater cut-off function to agricultural lands was not available for Castlegar Bog. It is assumed that these drains would be able to convey $Q_{med}$ (2 year return period) flows under non-backwater conditions which would be typical of natural watercourses in Ireland. Therefore under non-flood conditions it is expected that the external drains identified around Castlegar Bog will act as a hydraulic break to any hydraulic gradient created by bog re-wetting. However there is a risk that should the flow regime in any external drain be changed post rehabilitation that the land adjacent to the drain would become wetter.

There is also a risk that as the bog fills with water and wants to discharge, that unintended discharge locations would occur. A review of the bog boundary was carried out. No low points were identified that may become an unintended discharge location. The north east boundary of the bog discharges directly in the River Suck. As such there is little risk to adjacent lands should there be increased flows from the bog owing to elevated groundwater levels. However as previously set out this is based on the ability of the existing boundary drainage network, separating the bog from adjacent lands at a lower level, to provide a positive gravity drainage function in relation to groundwater entering the drain. In other words capacity to convey $Q_{med}$ or 2 year return period flows and a free flow (constantly falling) away from the bog.

The main internal bog drain that flows west to east and discharges to the River Suck will be retained within the rehabilitation plan. This feature will act as a drainage regulating measure ensuring a preferential ground water and surface water path for the majority of the bog.

### 3.2.2 Insufficient Drainage

It is a significant concern for adjacent landowners that restoration and rehabilitation measures could lead to localised impacts in terms of reduced drainage leading to flooding of agricultural lands upstream of the bog.

There is one inflow location to Castlegar bog (Figure 3.2) which connects to a drain which flows north through the bog. Should this drains function and capacity deteriorate, low lying parts of the upstream land may reduce in drainage efficiency. This low lying land was identified and included in the zone of influence (see Figure 3.2).

An assessment of the external drains was carried out in chapter 2. Various features were identified that may reduce the drains flow capacity. Culverts, bends, deposition and flooding backwater were identified as potential features that could reduce flow capacity. The drain which serves the lands in question flows through the western lobe of Castlegar bog and is currently a mix of open drain with culverted sections. The continued drainage of the lands identified is dependent on the continued performance of this drain and as such its ability to freely drain must be retained.

### 3.2.3 Increased Runoff

Evidence from bogs that have previously been the subject of restoration measures demonstrates that the measures proposed at Castlegar, which are all aimed at reducing runoff and retaining water within the bog, have the effect of reducing the frequency and magnitude of flood events by restoring a more natural hydrological regime. Restoration / rehabilitation has been successfully applied to numerous Bord na Móna bog sites as well as SAC sites such as Clara Bog (East), Raheenmore Bog, Carrownagappul Bog and Lisnageeragh Bog. Elsewhere, the restoration of peatland catchments in numerous sites across the UK, such as Exmoor National Park in Snowdonia, has demonstrated positive flood alleviation following rehabilitation measures. Monitoring found that this occurred as runoff from the moorland was reduced due to increased storage in the peat.

The risk of increased runoff from Castlegar Bog is low. All rehabilitation measures being proposed will reduce runoff. However there is a potential that if bog re-profiling is carried out as part of the bog rehabilitation measures that the bog sub-catchments will be modified. Changes in sub-catchments could result in certain discharge points draining larger areas. This would result in increased flows that could outweigh the effect of

the reduced runoff arising from the rehabilitation. This is a moderately low risk at Castlegar as the re-profiling of the bog will generally result in the same topographical flow paths, catchment watersheds and discharge locations as in the pre-rehabilitation state. However in the absence of a full pre and post rehabilitation runoff model and in line with a precautionary approach it is prudent that all drainage infrastructure from the bog is fit for purpose and retained such that at a minimum capacity to convey high frequency flood events ($Q_{med}$ or 2 year return period) is provided.

## 3.3 Potential Risk Areas

The following assets have been identified as being at potential risk from flooding or wetter conditions as described in Table 3.1.

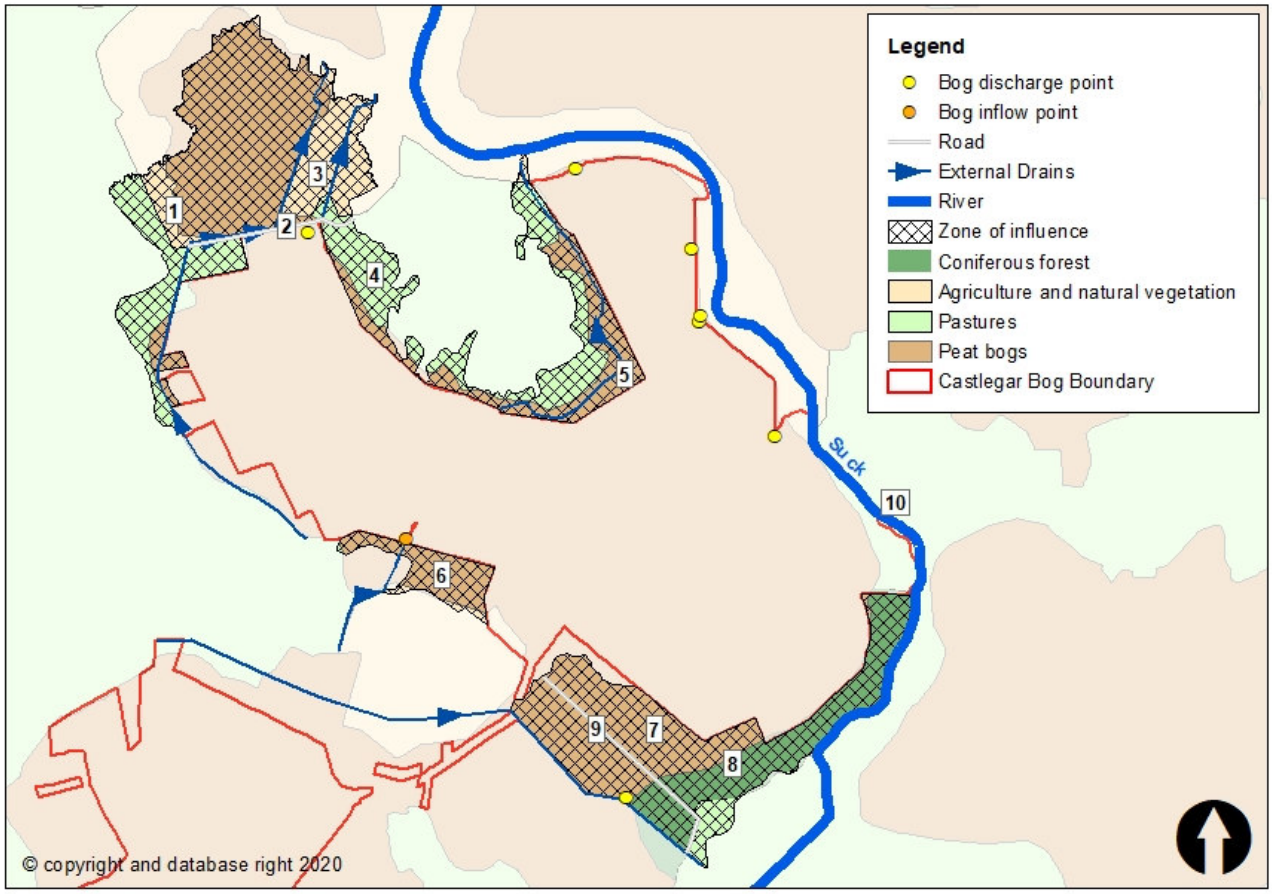


**Figure 3.4 Castlegar Bog Rehabilitation Plan – Assets at risk**

The assets at risk are set out in Table 3.3 along with the vulnerability, based on the current landuse, of the asset. It should be noted that the appraisal of the assets at risk is considering the consequences of flooding or wetter conditions, not the likelihood of flooding or wetter conditions occurring.

**Table 3.3 Assets at risk**

| Item | Asset | Vulnerability to flooding and/or wetter conditions |
|---|---|---|

| | | |
|---|---|---|
| 1 | Agricultural land and bog | High Vulnerability. Land would become less productive should it be made wetter. |
| 2 | Minor road accessing single dwelling | High vulnerability. Road level similar to bog and is currently at risk of flooding. Road is resilient to flooding but may be out of use while flooding is occurring. |
| 3 | Woodland | Low vulnerability. Land is mainly woodland which could tolerate wetter conditions. |
| 4 | Agricultural land | High vulnerability. Land would become less productive should it be made wetter. Less vulnerable as discharge from the bog is limited. |
| 5 | Commercial forest | Moderate vulnerability. Commercial trees require good drainage. Should the ground become wetter the growth rate of the trees may be reduced. |
| 6 | Agricultural land | High vulnerability. Land shows signs of improvement with land drains. Land would become less productive should it be made wetter. |
| 7 | Peat bog | High vulnerability. Assumed turf cutting. Land would become less productive should it be made wetter |
| 8 | Commercial forest | Moderate vulnerability. Commercial trees require good drainage. Should the ground become wetter the growth rate of the trees may be reduced. |
| 9 | Minor road accessing peat bog and agricultural land | Low vulnerability. Road level slightly higher than surrounding land. Risk of flooding is low. |
| 10 | River Suck | Low Vulnerability. Water quality would reduce were increased sediment to enter the River Suck. Existing silt ponds will continue to manage sediment. Vulnerability is therefore considered low. |

In addition to the above risks there is a general low risk that should degradation of the bog boundary occur surface water could be released into adjacent lands.

# 4 OBJECTIVES

The overarching objective of the Castlegar Drainage Management Plan is to facilitate the rehabilitation of bog through management of potential adverse impacts to adjacent land and waterbodies. SMART[2] objectives were developed for the Drainage Management Plan that provides direction for the overarching objective. These objectives consider constraints, risks and opportunities that were identified in chapters 2 and 3 and are detailed as follows:

1. To manage potential groundwater impacts between adjacent land and Castlegar bog during and after rehabilitation measures.
2. To retain the current drainage capacity of the agricultural land flowing into Castlegar Bog both during and after the rehabilitation measures.
3. To maintain or reduce flows released from the bog at the discharge locations.
4. To reduce sediment entering the River Suck during and after rehabilitation, these measures are to ensure compliance with current discharge limits in IPC Licence.

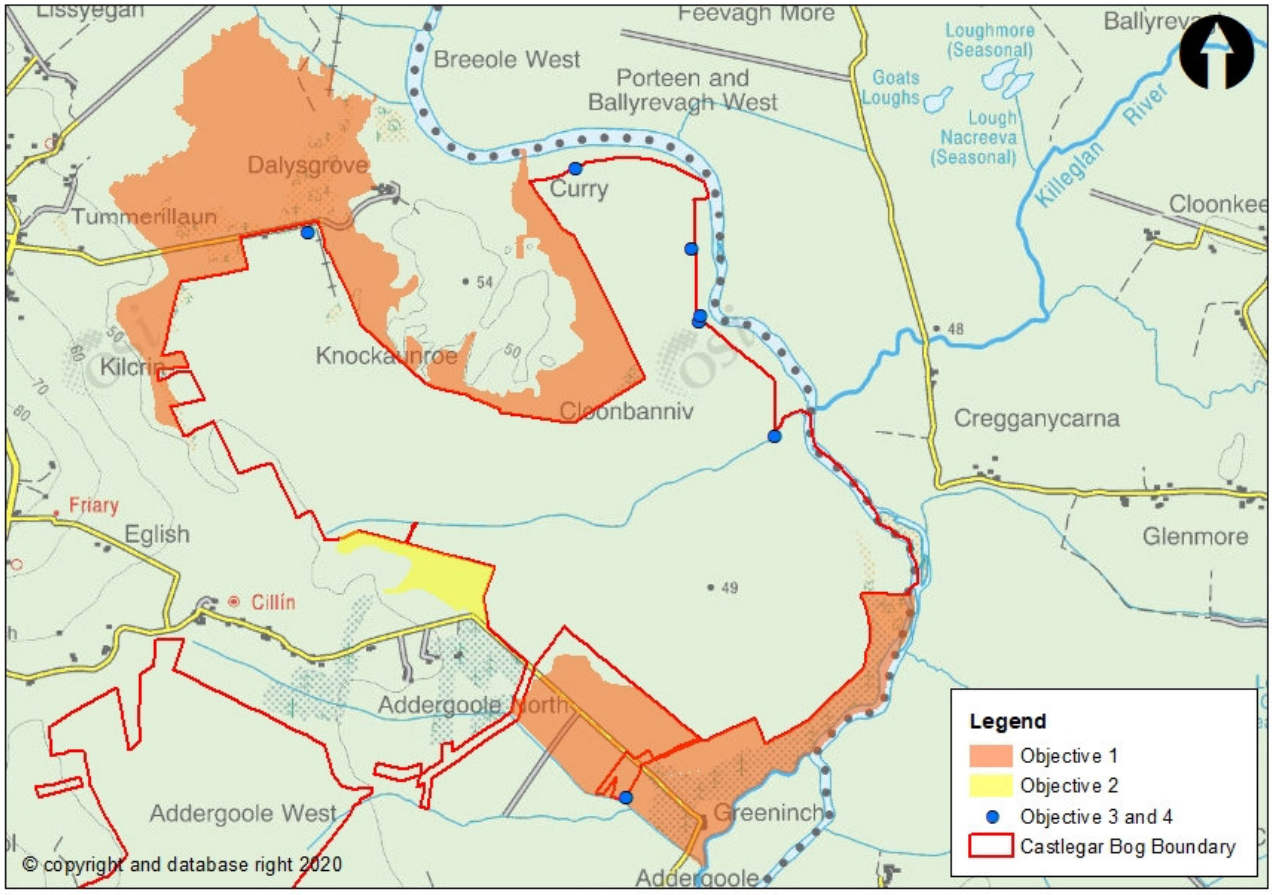


**Figure 4.1 Castlegar Bog DMP objectives**

[2] SMART – Specific, Measureable, Achievable, Relevant, Time bound

# 5 DRAINAGE MANAGEMENT MEASURES

## 5.1 Key Drainage Features

Drainage management measures were identified in relation to the objectives set in chapter 4 and are described below. Objective 1 considers the potential impact to adjacent land from groundwater rise. Objective 2 considers the existing drainage network flowing into and through the bog. Objectives 3 and 4 consider the control mechanisms to flow discharging from the bog.

An assessment was carried out to identify the key drainage features required to meet the objectives set. Figure 5.1 presents these features. It can be seen in the figure that for groundwater level rise to be managed between the bog and adjacent land that a hydraulic break will be required. To ensure that the land draining into the bog is not impacted the drainage path through the bog will need to be retained. And to ensure that the flow and sediment discharging from the bog is managed the discharge control points will need to be maintained.

Although outside the Bord na Móna bog boundary key external drains were identified. These drains are hydrologically connected to the bog drainage network. While no drainage issues were identified along these external drains, see section 2.4, a risk of sediment deposition was highlighted from sources outside the bog. The maintenance of the existing silt ponds will ensure that the bog will not contribute to an increased risk of sediment deposition arising from rehabilitation. Should this occur drainage from the bog could be impeded and adjacent land could become wetter.

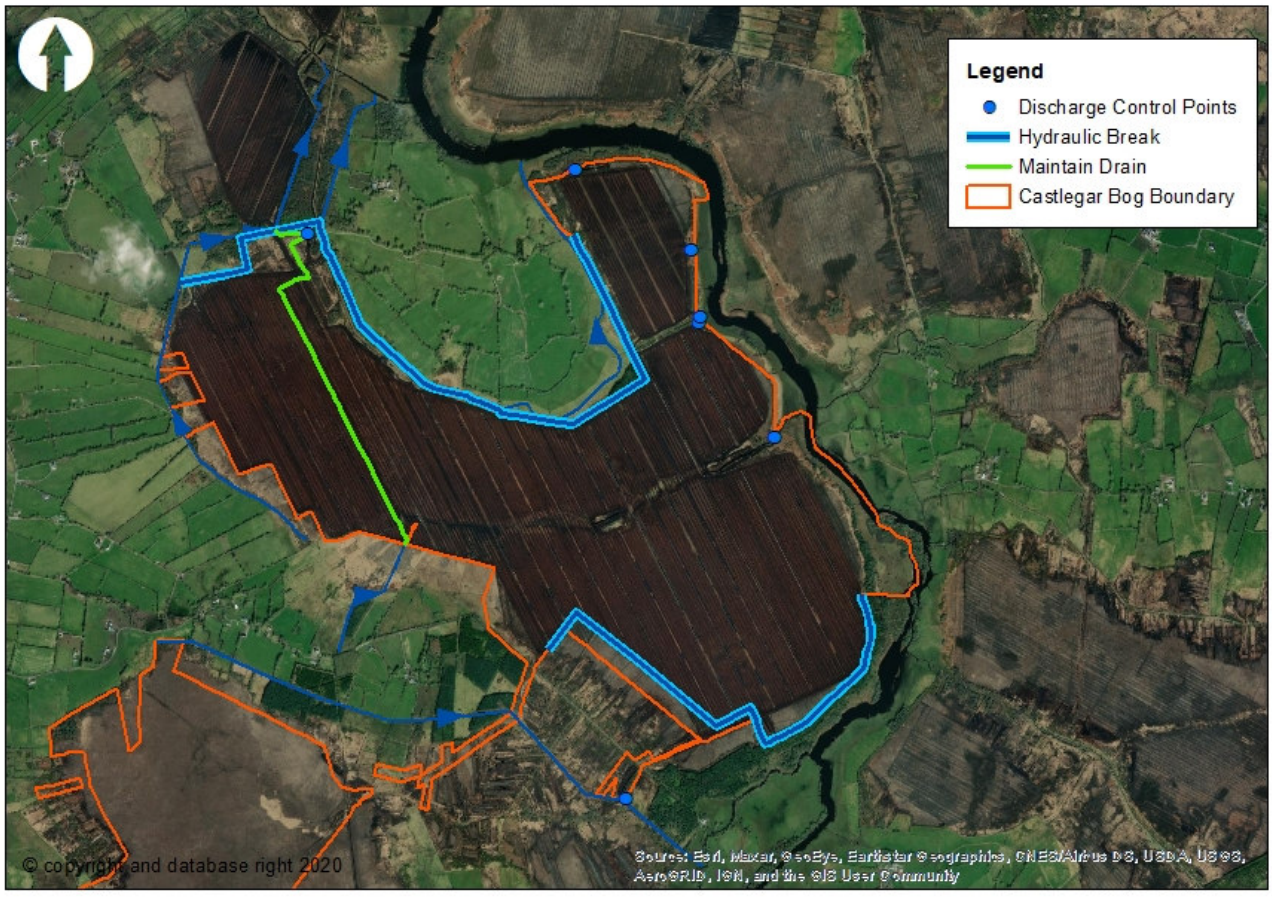


**Figure 5.1 Key drainage features for Castlegar Bog**

When identifying measures to provide the key drainage features a review was carried out of the drains. The review found that there is limited data available for boundary drains to the bog and external drains within the adjacent land. While data is available for internal drains this was found to be limited also. It was therefore required to produce a Drainage Management Plan that could offer a suite of measures whereby the most appropriate measures can be selected based on the level of robustness and on-site observations. The DMP would therefore allow the bog to be managed and adapted as the rehabilitation plan progresses and is retained in the future. The following sections describe the suite of measures that can feasibly be implemented for the Castlegar Bog Drainage Management Plan.

### 5.1.1 Boundary Drains

Boundary drains can provide hydraulic breaks between the bog and adjacent land, see Figure 3.3. In most areas of the Castlegar Bog there are existing boundary drains. Available information indicate that these drains are suitable to provide hydraulic breaks and can be designated as such and retained in the future. Observing and recording the suitability of the boundary drains is recommended and where they are found to be not functioning as predicted upgrade works will be required. This would involve modification of the drain to make them larger/deeper/wider/steeper. This may be only in specific locations along the drain or an entire reach may require upgrading. Where there is no boundary drain present a new drain can be excavated in order to create the hydraulic break required. In these cases a channel of specified dimensions and slope will be required.

### 5.1.2 Bog Rehabilitation Modification

Where a boundary drain is not suitable to act as a hydraulic break or where none exists it may be possible to review the bog rehabilitation plan to provide the required mitigation measure. This can take the form of sacrificing rehabilitation of the last peat field, closest to the adjacent land where an existing field drain could provide the hydraulic break function. The field's drainage network would be retained keeping the groundwater to current conditions and providing a groundwater cut-off in relation to the adjacent land.

### 5.1.3 Internal Drain Retention

Drains within the bog that include adjacent land within their sub catchment may need to be designated as key drainage features and retained to ensure that the drainage to the adjacent land does not deteriorate.

### 5.1.4 Maintenance of Silt Ponds

Existing silt ponds are located upstream of the bog discharge points. They help regulate the flow and level of suspended peat leaving the bog into the external drains and rivers. Bord na Móna have legal responsibility to maintain these silt ponds and ensure their proper functioning capacity under the existing IPC Licence (Ref.P0502-0).

Where no silt point exists upstream of a discharge point and no subsequent silt pond will be utilised before flow would leave the bog alternative silt control measures will be required. This can include blocking and or

diverting the discharge point so that the relevant sub-catchment of the bog drains to a different discharge point with a silt pond. The rehabilitation plan can also be adapted to allow proposed wetlands to act as a silt control measure.

### 5.1.5 Monitoring

As mentioned above DMP measures were selected based on level of certainty and on-site observations. The most appropriate measure was selected from a suite of measures representing varying levels of intervention. Monitoring of the measure and adjacent land will be required prior, during and after the rehabilitation measures. A monitoring programme can be implemented to observe the impact from the bog rehabilitation to the adjacent land. Monitoring would be observational where the condition of the asset in question is assessed in relation to present day conditions accounting for seasonal variability. Where negative impacts are observed other measures can be implemented that will establish a hydraulic break. Otherwise monitoring should continue until environmental stabilisation.

## 5.2 Drainage Assessment

A review was carried out of the existing drainage networks falling within the key drainage features as shown in Figure 5.1. These drainage networks were reviewed to the confluence with streams in order to identify potential downstream control features.

The estimated flood flows were compared with the hydraulic capacity of each of the control structures / features which are important to the effective performance of the drainage network.

Two methods have been considered for the derivation of the Index Flood flow ($Q_{med}$) as set out in Section 2.2. There is a high degree of uncertainty in the estimation of flood flows at the small catchment scale and therefore the largest of the two estimates has been chosen for each sub-catchment in line with a precautionary approach to uncertainty. Flood flows for $Q_{med}$ (50% AEP) and $Q_{100}$ (1% AEP) peak flows for each sub-catchment have been calculated. A generalised growth curve for peat catchments in the midlands has been used, whereby a growth factor of 2.3 has been used to scale up the $Q_{med}$ peak flow to determine the $Q_{100}$ event (100 year return period flood event).

The best projections on the effect of climate change have been applied to determine the Mid-Range Future Scenario (MRFS). This represents a 20% uplift over the present day flood flows.

**Table 5.1 Peak Flows in Each Sub-Catchment**

| Sub Catchment | $Q_{med}$ / 50% AEP | $Q_{100}$ / 1% AEP | Q100 / 1% AEP MRFS |
|---|---|---|---|
| 1 | 0.036 | 0.083 | 0.100 |
| 2 | 0.793 | 1.825 | 2.190 |
| 3 | 0.169 | 0.388 | 0.466 |
| 4 | 0.119 | 0.273 | 0.328 |
| 5 | 0.018 | 0.040 | 0.048 |

| | | | |
|---|---|---|---|
| 6 | 0.055 | 0.127 | 0.153 |
| 7 | 0.575 | 1.323 | 1.588 |
| 8 | 0.348 | 0.800 | 0.960 |
| 9 | 0.133 | 0.305 | 0.366 |
| 10 | 1.602 | 3.685 | 4.422 |

### 5.2.1 Assessment Points

Assessment Points have been assigned at key / critical points within the drainage network identified in Figure 5.1 as providing a key drainage management function. The location of the Assessment Points is provided in Figure 5.2.

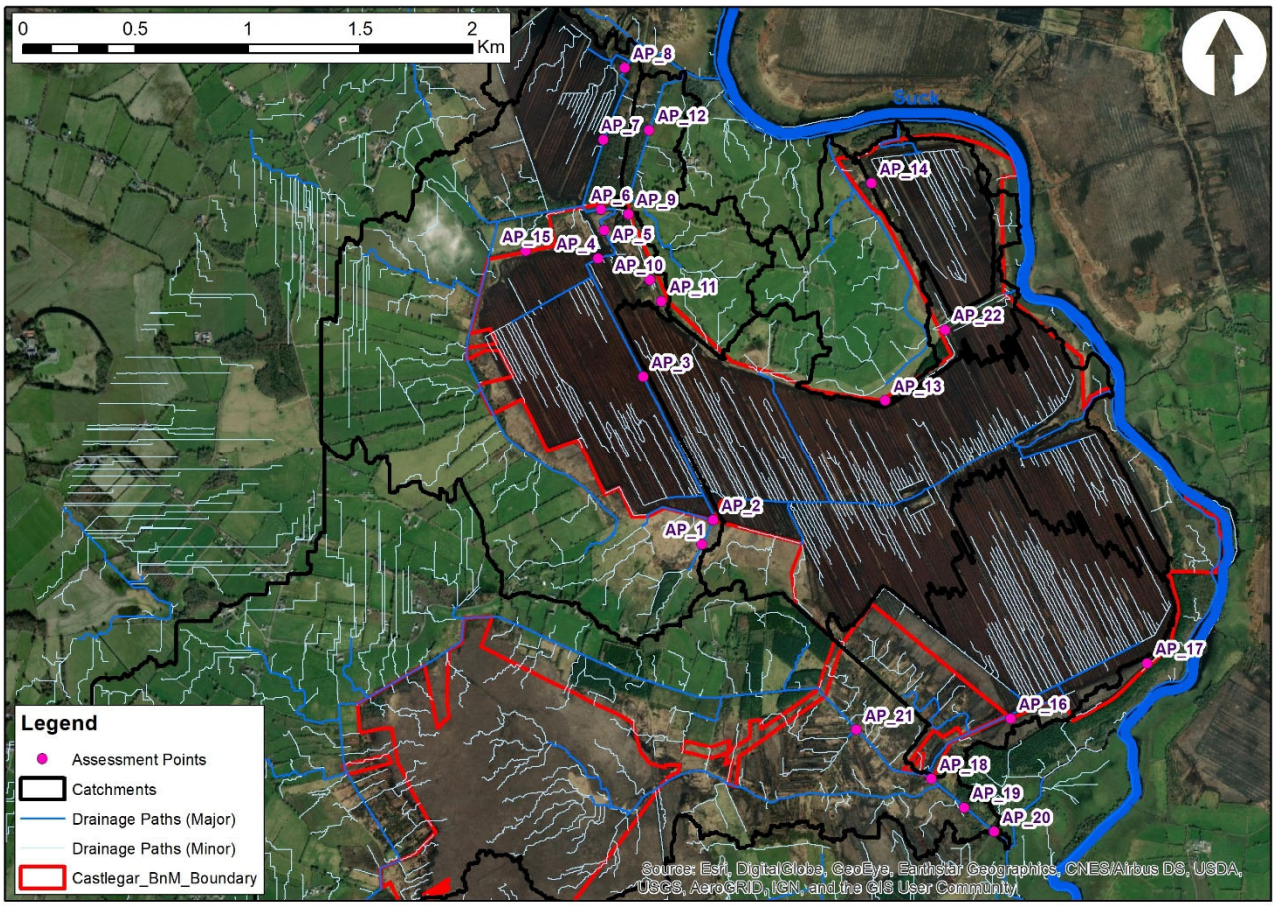


**Figure 5.2 Assessment Points at Castlegar Bog**

### 5.2.2 Hydraulic Analysis

The peak flows at each Assessment Point (AP) have been compared to the estimated hydraulic capacity of each of the features. A summary of the flood flows that may be generated at each AP along with their likely capacity to convey these flows is summarised below in Table 5.2. Note that the Assessment Points for each sub-catchment are ordered from upstream to downstream and as such capacity issues at an AP may have

knock on impacts in terms of flooding for the AP upstream (preceding APs in the table within the same sub-catchment)

**Table 5.2 AP Capacity**

| Assess. Point | Sub-Catch. | Feature Type | Flood Flow Range ($m^3/s$) | Capacity & Recommendations |
|---|---|---|---|---|
| AP_1 | 2 | External drain conveying flows into bog | 0.035 – 0.096 | Likely capacity to convey all flood flows. |
| AP_2 | 2 | Pipe conveying flows into bog | 0.039 – 0.106 | Unknown dimensions - **Check pipe capacity when conditions allow** |
| AP_3 | 2 | Internal drain flowing north west through centre of peat field | 0.174 – 0.408 | Dimensions of existing channel sufficient but reverse falls in places could result in backwatering impacting features upstream (AP_1 and AP_2) - **regrade** |
| AP_4 | 2 | 600mm Pipe draining large area of s.c. 2 | 0.274 – 0.755 | Likely capacity to convey $Q_{med}$ but likely to be surcharged for larger events |
| AP_5 | 2 | Silt pond at downstream (NW) extent of bog | 0.279 – 0.770 | Wide and deep pond with no conveyance issues |
| AP_6 | 2 | Internal open drain conveying flows from large area of s.c. 2 | 0.297 – 0.819 | Wide and deep drain with no conveyance issues |
| AP_7 | 2 | External open drain near outlet of s.c. 2 | 0.715 – 1.974 | Wide and deep drain. **Check drain capacity and falls when conditions allow.** |
| AP_8 | 2 | Pipe conveying flows from | 0.752 – 2.074 | Wide and deep pond with no conveyance issues. |
| AP_11 | 2 | Boundary drain | 0.047 – 0.131 | LiDAR indicates sufficient depth and width. **Check drain capacity and falls when conditions allow. Check any linking culverts > 450mm diameter** |
| AP_10 | 2 | Boundary drain potentially conveying internal and external flows post rehabilitation | 0.050 – 0.139 | Likely capacity to convey all flood flows |
| AP_9 | 2 | Pipe conveying flows from boundary drain on eastern edge of s.c. 2 | 0.056 – 0.154 | Likely capacity to convey all flood flows |
| AP_12 | 9 | External drain, potentially conveying more flow post rehabilitation | 0.112 – 0.309 | Unknown dimensions - **Check drain capacity when conditions allow** |
| AP_13 | 6 | Boundary drain potentially conveying more flow post restoration | 0.075 – 0.208 | Potential $Q_{med}$ capacity but not larger events. **Check drain capacity when conditions allow and increase capacity if necessary** |
| AP_14 | 4 | Boundary drain potentially conveying more flow post restoration | 0.059 – 0.164 | Likely to have flood flow capacity based on LiDAR. **Check drain capacity when conditions allow and regrade if necessary.** |

| Assess. Point | Sub-Catch. | Feature Type | Flood Flow Range ($m^3/s$) | Capacity & Recommendations |
|---|---|---|---|---|
| AP_15 | 2 | Boundary drain potentially conveying more flow post restoration | 0.413 – 1.141 | Unlikely to have flood flow capacity based on LiDAR. **Check drain capacity when conditions allow and upgrade to appropriate carrying capacity.** |
| AP_16 | 8 | Boundary drain potentially conveying more flow post restoration | 0.244 – 0.673 | Wide and deep drain with no conveyance issues |
| AP_17 | 8 | Boundary drain potentially conveying more flow post restoration | 0.096 – 0.264 | **Check drain capacity and falls when conditions allow.** |
| AP_18 | 8 | Pipe conveying all flow from sub-catchment 8 | 0.348 – 0.960 | Unknown dimensions - **Check pipe capacity when conditions allow** |
| AP_19 | 10 | External drain / stream | 1.593 – 4.397 | Unknown dimensions – **Check drain capacity when conditions allow** |
| AP_20 | 10 | External pipe / culvert structure | 1.679 – 4.635 | Unknown dimensions - **Check pipe capacity when conditions allow** |
| AP_21 | 10 | External pipe / culvert structure | 0.409 – 1.129 | Unknown dimensions - **Check pipe capacity when conditions allow** |
| AP_22 | 6 | Internal pipe, potentially conveying more flow post rehabilitation. | 0.080 – 0.221 | Unknown dimensions - **Check pipe capacity when conditions allow** |

## 5.3 Identification of Measures

The review of drain capacities found that most open drains are likely to have sufficient capacity to convey flow away from the bog. They would therefore be suitable to act as hydraulic breaks provided they are retained with their current estimated carrying capacity. One drain has been identified as requiring a higher level of intervention. Section 2.6 indicates how all boundary drains appear to be functioning sufficiently with no known drainage issues identified along the drain or in adjacent land. Although there is no survey data for some reaches the anecdotal evidence suggests that the boundary drains identified for retention are functional and can be used as drainage management measures. They would therefore be suitable to act as hydraulic breaks provided they are retained with their current estimated carrying capacity. Table 5.3 and Figure 5.3 details the level of intervention required along each reach of drainage network.


**Figure 5.3 DMP measures for Castlegar Bog**

DMP measure 4 refers to an internal drain which will require upgrading due to reverse falls in parts of the drain channel bed. This is consistent with the flooding which has been observed in the centre of the bog during 2009 and 2015/16 flood events and more generally, the poor drainage at this location observed by Bord na Móna in the centre of Castlegar Bog. Upgrading this drain would require re-grading of the channel bed to provide a continuous fall across the drain. The channel width and depth are otherwise adequate.

It is also understood that a preferential surface water drainage path through the centre of the bog, from west to east, will be developed and maintained such that surface water flows can drain freely through the middle of the bog (from West to East in Figure 5.3) as part of rehabilitation measures. This previous natural watercourse route has been culverted to facilitate peat abstraction at Castlegar but it is understood the rehabilitation measures will involve creating a series of blockages along this pipe and the re-profiling of the bog towards this natural low point such that the runoff regime mimics the pre-drainage state.

The remaining measures are of low intervention consisting of maintaining the existing features or monitoring lands and features.

**Table 5.3 Selection of DMP measures**

| Measures Item | Feature | Function required | Suite of measures Level of intervention | | | |
|---|---|---|---|---|---|---|
| | | | Low | | | High |
| 1 | Boundary drain | Hydraulic break | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 2 | Boundary drain | Hydraulic break | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 3 | Boundary drain | Hydraulic break & drainage of adjacent land | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 4 | Internal drain | Drainage of adjacent land | Retain drain | **Upgrade drain** | Maintain outside bog field | Create new drain |
| 5 | Internal drain | Drainage of adjacent land | **Retain drain** | Upgrade drain | - | Create new drain |
| 6 | Boundary drain | Hydraulic break | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 7 | Boundary drain | Hydraulic break | Retain drain | Upgrade drain | Maintain outside bog field | **Create new drain** |
| 8 | Boundary drain | Hydraulic break | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 9 | Boundary drain | Hydraulic break | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 10 | Boundary drain | Hydraulic break | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 11 | Field drain | Hydraulic break | - | - | **Maintain outside bog field** | Create new drain |

| Measures Item | Feature | Function required | Suite of measures Level of intervention | | | |
|---|---|---|---|---|---|---|
| | | | Low | | | High |
| 12 | Boundary drain | Hydraulic break | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 13 | Boundary drain | Hydraulic break | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 14 | Boundary drain | Hydraulic break | **Retain drain** | Upgrade drain | Maintain outside bog field | Create new drain |
| 15 | Pipe | Hydraulic break | Retain pipe | **Upgrade pipe** | Maintain outside bog field | Install new pipe |
| 16 | Silt ponds | Silt and flow control | **Maintain pond** | Upgrade pond | - | - |

## 5.4 Interaction with Monitoring Plan

As part of the bog rehabilitation plan groundwater level monitors will be installed at Castlegar Bog. These monitors will record groundwater levels over the coming months. It will therefore be possible to ascertain if groundwater is rising within the bog following the implementation of the rehabilitation plan.

This data should be considered during the monitoring measures of adjacent land. When groundwater levels are known to be rising within the bog, monitoring of the adjacent land (as described in Section 5.1.5) should take place on a more regular basis to ascertain if impacts to lands outside the bog are observed.

## 5.5 Residual Risk & Limitations

The level of flood risk to the bog and the surrounding lands has been shown to be low (Section 2.6) generally but with an area in the centre of the bog susceptible to poor drainage and flooding. The impact of the proposed rehabilitation measures will generally be to reduce runoff from the bog but this will lead to increased groundwater levels and surface water flooding in the bog itself. During flood events no increase in flood risk is envisaged as a result of the rehabilitation measures. During normal flow regime there are unknowns in relation to the post-rehabilitation water levels which will be realised, however the Drainage Management Plan seeks to identify the measures that should provide a hydrological cut off between the bog and the surrounding lands.

As indicated in previous sections there are limitations to the assessments associated with the drainage network both within the bog and outside. Factors such as flow estimations of small catchments, lack of survey data limiting drain capacity estimations and high level definition of soil porosity all contribute to these limitations. Nevertheless the measures recommended represent a pre-cautionary approach based on conservative assumptions.

The DMP measures proposed set a baseline approach however a suite of measures in any given location has been provided. This will allow a reactive approach to be taken if required. Should a measure not be operating efficiently a higher intervention measure can be implemented. This will allow Bord na Móna to identify the most appropriate measure while proceeding with drainage function uncertainties.

## 5.6 Climate Change Adaptability

There is high uncertainty in relation to the effects of climate change, particularly in how it may manifest in terms of small catchment runoff. Ireland is predicted to have drier summers and wetter winters. The most appropriate guidance in an Irish context can be found in the OPW's Flood Risk Management Climate Change Sectoral Adaptation Plan[3]. For the Mid-Range Future Scenario, representing a central emissions estimate on a 100 year time horizon, it is recommended that allowances for peak flow and rainfall are increased by 20%. If such

[3] Accessed on 10/12/2020 at https://www.gov.ie/pdf/?file=https://assets.gov.ie/46534/3575554721374f7ab6840ee11b8b066a.pdf#page=1

increases in runoff are realised over the timeframe of establishment of rehabilitation measures this could lead to a perception that bog rehabilitation measures at Castlegar are the cause of increased flood risk.

It is anticipated however that the rehabilitation measures will lead to reduced peak runoff as the water storage function of the bog is increased. This will serve to regulate peak runoff in winter and potentially smooth out the flows in drier periods, essentially acting against the anticipated effects of climate change.

It is therefore anticipated that the bog rehabilitation measures themselves will provide the mitigation of the effects of climate change on runoff and no additional measures will be needed. There are unknowns however in the effectiveness of the rehabilitation measures in this regard and also the severity of climate change impacts. Continued monitoring of the adjacent lands is therefore also crucial to gauge the effectiveness of the BRP measures in mitigating these climate change impacts.

# 6 SUMMARY OF DRAINAGE MANAGEMENT PLAN

The Drainage Management Plan for Castlegar consists of a series of measures to be implemented at different stages of the rehabilitation measures. Drains within the bog and along its boundary were identified as being key drainage paths or hydraulic breaks in order to mitigate against any potential impacts from the bog rehabilitation measures. The effectiveness of all drains acting as hydraulic breaks is dependent on their ability to convey flow which have been outlined in Section 5.3 and deemed appropriate subject to the measures recommended. Factors such as channel size and slope will determine this along with any downstream feature which may control water levels. The external drains which these boundary drains discharge into are also key drainage features that will affect the operation of the drainage network. Measures will range from low intervention to high and consist of monitoring, retention of existing features, upgrading features, updating the rehabilitation plan and creating new features. Maintenance of measures are proposed to the silt ponds within the bog to ensure that discharge from the bog and sediment is controlled. This is a legal obligation for Bord na Mona and will continue at all existing silt ponds. Monitoring of low and moderate vulnerability areas was included in the plan. The monitoring will observe adjacent bog and woodland for adverse impacts from the bog rehabilitation. Should these impacts be confirmed, higher intervention measures can be implemented to mitigate the impacts. Monitoring measures will therefore be ongoing during and after the bog rehabilitation measures. Continued retention and maintenance of the key drains and silt ponds will also be required after the bog rehabilitation measures. Throughout the process landowner engagement is recommended to ensure both the rehabilitation plan and Drainage Management Plan are understood and to promote collaborative working to manage impacts as they arise.

**Table 6.1 Drainage Management Plan**

| Measures required PRE bog rehabilitation measures | Measures required DURING bog rehabilitation measures | Measures required POST bog rehabilitation measures |
|---|---|---|
| Landowner engagement if required via community liaison | Landowner engagement if required via community liaison | Landowner engagement if required via community liaison |
| Retention of internal and boundary drains (see section 5.1.1) | - | - |
| Upgrade of internal drain (see section 5.1.1) | - | - |
| Monitoring external drains | IF REQUIRED – Consideration of need for higher intervention measures | - |
| Maintenance of silt ponds (see section 5.1.4) | Maintenance of silt ponds (see section 5.1.4) | Maintenance of silt ponds (see section 5.1.4) |
| Monitoring of adjacent land (see section 5.1.5) | Monitoring of adjacent land (see section 5.1.5) | Monitoring of adjacent vulnerability land (see section 5.1.5) |
| - | - | IF REQUIRED – boundary drain upgrades (see section 5.1.1) |

| | | |
|---|---|---|
| - | - | Retention of key drains and pipes |