BORD NA MÓNA

Cutaway Bog Decommissioning and Rehabilitation Plan

Screening Report for Appropriate Assessment

Boora Bog,

Co. Offaly

August 2021

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DOCUMENT APPROVAL

PROJECT	Boora Bog, Co. Offaly	
CLIENT / JOB NO	Bord Na Móna	6367
DOCUMENT TITLE	Cutaway Bog Decommissioning and Rehabilitation Plan Screening Report for Appropriate Assessment, Boora Bog, Co. Offaly	

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Date August 2021	Signature	Signature	Signature

Contents

Table of Figures

Table of Appendices

1 INTRODUCTION

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 Boora Bog group (Ref. P0500-01). As part of the condition 10.2 of the IPC license, decommissioning and rehabilitation of cutaway boglands is required. Boora 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 that will be planned in detail. 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).

Bord na Móna sub-divide Boora Bog into two bog units, Boora East Bog and Boora West Bog. Enhanced decommissioning and restoration measures have been implemented and completed for Boora East Bog. This area where restoration works have been completed is shown on Figure 1. It is at Boora West Bog that proposed PCAS measures will be focused and as well as in areas within Boora East Bog that are labelled Additional on Figure 1. This Screening Report for Appropriate Assessment is concerned with examining the works associated with PCAS that will be implemented for the remaining area of Boora Bog (i.e. Boora West Bog and the Additional areas) that will subject to forthcoming PCAS measures. This area is identified in Figure 1 below.

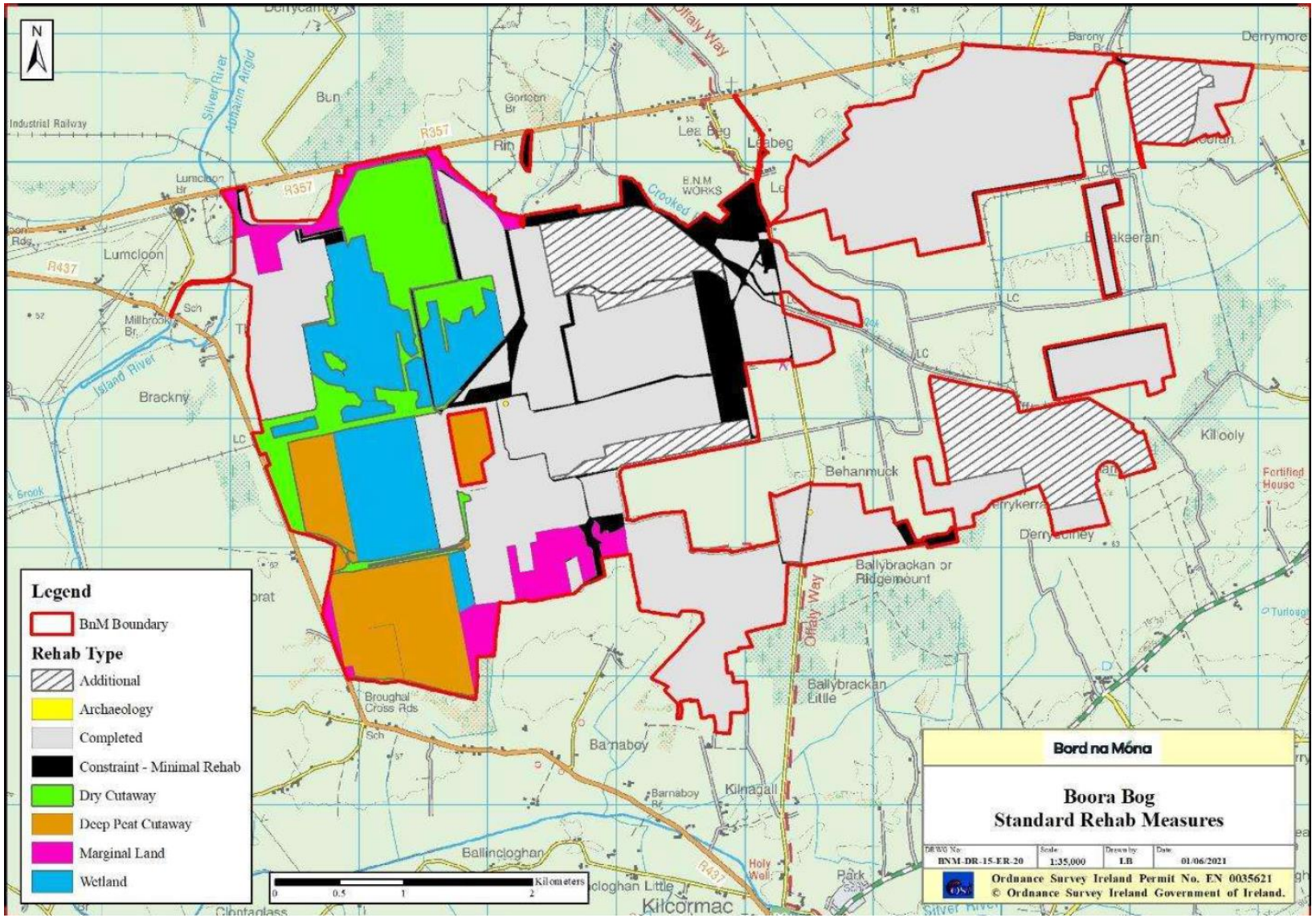


Figure 1: Boora Bog showing areas of Boora West Bog and the Additional Areas that will be subject to proposed PCAS measures

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**.

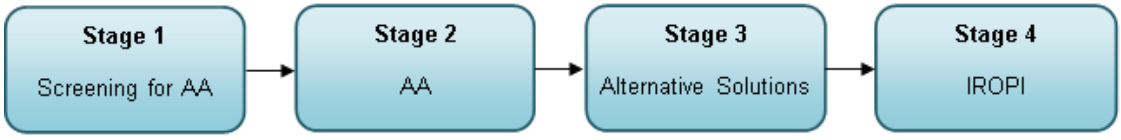


Figure 2: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DEHLG, 2009).

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.

Boora 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 Desktop Review

The Biodiversity baseline information presented in this report was collated from site investigations and field surveys, along with publicly available online resources including from the National Biodiversity Data Centre (NBDC) and the National Parks and Wildlife Service (NPWS) online webpage, which are regularly updated. Boora Bog is not an IWeBs site and is not monitored by BirdWatch Ireland as part of the IWeBS network.

Records held by the NBDC for protected species relevant to European Sites (i.e. Annex 2 species, special conservation interest bird species; waterbirds) in the wider area surrounding Boora Bog were obtained from the polygon surrounding Boora Bog as shown on Figure 2. Records for protected fauna species held by the NPWS for the wider area surrounding Boora Bog include white-clawed crayfish, hedgehog, Irish hare, otter, pine marten, badger, stoat, Soprano pipistrelle, common frog, red squirrel and Geyer's Whorl snail. The NPWS also hold records for the presence of rare, threatened or protected flora in the wider area surrounding Boora Bog and these include wood bitter-vetch; rannoch-rush, shepherd's needle, serrated wintergreen, green-winged orchid, fir clubmoss, opposite-leaved pondweed, red hempnettle, alder buckthorn, blue fleabane and basil thyme.

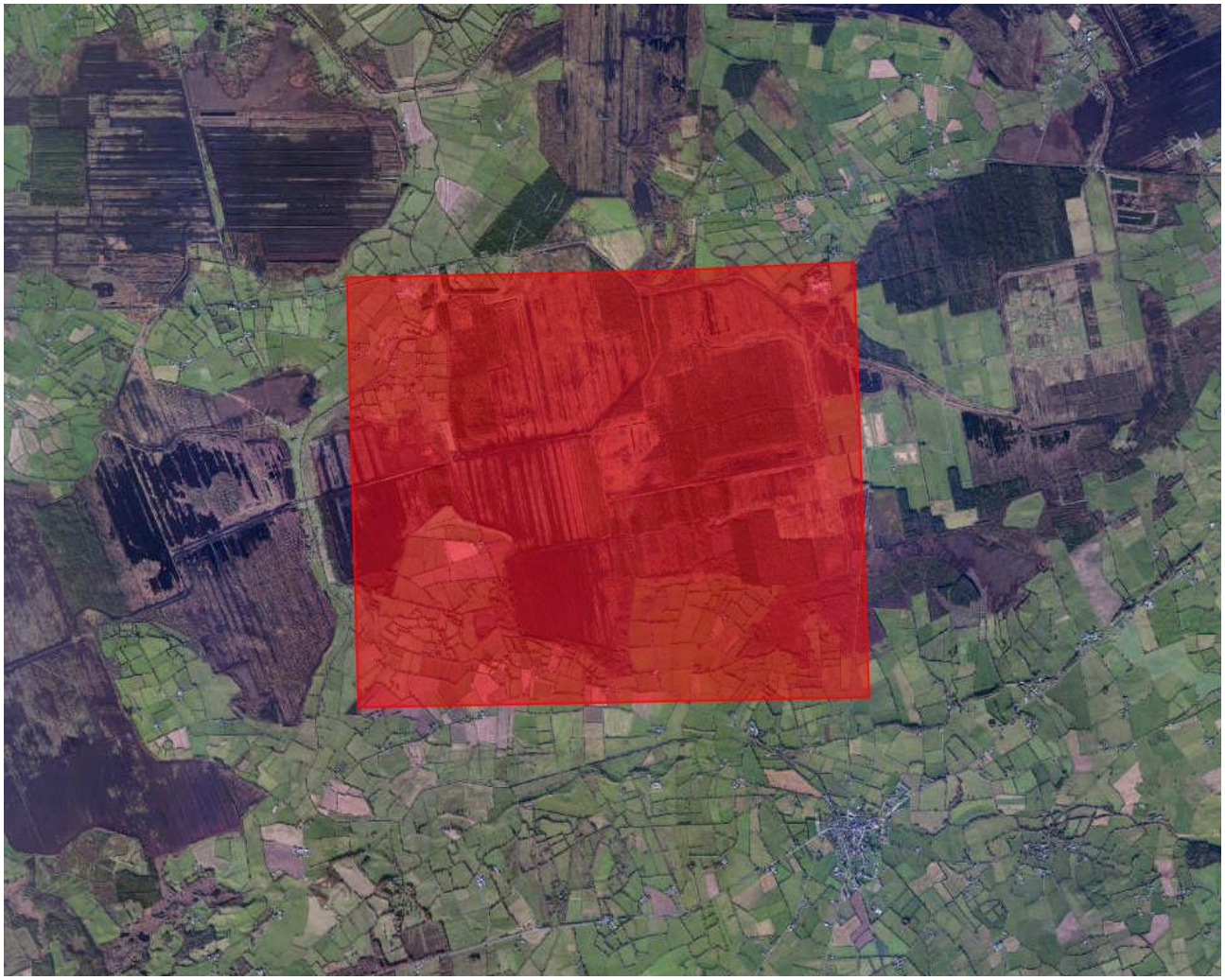


Figure 3: Area of Search (in Red) for Records of Rare, Threatened & Protected Species (Source NBDC)

Table 1: Rare, Threatened and Protected Species Intersecting with the Area of Search shown on Figure 3

Record Date	Species
23/07/2020	Common Frog (*Rana temporaria*)
23/08/2020	Smooth Newt (*Lissotriton vulgaris*)
31/12/2011	Barn Owl (*Tyto alba*)
19/05/2012	Barn Swallow (*Hirundo rustica)*
31/12/2011	Black-headed Gull (*Larus ridibundus*)
31/12/2011	Common Coot (*Fulica atra*)
31/12/2011	Common Goldeneye (*Bucephala clangula*)

Record Date	Species
31/12/2011	Common Grasshopper Warbler (*Locustella naevia*)
31/12/2011	Common Kestrel (*Falco tinnunculus*)
31/12/2011	Common Kingfisher (*Alcedo atthis*)
19/05/2012	Common Linnet (*Carduelis cannabina*)
19/05/2012	Common Moorhen (*Gallinula chloropus*)
19/05/2012	Common Pheasant (*Phasianus colchicus*)
19/05/2012	Common Pochard (*Aythya ferina*)
31/12/2011	Common Quail (*Coturnix coturnix*)
31/12/2011	Common Redshank (*Tringa totanus*)
31/12/2011	Common Sandpiper (*Actitis hypoleucos*)
19/05/2012	Common Snipe (*Gallinago gallinago*)
19/05/2012	Common Starling (*Sturnus vulgaris*)
19/05/2012	Common Swift (*Apus apus*)
31/12/2011	Eurasian Curlew (*Numenius arquata*)
31/12/2011	Eurasian Teal (*Anas crecca*)
31/12/2011	Eurasian Wigeon (*Anas penelope*)
31/12/2011	Eurasian Woodcock (*Scolopax rusticola*)
31/12/2011	European Golden Plover (*Pluvialis apricaria*)
31/07/1991	Great Black-backed Gull (*Larus marinus*)
31/12/2011	Great Cormorant (*Phalacrocorax carbo*)
19/05/2012	Great Crested Grebe (*Podiceps cristatus*)
31/12/2011	Greater Scaup (*Aythya marila*)
31/12/2011	Greater White-fronted Goose (*Anser albifrons*)
19/05/2012	Grey Partridge (*Perdix perdix*)
31/12/2011	Greylag Goose (*Anser anser*)
31/12/2011	Hen Harrier (*Circus cyaneus*)

Record Date	Species
31/12/2011	House Martin (*Delichon urbicum*)
31/12/2011	House Sparrow (*Passer domesticus*)
31/12/2011	Jack Snipe (*Lymnocryptes minimus*)
31/12/2011	Little Egret (*Egretta garzetta*)
19/05/2012	Little Grebe (*Tachybaptus ruficollis*)
02/02/2015	Mallard (*Anas platyrhynchos*)
31/12/2011	Merlin (*Falco columbarius*)
31/12/2011	Mew Gull (*Larus canus*)
02/02/2015	Mute Swan (*Cygnus olor*)
14/06/2017	Northern Lapwing (*Vanellus vanellus*)
31/12/2011	Northern Pintail (*Anas acuta*)
19/05/2012	Northern Shoveler (*Anas clypeata*)
31/12/2011	Pink-footed Goose (Anser brachyrhynchus)
31/07/1972	Red Grouse (*Lagopus lagopus*)
31/12/2011	Ringed Plover (*Charadrius hiaticula*)
19/05/2012	Sand Martin (*Riparia riparia*)
31/12/2011	Sky Lark (*Alauda arvensis*)
31/12/2011	Spotted Flycatcher (*Muscicapa striata*)
19/05/2012	Tufted Duck (*Aythya fuligula*)
14/06/2017	Water Rail (*Rallus aquaticus*)
31/07/1991	Whinchat (*Saxicola rubetra*)
31/12/2011	Whooper Swan (*Cygnus cygnus*)
31/12/2011	Yellowhammer (*Emberiza citrinella*)
19/05/2012	European Eel (Anguilla anguilla)
12/08/2014	Freshwater White-clawed Crayfish (*Austropotamobius pallipes*)
31/08/2010	Blue Fleabane (*Erigeron acer)*

Record Date	Species
31/12/1997	***Haliplus (Liaphlus) variegatus***
15/06/2020	**Marsh Fritillary (*Euphydryas aurinia*)**
15/06/2020	**Small Heath (*Coenonympha pamphilus*)**
02/04/1971	**Desmoulin's Whorl Snail (*Vertigo (Vertigo) moulinsiana*)**
31/12/2014	**Eurasian Badger (*Meles meles*)**
30/04/2013	**Eurasian Pygmy Shrew (*Sorex minutus*)**
14/06/2017	**Eurasian Red Squirrel (*Sciurus vulgaris*)**
18/05/2012	**European Otter (*Lutra lutra*)**
18/05/2012	**Irish Hare (*Lepus timidus subsp. hibernicus*)**
31/12/1982	**Irish Stoat (*Mustela erminea subsp. hibernica*)**
18/01/2016	**Pine Marten (*Martes martes*)**
18/05/2012	**Soprano Pipistrelle (*Pipistrellus pygmaeus*)**

1.2.3 Baseline Surveys

1.2.3.1 Habitats & Fauna

A range of baseline surveys have previously been completed at Boora Bog by Bord na Mona. As part of the formulation of the Boora Bog Rehabilitation Plan ecological field surveys were completed between 17th and 19th May 2011; 19th and 23rd August 2011.

Surveys to inform the current Appropriate Assessment reporting were completed by JOD on the following dates: 10th January; and 13th April 2021.

The habitat and fauna surveys completed in 2011 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 European Sites. The 2021 surveys also involved a survey of all silt ponds on site for the presence of otter holts, couches and field signs.

Habitats were identified and mapped during the 2011 field surveys and a detailed description of the field survey results is provided as Appendix III Ecological Survey Report to the Boora Rehabilitation Plan 2021. Figure 4a and figure 4b provides a habitat map of Boora Bog. Following the completion of these surveys the most common habitats present at Boora Bog were identified in order of dominance as:

- Emergent wetland and Reedbed communities with stands of Bulrush; Bottle Sedge; Horsetails; and Bog Cotton.
- Birch scrub and woodland – frequently in mosaic with poor fen and wetland communities.
- Poor fen communities dominated by Soft Rush and Bog Cotton – frequently in mosaic with wetland and scrub.
- Disturbed vegetation, calcareous grassland and Purple Moorgrass-dominated grassland. Found along the cycle track and in other dry open parts of the site.
- Limestone/marl lakes (FL3) (Loch an Dochas and Boora Lake)
- Embryonic bog community. This community represented by a mat of *Sphagnum* sp. cover is found close to the western boundary of the site adjacent to a section of conifer plantation.
- Conifer plantation (WD4) planted on cutaway bog.
- Broad-leaved plantations planted on cutaway bog (WS2)
- Calcareous grassland (GS1) – Mesolithic site
- Poor fen (PF2) - former Lough Boora
- Birch woodland (WN7) – former Lough Boora and around the site
- Rich fen (PF2) – former Lough Boora

Records of bird species, that are listed on Annex 1 of the Birds Directive and waterbirds, held by Bord na mona include: greylag goose; mute swan. Whooper swan; wigeon; mallard; teal; tufted duck; water rail; moorhen; crane; little grebe; lapwing; golden plover; ringed plover; curlew; Black-tailed Godwit; ruff; white-rumped sandpiper; woodcock; snipe; red-necked phalarope; redshank; Black-headed Gull; common gull; Lesser-Black Backed Gull; grey heron; kingfisher; hen harrier; and merlin.

The silt ponds offer suitable foraging habitat for kingfisher. There is no suitable nesting habitat for kingfisher occurring within the project site. While there are previous records for Kingfisher at the project site, this species was not recorded during any field surveys completed at Boora Bog during 2011 or 2021.

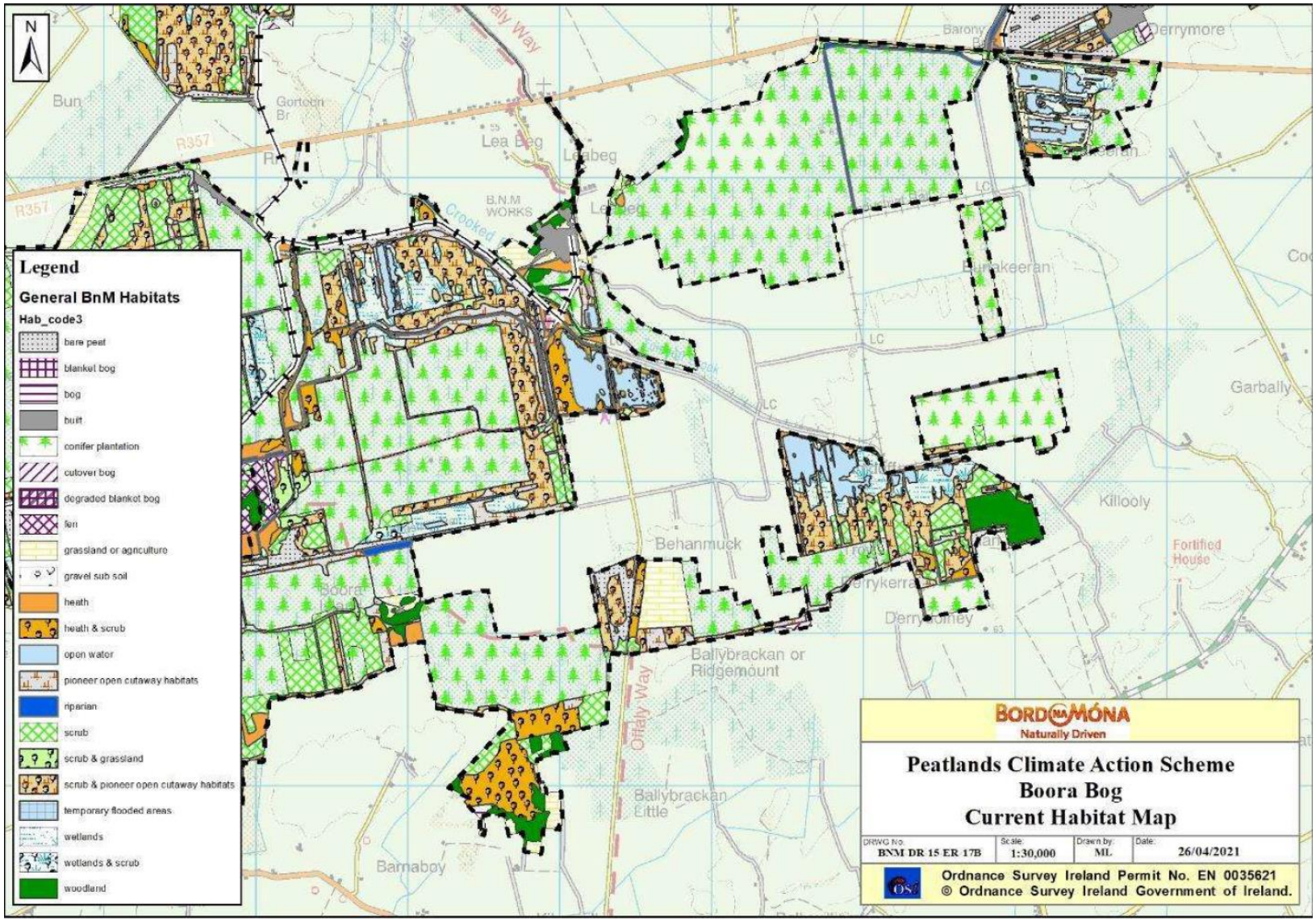


Figure 4a: Current Habitats at Boora Bog showing Boora West

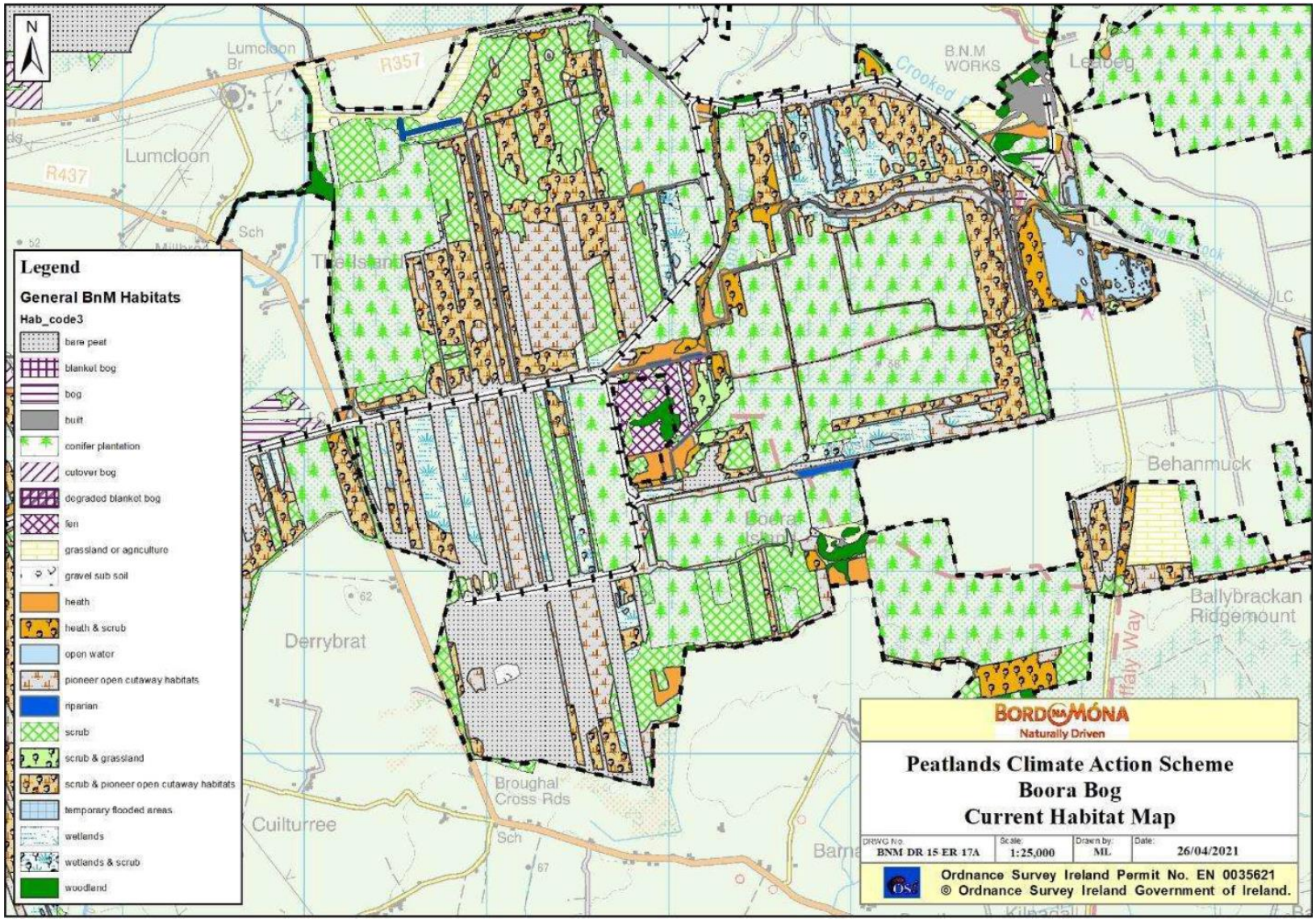


Figure 4b: Current Habitats at Boora Bog showing Boora East

Within the boundary of Boora Bog the onsite silt pond represents suitable habitat for supporting otters and their holts and couches. During the 2021 surveys at Boora Bog, the silt pond associated with Boora Bog (1 located on at the bog's northern boundary) was 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 the silt pond occurring at the Boora Bog.

1.2.3.2 Baseline Water Quality

Boora Bog is located in the Shannon catchment and Brosna_SC_070 and Brosna_SC_050 sub-catchments. The primary receiving surface water receptor for surface water draining from Boora Bog is the Silver River to the west, which discharge to the River Brosna. The River Brosna in turn drains to the River Shannon approximately 18.3km downstream from the Boora Bog. The River Brosna passes through two other sub-catchments of the River Shannon downstream from Boora Bog, namely the Brosna_SC_060 and the Brosna_SC_080.

The nearest EPA water quality data for the Silver River is located upstream of the confluence of drainage from Boora Bog and the Silver River at Lumcloon Bridge. The latest water quality monitoring undertaken from this monitoring station is from 2017 and resulted in a finding of Good water quality status.

Along the Brosna River further downstream one water quality monitoring point is located at a bridge near Kilcolgan, upstream of the confluence of the Brosna and Silver Rivers. The latest monitoring findings from this point, from 2017, resulted in a finding of Good water quality status. The nearest monitoring point along the Brosna downstream of its confluence with the Silver River is at Ferbane Bridge. The latest monitoring findings from this point, from 2017, resulted in a finding of Good water quality status.

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

There is one silt pond at Boora Bog and the surface water outlets from this silt pond is to the Brosna River IE_SH_25B090761, via the Silver River IE_SH_25S020700. Peat extraction was identified as a pressure in the second cycle of the river basin management plan for the Silver and is indicated as remaining so in the third cycle, currently under preparation, with the Brosna River remaining as not under pressure from peat.

The main emission limit value associated with this bog is 35mg/l suspended solids, with trigger levels for ammonia of 3.7mg/l and COD 100mg/l.

From an analysis of any monitoring over the 3 year period between 2017 and 2020 of the IPC licence environmental monitoring of the discharges from this bog, indicate that results were under the ELV for SS and trigger levels for ammonia and COD. See Table 4 below.

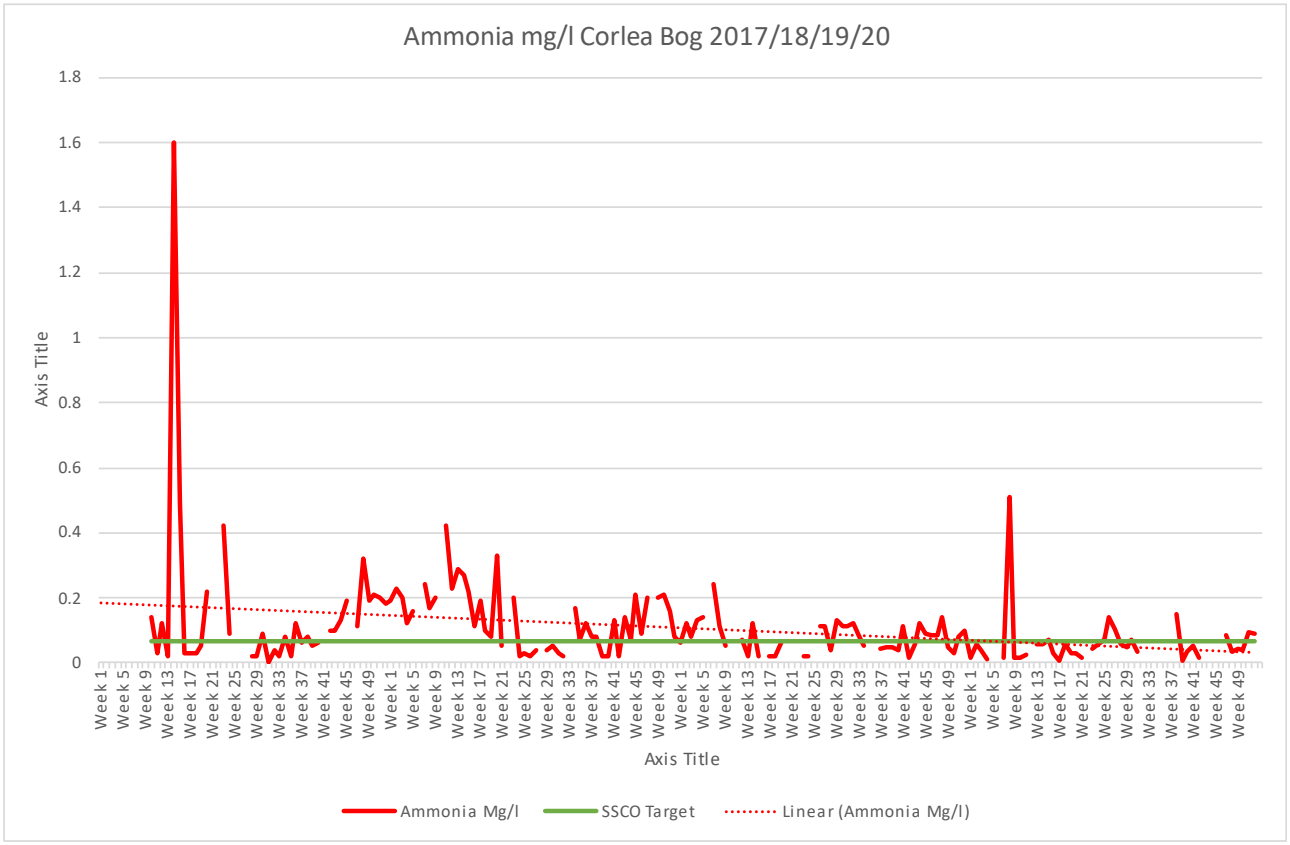
Table 4: EPA Water Quality Monitoring data

Bog	SW	Monitoring	pH	SS	TS	Ammonia	TP	COD	Colour
West Boora	SW-11	Q2 20	7.6	4	481	0.916	,0.05	52	183
West Boora	SW-11	Q3 18	7.7	5	358	1.5	0.05	52	173
West Boora	SW-11	Q1 17	7.5	28	412	1.5	0.05	57	130

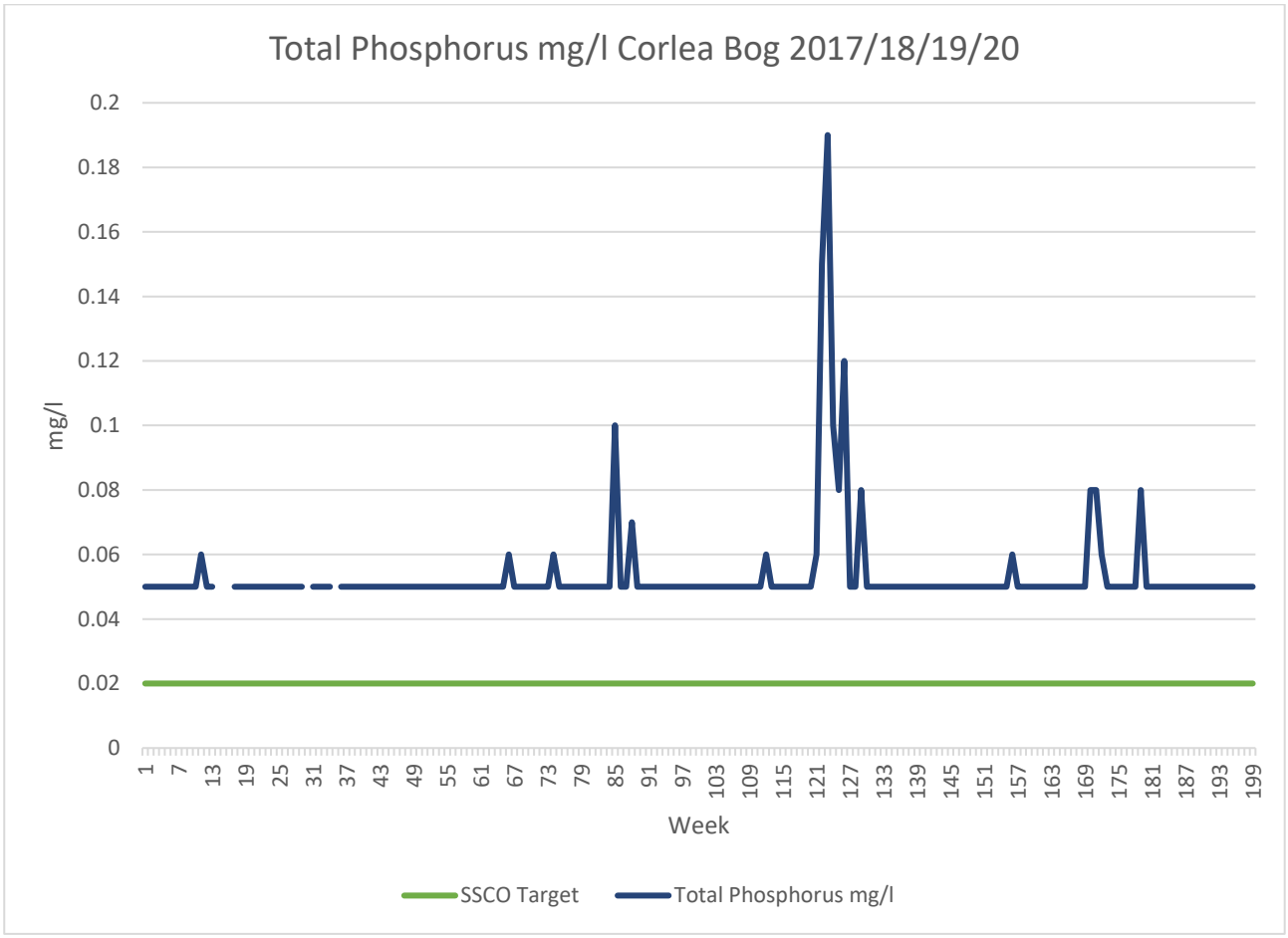
Initial monthly ammonia concentrations in February and March 2021 were found to range from 0.038 to 0.259mg/l with an average of 0.149mg/l. This indicates a significant decrease in the ammonia levels at Boora Bog between 2017/2018 and 2021. It is expected that following the implementation of the PCAS at Boora Bog the concentration of TP and ammonia, as well as SS will follow a downward trend and will within the short-term (i.e. within a 3-year period) reduce concentrations of these parameters to well below the IPC limits. This is supported by the results of the initial ammonia results reported for February and March 2021 when compared against the 20217/2018 datasets.

This projection is supported by water quality monitoring of 2 other similar raised bogs (Longfordpass Bog and Corlea Bog) that were previously subject to industrial peat extraction and that have since been subject to peatland rehabilitation. Graph 1 below shows the downward trend for ammonia at Corlea Bog, which is also located within Bilberry _SC_010 sub-catchment of the River Barrow catchment. Graph 2 shows a consistent low level of TP recorded for Corlea Bog. The laboratory detection limit for TP is 0.05mg/l and Graph 2 shows that concentrations for TP are below the laboratory limits of detection, indicating very low levels. Similarly, the laboratory detection limits for SS was 5ml/l up until July 2019. The laboratory was changed in July 2019 and a new detection limit for SS of 2mg/l was applied. The SS concentrations were consistently below the 5mg/l and the 2mg/l at both laboratories, indicating very low SS concentrations in silt pond outfalls. Rehabilitation measures continue to take hold at Corlea Bog and it has yet to stabilise, but the downward trend for ammonia found during the stabilisation of rehabilitation measures shows that once stabilised the re-wetted bog will reduce ammonia emissions to well below the IPC limits. It is also reasonable to predict a downward trend for SS and TP as the rehabilitation measures become established.

It is further noted that the concentrations of TP, SS and ammonia reported in Table 4 above are from onsite silt ponds. The water from the silt pond discharges to the Boora River and the Silver River. Water quality in both receiving watercourses as well as the Brosna further downstream is reported to be of 'Good' status, indicating that the waters discharging from the silt ponds at Boora Bog to the receiving watercourses is not undermining their water quality status.



Graph 1: Ammonia Concentrations and Trend at Corlea Bog



Graph 2: TP Concentrations at Corlea Bog, showing the limit of detection at 0.05mg/l

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.

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 2015, 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 Boora 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:

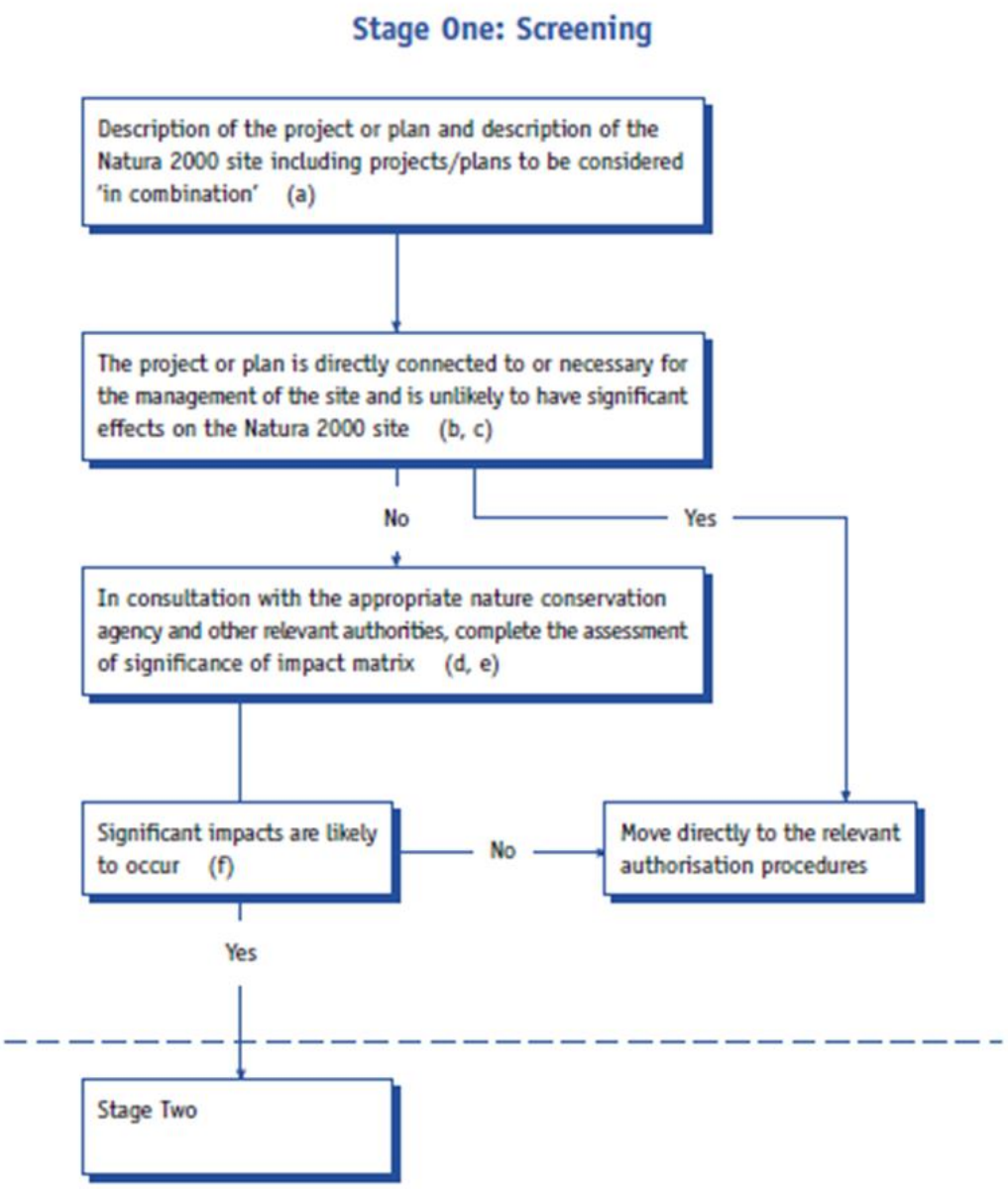


Figure 5: Stage 1 Screening

2.2 Overview of Boora Bog Decommissioning and Rehabilitation

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Boora bog group (Ref.-P0500-01). 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. Boora bog is part of the Boora bog group. Boora Bog is located in Co. Offaly.

A document titled '*Boora Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2021'* has been prepared specifically to describe the proposed decommissioning and rehabilitation measures at Boora 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 Boora 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. P0500-01, 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. P0500-01, 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. P0500-01:
"*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."*

Boora Bog was drained and developed for industrial peat production in the 1960s and has been in active peat production since 1964. Industrial peat production ceased circa 2005. The primary rehabilitation goal and outcome for Boora 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 Boora 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, Landcover

2.4.1.1 Location

The Boora Bog is located in Co. Offaly, approximately 3km northwest of Kilcormac. It is bounded to the north by the R357 and to the west by the R437 regional roads. Boora East Bog, for which restoration has been completed and Lough Boora Discovery Park occurs to the east. The surrounding landscape is a mosaic of low-lying agricultural land (pasture) interspersed with other raised bogs, many of which have also been managed by Bord na Móna for peat production with some areas utilised for domestic turf-cutting.

See **Figure 5: Site Location of Boora Bog** (over)**.**

2.4.1.2 Size, Scale, Landcover

Size and Scale: Boora Bog comprises 1847.1 Ha in total.

Boora Bog has been in peat production since the early 1950's. The peat was primarily harvested for fuel peat to be used in Cloghan Power Station, Derrinlough Brickette Factory and West Offaly Power in Shannonbridge, Offaly. Most the site is now cutaway and recent peat extraction was confined to a small portion of the western side of the site.

The Lough Boora Discovery Park encompasses all areas relating to amenity and biodiversity www.loughboora.com.

The Lough Boora Discovery Park has been in development since the 1990s and a Visitor Centre was officially opened at Boora in 2014. The Discovery Park includes 5 walking or cycling trails, several lakes (Loch an Dochas, Boora Lake, Tumduff Beag & Finnamores), wetland areas (Tumduff, Leabeg), a sculpture park & bird watching hides etc. Lough Boora Discovery Park now extends to over 2000 hectares and has a network of off-road walking and cycle routes within a perimeter of approximately 20 kilometres, and includes Boora Bog. The Offaly Way way-marked walking trail passes through Lough Boora Discovery Park. Lough Boora Discovery Park is now acknowledged as a nationally important outdoor amenity area and has attracted over 100,000 visitors a year for several years. The Lough Boora Sculpture Park has significant cultural value and is acknowledged as being of international importance.

The wider Boora area is recognised as an important bird-watching area in the midlands and the former cutaway attracts significant breeding and wintering waders and wildfowl. The Grey Partridge Conservation Project is located adjacent to LBPD and is managed for conservation by NPWS.

The Lough Boora Mesolithic site is located towards the centre of the site and is part of a former lake basin. This area is less developed and contains several features of significant ecological interest. Part of this area is designated as a potential National Heritage Area. It is almost completely surrounded by conifer plantation and can be accessed by the main cycle path, which runs through this section. Much of the former Boora lake basin was also drained. This area is part owned by the IWT and it is managed for nature conservation. The adjacent Mesolithic storm beach contains diverse calcareous grassland (GS1).

An active rail line is still operational between Boora and other sites to the west of the site. Decommissioning of this infrastructure is dependent on the general cessation of industrial peat production for supply of peat to Derrinlough Brickette Factory.

Several conifer plantations were established on this site in the 1980's by Coillte, with the site being leased by Coillte. Stands of mainly Lodgepole Pine and Sitka Spruce were planted on the site. Mixed broadleaves with Oak and Birch were also planted on one section of the site.

The underlying geology at Boora Bog is Visean Limestones (undifferentiated), along with Waulsortian Limestones, described as massive unbedded lime-mudstone.

Subsoils underlying extant peat are significantly calcareous marls, and glacial sub-soil mounds and ridges are being exposed in places.

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

- the cleaning of existing silt ponds (five 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; and
- the de-sludging of an existing septic tank.

All lands occurring within Boora bog will be subject to enhanced rehabilitation measures/activities.

The enhanced rehabilitation prescriptions to be applied at Boora Bog will included measures for deep peat cutover bog, dry cutaway bog, wetland cutaway and marginal land. Other prescriptions included comprise silt pond and archaeology. Not all measures will require land use interventions. For instance, no works will be required for the enhanced rehabilitation of marginal lands (comprising 74.8ha that will undergo rehabilitation).

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 Boora 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 Boora Bog rehabilitation comprises a series of bespoke (to Boora 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, and 3) measures associated with marginal lands, such as access roads and, habitats around the periphery of the bog. 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 Boora, where existing infrastructure is already in place via access tracks to facilitate the previous peat extraction. Alternative access to the bog is available at Boora. No change to baseline conditions to facilitate access for either decommissioning or rehabilitation is required.

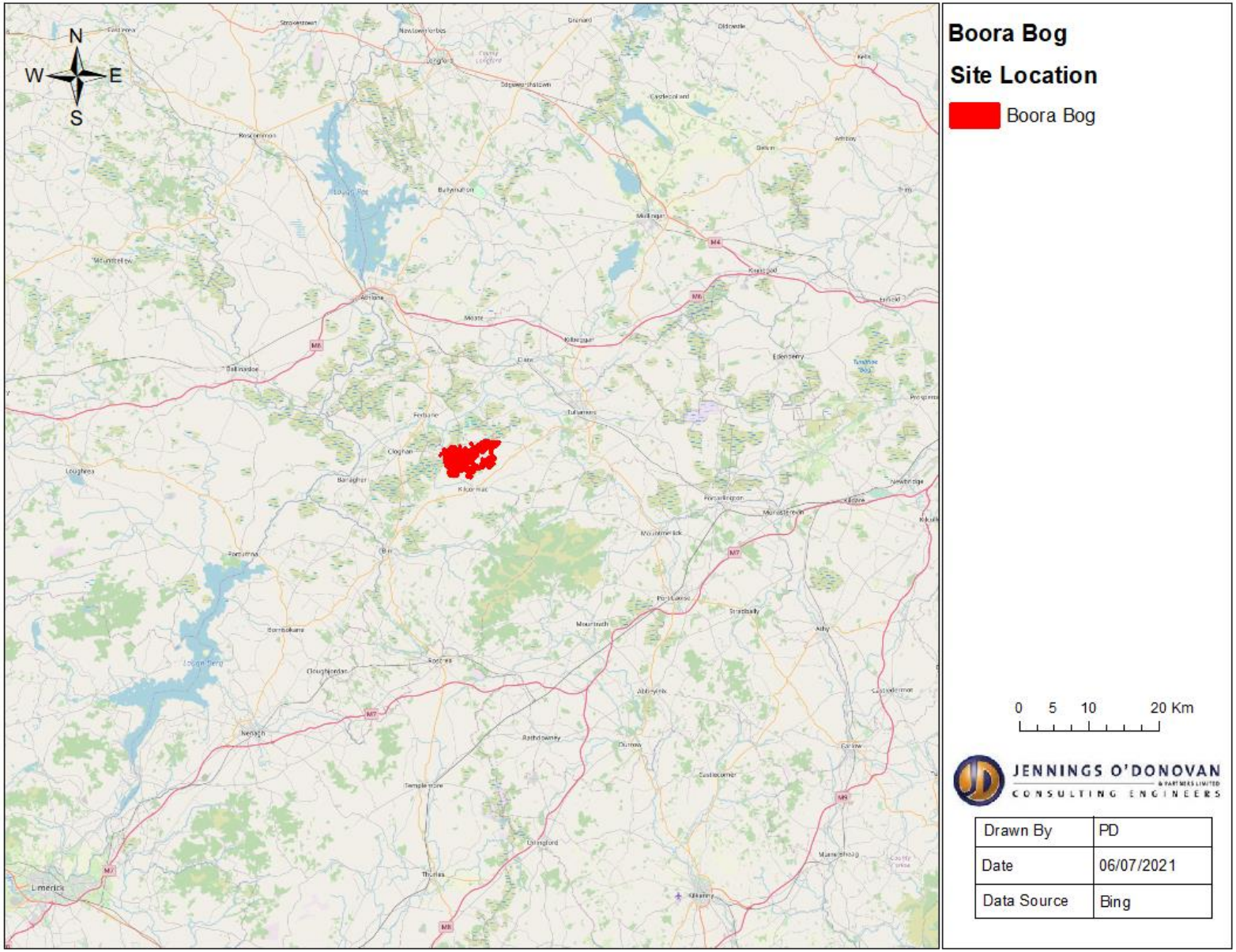


Figure 6: Site Location of Boora Bog

2.4.3.2 Standard Methodology for Decommissioning

Decommissioning at Boora Bog 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. P0500-01. 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 Boora. 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 Boora 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 Mona will utilize the appropriate waste hierarchy to identify waste that can reused or recycled ahead of disposal.

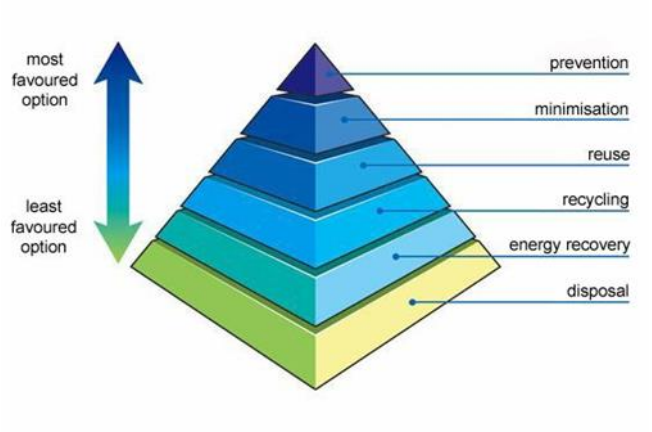


Figure 7: Waste Hierarchy

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 be stored and/or disposed of, in line with IPC license conditions.

Peat stockpiles: Any existing and unsalable peat stockpiles which are 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.

De-sludging of Septic Tanks: The septic tank at the bog will be de-sludged 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 Boora 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 **recently published** guidance issued by the EPA in 2020 – **Guidance on the process of preparing and implementing a bog rehabilitation plan**.

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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 Boora 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:

- Moundillion Integrated Pollution Control Licence;
- Mountdillion 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 Boora Bog that are used to inform this screening report for PCAS at Boora Bog.

Rehabilitation Packages

The key interventions to be applied for the restoration/rehabilitation of Boora 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 8 rehabilitation prescription types with different rehabilitation/restoration intensities to implement the PCAS at Boora Bog are proposed (see Table 5 which lists the rehabilitation prescription types that will be implemented at Boora Bog): Figure 8 shows the locations at Boora Bog where these prescription types will be applied.

Table 5: Rehabilitation Categories

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	0
	DPT2	More intensive drain blocking (7/100 m) + blocking outfalls and managing overflows	14.6
	DPT3	More intensive drain blocking (max 7/100 m), + field reprofiling with screw leveller +drain infilling +cross berms + blocking outfalls and managing overflows	0
	DPT4	Berms and field re-profiling (45m x 60m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	122.75
	DPT5	Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	0
Dry cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	119.8
	DCT2	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	15.6
	DCT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows + targeted fertiliser treatment	0
Wetland cutaway	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	0
	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	0
	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	67.7
	WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	113.3
	WLT5	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	0
	MLT1	No work required	74.8

Marginal land	MLT2	More intensive drain blocking (max 7/100 m)	0
	MLT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows with + boundary berm	0
Other (Boora East Bog)		Largely rehabilitated. Assessment will consider additional enhancement measures that align with current land-use, amenity and constraints	1196.9
Other		Silt-ponds	0.4
Other		Constrained Areas	126.4
Other		Archaeology Constrained Areas	0.25
Total			1852.7

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

1. Regular Drain Blocking (3/100m) (Speed Bump method using Dozer–DCT2)
2. Intensive Drain Blocking (max 7/100m)
3. Blocking Outfalls
4. Managing Water levels with overflow pipes and/or cutting taps in high fields
5. Field Reprofiling
6. Cut and fill cell bunding (30m x 30m cell)
7. Drainage channels for excess water
8. *Sphagnum* Inoculation (DPT4 & DPT5)

In addition, PCAS activities will include:

9. Silt Pond Cleaning
10. Retention of Hydraulic Breaks (DMP measure)

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

1. Regular Drain Blocking (3/100m)

This measure can be applied to cutover bog, cutaway bog and drained raised bog with different environmental characteristics. It can be applied to residual peat of various depths including deep cutover peat. The main objective is to place peat blockages in drains to raise water levels, re-wetting peat and slowing water movements through the site. Slowing water movement will 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 number of peat blockages per 100m is determined by the topography of the site, but an allowance has been estimated at on average 3 blocks per 100m of field drain. The methodology follows NPWS

guidelines published by the National Parks and Wildlife Service (Mackin *et al.,* 2017[1]) and in line with methodologies originally developed by McDonagh (1997).

In all instances peat blockages will be installed using a specially adapted tracked machine. The process involves clearing the drain and creating a 'key' in the drain sides in order to ensure a tight seal is maintained. The drain is subsequently blocked with peat taken from a nearby 'borrow pit' and involves placing layer after layer of peat until it is built up to above the ground surface, after which it is covered with a 'scraw' of vegetation (where available). Each peat blockage takes approximately 5mins to complete. Appendix C provides further details on the approach to peat blockages.

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

This measure can be applied to cutover bog, cutaway bog and drained raised bog with different environmental characteristics. It can be applied to residual peat of various depths including deep cutover peat. The main objective is to block drains with peat barriers to raise water levels, re-wetting peat and slowing water movements through the site. Slowing water movement will 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 number of peat blockages per 100m is determined by the topography of the site, but an allowance has been estimated at a maximum of 7 blocks per 100m of field drain. The methodology follows NPWS guidelines published by the National Parks and Wildlife Service (Mackin *et al.,* 2017) and in line with methodologies originally developed by McDonagh (1997).

The increased number of peat blockages (compared with the standard measures) will benefit re-wetting and trapping silt on cutaway with slightly greater slopes and will further slow the movement of water from these sites. Methods are as per 1 but blockages are at a higher frequency along the length of the drainage feature. See also Appendix D. Figure 7 indicates the locations where drain blocks will be provided.

3. **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.

[1] https://www.npws.ie/sites/default/files/publications/pdf/IWM99_RB_Restoration_Best%20Practice%20Guidance.pdf

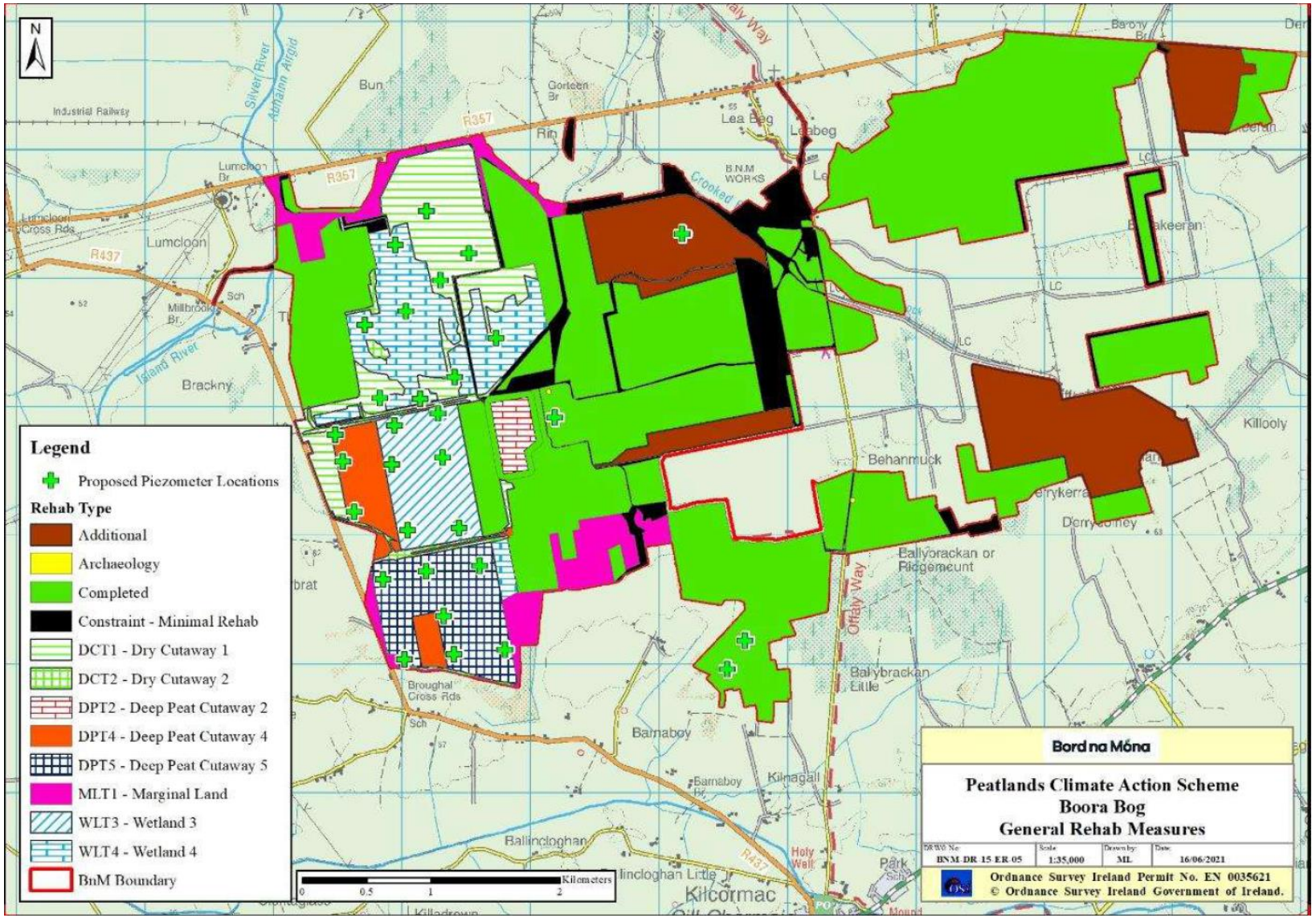


Figure 8: Proposed Enhanced (PCAS) Rehabilitation Plan Boora Bog shown in area to the west of Figure 8, with Boora East Bog denoted as completed

4. 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

5. Field Reprofiling

The concept of field re-profiling is to level the surface of the individual peat production fields to allow more uniform coverage of water at an ideal depth (c.100mm ± 50mm) for vegetation colonisation and in particular, the development of mosses that will accelerate the trajectory towards naturally functioning peatland ecosystems. It can be applied to residual peat of various depths including deep cutover peat.

Peat production fields generally have a convex camber toward the edges and have a heterogeneous topography. It is usual for the drains and edges of the fields to become wet whilst the high centres of the fields remain dry. Small hollows within the peat fields will retain surface water for longer. This enhanced measure will target the development of a flat or concave topography that will help the retention of shallow surface water. This approach will be combined with other measures such as drain blocking to re-wet peat to increase the cover of shallow surface water and re-wetted peat on the former production fields. In general, peat production fields will still have a prevailing slope (they will be flatter or convex, but not level.

This method uses a bull dozer to remove the high central camber from individual production fields and deposit the peat on the lower-lying edges of the same production field and partially in the drains (see Appendix C for further details on the field reprofiling methods). It is not intended to completely infill the drains, but the drains will be blocked with peat blocks. It is planned to create a final profile with a largely flat or slightly concave surface. This will depend on the general topography and slope. On cutaway with increased slopes, it will be more advantageous to create shallow depressions. Any depressions will be 10-20cm deep, and a maximum of 20m long (although natural topography may require flexibility in sizing). Depressions can be separated by a strip of undisturbed peat 1-2 m wide.

An alternative to using a dozer is to use a screw-leveller to create a 'clean cut' into a field of deep peat. Any peat which has been thrown to the side is then using to infill adjacent drains using a dozer.

In general, water will still flow across the surface of the re-profiled peat field depending on the prevailing slope but will be retained for longer in the depressions, encouraging the development of wetland habitats. The increased depression will increase the area of optimal hydrological conditions. On more level ground, it will be more straightforward to re-wet larger areas with a more homogenous topography. Slowing water movement will 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.

See Methodology Drawings included as Appendix C.

6. 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.

The width of each cell will typically be four fields wide. The centre of former cambered peat production field will be used one 'side' of the cell. Drains within the cell will be infilled. A bull dozer will be used to level and flatten the base of the cell and to infill the drains. The bull-dozer will be used to remove the camber from the former peat production fields and to create a flat and level surface. Laser levels will be mounted on bull-dozers to allow the machine drivers to move peat and create flat surfaces.

Alternatively, a similar process but utilising a screw leveller to remove the cambered surface may be undertaken.

Berms will be formed across or perpendicular to the fields using materials from the cell floor. These berms will be relatively shallow (30 cm high) and will be at least 4-5 m wide. These berms will act to enclose the cell and to retain shallow surface water. Pipes will be used to manage overflows and prevent bund erosion.

The berms will be constructed using an excavator and the trench-bunding technique may be used. The trench bunding technique involves digging a new trench as a 'foundation' or key for the bund. Material is then repacked into the trench and then built up to create a bund. Additional material for the bund will be supplied by the surrounding area. The trench bunding technique improves the overall strength of the bund by creating a foundation and also reduces sub-surface flows through the bunded area.

The exact dimensions of the cells will be dependent upon the topography of the site and the heights of the various peat fields. For example, it may be appropriate to have cells that are only two fields wide

where two low fields have higher fields on either side. It may not be appropriate to equalise the levels of two adjacent fields where there is a significant height difference. The length of the cells may be shorter if the fields are on a steeper gradient to that the base of the cells is flat to retain water. Such flexibility is essential to maximise water retention on site and minimise machinery and peat movements. This enhanced measure requires more intensive planning to adapt it towards varying topography.

The methodology to be used for the creating of cells is provided in Appendix C.

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.

Bunds will be constructed using an excavator at a level approximately 30cm higher than the cell floor and will be about 4-5 m in width. Bunds may be constructed using the trench bunding approach described above. When the bund is constructed using this drier peat, it is compacted by the excavator's tracks to ensure that the bund retains shallow water in the cell. The top surface level of the bunds are constructed with a high level of accuracy (level along the extent of length bounding the cell). This is essential as surface water eventually overflows the bunds at later stages when drainage pipes become less functional.

When bunds are being constructed, drainage pipes are added (1 per cell) to channel flow from pond to pond down the site gradient. The drainage pipes include a 90-degree elbow and a section of straight pipe on the up-flow side to control the level of water in the cell at the desired level below the top level of the berm. Drainage pipes are important to prevent erosion of the bund during initial phases however, once the bunds are stabilised, the pipes became redundant as the vegetation within the pond establishes to a point where it hinders water flow to the pipe.

The methodology to be used for the creating of cells is provided in Appendix C. Figure 7 indicates the locations where bunded cells will be provided.

8. 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 Boora 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 Cavemount which might otherwise back up and flood upstream, neighbouring lands. This will require upgrading using an excavator.

9. *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.

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.

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. Due to the seasonal flooding at Boora Bog over the winter period no rehabilitation works can be progressed between the months of November to March inclusive. As such rehabilitation 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. In any case, the rehabilitation period will not be longer than 1 year.

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 associated with deep peat cutover bog; dry cutaway bog and wetland cutaway

bog will take place on 453.75 hectares of land. Note 74.8 hectares that will be treated as MLT1 will not require any rehabilitation activities. Other Additional areas in Boora East Bog have already been largely rehabilitated, and additional enhancement measures that align with current landuse, amenity and constraints will be considered for these areas. 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, 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 Boora 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 Boora 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. Maintenance of silt ponds are ongoing and their continued future maintenance will be in line with existing maintenance procedures and will represent minor, scale activities at Boora Bog during the operation phase of the PCAS. 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 Boora Bog Drainage Management Plan (RPS, 2021).

Operational Access: Operational access will be through the Boora Bog, where existing infrastructure is already in place via access tracks (such as railway line or machinery travel path), providing the main access to the site.

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 Boora 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 Boora 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.

There is no known licenced or unlicenced peat extraction through turbary being undertaken around the margins of Boora Bog. However, it is likely that turbary is undertaken 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 planning search of the National Planning Database (July, 2021) and Offaly County Council online planning portal (July,2021) found no recent (within the last 5-years) proposed or consented developments within the vicinity of Boora Bog.

There are 3 no. local authority jurisdictions within the wider area of Boora Bog (Offaly County Council, Westmeath County Council and Laois County Council). All three have County Development Plans and/or plans relating to Heritage and Biodiversity.

There is a current ongoing NPWS Raised Bog Restoration Project which may include at some date some raised bogs within the wider area surrounding Boora Bog. None of these NPWS SAC bogs are located within the River Brosna sub-catchment in which Boora Bog is located. Given the absence of a hydrological link between the Boora Bog and other NPWS SAC bogs within the Brosna catchment and

the unknown temporal overlap between any NPWS planned restoration activities and the decommissioning and rehabilitation of Boora Bog, the PCAS at Boora Bog will not combine with bog restoration works at other NPWS SAC bog sites.

2.4.5.1 Other BnM Bog Group Decommissioning and Rehabilitation

Other BnM bogs within the River Brosna sub-catchment (i.e. the sub-catchment in which Boora Bog is located) 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 River Brosna sub-catchment is at Derries Bog (approximately 350m to the north of Boora Bog); Pollagh Bog (approximately 6.2km to the east of Boora Bog), Turraun Bog (2.6km to the east) and Oughter Bog (5km to the east of Boora 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 Boora Bog share connectivity to the Middle Shannon Callows SPA and the River Shannon Callows SAC downstream.

The Operational stage of Boora Bog Decommissioning and Rehabilitation will overlap the Rehabilitation stage of other bogs within the Boora group however the expected magnitude of any effects from Boora 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 Boora 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

Small scale private turbary exists at the margins of Boora Bog. Licensed turbary occurs at various locations within the wider surrounding area of Boora Bog, however no known licenced turbary sites are located within the River Brosna sub-catchment in which the Boora Bog is located. Unauthorised private turbary is also likely to exist at 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.

2.4.5.3 NPWS Raised Bog Restoration at River Shannon Callows SAC

An Appropriate Assessment (of the National Raised Bog SAC Management Plan 2017-2022) has been carried out in accordance with Regulation 42(11) and 42(12) of the European Communities (Birds and Natural Habitat) Regulations 2011-2015 and has had regard to the findings of the Natura Impact Statement, the conservation and management measures set out in the National Raised Bog SAC Management Plan 2017-2022 and which constitute plan-level mitigation measures, and the submissions

and observations received on the (draft) National Raised Bog SAC Management Plan[2]. One of the primary mitigation elements proposed is that screening for appropriate assessment and if necessary appropriate assessment will be carried out in relation to any site specific/project level measures including restoration measures and turf-cutting. If AA of a project at site level determines that adverse effects are likely, or cannot be ruled out, the project will either not be pursued or, where considered appropriate, the derogation steps of Article 6(4) will apply, but only in a case in which there are imperative reasons of overriding public interest (IROPI) requiring a project to proceed, there are no less damaging alternative solutions, and compensatory measures have been identified that can be put in place.

On this basis, it is assumed that the appropriate level of Appropriate Assessment has or will be carried out in respect of any future proposed restoration activities at the above bog, and that any required mitigation to avoid adverse effects on European Site integrity will be in place.
Furthermore, as noted in Section 2.4.5 above there are no raised bog SACs occurring within the Brosna sub-catchment.

2.4.5.4 Agricultural Activity

Given the proximity of Boora Bog to the River Silver, 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 Boora Bog. Most of these activities are not subject to Appropriate Assessment, and form part of the existing baseline environment.

2.4.5.5 Local Authority Development Plans

The following development plans have been identified:

- Offaly County Development Plan 2021 – 2027
- County Offaly Heritage Plan 2017-2021
- Westmeath County Development Plan 2014 -2020
- Draft Westmeath County Development Plan 2021 – 2027
- Laois County Development Plan 2017 - 2023

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.

2.4.5.6 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 small scale of the projects identified in the vicinity of Boora Bog; the absence of hydrological connectivity or shared hydrological catchment with many of the other plans or

[2] https://www.npws.ie/sites/default/files/general/AA%20Determination%20NRBMP%202017_2022_0.pdf

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 Boora 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 Boora 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 **20 European Sites** - 14 Special Areas of Conservation (SAC) and 6 Special Protection Area (SPA) - **within 15km of Boora Bog.** The locations of these European Sites are illustrated in **Figure 9: SACs within 15km of Boora Bog and Figure 10: SPAs within 15km of Boora Bog.**

Table 6 lists the European Sites occurring within 15km of Boora Bog, specifies the distances to each of these European Sites and provides a comment on the presence or absence of hydrological connectivity between Boora Bog and each of the European Sites listed.

Table 6: Proximity of the proposed Boora 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 Boora Bog)
River Shannon Callows SAC	000216	10.5km W	Y: approximately 18.5km downstream
Charleville Wood SAC	000571	13.6km E	N
Clara Bog SAC	000572	8.9km NE	N
Clonaslee Eskers and Derry Bog SAC	000859	11.1km SE	N
Pilgrim's Road Esker SAC	001776	13.3km NW	N
Ferbane Bog SAC	000575	5.1km NW	N
Fin Lough (Offaly) SAC	000576	13.3km NW	N
Moyclare Bog SAC	000581	6.9km W	N
Mongan Bog SAC	000580	13.8km NW	N
Island Fen SAC	002236	14.7km S	N
All Saints Bog and Esker SAC	000566	13.2km SW	N
Slieve Bloom Mountains SAC	000142	11.1km SE	N

European Site (SAC or SPA)	Site Code	Distance from the Development*	Hydrological Connectivity (Y/N: If Yes Downstream or Upstream connectivity relative to Boora Bog)
Ridge Road SW Rapemills SAC	000919	13.2km SW	N
River Barrow & River Nore SAC	002162	14.7km SE	N
Mongan Bog SPA	004017	13.8km NW	N
Middle Shannon Callows SPA	004096	10.5km W	Y: 18.5km downstream
Slieve Bloom Mountains SPA	004139	11.1km SE	N
River Little Brosna Callows SPA	004086	13.7km SW	N
Dovegrove Callows SPA	004137	13km SW	N
All Saints Bog SPA	004103	13.5km SW	N

*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 twelve European Sites examined in this Screening Report are provided in **Table 7.**

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.

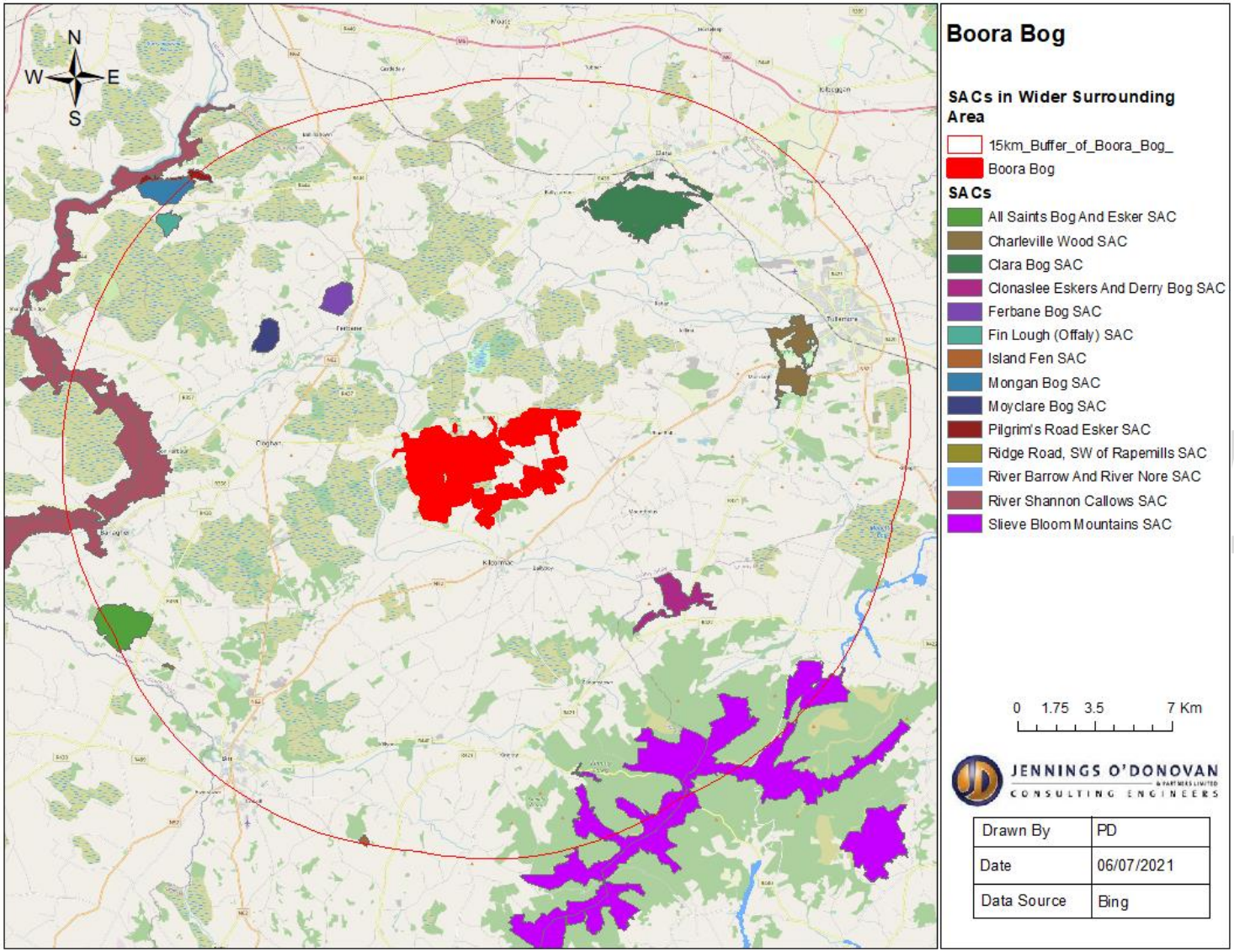


Figure 9: SACs within the wider surrounding area of Boora Bog

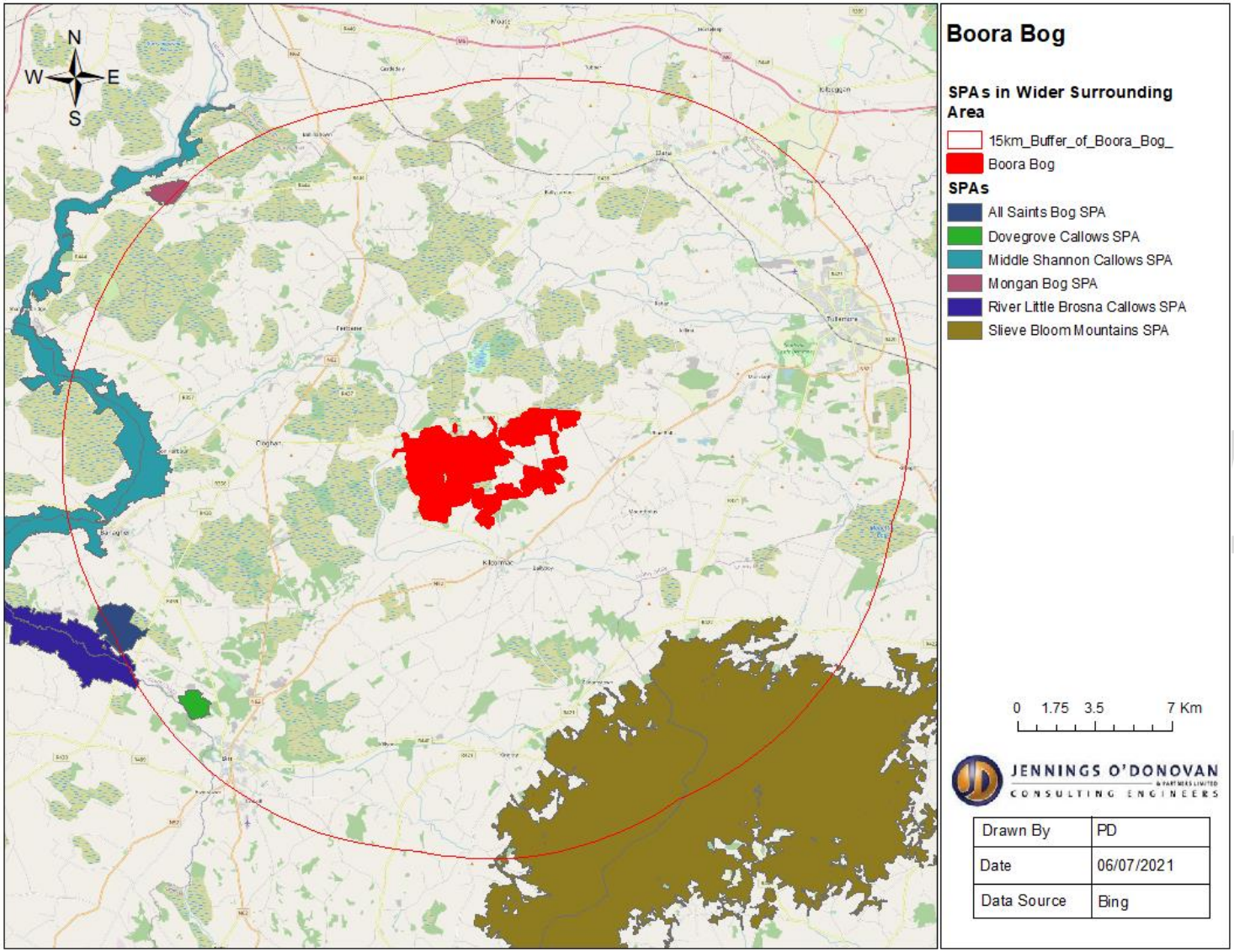


Figure 10: SPAs within the wider surrounding area of Boora Bog

Table 7: Description of European Sites within a 15km radius of Boora Bog

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
1	River Shannon Callows SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] Limestone pavements [8240] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae, Salicion albae*) [91E0] 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.	https://www.npws.ie/protected-sites/sac/000216
2	Charleville Wood SAC	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae, Salicion albae*) [91E0] *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016]	Charleville Wood is a large woodland surrounded by estate parkland and agricultural grassland located about 3 km south-west of Tullamore in Co. Offaly. The site, which is underlain by deep glacial deposits, includes a small lake with a wooded island, and a stream runs along the western perimeter. The woodland is one of very few ancient woodlands remaining in Ireland, with some parts undisturbed for at least 200 years. It is one of the most important ancient woodland	https://www.npws.ie/protected-sites/sac/000571

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			sites in Ireland. The woodland has a varied age structure and is relatively intact with areas of both closed and open canopy. The understorey and ground layers are also well-represented. Alluvial forest is a priority habitat listed on Annex I of the E.U. Habitats Directive, while the rare snail species, Vertigo moulinsiana, is listed on Annex II of this Directive. The wetland areas, with their associated bird populations, rare insect and Myxomycete species, contribute further to the conservation significance of the site.	
3	Clara Bog SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150] Bog woodland [91D0]	Clara Bog is situated some 2 km south of Clara village in Co. Offaly. Much of it is State-owned and designated a statutory Nature Reserve. Clara Bog has long been regarded as one of the most important raised bogs in the country, being the largest remaining example of the true midland sub-type. It has well-developed hummock and hollow complexes, and one of the few remaining soak systems. The bog vegetation at this site has been much-studied.	https://www.npws.ie/protected-sites/sac/000572
4	Clonaslee Eskers and Derry Bog SAC	Alkaline fens [7230] *Vertigo geyeri* (Geyer's Whorl Snail) [1013]	Located approximately 5 km west of the town of Clonaslee, and largely in Co. Laois, this site consists of a series of morainic hills and esker ridges which are the legacy of the last period of glaciation. To the north-west, the Derry Hills are two isolated hill situated in a bog, which forms part of the site. The main esker ridge runs along the southern part of the site. This site is of conservation importance for the presence of alkaline fen vegetation and is considered one of the best sites in the south-east region for this habitat. Also of interest is the extremely unusual assemblage of plants associated with the esker ridges, which includes	https://www.npws.ie/protected-sites/sac/000859

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			three rare plants, two of which are legally protected in Ireland. Of further conservation importance is the presence of the rare snail Vertigo geyeri.	
5	Pilgrim's Road Esker SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) [6210]	Pilgrim's Road Esker SAC is a narrow esker ridge extending 2 km east from Clonmacnoise in Co. Offaly. The site is adjacent to the River Shannon Callows, to the north, and Mongan raised bog, to the south. The western area includes Bunthulla Hill (north of the road) and Hanging Hill (south of the road); the central area runs along both sides of the summit ridge before widening out eastwards to include a substantial area of esker grassland centred on the site of an old ring-fort. Pilgrim's Road Esker is the most scenically impressive esker in the midlands and the one best known to the public. Orchid-rich calcareous grassland is a rare habitat in Ireland and is listed as a priority habitat under Annex I of the E.U. Habitats Directive. Furthermore, the population of the rare Green-winged Orchid is the largest known in Ireland.	https://www.npws.ie/protected-sites/sac/001776
6	Ferbane Bog SAC	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Ferbane Bog is a relatively large, domed, raised bog located about 10 km east of Shannonbridge in Co. Offaly. It is underlain by low permeability Waulsortian limestone and clay-rich tills. Ferbane Bog is a good example of a raised bog and is of considerable conservation significance. Active raised bogs are becoming increasingly rare in Ireland, and Europe, and are listed as a priority habitat on Annex I of the E.U. Habitats Directive.	https://www.npws.ie/protected-sites/sac/000575
7	Fin Lough (Offaly) SAC	Alkaline fens [7230] *Vertigo geyeri* (Geyer's Whorl Snail) [1013]	Fin Lough is a shallow limestone lake surrounded by a complex of wetland habitats; 7 km north-east of Shannonbridge in Co. Offaly. The name Fionn Loch,	https://www.npws.ie/protected-sites/sac/000576

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			"White Lake", probably derives from the white colour of the lake bottom caused by marl deposits. It is a shallow lake, about 16 ha in extent (in winter) and bounded to the north and east by the Clonfinlough esker ridge, and to the south and west by Blackwater Bog, which is now largely cut-over. The lake and its surrounding wetland communities are arranged in distinct zones reflecting wetness and substrate. They include open water, Reedswamp, tall sedge, alkaline fen, fen-bog transition, swamp woodland and bog. The transition from calcium-rich lake to reedbed, to fen, to bog is relatively intact in some areas, which is exceptional for this part of the country. Fin Lough remains an important site, however, because of the diversity of wetland habitats and species that it supports.	
8	Moyclare Bog SAC	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Moyclare Bog is a small raised bog situated 4 km west of Ferbane in Co. Offaly. Its mean height above sea level is 54 m. On the western edge of the bog, a low peat face with no perimeter drain lies adjacent to wet peaty pasture, which has a spring-line at its junction with mineral soil. The water from this spring disappears under the peat dome of the bog. The site occurs in close proximity to a number of important raised bogs close to the floodplain of the River Shannon. Whilst relatively small, Moyclare bog is a site of high conservation value as it is relatively intact and contains examples of the Annex I habitats active raised bog, degraded raised bog and depressions on peat substrates (Rhynchosporion). The uncut peat dome has an unusually high proportion of active raised bog.	https://www.npws.ie/protected-sites/sac/000581

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
9	Mongan Bog SAC	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Mongan Bog is a midland raised bog of medium size situated immediately east of the monastic site of Clonmacnoise, Co. Offaly, and 12 km south of Athlone. It is situated in a basin, surrounded on 95% of its perimeter by high ground on mineral soil. At two points in the north, it shares a common boundary with Pilgrim's Road Esker SAC. Most of the bog is a Statutory Nature Reserve, established in 1987. The bog has been the subject of ongoing intensive research since 1972. Mongan Bog is of high conservation importance as it is a good example of a raised bog site which contains examples of the Annex 1 habitats active raised bog, degraded raised bog and depressions on peat substrates (Rhynchosporion). It is mostly intact and has classic hummock and pool formations over a large proportion of the surface. It has several features of special zoological interest. Scenically it is part of an area rich in intact natural features (callows, eskers, limestone pavement) which enhances its importance further. The ongoing intensive research on aspects of bog ecology at the site reinforces its international importance.	https://www.npws.ie/protected-sites/sac/000580
10	All Saints Bog & Esker SAC	All Saints Bog And Esker SAC	[6210] Orchid-rich Calcareous Grassland* [7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation [91D0] Bog Woodland*	All Saints' Bog is a unique bog, important for its vegetation types, plants, invertebrates and birds. To conserve the site peat cutting needs to stop, drains need to be blocked and marginal dams built to raise the water table. The esker supports species-rich grassland, including rare species, and this area should continue

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
				to be grazed but left unfertilized. Further gravel extraction should be prevented, although some disturbance may be required to conserve the Red Hemp-nettle and Blue Fleabane.
11	Island Fen SAC	[5130] Juniper Scrub [7230] Alkaline Fens	Island Fen SAC is located in a small valley in the foothills of the Slieve Bloom Mountains, south west of Clareen village in Co. Offaly. Excellent specimens of upright Juniper (Juniperus communis) occur at this site in association with species-rich calcareous grassland, heath and some exposed limestone rocks. The alkaline fen vegetation occurs on the reed margins to the west and in the north of the site. The fen grades into reedswamp and wet marsh/swamp habitat. This site is important for the occurrence of excellent examples of upright Juniper scrub formations, on a species rich calcareous grassland/heath, and alkaline fen, both habitats listed on Annex 1 of the E.U. Habitats Directive	https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002236.pdf
12	Ridge Road Rapemills SAC	[6210] Orchid-rich Calcareous Grassland*	Although small, this SAC is of ecological value as a good example of species-rich calcareous grassland, rich in orchids. This habitat type is increasingly rare as a result of agricultural intensification, and is given priority status on Annex I of the E.U. Habitats Directive. The vegetation at Ridge Road is diverse and features a variety of unusual plant communities, as well as a large population of Green-winged Orchid. Eskers are becoming increasingly rare in Ireland - many have been	

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			destroyed as a result of gravel extraction.	
13	Slieve Bloom Mountains SAC	[4010] Wet Heath [7130] Blanket Bogs (Active)* [91E0] Alluvial Forests*	The Slieve Bloom Mountains lie on the Offaly-Laois border, starting about 8 km north-east of Roscrea and running about 24 km north-east, towards Clonaslee. This site is remarkable for its mountain blanket bog habitat. This extensive site is dominated by blanket bog on a high plateau. However, on more steeply-sloping flanks wet heath vegetation occurs on shallower peat (typically 0.5- 1.5 m deep). Alluvial forest occurs along the Camcor River in the northern part of the site, on the floodplain of the river and on adjacent slopes along the valley.	https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000412.pdf
14	River Barrow & River Nore SAC (Site Code 002162)	[1130] Estuaries [1140] Tidal Mudflats and Sandflats [1170] Reefs [1310] Salicornia Mud [1330] Atlantic Salt Meadows [1410] Mediterranean Salt Meadows [3260] Floating River Vegetation [4030] Dry Heath [6430] Hydrophilous Tall Herb Communities [7220] Petrifying Springs* [91A0] Old Oak Woodlands [91E0] Alluvial Forests* [1016] Desmoulin's Whorl Snail (*Vertigo moulinsiana*) [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1092] White-clawed Crayfish (*Austropotamobius pallipes*) lowland blanket bog [1095] Sea Lamprey (*Petromyzon marinus*) [1096] Brook Lamprey (*Lampetra planeri*)	This site consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford. Good examples of alluvial forest are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site. A good example of petrifying springs with tufa formations occurs at Dysart Wood along the Nore. The best examples of old oak woodlands are seen in the ancient Park Hill woodland in the estate at Abbeyleix; at Kyleadohir, on the Delour, Forest Wood House, Kylecorragh and Brownstown Woods on the Nore; and at Cloghristic Wood, Drummond	NPWS (2016) River Barrow & River Nore SAC (Site Code 002162). Version dated 09.02.2016. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 15/04/2021

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
		[1099] River Lamprey (*Lampetra fluviatilis*) [1103] Twaite Shad (*Alosa fallax*) [1106] Atlantic Salmon (Salmo salar) [1355] Otter (*Lutra lutra*) [1421] Killarney Fern (*Trichomanes speciosum*) [1990] Nore Freshwater Pearl Mussel (*Margaritifera durrovensis*)	Wood and Borris Demesne on the Barrow. Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the floodplain of the river is intact. Floating river vegetation is well represented in the Barrow and in the many tributaries of the site. Dry heath at the site occurs in pockets along the steep valley sides of the rivers especially in the Barrow Valley and along the Barrow tributaries where they occur in the foothills of the Blackstairs Mountains. Salt meadows occur at the southern section of the site in old meadows where the embankment has been breached, along the tidal stretches of in-flowing rivers below Stokestown House. Glassworts (*Salicornia* spp.) and other annuals colonising mud and sand are found in the creeks of the saltmarshes and at the seaward edges of them. The estuary and the other E.U. Habitats Directive Annex I habitats within it form a large component of the site. Extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. The site is very important for the presence of a number of E.U. Habitats Directive Annex II animal species including Freshwater Pearl Mussel (*both Margaritifera margaritifera* and *M. durrovensis),* White-clawed Crayfish, Salmon, Twaite Shad, three lamprey species – Sea Lamprey, Brook Lamprey and River Lamprey, the tiny whorl snail *Vertigo moulinsiana* and Otter.	
15	Mongan Bog SPA	Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	Mongan Bog is a midland raised bog of medium size situated immediately east of the monastic site of Clonmacnoise, Co. Offaly, and 12 km south of Athlone. It is situated in a basin, surrounded	https://www.npws.ie/protected-sites/spa/004017

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			on part of its perimeter by high ground on mineral soil. Mongan Bog is owned by An Taisce (the National Trust) and is a Ramsar Convention site, a Biogenetic Reserve and a Statutory Nature Reserve.	
16	Middle Shannon Callows SPA	Whooper Swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Corncrake (*Crex crex*) [A122] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Black-tailed Godwit (*Limosa limosa*) [A156] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] 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 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 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 Shannon Callows is the largest site monitored as part of I-WeBS and many parts of it are inaccessible on the ground.	https://www.npws.ie/protected-sites/spa/004096

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
17	Slieve Bloom Mountains SPA	Hen Harrier (*Circus cyaneus*) [A082]	The Slieve Bloom Mountains SPA is situated on the border between Counties Offaly and Laois, and runs along a north-east/south-west aligned ridge for approximately 25km. Much of the site is over 200 m in altitude, rising to a maximum height of 527 m at Arderin. The mountains are of Old Red Sandstone, flanked by Silurian rocks. Several important rivers rise within the site, including the Barrow, Delour and Silver. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Hen Harrier. The presence of three species, Hen Harrier, Merlin and Peregrine, which are listed on Annex I of the E.U. Birds Directive is of note. The Slieve Bloom Mountains is a Ramsar Convention site and a Biogenetic Reserve. Part of the Slieve Bloom Mountains SPA is a Statutory Nature Reserve.	https://www.npws.ie/protected-sites/spa/004160
18	River Little Brosna Callows SPA	Whooper Swan (Cygnus cygnus) [A038] Wigeon (Anas penelope) [A050] Teal (Anas crecca) [A052] Pintail (Anas acuta) [A054] Shoveler (Anas clypeata) [A056] Golden Plover (Pluvialis apricaria) [A140] Lapwing (Vanellus vanellus) [A142] Black-tailed Godwit (Limosa limosa) [A156] Black-headed Gull (Chroicocephalus ridibundus) [A179] Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]	The River Little Brosna Callows SPA is one of the top sites in the country for wintering waterfowl and part of the site is a Wildfowl Sanctuary. It is of international importance on account of the total numbers of birds that use it, as well as for its Greenland White-fronted Goose, Golden Plover and Black-tailed Godwit populations. In addition, there are a further seven species with nationally important populations, several of which are the largest in the country. Also of note is that three of the species which occur regularly, i.e. Whooper Swan, Greenland White-fronted Goose and Golden Plover, are listed on Annex I of the E.U. Birds Directive.	npws.ie/sites/default/files/protected-sites/synopsis/SY004086.pdf

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
		Wetland and Waterbirds [A999] T		
19	Dovegrove Callows SPA	[A395] Greenland White-fronted Goose (Anser albifrons flavirostris)	Dovegrove Callows is an area of callowland beside the Little Brosna River 2 km downstream from Birr, Co. Offaly and 5 km upstream from the start of the main area of River Little Brosna callows. The site is an important feeding area for the internationally important Little Brosna Greenland White-fronted Goose flock (527 individuals - 5 year mean peak for the period 1994/95 to 1998/99) and is used on an occasional basis when other feeding sites along the middle Shannon and Little Brosna callows are flooded. It is of particular importance as it can support the entire Little Brosna flock. For this reason the site is a key part of this flock's winter range and important for its protection.	https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004137.pdf
20	All Saints Bog SPA	Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]	All Saints Bog is a lowland raised bog located about 5 km north-west of Birr in Co. Offaly. It is separated from the River Little Brosna callows by a fragmented esker ridge. The site is unique in that it contains the largest stand of birch (Betula sp.) woodland in the country growing on an active raised bog. At the time this site was designated as a Special Protection Area (SPA) it was known to be utilised by part of an internationally important population of Greenland Whitefronted Goose. Greenland White-fronted Goose is regarded as a special conservation interest for this SPA. All Saints Bog was formerly used by part of the internationally important Greenland White-fronted Goose population based on the River Little Brosna. In recent years,	NPWS (2012) All Saints Bog SPA

	European Site Name	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			however, there has been little or no use of All Saints by the geese following a general trend of less usage of raised bogs in favour of grassland sites. The last record of Greenland White-fronted Goose within the site was 75 individuals in 1993/94. Merlin has been seen on the bog during the breeding season and may breed there. The peat dome and marginal areas provide good foraging habitat for this bird of prey species.	

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 Boora 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 Boora 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.

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 Boora 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 Boora 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. 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

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

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

There is no spatial overlap between Boora Bog and any of the SAC's under consideration. It can therefore reasonably be concluded that there is no potential for interactions and associated direct impact/effects (such as habitat loss, or loss of habitat connectivity) on any SAC's from the proposed decommissioning and rehabilitation of Boora Bog.

2.7.2 Indirect impacts to habitats within SAC boundaries

All SACs are located at significant distance from the Boora Bog (the nearest being Ferbane Bog SAC, located approximately 5km to the northwest). There will be no potential for the project to result in emissions to air, noise emissions or visual disturbance to the SACs occurring in the wider surrounding area. As such the consideration of indirect impacts to restricted to emissions to the aquatic environment.

Sources (all outside SAC boundaries):

The following processes/elements associated with rehabilitation works have the potential to represent sources of perturbation to water quality along and downstream of the Silver River that receive drainage water from Boora Bog: 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 drains (where required); changes in local hydrological and hydrogeological conditions; 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

Pathway Connectivity between Boora Bog and SACs

Of the 14 SACs occurring in the wider surrounding area, as listed on Table 7 and shown on Figure 9, all except the River Shannon Callows SAC are not connected via a hydrological pathway to Boora Bog.

Boora Bog is located within the River Shannon catchment and there is a hydrological pathway between Boora Bog and the River Shannon Callows SAC, established by surface water discharges from Boora Bog to the Silver River, which in turn discharge to the Brosna River, which in turn drains to the River Shannon Callows SAC. This is a distant pathway with the nearest point of the River Shannon Callows SAC located approximately 18.5km downstream from Boora Bog.

2.7.3 Indirect or ex-situ disturbance or displacement of Qualifying Species of SACs

Boora Bog is located at a remote distance from any of the 14 SACs occurring in the wider area. The River Shannon Callows SAC is the only SAC in the wider surrounding area that is designated for its role in supporting mobile Annex 2 qualifying species. A number of the SACs (e.g. Charleville Wood SAC and Clonaslee Eskers are designated for supporting Annex 2 Vertigo species, which are considered to be sedantary species whose dispersal is believed to be mediated by mammals and birds (NPWS, 2019; Horsak, 2017). In addition, no suitable basic flush habitat is present at Boora Bog to support Annex 2 Vertigo species). Otter is the Annex 2 qualifying species of the River Shannon Callows SAC and therefore consideration of indirect or ex-situ disturbance or displacement is restricted to the otter population of this SAC that are reliant on the aquatic environment.

Sources (all outside SAC boundaries): The following processes/elements associated with rehabilitation works have the potential to represent sources of perturbation to water quality along and downstream of the Silver River that receive drainage water from Boora Bog: 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 drains (where required); changes in local hydrological and hydrogeological conditions; 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,

Pathway Connectivity between Boora Bog and SACs

Of the 14 SACs occurring in the wider surrounding area, as listed on Table 7 and shown on Figure 9, all except the River Shannon Callows SAC are not connected via a hydrological pathway to Boora Bog.

Boora Bog is located within the River Shannon catchment and there is a hydrological pathway between Boora Bog and the River Shannon Callows SAC, established by surface water discharges from Boora Bog to the Silver River, which in turn discharge to the Brosna River, which in turn drains to the River Shannon Callows SAC. This is a distant pathway with the nearest point of the River Shannon Callows SAC located approximately 18.5km downstream from Boora Bog.

2.7.4 Indirect or ex-situ mortality of Qualifying Interests of SACs

Boora Bog is located at a remote distance from any of the 14 surrounding SACs. As noted above the River Shannon Callows SAC is the only SAC occurring in the wider surrounding area that supports mobile Annex 2 qualifying species (i.e. otters). Otter has been recorded in the local area surrounding Boora Bog in past and signs of otters were also recorded at the bog during surveys in 2011. No holts, couches or other resting places were recorded on Boora Bog during these habitat surveys. In addition, the field surveys completed in 2021 have confirmed the absence of otters and their resting places at Boora Bog and as such there will be no potential for the rehabilitation works to result in mortality to otters outside the boundary of the River Shannon Callows SAC.

2.7.5 Other Projects with Potential to Cause Cumulative Impacts to SAC sites

Other projects occurring in the surrounding area has been identified and have been detailed in Section 2.4.5 above. These projects are minor in scale and will not have the potential to combine with the rehabilitation works at Boora Bog to result in cumulative negative impacts to the aquatic environment downstream of Boora Bog. It is further noted that given the requirement for Habitats Regulations assessments pertaining to other plans or projects, it can reasonably be assumed that, where necessary, all other plans or project occurring in the wider area surrounding Boora Bog will be subject to mitigation to ensure adverse effects on European Sites are avoided.

2.7.6 Direct Impacts to Habitats within SPAs

There is no spatial overlap between Boora Bog and any of the 6 SPA'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 SPA's from the proposed decommissioning and rehabilitation of Boora Bog. Possible pathways can only exist for indirect effects on SPA's either secondary, cross-factor or 'ex-situ'. Therefore, there is **no possibility of direct impacts to SPA** habitats, and this impact pathway is screened out from further evaluation. No potential for likely significant effects identified.

2.7.7 Indirect impacts habitats within SPA sites

All 6 SPAs in the wider surrounding area are located at significant distance from the Boora Bog (the nearest being the Middle Shannon Callows SPA, located approximately 10.5km to the west or 18.5km downstream). There will be no potential for the project to result in emissions to air, noise emissions or visual disturbance to the SPAs occurring in the wider surrounding area. As such the consideration of indirect impacts is restricted to emissions to the aquatic environment.

Sources (all outside SPA boundaries):

The following processes/elements associated with rehabilitation works have the potential to represent sources of perturbation to water quality along and downstream of the Silver River that receive drainage water from Boora Bog: 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 drains (where required); changes in local hydrological and hydrogeological conditions; 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

Pathway Connectivity between Boora Bog and SPAs

Of the 6 SPAs occurring in the wider surrounding area, as listed on Table 7 and shown on Figure 10, all except the Middle Shannon Callows SPA are not connected via a hydrological pathway to Boora Bog.

Boora Bog is located within the River Shannon catchment and there is a hydrological pathway between Boora Bog and the Middle Shannon Callows SPA, established by surface water discharges from Boora Bog to the Silver River, which in turn discharge to the Brosna River, which in turn drains to the Middle Shannon Callows SPA. This is a distant pathway with the nearest point of the Middle Shannon Callows SPA located approximately 18.5km downstream from Boora Bog.

2.7.8 Indirect or ex-situ disturbance/displacement of bird species of Special Conservation Interest

Sources: the sources of potential disturbance/displacement impacts to wetland bird species in general that could arise as a result of the PCAS at Boora Bog include 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: contact, visibility, noise – all pathways will only be representative of functional impact pathways where special conservation interest bird species (or other wetland bird species) of the surrounding SPAs are found to rely on Boora Bogs. It is noted that the distance of SPAs from Boora Bog in the surrounding area is greater than the distance established by Natural Scotland in their guidance document Assessing Connectivity with Special Protection Areas (SPAs) (SNH, 2016) for evaluating the potential for connectivity with wetland bird species.

Potential Boora Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity: The 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.

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[3].

2.7.9 Other Projects with Potential to Cause Cumulative Impacts to SPA sites

Other projects occurring in the surrounding area has been identified and have been detailed in Section 2.4.5 above. These projects are minor in scale and will not have the potential to combine with the rehabilitation works at Boora Bog to result in cumulative negative impacts to the aquatic environment

[3] 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.

downstream of Boora Bog. It is further noted that given the requirement for Habitats Regulations assessments pertaining to other plans or projects, it can reasonably be assumed that, where necessary, all other plans or project occurring in the wider area surrounding Boora Bog will be subject to mitigation to ensure adverse effects on European Sites are avoided.

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 Boora 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 Boora Bog decommissioning and rehabilitation is the construction stage, no impact source-pathways are identified during the operational stage.

The following impact source-pathways for the 14 SAC sites are evaluated in relation to any potential for significant effects (Table 8 below):

- Direct Impacts to Habitat within SACs
- Indirect impacts habitats within SACs
- Indirect or ex-situ disturbance or displacement of Qualifying Species of SACs
- Indirect/ex-situ mortality of Qualifying Species of SACs

The following impact source-pathways for the 6 SPA sites are evaluated in relation to any potential for significant effects (Table 9 below):

- Direct Impacts to Habitat within SPAs
- Indirect impacts habitats within SPAs
- Indirect or ex-situ disturbance or displacement of Special conservation interests/wetland bird species
- Indirect/ex-situ mortality of special conservation interests/wetland birds of SPAs

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. This evaluation has found that there is no potential for the PCAS at Boora Bog to combine with other plans or projects to result in cumulative negative impacts to the SACs or SPAs occurring in the wider area surrounding Boora Bog. Given this evaluation the potential for the PCAS at Boora Bog to result in cumulative negative impacts to European Sites is **Screened Out.**

Table 8: Evaluation of Possibly Significant Effects to the 14 SAC sites

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
1	River Shannon Callows SAC (000216)	10.5km W	Yes: Downstream	1: **Screened Out** - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within the SPA Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC 2: **Screened Out** - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC. As identified in Section 2.7.2 above rehabilitation works are likely to result in the mobilisation of peat material with the potential for subsequent runoff to the Silver Rivers. The loss of sediment to the Silver River from surface water runoff will coincide with the reprofiling of the bog surface, the blocking of drains and the creation of berms. The maintenance of silt ponds will also have the potential to mobilise sediment in ponds and result in the release of sediment downstream to these watercourses. These works will be completed over a short time scale and during the late spring and summer when surface water runoff will be lower (works at Boora Bog can only be scheduled for this time of the year due to seasonal winter flooding). The release of silt-laden waters to these watercourses during these works will have the potential to result in localised short-term impacts to water quality. The presence of drain blocks and berms at Boora Bog subsequent to the completion of works will retard runoff from the site and minimise the volume of surface water runoff discharging from the bog to these receiving watercourses. The presence of these features will over time reduce the potential for silt-laden surface water

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				runoff to be released to the Silver River and downstream to the Shannon catchment and result in positive water quality effects. The rehabilitation works have also been identified as having the potential to result in changes to the hydrological regime of the Silver River. Where such an impact is likely to occur it will be a localised impact confined to the stretch of this watercourse immediately downstream of Boora Bog and will not have the potential to result in any changes to the hydrological regime of this SAC. The qualifying habitats of the River Shannon Callows SAC that can be influenced by freshwater/lotic processes are [6410] Molinia meadows and [91E0] alluvial woodland. These habitats can also be influenced by freshwater/lotic processes during spate events when the meadow or woodland floor is flood by rivers and streams. All other qualifying habitats of the SAC are terrestrial that are not connected to or at very remote distances from the Boora Bog, such that there will be no potential for the PCAS to result in negative effects to their conservation status. The extent of alluvial woodland or Molinia meadow occurring within the River Shannon Callows SAC have not been mapped in the conservation objectives mapping. However, the known extent of these habitats have been mapped at a national level as part of the Article 17 mapping of the range of these habitats. In addition, the extent of alluvial woodland has also been mapped at a national level as part of the National Survey of Native Woodland. The nearest example of alluvial woodland as mapped on either of these datasets is located at the downstream end of Maddens Island, over 25km downstream from Boora Bog. The nearest location of Molinia meadows as

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				mapped by the Article 17 dataset is approximately 19km downstream from Boora Bog. This example of Molinia meadows is situated in an area of callows that has been subject to arterial drainage and is situated approximately 75m from the bankside of the River Shannon. Any potential impacts to water quality as a result of the PCAS at Boora Bog will be localised to the Silver River downstream of the project site. This will be due to the short-term and relatively small-scale nature of the rehabilitation works and the required timing of the works during the late spring and summer months when the potential for runoff will be minimised. In addition, and as detailed in Section 1.2.3 above, the surface water draining from Boora Bog have not been found to have a negative impact on the water quality of receiving waters downstream. Water quality status for the Silver River, and Brosna River downstream of Boora Bog has been found to be of good status. The implementation of the PCAS at Boora Bog will contribute positively to managing surface water within the Brosna_SC_070 sub-catchment with a downward trajectory in a variety of surface water parameter concentrations predicted to occur over the longer term. Given that Boora Bog is separated from the nearest point of the River Shannon Callows SAC by two sub-catchments of the River Shannon catchment (i.e. the Brosna_SC_060 and the Brosna_SC_080 sub-catchments) and the pathway of approximately 18.5km to the SAC which involves the Silver River draining to the Brosna before draining to the SAC, significant dilution and attenuation of any surface water runoff from Boora Bog will occur within the hydrological pathway prior to the SAC and any contaminants discharging from the bog will have the potential to result in only localised impacts along the Silver River and will be imperceptible further downstream. In light of the significant dilution and attenuation achievable downstream of Boora Bog within the

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				Brosna sub-catchments there will be no potential for inputs of silt-laden surface water runoff or any other contaminants that may arise as a result of the rehabilitation works at concentrations required to result in likely significant effects to the conservation objectives of the qualifying habitats of the River Shannon Callows SAC occurring downstream. Given the short-term nature of the rehabilitation works, the potential for positive impacts to local water quality downstream subsequent to the completion of the rehabilitation works, the downward trajectory in concentrations of potential water quality contaminants following the implementation of PCAS measures, and the small scale nature of other projects occurring in the vicinity of Boora Bog, there will be no potential for the PCAS at Boora Bog to combine with other projects to result in cumulative negative impacts to the qualifying habitats of the River Shannon Callows SAC downstream. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying species The qualifying species of the River Shannon Callows SAC that are dependent on freshwater/lotic habitats are otters. Field surveys completed at Boora Bog recorded no evidence of otters relying on the silt ponds or the stretch of the Boora River downstream of the bog as a resting or breeding site (no holts or couches were identified). Given the absence of otter holts and couches at Boora Bog and the distance of approximately 18.5km from Boora Bog and the River Shannon Callows SAC there will be no potential for the PCAS to result in disturbance or

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				displacement impacts that could in turn result in likely significant effects to the otter population of the River Shannon Callows SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality to species of Qualifying Interests Boora Bog does not support otters, which is the only qualifying features of the River Shannon Callows SAC that could be at risk of mortality as a result of collision with machinery. The PCAS at Boora Bog will not, alone or in-combination with other plans or projects, have the potential to result in mortality to qualifying species of this SAC.
2	Charleville Wood SAC (000571)	13.6km E	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species Qualifying species only relate to Vertigo snail species which are not sensitive to indirect disturbance at the distance of separation from the PCAS at Boora Bog. Furthermore as noted in Section 2.7.3 above no suitable habitat for Vertigo species is supported by Boora Bog.

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species Due to the remote distance separating the PCAS at Boora Bog from this SAC and the habitat supporting Vertigo species there will be no potential for the PCAS to result in ex-situ mortality to this species.
3	Clara Bog SAC (000572)	8.6km NE	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.
4	Clonaslee Eskers and Derry Bog SAC (000859)	11.4km SE	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species Qualifying species only relate to Vertigo snail species which are not sensitive to indirect disturbance at the distance of separation from the PCAS at Boora Bog. Furthermore as noted in Section 2.7.3 above no suitable habitat for Vertigo species is supported by Boora Bog. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species Due to the remote distance separating the PCAS at Boora Bog from this SAC and the habitat supporting Vertigo species there will be no potential for the PCAS to result in ex-situ mortality to this species.
5	Pilgrim's Road Esker SAC (001776)	13km NW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
6	Ferbane Bog SAC (000575)	4.7km NW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.
7	Fin Lough (Offaly) SAC (000576)	13km NW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				Qualifying species only relate to Vertigo snail species which are not sensitive to indirect disturbance at the distance of separation from the PCAS at Boora Bog. Furthermore as noted in Section 2.7.3 above no suitable habitat for Vertigo species is supported by Boora Bog. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species Due to the remote distance separating the PCAS at Boora Bog from this SAC and the habitat supporting Vertigo species there will be no potential for the PCAS to result in ex-situ mortality to this species.
8	Moyclare Bog SAC (000581)	6.9km W	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.
9	Mongan Bog SAC (000580)	13.5km NW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.
10	Island Fen SAC	14.7km S	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.
11	All Saints Bog & Esker SAC	13.2km SW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.
12	Slieve Bloom Mountains SAC	13.2km SE	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 9 SAC Sites: 1. Direct impacts to Habitats of SACs 2. Indirect impacts to Habitats of SACs 3. Indirect/ex-situ disturbance or displacement of Qualifying Species of SACs 4. Indirect or ex-situ mortality of Qualifying Species of SACs
				No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.
13	Ridge Road Rapemills SAC	11.1km SW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Bog from this SAC there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.

Table 9: Evaluation of Possibly Significant Effects to the 4 SPA sites

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
14	River Barrow & River Nore SAC	14.7km SE	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SAC Due to the remote distance separating the PCAS at Boora Boora Bog from this SAC there will be no potential for the PCAS, alone or in-combination with other plans or projects to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SAC Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC. 4: **Screened Out** - No potential for indirect or ex-situ mortality of Qualifying Species No Annex 2 species are listed as qualifying species/qualifying features of interest for this SAC.
1	Middle Shannon Callows SPA (004096)	10.5km W	Yes: Downstream	1: **Screened Out** - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within the SPA Due to the remote distance separating the PCAS at Boora Bog from this SPA there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SPA 2: **Screened Out** - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA As identified in Section 2.7.7 above rehabilitation works are likely to result in the mobilisation of peat material with subsequent runoff to the Silver River. The loss of sediment to the Silver River from surface water runoff will coincide with

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
				the reprofiling of the bog surface, the blocking of drains and the creation of berms. The maintenance of silt ponds will also have the potential to mobilise sediment in ponds and result in the release of sediment downstream to these watercourses. These works will be completed over a short time scale and during the late spring and summer when surface water runoff will be lower (works at Boora Bog can only be scheduled for this time of the year due to seasonal winter flooding). The release of silt-laden waters to this watercourse during these works will have the potential to result in localised short-term impacts to water quality. The presence of drain blocks and berms at Boora Bog subsequent to the completion of works will retard runoff from the site and minimise the volume of surface water runoff discharging from the bog to these receiving watercourses. The presence of these features will over time reduce the potential for silt-laden surface water runoff to be released to the Silver River and downstream to the Shannon catchment. The rehabilitation works have also been identified as having the potential to result in changes to the hydrological regime of Silver River. Where such an impact is likely to occur it will be a localised impact confined to the stretch of these watercourses immediately downstream of Boora Bog and will not have the potential to influence the hydrological regime of this SPA. The wetland habitats of the Middle Shannon Callows SPA that can be influenced by freshwater/lotic processes are the sections of watercourse channels within the SPA and the fringing bankside wetland habitats that are subject to inundation during times of flood. Any potential impacts to water quality as a result of the PCAS at Boora Bog will be localised to the Silver River downstream of the project site. This will be due to the short-term and relatively small-scale nature of the rehabilitation

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
				works and the required timing of the works during the late spring and summer months when the potential for runoff will be minimised. In addition, and as detailed in Section 1.2.3 above, the surface water draining from Boora Bog have not been found to have a negative impact on the water quality of receiving waters downstream. Water quality status for the Silver River and Brosna River downstream of Boora Bog West has been found to be of good status. The implementation of the PCAS at Boora Bog will contribute positively to managing surface water within the Brosna_SC_070 sub-catchment with a downward trajectory in a variety of surface water parameter concentrations predicted to occur over the longer term. Given that Boora Bog is separated from the nearest point of the Middle Shannon Callows SPA by two sub-catchments of the River Shannon catchment (i.e. the Brosna_SC_060 and the Brosna_SC_080 sub-catchments) and the pathway of approximately 18.5km to the SPA which involves the Silver River draining to the Brosna before draining to the SPA, significant dilution and attenuation of any surface water runoff from Boora Bog will occur within the hydrological pathway prior to the SPA and any contaminants discharging from the bog will have the potential to result in only localised impacts along the Silver River and will be imperceptible further downstream. In light of the significant dilution and attenuation achievable downstream of Boora Bog within the Brosna sub-catchments there will be no potential for inputs of silt-laden surface water runoff or any other contaminants that may arise as a result of the rehabilitation works at concentrations required to result in likely significant effects to the conservation objectives of the qualifying habitats of the Middle Shannon Callows SPA occurring downstream. Given the short-term nature of the rehabilitation works, the potential for positive impacts to local water quality downstream subsequent to the completion of the rehabilitation works, the downward trajectory in concentrations of

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
				potential water quality contaminants following the implementation of PCAS measures, and the small scale nature of other projects occurring in the vicinity of Boora Bog, there will be no potential for the PCAS at Boora Bog to combine with other projects to result in cumulative negative impacts to the qualifying habitats of the Middle Shannon Callows SPA downstream. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of special conservation interests/wetland bird population supported by the Middle Shannon Callows SPA The wetland birds of the Middle Shannon Callows SPA can be influenced by freshwater/lotic processes. Field surveys completed at Boora Bog recorded no evidence of wetland birds relying upon Boora Bog and concluded that Boora Bog does not provide a significant role in supporting wintering or breeding populations of wetland birds (see Section 1.2.3 above). Given the absence of wetland birds relying on Boora Bog and the distance of approximately 18.5km from Boora Bog and the Middle Shannon Callows SPA there will be no potential for the PCAS to result in disturbance or displacement impacts that could in turn result in likely significant effects to the wetland bird populations of the Middle Shannon Callows SPA. 4: **Screened Out** - No potential for indirect or ex-situ mortality to species of Qualifying Interests

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
				Boora Bog is not relied upon by populations of wetland bird species and no wetland birds were identified on site during recent surveys in January and April 2021. As such there will be no risk of mortality to wetland bird species as a result of collision with machinery. The PCAS at Boora Bog will not, alone or in-combination with other plans or projects, have the potential to result in mortality to wetland bird population supported by the Middle Shannon Callows SPA.
2	Mongan Bog SPA (004017)	13.8km NW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SPA Due to the remote distance separating the PCAS at Boora Bog from this SPA there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SPA Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of special conservation interest /wetland birds No special conservation interest bird species/wetland bird species of this SPA rely on Boora Bog and there will be no potential for PCAS activities at Boora Bog to result in disturbance or displacement to the populations of special conservation interest bird species/wetland bird species supported by this SPA. 4: **Screened Out** - No potential for indirect or ex-situ mortality to special conservation interest /wetland bird species

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
				Boora Bog is not relied upon by populations of wetland bird species and no wetland birds were identified on site during recent surveys in January and April 2021. As such there will be no risk of mortality to wetland bird species as a result of collision with machinery. The PCAS at Boora Bog will not, alone or in-combination with other plans or projects, have the potential to result in mortality to wetland bird population supported by this SPA.
3	Slieve Bloom Mountains SPA (004139)	10.6km N	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SPA Due to the remote distance separating the PCAS at Boora Bog from this SPA there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SPA Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of special conservation interest /wetland birds No special conservation interest bird species of this SPA rely on Boora Bog and there will be no potential for PCAS activities at Boora Bog to result in disturbance or displacement to the populations of special conservation interest bird species supported by this SPA. 4: **Screened Out** - No potential for indirect or ex-situ mortality to special conservation interest /wetland bird species

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
				Boora Bog is not relied upon by populations of breeding hen harrier and no hen harrier were identified on site during recent surveys in January and April 2021 or previous detailed surveys between 2021 and 2014. As such there will be no risk of mortality to wetland bird species as a result of collision with machinery. The PCAS at Boora Bog will not, alone or in-combination with other plans or projects, have the potential to result in mortality to special conservation interest bird species population supported by this SPA.
4	River Little Brosna Callows SPA (004086)	13.7km SW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SPA Due to the remote distance separating the PCAS at Boora Bog from this SPA there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SPA Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of special conservation interest /wetland birds No special conservation interest bird species/wetland bird species of this SPA rely on Boora Bog and there will be no potential for PCAS activities at Boora Bog to result in disturbance or displacement to the populations of special conservation interest bird species/wetland bird species supported by this SPA. 4: **Screened Out** - No potential for indirect or ex-situ mortality to special conservation interest /wetland bird species

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
				Boora Bog is not relied upon by populations of wetland bird species and no wetland birds were identified on site during recent surveys in January and April 2021. As such there will be no risk of mortality to wetland bird species as a result of collision with machinery. The PCAS at Boora Bog will not, alone or in-combination with other plans or projects, have the potential to result in mortality to wetland bird population supported by this SPA.
5	Dovegrove Callows SPA (004137)	13km SW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SPA Due to the remote distance separating the PCAS at Boora Bog from this SPA there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SPA Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of special conservation interest /wetland birds No special conservation interest bird species/wetland bird species of this SPA rely on Boora Bog and there will be no potential for PCAS activities at Boora Bog to result in disturbance or displacement to the populations of special conservation interest bird species/wetland bird species supported by this SPA. 4: **Screened Out** - No potential for indirect or ex-situ mortality to special conservation interest /wetland bird species

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
				Boora Bog is not relied upon by populations of wetland bird species and no wetland birds were identified on site during recent surveys in January and April 2021. As such there will be no risk of mortality to wetland bird species as a result of collision with machinery. The PCAS at Boora Bog will not, alone or in-combination with other plans or projects, have the potential to result in mortality to wetland bird population supported by this SPA.
6	All Saints Bog SPA (004103)	13.5km SW	No	1: **Screened Out** - No likelihood for significant direct impacts to habitats within the SPA Due to the remote distance separating the PCAS at Boora Bog from this SPA there will be potential for the PCAS, alone or in-combination with other plans or projects, to result in significant direct impacts to habitats within this SAC. 2: **Screened Out** - No likelihood for significant indirect impacts to habitats within the SPA Due to the absence of hydrological pathways and the separation distance between proposed activities and this European Site, no pathways for effects are identified. 3: **Screened Out** - No potential for indirect or ex-situ disturbance or displacement of special conservation interest /wetland birds No special conservation interest bird species/wetland bird species of this SPA rely on Boora Bog and there will be no potential for PCAS activities at Boora Bog to result in disturbance or displacement to the populations of special conservation interest bird species/wetland bird species supported by this SPA. 4: **Screened Out** - No potential for indirect or ex-situ mortality to special conservation interest /wetland bird species

	European Site	Separation Distance from Boora Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Boora 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: 1. Direct impacts to Habitats of SPAs 2. Indirect impacts to Habitats of SPAs; 3. Indirect/ex-situ disturbance or displacement of special conservation interest /wetland species of SPAs. 4. Indirect or ex-situ mortality of Qualifying Species of SPAs.
				Boora Bog is not relied upon by populations of wetland bird species and no wetland birds were identified on site during recent surveys in January and April 2021. As such there will be no risk of mortality to wetland bird species as a result of collision with machinery. The PCAS at Boora Bog will not, alone or in-combination with other plans or projects, have the potential to result in mortality to wetland bird population supported by this SPA.

2.8.1 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 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 Boora Bog, as required. There are a total of 20 European Sites located within the 15km zone of consideration:

Table 10: European Sites Considered within an Extended Buffer

No.	European Site	Site code
1	River Shannon Callows SAC	000216
2	Charville Wood SAC	000571
3	Clara Bog SAC	000572
4	Clonaslee Eskers and Derry Bog SAC	000859
5	Pilgrim's Road Esker SAC	001776
6	Ferbane Bog SAC	000575
7	Fin Lough (Offaly) SAC	000576
8	Moyclare Bog SAC	000581
9	Mongan Bog SAC	000580
10	Island Fen SAC	002236
11	All Saints Bog and Esker SAC	000566
12	Slieve Bloom Mountains SAC	000142
13	Ridge Road SW Rapemills SAC	000919
14	River Barrow & River Nore SAC	002162
15	Mongan Bog SPA	004017
16	Middle Shannon Callows SPA	004096
17	Slieve Bloom Mountains SPA	004139
18	River Little Brosna Callows SPA	004086
19	Dovegrove Callows SPA	004137
20	All Saints Bog SPA	004103

Following screening it can reasonably be concluded that **there is no likelihood of significant effects to these 20 European Sites** because of the proposed project, either alone or in-combination with other plans or projects. **Therefore, the potential for significant effects on these 20 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.**

3 REFERENCES

Anderson, R., Farrell, C., Graf, M., Muller, F., Calvar, E., Frankard, P., Caporn, S., Anderson, P. (2017). An overview of the progress and challenges of peatland restoration in Western Europe. Restoration Ecology, Issue 2 Pages 271-282.

Bonn, A., Allott, T., Evans, M., Joosten, H. & Stoneman, R. (2017) Peatland restoration and ecosystem Services- science, policy and practice. Cambridge University Press.

Bord na Móna 2014. Blocking Drains in Irish raised bogs. The Bord na Móna Raised Bog Restoration Project. Cris, R. Buckmaster, S. Bain, C. Reed, M. (Eds) (2014) Global Peatland Restoration demonstrating SUCCESS. IUCN UK National Committee Peatland Programme, Edinburgh.http://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/IUCNGlobalSuccessApril2014.pdf

Carroll, J., Anderson, P., Caporn, S., Eades, P., O'Reilly C. & Bonn, A. 2009. Sphagnum in the Peak District. Current Status and Potential for Restoration. Moors for the Future Report No 16. Moors for the Future Partnership.

Chanin P (2003). *Ecology of the European Otter.* Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

Chanin, P., (2013) *Otters (The British Natural History Collection).* Whittet Books Ltd.

Charles, P, Edwards, P (eds) (2015). Environmental Good Practice on Site. CIRIA.

Clark, D. and Rieley, J. 2010. Strategy for responsible peatland management. International Peat Society, Finland.

Cramp, S. (1977-1993). *Handbook of the birds of Europe, the Middle East and North Africa: the birds of the Western Palearctic* (7 Vols). Oxford University Press, Oxford.

Crowe, O. (2005). Irelands Wetlands and their Waterbirds: Status and Distribution. Birdwatch Ireland, Newcastle, Co. Wicklow.

Department of Environment, Heritage and Local Government (2009) Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities, DoEHLG, Dublin.

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

Eades, P., Bardsley, L., Giles, N. & Crofts, A. (2003). The Wetland Restoration Manual. The Wildlife Trusts, Newark.

Farrell, C. A. and Doyle, G. J. 2003. Rehabilitation of Industrial Cutaway Atlantic Blanket Bog, NW Mayo, Ireland. Wetlands Ecology and Management, 11, 21-35.

Fox, T. & Stroud, D.A. (2002). The Greenland White-fronted Goose *Anser albifrons flavoristris*. BWP Update 4: 65-68.

Gann, G.D., McDonald, T., Walder, B., Aronson, J., Nelson, C.R., Jonson, J., Hallett, ,J.G., Eisenberg, C., Guariguata, M.R., Liu, J., Hua,F., Echeverría, C., Gonzales, E., Shaw, N., Decleer, K. & Dixon, K.W. (2019). International Principles and Standards for the practice of Ecological Restoration. Restoration Ecology 27(S1): S1–S46.

Hayhow, D.B. (2009). *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*. Available at: https://ueaeprints.uea.ac.uk/id/eprint/10607/1/Thesis_hayhow_d_2009.pdf

Heery, S. (2018) Birds in Central Ireland. 6th mid Shannon Bird Report. 2012-2016. BirdWatch Ireland, Kilcoole, County Wicklow.

Hinde, S., Rosenburgh, A., Wright, N., Buckler, M. and Caporn, S. 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. Moors For The Future Partnership.

EU Birds Directive (2009) Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version) Official Journal of the European Union 26.1.2010 L20/7 – L20/25

EU Habitats Directive (1992) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora Official Journal of the European Communities 22/07/1992 L206/07 – L206/50

Environment and Heritage Service (2002) The Habitats Regulations: A guide for competent authorities. Environment and Heritage Service, Belfast.

European Commission (2018) Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC. https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/EN_art_6_guide_jun_2019.pdf

Fox, A.D, I. Francis, D. Norriss & Alyn Walsh. 2019. Report of the 2018/2019 International Census of Greenland White-fronted Geese. Greenland White-fronted Goose Study / National Parks & Wildlife Service report, Kalo

Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters. Available online at: https://www.fisheriesireland.ie/documents/624-guidelines-on-protection-of-fisheries-during-construction-works-in-and-adjacent-to-waters/file.html

Irish Statute Book (Various) European Communities (Natural Habitats) Regulations 1997 (S.I. 94/97) as amended in 1998 (S.I. No. 233/1998), 2005 (S.I. No. 378/2005) and 2011 (SI No. 477/2011). Dublin, Ireland

Joosten, H. and Clarke, D. 2002. Wise Use of mires and peatlands – Background and Principles including a framework for Decision-making. I.M.C.G. – I.P.S., Jyväskylä, Finland.

Lewis, L.J., Burke, B., Fitzgerald, N., Tierney, T.D. & Kelly, S. (2019). Irish Wetland Bird Survey: Waterbird Status and Distribution 2009/10-2015/16. Irish Wildlife Manuals, No. 106. National Parks and Wildlife Service, Department of culture, Heritage and the Gaeltacht, Ireland.

Lindsay, R., 2010. Peatbogs and Carbon: a Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change (Report to RSPB Scotland, Edinburgh).

Livezey KB, Ferna´ndez-Juricic E, Blumstein DT. 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(1):181-191; e1944-687X. doi: 10.3996/082015-JFWM-078

Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. & Fernandez Valverde, F. (2017) Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

McBride, A., Diack, I., Droy, N., Hamill, B., Jones, P., Schutten, J., Skinner, A. and Street, M. 2011. The Fen Management Handbook, (2011), Scottish Natural Heritage, Perth.

McDonagh, E. (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service. https://www.npws.ie/sites/default/files/publications/pdf/McDonagh_1996_Drain_Blocking_Raised_Bogs.pdf.

NPWS (2017). National Raised Bog SAC Management Plan 2017-2022. Available at: https://www.npws.ie/sites/default/files/files/FOR%20UPLOAD%20Plan(WEB_English)_05_02_18%20(1).pdf

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

NPWS (2013) Lisduff Turlough SAC 000609. Version dated 04.09.2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 30.07.2020

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 30.07.2020

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 30.07.2020

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 30.07.2020

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 30.07.2020

NPWS (2013) Four Roads Turlough SAC 001637. Version dated 06.11.2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 30.07.2020

NPWS (2013) Castlesampson Esker SAC 001625. Version dated 06.11.2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 30.07.2020

NPWS (2015) Lough Funshinagh SAC 000611. Version dated 23.11.2015. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 30.07.2020

NPWS (2013) Site Synopsis: River Shannon Callows SAC 000216. Version dated 12.08.2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 01.07.2020

NPWS (2012) Site Synopsis: Middle Shannon Callows SPA 004096. Version dated 10.01.2012. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 01.07.2020

NPWS (2010) Four Roads Turlough SPA 004140. Version dated 10.06.2010. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 30.07.2020

NPWS (2014) Site Synopsis: River Suck Callows SPA 004097. Version dated 31.10.2014. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 01.07.2020

NPWS (2020) Conservation objectives for River Shannon Callows SAC [000216]. Generic Version 7.0 dated 07.04.2020. Department of Culture, Heritage and the Gaeltacht. Accessed online 01.07.2020

NPWS (2020) Conservation objectives for Middle Shannon Callows SPA [004096]. Generic Version 7.0 dated 07.04.2020. Department of Culture, Heritage and the Gaeltacht. Department of Culture, Heritage and the Gaeltacht. Accessed online 01.07.2020

NPWS (2020) Conservation objectives for River Suck Callows SPA [004097]. Generic Version 7.0. Department of Culture, Heritage and the Gaeltacht. Accessed online 31.07.20

NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report. Edited by:Deirdre Lynn and Fionnuala O'Neill

NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

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

NPWS (2015). Article 12 Reporting: Annex 2: Bird Species status and trends reporting format for the period 2008-2012. Available online at: http://cdr.eionet.europa.eu/Converters/run_conversion?file=/ie/eu/art12/envuvesya/IE_birds_reports-14328-144944.xml&conv=343&source=remote#A082_B

NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes; Available online at: https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Crossing-of-Watercourses-during-the-Construction-of-National-Road-Schemes.pdf

Office for Official Publications of the European Communities (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg.

Office for Official Publications of the European Communities (2001) 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. Office for Official Publications of the European Communities.

OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts. Available online at: https://www.gov.ie/en/publication/957aa7-consent-requirements-constructionalteration-of-watercourse-infrastru/

Quinty, F. and L. Rochefort, 2003. Peatland Restoration Guide, second edition. Canadian Sphagnum Peat Moss Association and New Brunswick Department of Natural Resources and Energy. Québec, Québec.

Renou-Wilson F., Bolger T., Bullock C., Convery F., Curry J. P., Ward S., Wilson D. & Müller C. (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency. Johnstown Castle, Co. Wexford.

Schouten, M.G.C. 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; Staatsbosbeheer, the Netherlands; Geological Survey of Ireland; Dublin.

Scottish Natural Heritage. (2017) '*Survey Methods for use in assessing the impacts of onshore windfarms on bird communities'* Version 2. SNH, Battleby, Scotland.

Scottish Natural Heritage. (2017) '*Assessing Connectivity with Special Protection Areas (SPA's).* SNH, Battleby, Scotland. Available online at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

Scottish National Heritage (2016) *Dealing with Construction and birds. Guidance Version 3*. SNH, Battleby ,Scotland.

Scottish National Heritage (2009) *Monitoring the impact of onshore wind farms on birds - January 2009. Guidance Note*. SNH, Battleby, Scotland.

Thom, T., Hanlon, A., Lindsay, R., Richards, J., Stoneman R. & Brooks, S. (2019). Conserving Bogs – Management Handbook. https://www.iucn-uk-peatlandprogramme.org/sites/default/files/header-images/Conserving%20Bogs%20the%20management%20handbook.pdf

Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A. Sitiwardens, G.M.&Baillie, S.R. (eds). 2002. *The Migration Atlas; movements of the birds of Britain and Ireland.* T. & A.D.Poyser, London.

Wetlands International. (2018). *Waterbird Population Estimates*. wpe.wetlands.org.

Wheeler, B. D., & Shaw, S. C. (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction. London: HMSO.

Wittram, B. W., Roberts, G., Buckler, M., King, L., & Walker, J. S. (2015). A Practitioners Guide to Sphagnum Reintroduction. Edale: Moors for the Future Partnership.

Appendix A FONSE

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 Boora Bog. 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 Boora Bog, as required. There are a total of 20 European sites located within the 15km zone of consideration:
<table>
<tr><th>No.</th><th>European Site</th><th>Site code</th></tr>
<tr><td>1</td><td>River Shannon Callows SAC</td><td>000216</td></tr>
<tr><td>2</td><td>Charville Wood SAC</td><td>000571</td></tr>
<tr><td>3</td><td>Clara Bog SAC</td><td>000572</td></tr>
<tr><td>4</td><td>Clonaslee Eskers and Derry Bog SAC</td><td>000859</td></tr>
<tr><td>5</td><td>Pilgrim's Road Esker SAC</td><td>001776</td></tr>
<tr><td>6</td><td>Ferbane Bog SAC</td><td>000575</td></tr>
<tr><td>7</td><td>Fin Lough (Offaly) SAC</td><td>000576</td></tr>
<tr><td>8</td><td>Moyclare Bog SAC</td><td>000581</td></tr>
<tr><td>9</td><td>Mongan Bog SAC</td><td>000580</td></tr>
<tr><td>10</td><td>Mongan Bog SPA</td><td>004017</td></tr>
<tr><td>11</td><td>Middle Shannon Callows SPA</td><td>004096</td></tr>
<tr><td>12</td><td>Slieve Bloom Mountains SPA</td><td>004139</td></tr>
<tr><td>13</td><td>Island Fen SAC</td><td>002236</td></tr>
<tr><td>14</td><td>River Barrow & River Nore SAC</td><td>002162</td></tr>
<tr><td>15</td><td>All Saints Bog and Esker SAC</td><td>000566</td></tr>
<tr><td>16</td><td>Slieve Bloom Mountains SAC</td><td>000142</td></tr>
<tr><td>17</td><td>Ridge Road SW Rapemills SAC</td><td>000919</td></tr>
<tr><td>18</td><td>Mongan Bog SPA</td><td>004017</td></tr>
<tr><td>19</td><td>Middle Shannon Callows SPA</td><td>004096</td></tr>
<tr><td>20</td><td>Slieve Bloom Mountains SPA</td><td>004139</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 Boora Bog group (Ref. P0500-01). 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. Boora Bog is part of the Boora bog group. Boora Bog is located in Co. Offaly

A document titled 'Boora Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2021' has been prepared specifically to describe the proposed</td></tr>
</table>

Finding of No Significance Effects Report	
	decommissioning and rehabilitation measures at Boora Bog as appended to this document as Appendix B. **Purpose:** The decommissioning and Rehabilitation of **Boora Bog** as required under IPC license.
Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?	No
Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?	Yes: In addition to the proposed decommissioning and rehabilitation plan the following projects were considered: 1 Other BnM Bog Group Decommissioning and Rehabilitation 2 Turbary 3 Agriculture 4 Local Authority Development Plans
The Assessment of Significant Effects	
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site	The results are that **is there is no *potential* for the Decommissioning and Rehabilitation plan to cause any effects to the following 20 no. European Sites:** **No. — European Site — Site code** 1 River Shannon Callows SAC 000216 2 Charville Wood SAC 000571 3 Clara Bog SAC 000572 4 Clonaslee Eskers and Derry Bog SAC 000859 5 Pilgrim's Road Esker SAC 001776 6 Ferbane Bog SAC 000575 7 Fin Lough (Offaly) SAC 000576 8 Moyclare Bog SAC 000581 9 Mongan Bog SAC 000580 10 Mongan Bog SPA 004017 11 Middle Shannon Callows SPA 004096 12 Slieve Bloom Mountains SPA 004139 13 Island Fen SAC 002236 14 River Barrow & River Nore SAC 002162 15 All Saints Bog and Esker SAC 000566 16 Slieve Bloom Mountains SAC 000142 17 Ridge Road SW Rapemills SAC 000919 18 Mongan Bog SPA 004017 19 Middle Shannon Callows SPA 004096 20 Slieve Bloom Mountains SPA 004139 Therefore, these EU sites have been 'Screened Out' at Stage One of the Appropriate Assessment process.

Finding of No Significance Effects Report			
Explain why these effects are not considered significant	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 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 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 these 20 European sites as a result of the proposed decommissioning and rehabilitation, as described in Appendix B. With regard to the 20 listed European Sites, Significant Effects, in the absence of mitigation (which is not considered at Screening Stage) are not considered possible or likely via identified source-pathway linkages.	Bord na Mona, Leabeg, Blueball, Tullamore, Co. Offaly, R35 P304.

Appendix B Boora Bog: Cutaway Bog Decommissioning and Rehabilitation Plan 2020

Boora Bog

Cutaway Bog Decommissioning and Rehabilitation Plan 2021

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0500-01:

> "*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 Boora 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 Boora Bog.

In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. P0500-01, 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 Boora 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 Boora Bog as environmental stabilisation, re-wetting and setting the bog on a trajectory towards development of naturally functioning peatland and wetland habitats.

Lough Boora Discovery Park is a key amenity in the midlands of Ireland that has been developed at Boora Bog over a long period. Rehabilitation will take account of existing land-uses and infrastructure and will seek to positively integrate peatland re-wetting while maintaining other land-uses, particularly amenity.

Any consideration of any other future after-uses for Boora 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:	Boora Bog Decommissioning and Rehabilitation Plan 2020
Document File Path:	G:\Ecology Team\EPA draft rehab plans 2017 word docs\Boora ref.500\Boora
Document Status:	Draft

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

Rev. 1.0	Author(s):	Checked By:	Approved By:
Name(s):	CC	MMC	MMC
Date:	10/12/2020	1/01/2021	26/02/2021

Rev. 1.1	Author(s):	Checked By:	Approved By:
Name(s):	CC/SD	MMC	MMC
Date:		26/04/2021	26/04/2021

Rev. 1.2	Author(s):	Checked By:	Approved By:
Name(s):	SD	MMC	MMC
Date:		10/06/2021	10/06/2021

Rev. 1.3	Author(s):	Checked By:	Approved By:
Name(s):	SD	MMC	MMC
Date:		30/06/2021	30/06/2021

Note: This finalised version of the Rehabilitation Plan has been updated to take account that several planning actions listed in Section 8.1 have been completed and have been incorporated into the plan. This includes an Appropriate Assessment of the rehabilitation plan. See Boora Decommissioning and Rehabilitation Plan – Addendum 1 for more details.

Table of Contents

SUMMARY

Name of bog: Boora **Area:** 1847.1 ha

Site description:

- Boora Bog is located in Co. Offaly, ca.1.5km north of Kilcormac Village. It is part of the Boora Bog group. The Bord na Móna Works and Offices is located at Leabeg within Boora bog. The overall Boora bog is divided into two main sections, often assigned the designation Boora East and Boora West.
- Boora Bog has been in peat production since the early 1950's. The peat was primarily harvested for fuel peat to be used at Cloghan Power Station, West Offaly Power in Shannonbridge and Derrinlough Brickette Factory in Co. Offaly. Cloghan Power Station was decommissioned in 1990s.
- Large sections of the Boora Bog were cutaway at an earlier stage. Areas were planted with conifer forestry and were developed as farmland in the 1980's-1990s. Other sections were re-wetted and allowed to develop as naturalising mosaic of scrub, woodland and wetland.
- The Lough Boora Discovery Park has been in development since the 1990s and a Visitor Centre was officially opened at Boora in 2014. The Discovery Park includes 5 walking or cycling trails, several lakes (Loch an Dochas, Boora Lake, Tumduff Beag & Finnamores), wetland areas (Tumduff, Leabeg), a sculpture park & bird watching hides etc. Lough Boora Discovery Park now extends to over 2000 hectares and has a network of off-road walking and cycle routes within a perimeter of approximately 20 kilometres, and includes Boora Bog. The Offaly Way way-marked walking trail passes through Lough Boora Discovery Park. Lough Boora Discovery Park is now acknowledged as a nationally important outdoor amenity area and has attracted over 100,000 visitors a year for several years. The wider Boora area is recognised as an important bird-watching area in the midlands and the former cutaway attracts significant breeding and wintering waders and wildfowl. The Grey Partridge Conservation Project is located adjacent to LBPD and is managed for conservation by NPWS.
- A substantial portion of Boora is already rehabilitated/stabilised.
- Industrial peat production in the remaining active peat production areas to the west of the site ceased in 2019.

Rehabilitation goals and outcomes

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

- Meeting conditions of the IPC licence;
- Stabilisation or improvement in water quality parameters (e.g. suspended solids);
- Environmental stabilisation.
- Optimising hydrological conditions in the former area recently in industrial peat production for the further development of wetland, Reed swamp, wet woodland and fen habitats on shallow cutaway peats, along with management of existing wetlands.
- The site has already developed a mosaic of pioneer cutaway habitats, notably wetland, Birch woodland and fen habitats and is largely stabilised. These areas will be assessed for potential for targeted actions to enhance existing wetland habitats and create small wetland features.
- Integrating rehabilitation measures with current infrastructure and land-uses,
- Supporting current amenity land-use and potential future amenity. Lough Boora Discovery Park is an important amenity area.
- Rehabilitation will support the National Policies on Climate Action and GHG mitigation by maintaining and enhancing the current residual peat storage capacity of the bog (locking the carbon into the ground). It is expected that the bog will have reduced emissions (reduced source) as it develops naturally

functioning wetland and peatland habitats. It will also support Ireland's commitments towards Water Framework Directive and the National River Basin Management Plan 2018-2021.
- Optimising hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future.

Scope of rehabilitation

The principal scope of this rehabilitation plan is defined by:

- The area of Boora Bog.
- EPA IPC Licence - Ref. P0500-01. 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 Boora Bog optimising **climate action benefits**.
- The local environmental conditions of this bog. Boora Bog has variable environmental characteristics with a range of residual peat depths, hydrology and topography. Much of the bog has been cutaway and has already been rehabilitated or developed for other land-uses.
- The key goals and outcomes of rehabilitation at this bog outlined above.
- To minimise potential impacts on neighbouring land, some boundary drains around Boora Bog will be left unblocked, as blocking boundary drains could affect adjacent land.
- Other constraints including archaeology and rights of way.
- Current Land-uses. Lough Boora Discovery Park is an important midlands amenity site. It is not proposed to carry out any intensive rehabilitation actions to change or negatively affect any amenity infrastructure or existing land-uses.
- Other areas are managed for conifer forestry by Coillte. It is not proposed to carry out any measures that would negatively affect Coillte managed lands.
- Areas developed as farmland in the 1980s-1990s and sold to local farmers are not considered as part of the scope of this rehabilitation plan.

Criteria for successful rehabilitation:

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

- Rewetting of residual 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 measures and this will be measured by an aerial survey after rehabilitation is completed. (IPC Licence validation).
- Stabilising/improving key potential emissions to water (e.g. suspended solids). This will be measured via water quality monitoring (suspended solids and ammonia) for at least 2 years after the rehabilitation has been completed (IPC Licence validation).
- Reducing pressure from peat production on the local river catchment (IPC Licence validation). This will be measured by the EPA WFD monitoring programme.
- Optimising the extent of suitable hydrological conditions for climate action (Climate action verification). This will be measured by an aerial survey after rehabilitation has been completed.
- Reduction in carbon emissions (Climate action verification). Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.

- Setting the site on a trajectory towards establishment of a mosaic of compatible habitats including wetland, fen, Reed swamp, wet woodland, heath, embryonic *Sphagnum*-rich peat forming communities, scrub and Birch woodland communities, where conditions are suitable, and eventually towards a reduced Carbon source (Climate action verification). Some areas will naturally be dry and develop Birch woodland and other drier habitats. It will take some time for stable naturally functioning habitats to fully develop at Boora Bog.
- Improvement in biodiversity and ecosystem services (Climate action verification).

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

Summary of measures:

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

- Planning actions, including developing a detailed site plan and carrying out a hydrology and drainage assessment.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation.
- Carry out proposed measures, which will be a combination of drain blocking, peat field re-profiling, wetland creation, targeted drain-blocking within stabilised areas and fertiliser applications targeting bare peat on headlands, high fields and other areas.
- Phase 2 measures may include seeding of targeted vegetation and inoculation of *Sphagnum* in compatible 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.
- 2021: Short-term practical actions.
- 2021-2024: Any Long term practical actions; Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.
- 2024: Decommission silt-ponds, if necessary.

Budget and Costing

- The rehabilitation plan outlined in this document is predicated on the understanding that it is the Minister's intention to support, via the Climate Action Fund, Bord na Móna in developing a package of measures, 'the proposed Scheme', for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme'. *However, only the additional costs associated with the additional and enhanced rehabilitation, i.e, measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support.*
- In relation to the pre-existing Condition 10 IPC Licence requirement to carry out what can be termed the 'standard' decommissioning and rehabilitation, Bord na Móna maintains a Provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. This is updated every year. For more information see the Bord na Móna Annual Report (Bord na Móna 2020). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.

Monitoring, after-care and maintenance

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

- Quarterly monitoring assessments of the site to determine the general status of the site, assess the condition of the rehabilitation work, 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 survey, after rehabilitation measures are implemented. It is proposed that sites can be monitored against this baseline in the future.
- Biodiversity Ecosystem services will be monitored using specific indicators.
- Carbon emissions monitoring only be carried out on a small proportion of BnM sites to develop better understanding of carbon emissions and GHG emission factors from different types of BnM sites and will be developed on association with other established research programmes. Reduction in carbon emissions will be modelled by a combination of habitat condition assessment and application of appropriate carbon emission factors derived from other sites. Baseline monitoring (habitat condition) will be carried after rehabilitation is completed (during the Scheme). It is proposed that sites can be monitored against this baseline in the future.
- Monitoring as part of Climate Action Verification is dependent on support from the Climate Action Fund or other external funding.

Validation and IPC Licence surrender

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

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

1. INTRODUCTION

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Boora bog group (Ref. P0500-01). 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. Boora bog is part of the Boora bog group (see Appendix I for details of the bog areas within the Boora Bog Group). Boora Bog is located in Co. Offaly.

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0500-01:

> "*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 actions;
- Budget and Costings; and
- Associated aftercare, maintenance and monitoring.

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme on its peatlands. Note this proposal is also known colloquially as the 'Peatlands Climate Action Scheme' (PCAS). The additional costs of the 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 as peatlands suitable for this scheme. 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.

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

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

- more intensive management of water levels through outfall management, drain-blocking and management of water levels within the bog;
- re-profiling/re-wetting of extant deep peat that will deliver suitable conditions for development of wetlands, fens and bog habitats;
- targeted fertiliser applications,
- seeding of targeted vegetation; and
- proactive inoculation of suitable peatland areas with *Sphagnum.*

These are collectively designed to optimise hydrological conditions (ideally and where possible water-levels <10 cm) for climate action benefits and to accelerate the trajectory of the site towards a naturally functioning ecosystem, and eventually a reduced carbon source/carbon sink again. (In some areas of dry cutaway this trajectory will be significantly longer and it is not feasible in the short-term to re-wet some areas. These areas will develop other habitats. The key to optimising climate action benefits is the restoration of suitable hydrological conditions and more intensive intervention means that the extent of suitable hydrological conditions can be optimised.

These measures are designed to encourage the development of peat-forming habitats, where possible. They are also designed to further slow the movement of water across the site (with the site acting similarly to a constructed wetland), slowing the release of water (improving local water attenuation) and water quality is also expected to improve as the site returns to a naturally functioning peatland ecosystem. The measures will also accelerate the development of new habitats for a range of species under pressure in the wider landscape and will have the potential to develop habitats (e.g. Annex I raised bog, wetlands that support wader water birds of conservation interest) that will contribute towards the delivery of national biodiversity objectives.

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

1.1 Constraints and Limitations

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

Boora Bog is also referred to as comprising ‘Boora East’ and ‘Boora West’ and the use of these designations, such as in mapping, should be interchangeable with ‘Boora’.

This rehabilitation plan takes account of the **current land-uses** of Boora Bog. Amenity and Biodiversity and ecosystem services have been identified as the current primary land use at Boora Bog, with some ecosystem services already in place. Sections are also used for conifer forestry and are managed by Coillte.

Bord na Móna will continue to review the future after-use of its land-bank. Any consideration of any other future after-uses for Boora 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.

Industrial peat extraction at Boora Bog permanently ceased in 2019.

The area in recent peat production is bare peat. however substantive areas of Boora are recolonising or have been for a number of years, with resultant pioneering vegetation now in situ. In addition, some rehabilitation has been carried out previously, and much of the land area included within the current Bog Boundary is stabilised.

It is anticipated that the combination of active enhanced rehabilitation measures and further natural colonisation will quickly support the further development of pioneer vegetation. Nevertheless, it will take some time (30-50 years) for naturally functioning peatland ecosystems to fully re-establish across the entirety of Boora Bog.

Parts of Boora Bog (outside the areas owned and under the control of Bord na Móna) are currently used by domestic turf cutters to harvest pea., 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 Boora 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.

Other land-uses such as farming and nature conservation (Grey Partridge Conservation Area – owned and managed by NPWS) occur on the margins of Boora Bog. While these areas were cutaway originally, they were rehabilitated in the 1980s and occur outside the IPC licenced area. These areas are outside the scope of the rehabilitation plan.

An existing amenity land use- the Lough Boora Discovery Park and visitor centre was officially opened at Boora in 2014 and includes 5 walking or cycling trails, four lakes, a sculpture park, bird watching hides etc. Lough Boora Discovery Park now extends to over 2000 hectares and has a network of off-road walking and cycle routes within a perimeter of approximately 20 kilometres.

Bord na Móna maintains and operates one of its primary facilities (office and workshop) at Leabeg, within Boora Bog boundary.

A community lease to facilitate a local fishing club is in place at Finnamores.

A ‘Sensory Garden’, utilising another land lease is also in place, with a planned expansion recently announced.

A BOGFOR trial is located within the Boora Bog boundary.

A Bord na Móna willow biomass trial area, is also present.

The Irish Wildlife Trust (hereafter IWT) now manage a land folio at Lough Boora as a Nature Reserve, which was formerly within the IPC license extent, and is now outside the BNM Boora Bog boundary.

The Offaly Way, a national waymarked route, traverses Boora Bog.

Rehabilitation in other areas of the bog may also be constrained due to other property issues or issues such as rights of way. There are known archaeology records at or near Boora itself (a Mesolithic habitation site is known from Lough Boora for example).

2. METHODOLOGY

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

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

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

2.1 Desk Study

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

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

- Lindsay (2010). Peatbogs and Carbon: a Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change.
- Mackin *et al*. (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al*. (2011). The Fen Management Handbook (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised Bog Special Areas of Conservation management plan. Department of Arts, Heritage and the Gaeltacht.
- Quinty & Rochefort (2003). Peatland Restoration Guide, second edition. Canadian *Sphagnum* Peat Moss Association and New Brunswick Department of Natural Resources and Energy.
- Regan*, et. al.* (2020). Ecohydrology, Greenhouse Gas Dynamics and Restoration Guidelines for Degraded Raised Bogs. EPA Research Report. Prepared for the Environmental Protection Agency by Trinity College Dublin.
- Renou-Wilson *et al*. (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.
- Schouten (2002). Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies. Dúchas - The Heritage Service of the Department of the Environment and Local Government, Ireland;
- Thom (2019). Conserving Bogs – Management Handbook.
- Wheeler & Shaw (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction.
- Wittram *et al*. (2015). A Practitioners Guide to Sphagnum Reintroduction. Moors for the Future Partnership.

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

- Boora Integrated Pollution Control Licence;
- Boora 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 Sur
- vey of Ireland - Groundwater Database (www.gsi.ie);
- Historic Environment Viewer at https://webgis.archaeology.ie/historicenvironment/
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive catchments.ie/maps/ Map Viewer (www.catchments.ie);
- OPW Indicative Flood Maps (www.floodmaps.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie);
- River Basin Management Plan for Ireland 2018 – 2021;
- Bord na Móna Annual Report 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

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

2.3 Field Surveys

Bord na Móna carried out a baseline ecological survey of all of its properties in 2009-2012 and developed habitat maps. As part of this exercise, Boora Bog was surveyed in 2011. Additional ecological monitoring and visits have taken place at Boora Bog between 2013-2020 to inform rehabilitation planning, where required.

A final site visit to inform the current Rehab Plan took place by BNM Ecologists in December of 2020 and habitat maps have been updated, where required, accordingly.

This rehabilitation plan is informed by the original baseline survey as well as subsequent confirmatory site walk-over surveys and visits, and updates to baseline data.

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

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

3. SITE DESCRIPTION

Boora Bog is located in Co. Offaly, ca.1.5km north of Kilcormac Village (see Figure 3.1). It is part of the Boora Bog group. The Bord na Móna Works and Offices is located at Leabeg within Boora bog. The overall Boora bog is divided into two main sections, often assigned the designation Boora East and Boora West. There is access to the bog via several public roads. The bog is flanked to the south and west by the Silver [Kilcormac] River, but is also drained by the Boora Stream, the Pollagh Stream [Brosna], and the LEA_BEG, all of which flow northwards to the Brosna River.

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.

Boora is an older production bog with earliest production dating back to the early 1950's. The western section i.e. Boora West contains the most recently active milled peat production areas.

3.1 Status and Situation

3.1.1 Site history

Boora Bog has been in peat production since the early 1950's. The peat was primarily harvested for fuel peat to be used in Cloghan Power Station, Derrinlough Brickette Factory and West Offaly Power in Shannonbridge, Offaly. Most the site is now cutaway and recent peat extraction was confined to a small portion of the western side of the site.

Research into the rehabilitation of cutaway industrial peatlands has been ongoing by Bord na Móna since the 1960s. Initially the main focus was on finding a commercial after-use for these areas and several experimental trials were established across the range of Bord na Móna peatlands to determine the success of vegetable growing, forestry, agricultural grassland and biomass crops. In later years, the focus has shifted towards allowing the post-industrial peatland areas to naturalise and revert to wetland and dry wilderness areas, as well as developing alternative commercial uses such as using cutaway for renewable energy.

Several rehabilitation measures comprising naturalisation and development of alternative after-uses have been already explored at the Boora Bog Group, including coniferous forestry, biomass, agricultural grassland, amenity use, rare species conservation management (specifically Grey Partridge) and wetland creation. While agricultural fields and coniferous forestry have been developed successfully on the cutaway bogs at Boora, these require financial investment that at this time exceeds any potential commercial output value. Former areas of Boora Bog that were developed for agriculture have since been sold to local farmers (1990s). In addition, two large blocks of cutaway were also transferred to NPWS ownership for Grey Partridge conservation. Boora is the only Grey Partridge site in Ireland (Figure 8.1).

3.1.2 Current land-use

The Lough Boora Discovery Park encompasses all areas relating to amenity and biodiversity www.loughboora.com. (Figure 3.3-3.4).

The Lough Boora Discovery Park has been in development since the 1990s and a Visitor Centre was officially opened at Boora in 2014. The Discovery Park includes 5 walking or cycling trails, several lakes (Loch an Dochas, Boora Lake, Tumduff Beag & Finnamores), wetland areas (Tumduff, Leabeg), a sculpture park & bird watching

hides etc. Lough Boora Discovery Park now extends to over 2000 hectares and has a network of off-road walking and cycle routes within a perimeter of approximately 20 kilometres, and includes Boora Bog. The Offaly Way way-marked walking trail passes through Lough Boora Discovery Park. Lough Boora Discovery Park is now acknowledged as a nationally important outdoor amenity area and has attracted over 100,000 visitors a year for several years. The Lough Boora Sculpture Park has significant cultural value and is acknowledged as being of international importance. The wider Boora area is recognised as an important bird-watching area in the midlands and the former cutaway attracts significant breeding and wintering waders and wildfowl. The Grey Partridge Conservation Project is located adjacent to LBPD and is managed for conservation by NPWS.

The Lough Boora Mesolithic site is located towards the centre of the site and is part of a former lake basin. This area is less developed and contains several features of significant ecological interest. Part of this area is designated as a potential National Heritage Area. It is almost completely surrounded by conifer plantation and can be accessed by the main cycle path, which runs through this section. Much of the former Boora lake basin was also drained. This area is part owned by the IWT and it is managed for nature conservation. The adjacent Mesolithic storm beach contains diverse calcareous grassland (GS1).

An active rail line is still operational between Boora West and other sites to the west of the site. Decommissioning of this infrastructure is dependent on the general cessation of industrial peat production for supply of peat to Derrinlough Brickette Factory.

Several conifer plantations were established on this site in the 1980's by Coillte, with the site being leased by Coillte. Stands of mainly Lodgepole Pine and Sitka Spruce were planted on the site. Mixed broadleaves with Oak and Birch were also planted on one section of the site.

3.1.3 Socio-Economic conditions

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

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

In respect of Boora Bog, jobs included in the above study would have included those to facilitate extraction of peat at Boora, and associated processing and transfer to the relevant power station, in addition to staff employment at workshops and the main Bord na Móna facility located at Leabeg.

As the primary employer in many Midland counties, Bord na Móna played a central role in building communities through a number of 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."

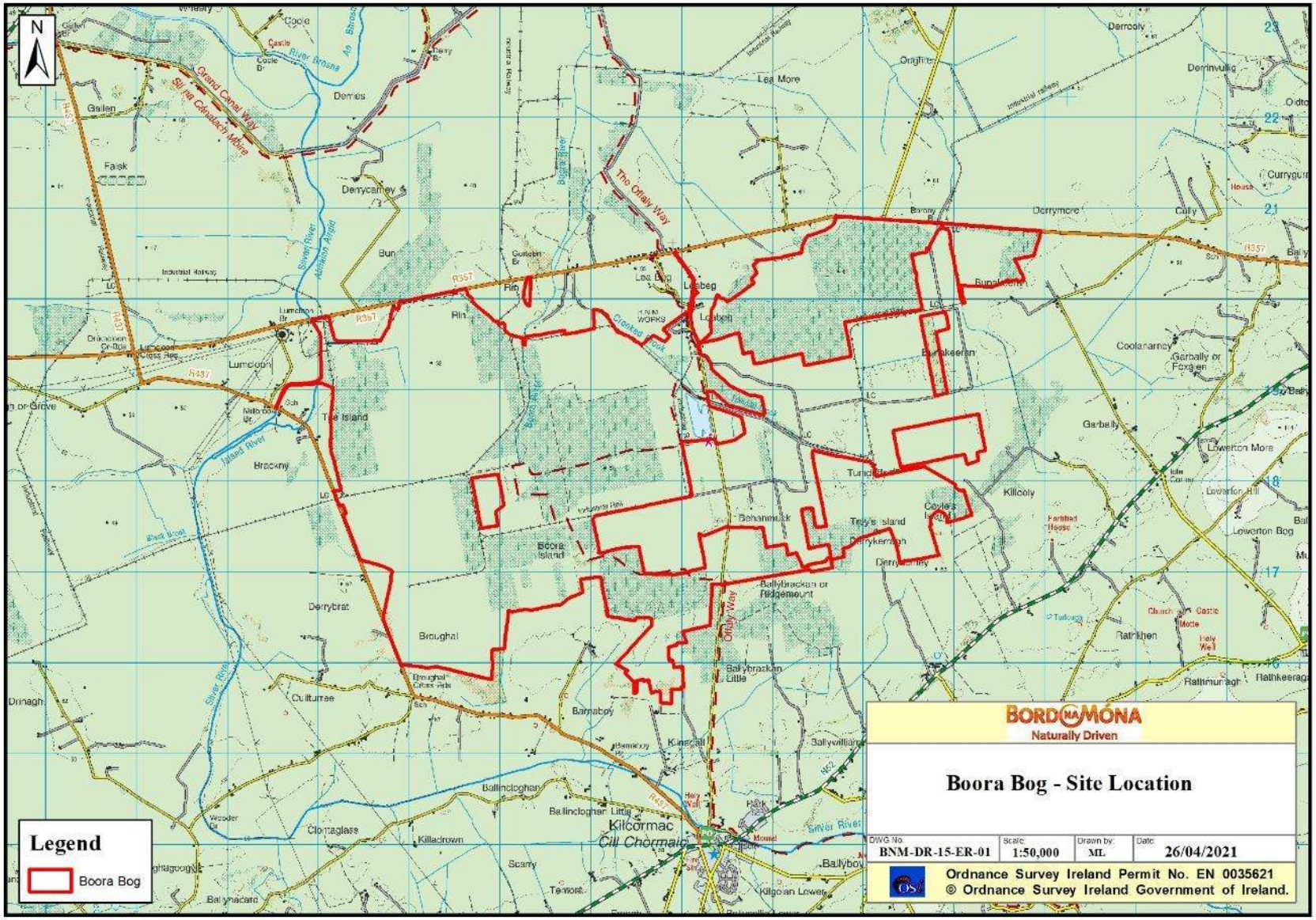


Figure 3.1 Location of Boora Bog in context to other Bord na Móna bogs and surrounding area

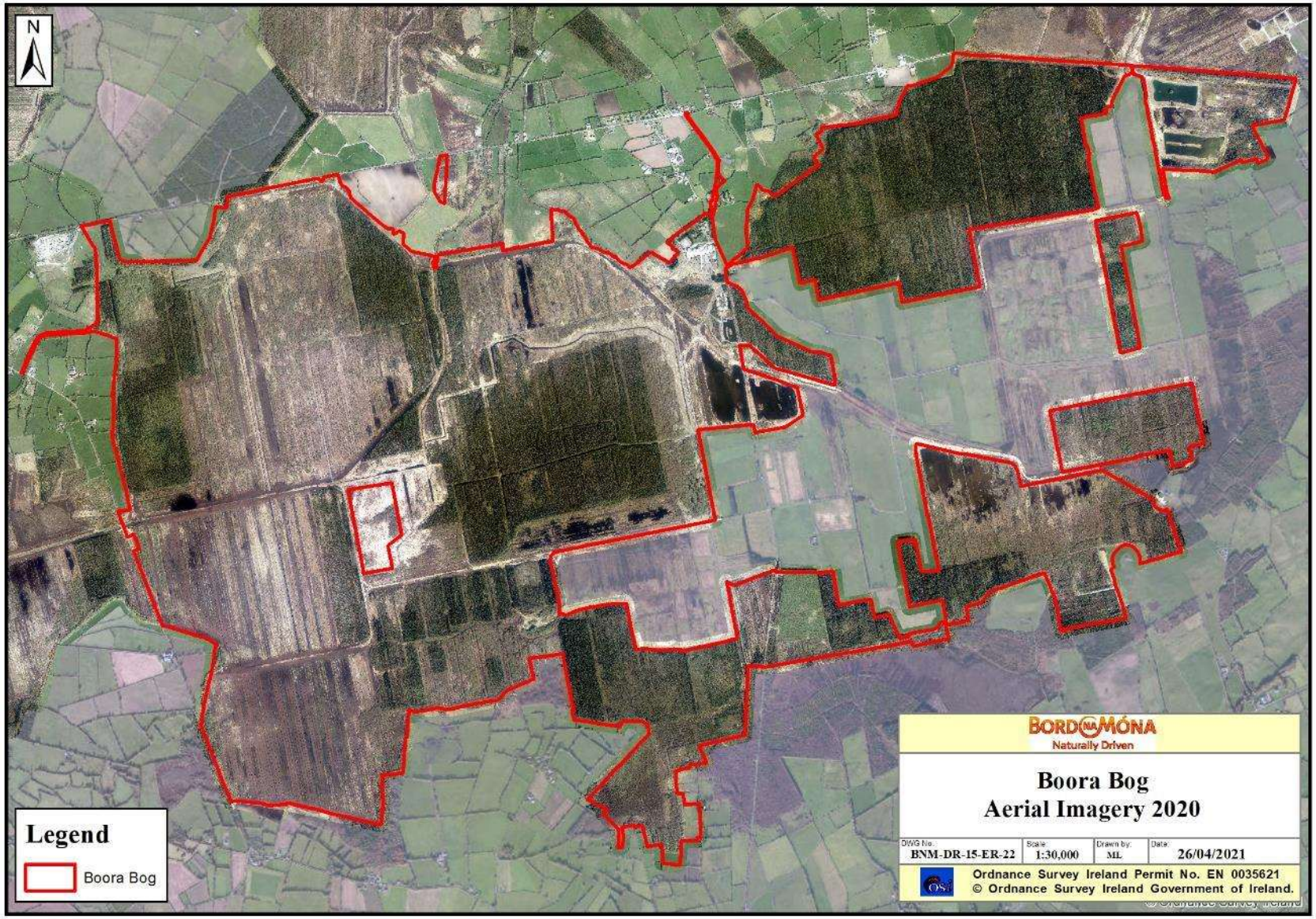


Figure 3.2 Aerial photo of Boora Bog.

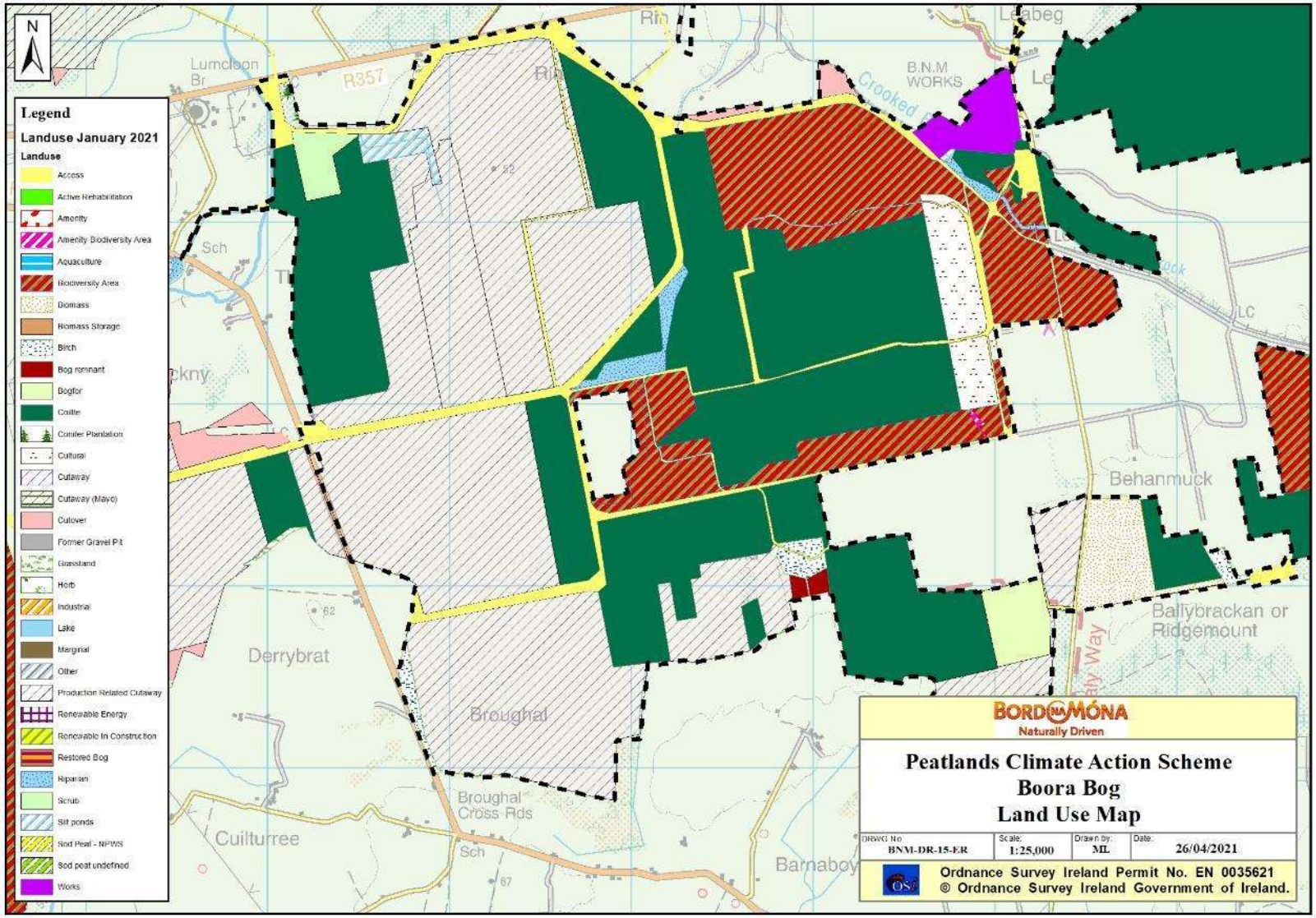


Figure 3.3. Land use at Boora West.

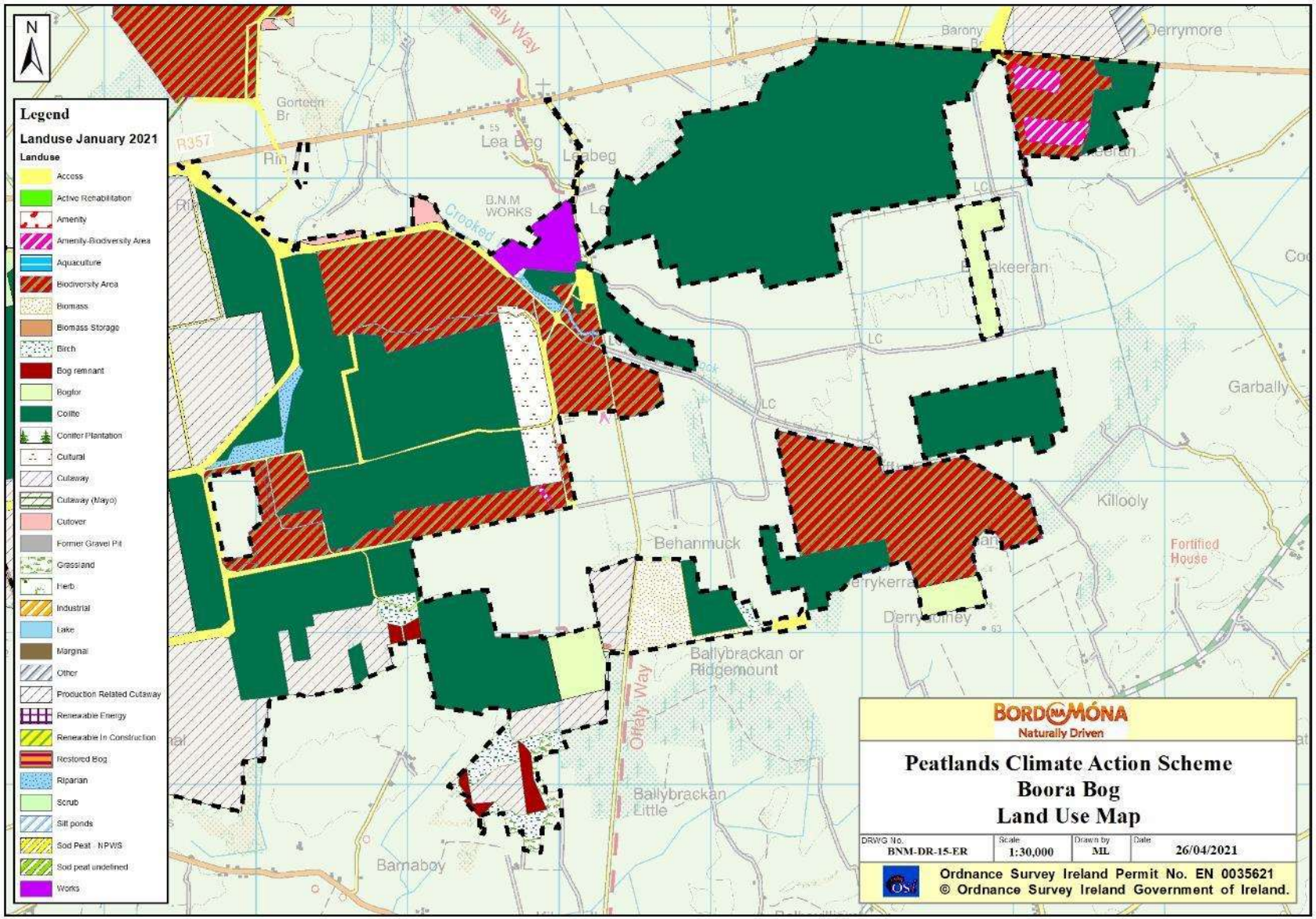


Figure 3.4 Land-use at Boora East

3.2 Geology and Peat Depths

3.2.1 Sub-soil geology

The underlying geology at Boora Bog is Visean Limestones (undifferentiated), along with Waulsortian Limestones, described as massive unbedded lime-mudstone.

Subsoils underlying extant peat are significantly lacustrine calcareous marls, and glacial sub-soil mounds and ridges are being exposed in places (Figure 8.1).

3.2.2 Peat type and depths

Commercial peat extraction has been undertaken at Boora Bog since the early 1950's. Most the site is cutaway with shallow residual peat depths or exposed sub-soils (Figure 8.1).

As a result, peat depths of 2-3 m mainly occur within the south-western portion of Boora west, that has been in recent peat extraction.

3.3 Key Biodiversity Features of Interest

Boora bog is located in Co. Offaly, with its centre ca.4.5 km north of Kilcormac. The Bord na Móna Works and Offices is located at Leabeg and is part of the Boora bog. The overall Boora bog is divided into two main sections, Boora East and Boora West for ease of survey. The minor road that connects Leabeg and Kilcormac is the main division between these two sections, with all of the BnM property to the east of the road described in this report.

3.3.1 Current habitats

<u>Boora East</u>

Boora East contains a large area of rehabilitated cutaway. This bog is one of the older bogs that went into production at the beginning of industrial peat production and therefore has some of the oldest developing cutaway. Much of the cutaway has been rehabilitated as agricultural grassland, conifer plantation, or as part of the Lough Boora Discovery Park and has already stabilised. The rehabilitation of the cutaways of Lough Boora Discovery Park has been described in detail by Egan (2008). The improved grassland has been sold to local farmers and a large area of cutaway "known as the Marl square' and a further section in Boora South has since been sold to the NPWS, who now manage this land for Grey Partridge conservation. This has fragmented Boora east into several 'isolated' sub-sections. For ease of description, each of these sub-sections is described separately as follows.

Finnamores Lakes

The Finnamores lakes are located at the north-east corner of Boora east. This area is now managed in part by a local angling club (CACI). Two fishing lakes were constructed by digging into the sub-soil, creating a basin and using the spoil around the lake to create embankments. Both lakes are relatively shallow with calcareous water chemistry and there is likely to be influence from underlying marl and glacial sub-soil/gravel. The lakes attract some water birds with Mallard, Tufted Duck, Little Grebe and feral geese all present.

The use of the spoil from the lake basins around the lake margins has had the effect of creating relatively diverse calcareous grassland. This grassland is in the pioneer phase and is still developing.

The wetlands that have developed associated with the lakes are quite diverse, structurally and at species level. The wetlands in the central area host flocks of roosting Lapwing and other wintering or passage waders. The central wetland margins are vegetated with Bog Cotton-dominated vegetation and Bottle Sedge-dominated vegetation. The wetlands are used by breeding Lapwing and Redshank.

The wetland located adjacent to the northern lake has a highly calcareous water chemistry. This wetland is quite structurally diverse and is infilling with stands of Common Reed and Bottle Sedge. The western margin adjacent to the lake has some diverse sedge-rich vegetation dominated by Yellow Sedge. This community is associated with rich fen habitat. Further east there is extensive tufa precipitation out of the water along around the wetland margins, creating a layer of tufa over the remnant peat or marl that forms the surface. There are some sections where there is extensive development of Charophtyes in the shallow water.

Further south there is similar wetland development. The eastern margin adjacent to the conifer plantation has some typical Birch scrub mosaic and poor fen dominated by Soft Rush. There is one particular wetland area that extends into the conifer plantation that is developing typical fen carr woodland. The wetland vegetation is dominated by Bottle Sedge while the scrub is dominated by Willow.

This sub-section contains a large rabbit population. The rabbits have had a significant impact on the development of the vegetation with a low-cropped grass sward adjacent to the lake and areas of bare peat on the embankment stripped of most vegetation apart from Brambles.

Tumduff Mór wetlands

The Tumduff Mór wetlands are located in the south-east corner of Boora east. As well as the extensive wetland development, there is also a large area of Birch scrub and some conifer plantation. The wetlands were mainly developed in a natural hollow in conjunction with high fields and embankments used by the railway and for travel paths. The main outfall is located at the north-west corner. Water flows out of the wetland over a rock-based channel and into the main drainage system, which directs the water west towards the Boora River. These wetlands attract significant numbers of wintering waterbirds, including Whooper Swans. The wetlands are also used by breeding Lapwing, Redshank and Ringed Plover.

The deepest part of the wetland is the west side, and the wetland gets progressively shallower towards the east. These shallower sections become more and more in-filled with emergent wetland vegetation.

The eastern side of the wetland is divided from the western side by a high field/embankment, although there is likely to be some drainage links. This eastern wetland is much shallower and this has allowed a diverse wetland structure to develop. The northern margin is mostly dominated by a narrow strip of dry heath, bare peat and Purple Moorgrass mosaic, along the old railway embankment.

Further east of the wetland there is generally Birch scrub developing within the BnM property. There is some Birch woodland with mature Pine developing on the margins of the site and Pine and Heather are colonising some small areas on the cutaway. There is a large open area between the two BnM properties (wetland and forestry) that is owned by the NPWS and managed for Grey Partridge conservation. This zone of the cutaway is dominated by bare peat and is slow to re-colonise. There are scattered clumps of Soft Rush and some Birch saplings present, while further east, Bog Cotton begins to become more common.

South of this wetland there is also a substantial area of dense Birch scrub, poor fen mosaic dominated by Soft Rush, and developing Birch woodland.

There are several conifer plantations attached to the Tumduff wetlands area. These have mainly been developed along the southern side on higher ground. The main plantation is located at the south-west end and is primarily Lodgepole Pine. Much of this is poorly developed.

Tumduff Beag lake

This small man-made lake was created from cutaway along the Leabeg-Kilcormac road, along with Boora Lake. It is now a focus point for the Lough Boora Parklands as there is a large bird hide built along the road. It has developed as a wetland with an increasingly diverse structure. Little Grebe and Mute Swan have bred here along with other species. There are several 'islands' within the lake that are used for nesting by small numbers of Black-headed Gulls and in winter are often used by roosting Lapwing and Curlew. Stands of Grey Bulrush, Reedmace and Bottle Sedge are developing within the lake and creating Reedbeds and emergent vegetation. A single stand of Common Reed is also present at the north-east corner.

The lake is surrounded by mainly Purple Moorgrass-dominated grassland. One notable feature is the abundance of Devil's-Bit within this grassland. There are also some patches of Birch and Willow scrub. Dry Heath with Heather is also present, particularly along the road embankment.

Some calcareous grassland with abundant Knapweed and Glaucous Sedge is present along the southern side of this sub-section, on higher ground where the peat is thin or has been totally removed. Some of this grassland is being covered with Brambles and Willowherb and will slowly develop into scrub.

Southern Biomass area

This area is located at the southern end of Boora east in Ballybracken. It is located adjacent to the Leabeg-Kilcormac Road. It includes some conifer forestry developed by Coillte. Like many of the other plantations it is variable in quality.

This sub-section also includes the BnM Willow biomass trial. Adjacent to this area there is some cutaway along the road. This is being colonised by Heather, Birch scrub and Purple Moorgrass.

Northern Conifer plantation

This large area of mainly conifer plantation was developed by Coillte and extends from Leabeg to Finnamores. Conifers. It was planted in the 1990's and is at a post-thicket stage. There has been no significant thinning of any compartments. Lodgepole Pine was the main species planted as well as some Norway Spruce and Sitka Spruce. Some broadleaves were also planted in various compartments. This conifer plantation varies in quality and some is poorly developed.

South-eastern conifer plantations

This plantation is located adjacent to the lands managed for Grey Partridge by NPWS and north of Tumduff Mor wetlands. It is a mixed plantation with some blocks of conifers, some mixed stands and some blocks of broad-leaves that were planted as trials. The eastern side seems to be poorly developed with substantial Birch development amongst the conifers. There is an additional plantation to the north of the above area that is located

adjacent to the east side of the 'Marl Square'. This plantation is a series of blocks of different conifer and broadleaf crop types that was planted for the BOGFOR forestry trial.

Boora West

Boora West contains a large area of cutaway. This bog is one of the older bogs that went into production at the beginning of industrial peat production and therefore has some of the oldest developing cutaway. Much of the cutaway has been developed as conifer plantation by Coillte, or as part of the Lough Boora Discovery Park. A significant portion of cutaway within the Lough Boora Discovery Park has been actively rehabilitated and this includes the construction of two lakes and a large wetland area (Leabeg wetlands). The western side still has some active peat production and younger pioneer cutaway developing in production-related cutaway. There is a railway along part of the northern boundary that connects the Boora yard and workshop to the Boora bog group. The Lough Boora Mesolithic site is located towards the centre of Boora west and is part or a former lake basin. This area is less developed and contains several features of significant ecological interest. Part of this area is designated as a potential National Heritage Area. Further south there is some other cutaway that has been developed as wetlands (South Boora wetlands). A large part of the former southern cutaway area has now been sold to the National Parks and Wildlife Service and is actively managed for Grey Partridge conservation. For ease of description Boora west is further sub-divided into several sub-sections.

Mesolithic site, Boora Lake and surrounding areas

This area is located towards the centre of Boora west. It is almost completely surrounded by conifer plantation and can be accessed by the main cycle path, which runs through this sub-section. Much of the former Boora lake basin (IWT area and adjacent BnM-owned area) was also ditched and developed into fields. However, there are sections of this area and the Mesolithic storm beach that were not stripped of vegetation and retain fen habitats. The former Boora lake basin now contains a small area of developing Birch woodland surrounded by Birch and Willow-dominated scrub that is mainly spreading into poor fen type vegetation.

Leabeg Wetlands

This area includes the large area of wetlands to the north of Boora that extends from the new Lough Boora lake west to the conifer plantation. Wetland enhancement work has been carried out in this area in the past with drain-blocking and the creation of a berm to hold water over a greater area. This has been extremely effective with the result that wetlands communities with open water have established and these are found in mosaic with scrub and poor fen communities. Small number of wintering wildfowl, particularly Wigeon and Teal, regularly use these wetlands, and Lapwing, Snipe and Water Rail nest on some of the drier grassy areas.

South Boora wetlands

This area is located to the south of Boora and adjacent to the Grey Partridge Project area to the south. Conifer forestry borders this area to the north. There has been some wetland enhancement works carried out in the past. More work has recently been carried out (2009-2010) with the blocking of the main outflow with the result that the water level has been raised and there is now more water pushed over the overall area. The wetland development is a younger stage compared to the Leabeg wetlands. Lapwing and Ringed Plover have both been

recorded nesting on some of the barer fields and Black-headed Gulls have nested on some of the emergent vegetation tussocks within the wetlands.

South-east sub-section (including the Bogfor trial area)

Peat production has been much less intensive in these marginal sections of Boora. The Bogfor trial was established on typical dry cutaway. This area is fenced. Some of the planted trees have established but many of the trees seem to be in check. Mixtures of conifers and broad-leaved trees were planted. Birch, Lodgepole Pine and Willow have also naturally colonised within the site along with Soft Rush, Bramble, Raspberry and some Heather. This area is fenced but the fence is now degraded. The vegetation is quite dense.

West of the BOGFOR trial there is a small area of open cutaway that is establishing on higher bog. This is also located adjacent to the road between Leabeg and Kilcormac. Tall Birch and patchy Heather is established along the drains but between the drains there is mainly bare peat and Bog Cotton. Lodgepole Pine is naturally colonising towards the southern side and adjacent to conifer plantation on the margins.

South of the BOGFOR trial and some conifer plantation there is another area of cutaway that is almost completely re-vegetated. This area is also characterised by deep peat that has been extensively naturally colonised by Birch and Pine forming closed scrub, while the open sections are now covered in tall Heather, forming dry heath in mosaic with the Birch scrub.

Further south there is a relatively large area of ditched high bog that may have been undeveloped for peat production, or peat production was minimal. This area is also characterised by very thick impenetrable closed Birch scrub/ woodland along the margins.

North West Boora

This area includes the western side of Boora from the central rail line northwards. A small area immediately to the north of the railway line was until recently still used for peat production. Several access routes are still active through this section and a cycle route to allow access from Boora to Turraun is located at the eastern edge of this area. The cutaway areas had re-vegetated, mainly with a mixture of Birch scrub with open habitats such as grassland and poor fen. A small area (0.15ha) of embryonic bog community is located alongside a section of conifer plantation close to the north western boundary of the site.

The north-west corner of the sub-section (to the north of the conifer plantation and adjacent to the old power station site contained areas of calcareous grassland, scrub and conifer plantation. The Silver River flows along the western boundary of this area. The riparian area comprised trees and scrub mainly.

South West Boora

This sub-section of Boora west encompasses the area directly to the south of the central rail way line. The area immediately to the south of the central rail way line was a mixture of bare peat production fields and re-vegetated cutaway. The pioneer vegetation was a mixture of Birch scrub, poor fen vegetation with some small areas of open water.

The south west corner of the sub-section was until recently in full peat production and comprises, for the most part, bare peat. A small area to the south of the railway line and immediately to the west of the conifer plantation has developed into a wetland. This area comprised of areas of open water, reed beds and poor fen vegetation.

A habitat map of Boora Bog is shown in Figure 3.9 & 3.10.

Figure 3.5. View of Finnnamores Lakes at Boora Bog East

Figure 3.6. View of Emergent Vegetation at Tumduff Beag, Boora Bog

Figure 3.7. View of wetland at Boora west, Boora Bog

Figure 3.8. View of wetland at Leabeg, Boora Bog

3.3.2 Species of conservation interest

Boora East

The various sub-sections of Boora Bog described above, form part of the Lough Boora Parklands, and their flora and fauna is increasingly becoming well-known, particularly their potential to attract bird species of interest including rare vagrants and passage migrants such as Marsh Harrier and Red-necked Phalarope. Lough Boora Parklands (and the surrounding farmland) are becoming known as one of the best locations in Offaly and the midlands for watching birds. These cutaways are somewhat older in development than many other bogs and therefore are somewhat more diverse with greater biodiversity value.

Tumduff Mór is a diverse wetland that attracts breeding and wintering waders and wildfowl and is an excellent example of wetland habitat rehabilitation. This area was enhanced via the creation of a berm holding back the water into a natural basin. It now contains a range of typical cutaway wetland communities with substantial open water, Reedmace stands, Grey Bulrush stands and other emergent vegetation Boora East also includes a known Hen Harrier winter roost.

Finnamores wetlands are another excellent example of wetlands rehabilitation. This area, along with the two fishing lakes also attracts breeding waders such as Lapwing and Redshank. Part of the wetland is extremely calcareous with a significant amount of tufa precipitating out of the water due to the underlying marl. This area has potential to develop as rich fen. Some of the vegetation communities to the east adjacent to the conifer plantation are naturalising and are developing similar to fen carr woodland. The fishing lakes are surrounded by landscaped grassland that is now diverse orchid-rich calcareous grassland in places.

There have been records of White-clawed Crayfish from the Finnamores lakes. This species is listed on Annex II of the EU Habitats Directive and is a species of conservation importance that is likely to have colonised from the surrounding drainage network.

Tumduff Beag lake is a site that is becoming quite naturalised with features and structure similar to a natural lake.

The site is regularly used by the Grey Partridge and is adjacent to the area managed by the NPWS for Grey Partridge. Tumduff Beg also has a small Black-headed Gull breeding colony.

There are substantial records found in other reports such as Heery *et al.* (1999) and Copland (2009) as well as several other older reports by BirdWatch Ireland.

Boora East attracts breeding waders including Northern Lapwing *Vanellus vanellus* (now Red-listed on the Birds of Conservation Concern in Ireland list[1] and highlighted as a conservation priority in the Government's Prioritised Action Framework 2014-2020[2]). Farmland adjacent to Boora east attracts Whooper Swan *Cygnus cygnus* (Amber listed in Ireland and also on Annex I of the EU Birds Directive) along with other species of wintering waterfowl such as Golden Plover *Pluvialis apricaria*.

Boora West

Boora West includes a pNHA – Lough Boora. The former Boora Lake (now drained) was designated as a pNHA for its geological interest. Part of the site is the Lough Boora Mesolithic site where an old storm beach (of a much older and larger lake) is present, and is also of very significant archaeological interest. This area is now developing some diverse habitats including Birch woodland, poor fen (PF2) and some rich fen (PF1). This habitat type may

[1] Colhoun, K. & Cummins, S. (2013). Birds of Conservation Concern in Ireland 2014–2019. *Irish Birds* 9: 523-544

[2] https://www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf

qualify as the Annex I priory habitat '*Calcareous fens with Cladium mariscus and species of the Caricion davallianae' (7210). The presence of an intact natural transition between raised bog vegetation and this rich fen vegetation is also present. The Birch woodland contains Alder Buckthorn – a species listed in the Red Data Book. In association with this area is the Lough Boora Mesolithic site that has developed rich calcareous grassland (GS1). The Mesolithic site is known for its display of many Marsh Helleborine and several other orchid species including Bee Orchid have been recorded here. The overall area has diverse habitats, a contrast between strongly calcareous habitats (the grassland) and peatland habitats (drained lake), a rich diverse flora and also attracts wildlife of conservation interest such as Long-eared Owl and Whinchat (1999).

The Leabeg wetlands are an exceptional example of wetland habitat rehabilitation. This area was enhanced via the creation of a berm and drain-blocking. It now contains a range of typical cutaway wetland communities with substantial Bulrush stands intermixed with scrub and other poor fen and wetland habitats in drier areas. Some of the plant communities are now quite naturalised and similar to semi-natural sites. The wetlands also consistently attract breeding waders such as Lapwing and wintering waterfowl.

A Hen Harrier winter roost is also present at Boora West.

The South Boora wetlands have also been rehabilitated, although they are less mature. This wetland area also attracts breeding waders such as Lapwing and wintering waterfowl.

The two amenity lakes of Boora lake (new) and Loch an Dochas also have developed typical aquatic plant communities and the fringing wetland communities with extensive Reedbeds around Boora lake are particularly well-developed. Common Gull have attempted to breed at Boora Lake in the past.

The Boora parklands and Sculpture Park contains Blue Fleabane. This plant species is also listed within the Red Data Book and is widespread in the disturbed grassland along the cycle track between the Lough Boora Triangle and past the Tippler Bridge.

Heery (1999) outlines many of the biodiversity features of the overall Lough Boora Parklands, which includes this site. These include the presence of bird species of significant conservation interest such as the Grey Partridge and Hen Harrier, both of which have been noted in Boora West. Information on other groups of flora and fauna is also present in this report.

The bird life of Boora West has been well studied through the initial surveys of 1990's (Heery 1999) IWebs wintering bird surveys and breeding bird surveys carried out by Birdwatch Ireland (Copland 2009). Boora West provides breeding and wintering habitat to many species.

Both Boora East and Boora West was included in the BioBlitz 2012 and over 900 species across all taxa, were recorded. For further information see Appendix III.

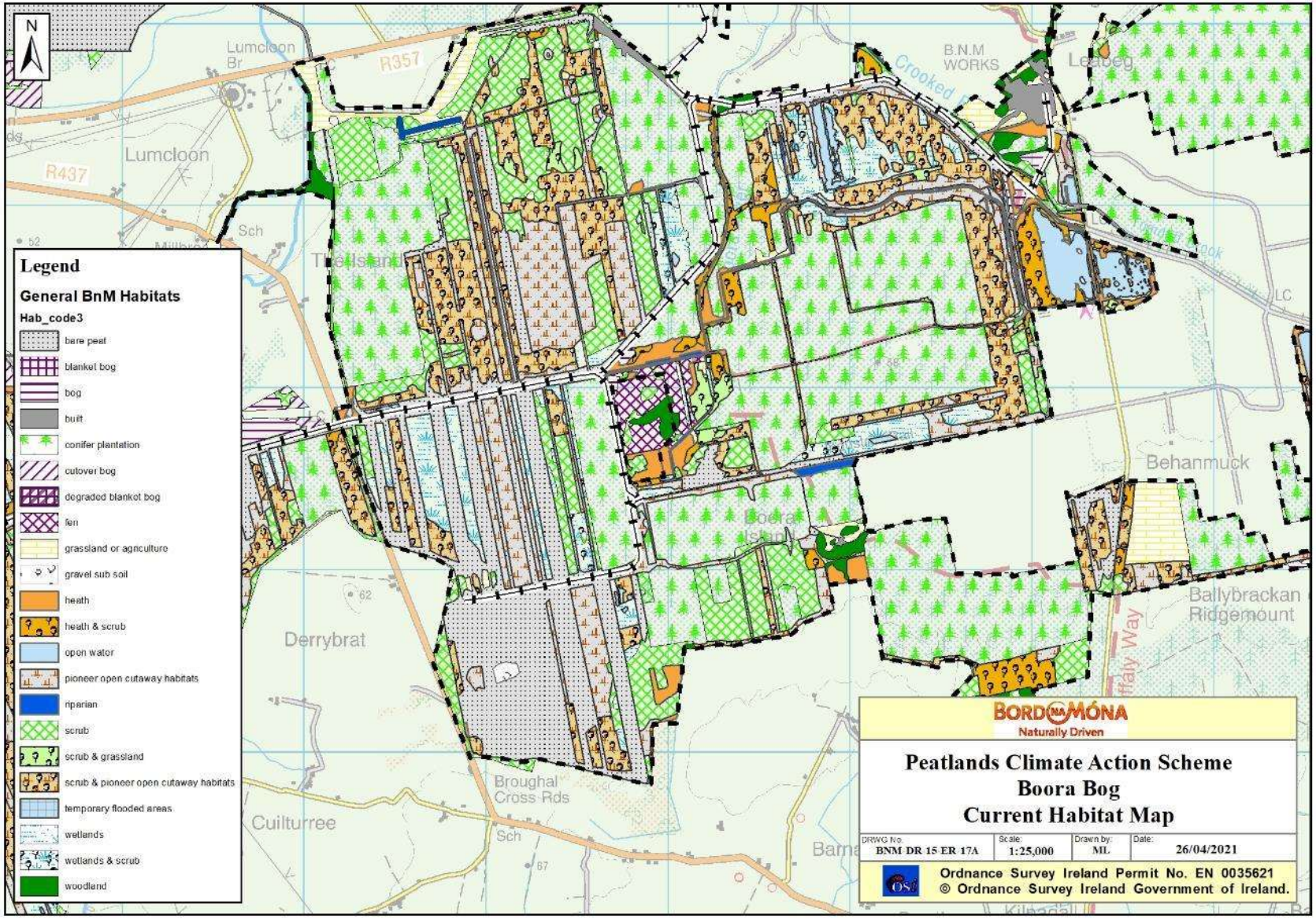


Figure 3.9 Habitat map of Boora Bog showing habitats at Boora East

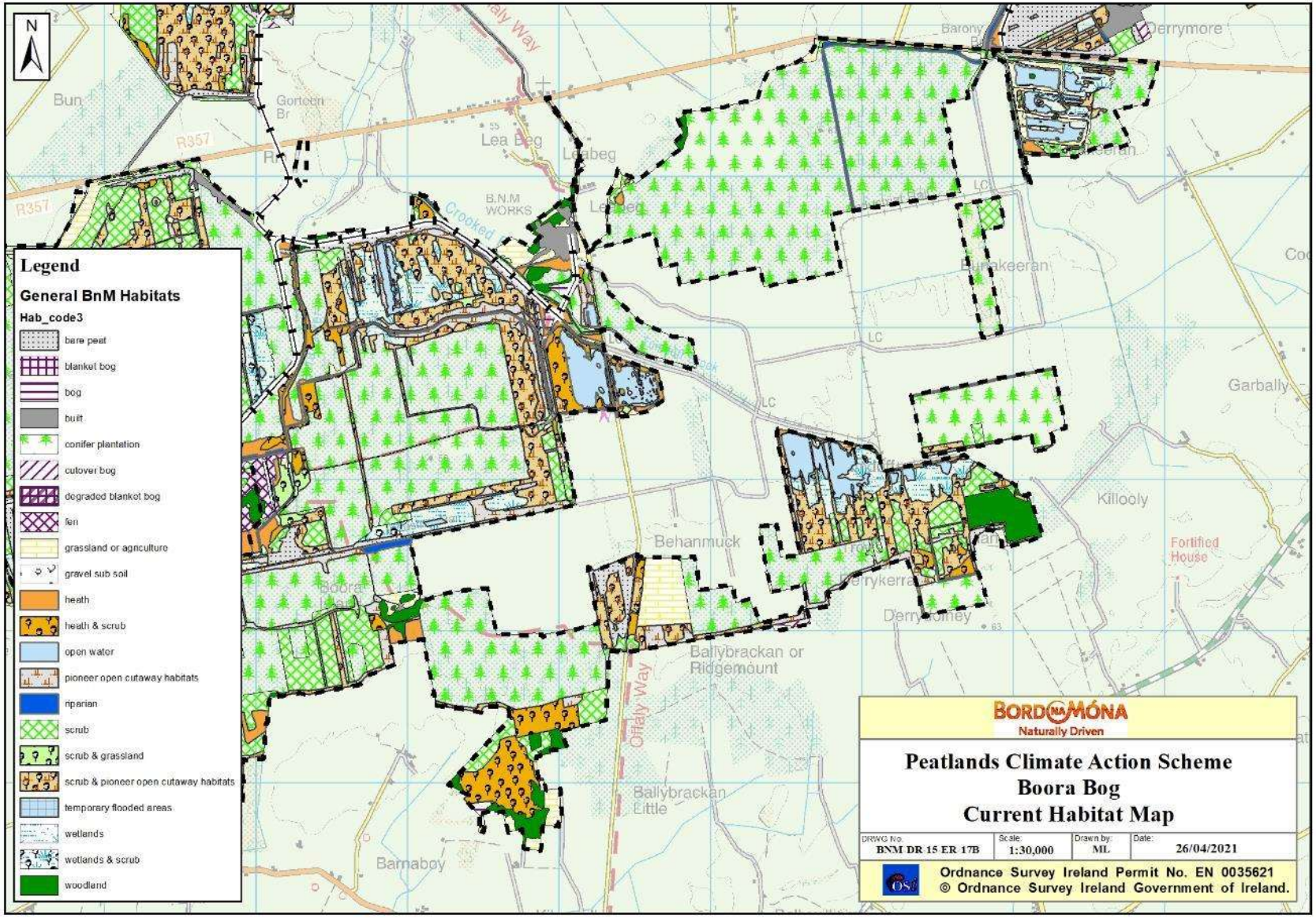


Figure 3.10 Habitat map of Boora Bog showing habitats at Boora West

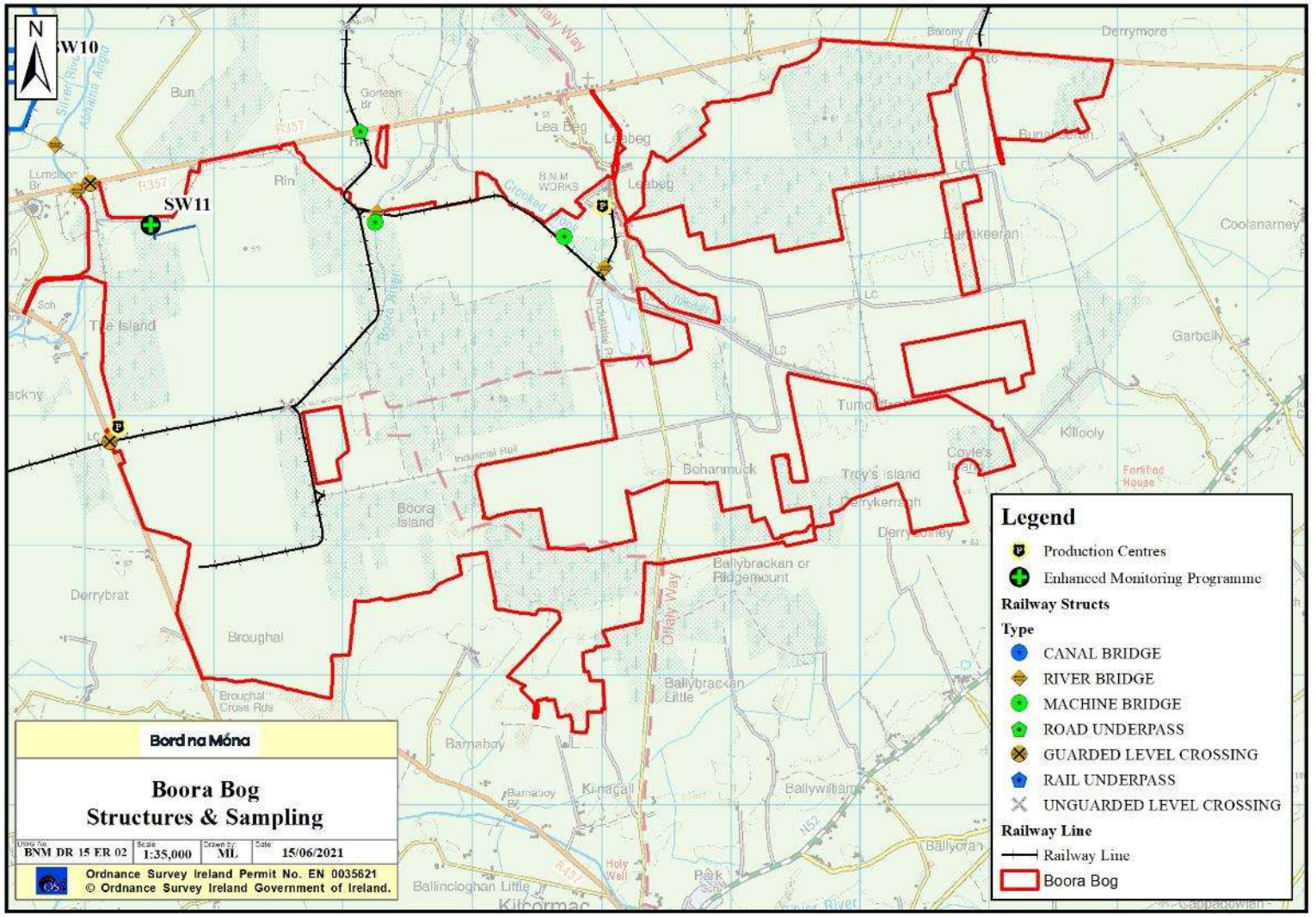


Figure 3.11. Map of Boora Bog showing key structures and designated emission points

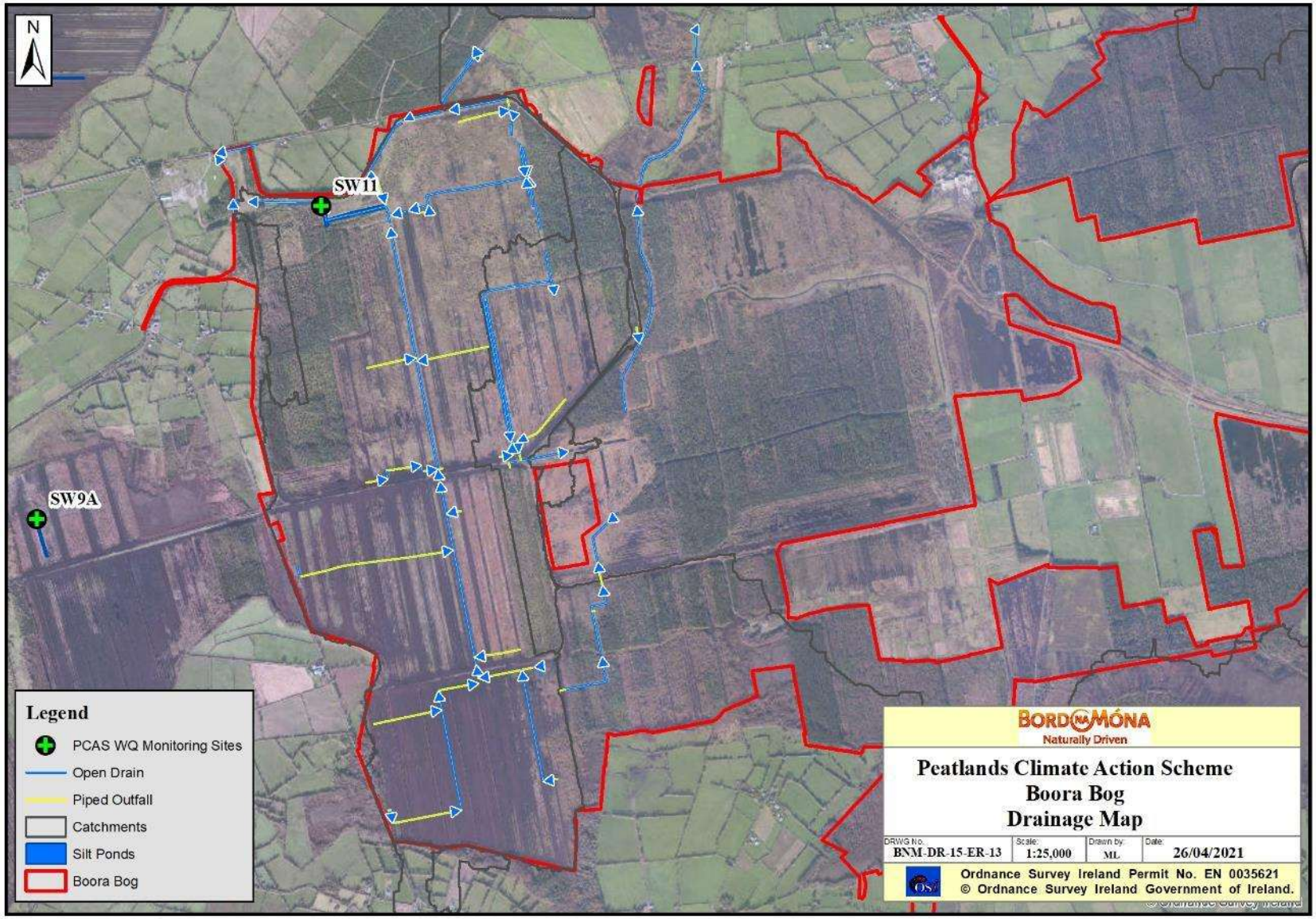


Figure 3.12. Key drainage features.

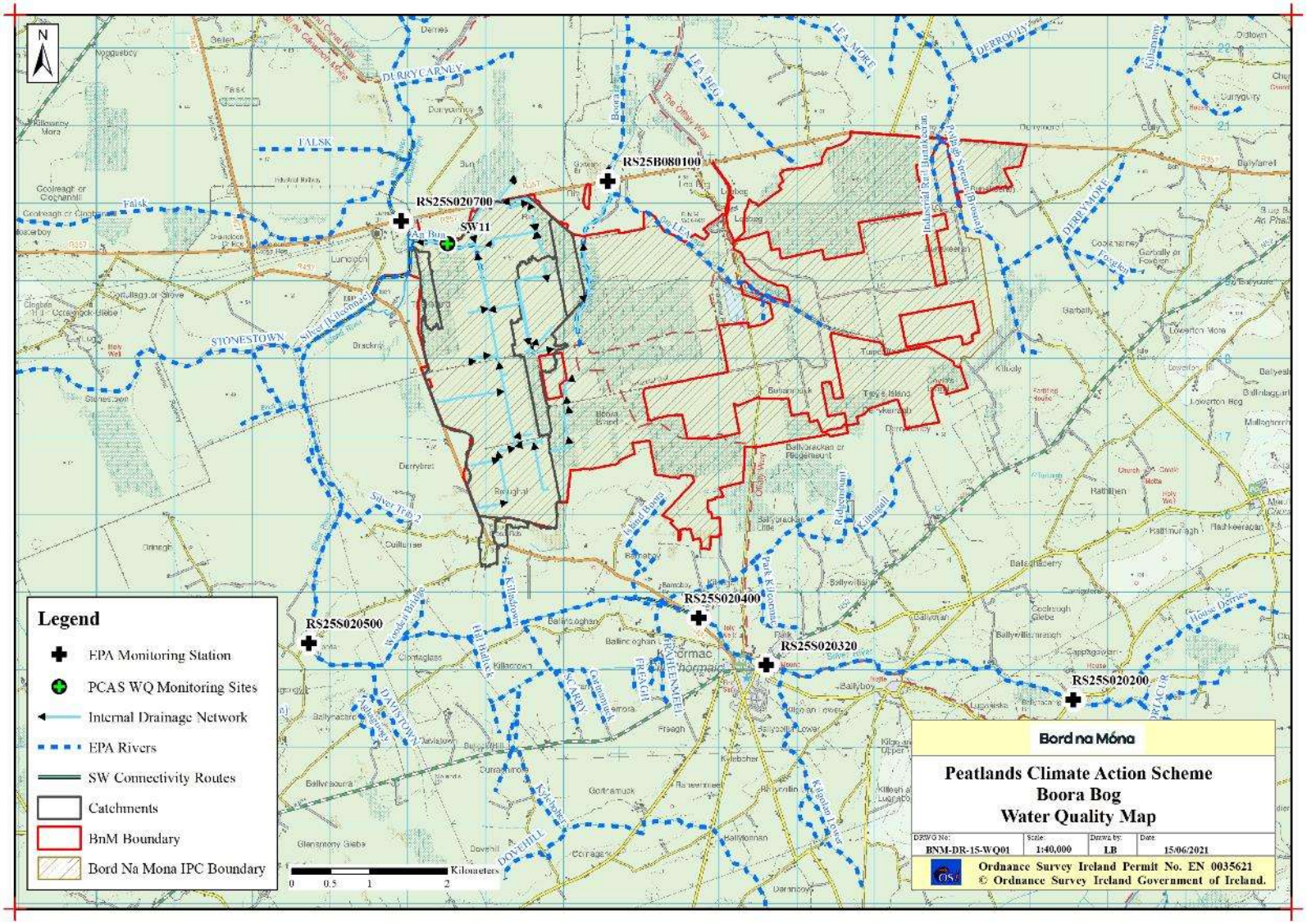


Figure 3.12a. Key drainage features.

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.

An invasive aquatic plant species Parrots Feather *Myriophyllum aquaticum* was identified in the amenity areas of Boora in 2016, actions to control its spread have been enacted along with the notification of the presence of this species to the relevant authorities. *Rhododendron ponticum* has also been recorded. American Mink (*Mustela vison*), Eastern Grey Squirrel (*Sciurus carolinensis*, Fallow Deer (*Dama dama*) and Bank Vole (*Myodes glareolus*) have all been recorded within 10km squares which overlap Boora Bog (source NDBC), as have invasive non-marine mollusc's such as Wrinkled Snail (*Candidula intersecta*) and Budapest Slug (*Tandonia budapestensis*). A small herd of Feral Goat utilises Boora West, particularly the area around Rin.

A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs, and although spatial overlap with the PCAS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during PCAS activities.

3.4 Statutory Nature Conservation Designations

There are no European Sites (SAC's or SPA's) in close proximity (i.e. within a 5km radius at minimum) to Boora Bog. A number of pNHA's namely the Grand Canal pNHA (Site Code 002104), Lough Coura pNHA (Site Code 000909), and Kilcormac Esker pNHA (Site Code 000906) all occur within 5km of Boora Bog (Figure 3.13).

A single pNHA, Lough Boora pNHA (Site Code 001365) overlaps Boora Bog in part. This pNHA, part of which is now partly owned and managed as a reserve by the Irish Wildlife Trust was previously a post-glacial lake, and the now drained lake bed consists of shallow fen peat overlying calcareous shell-marsh. It is of interest botanically due to the mixture of fen and bog species on the former peatland lake-bed and additionally from an archaeological perspective.

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 Boora Bog (i.e. within 3km) The closest Ramsar Sites to Boora Bog include Pollardstown Fen (Kildare), Clara Bog and Raheenmore Bog (Offaly).

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

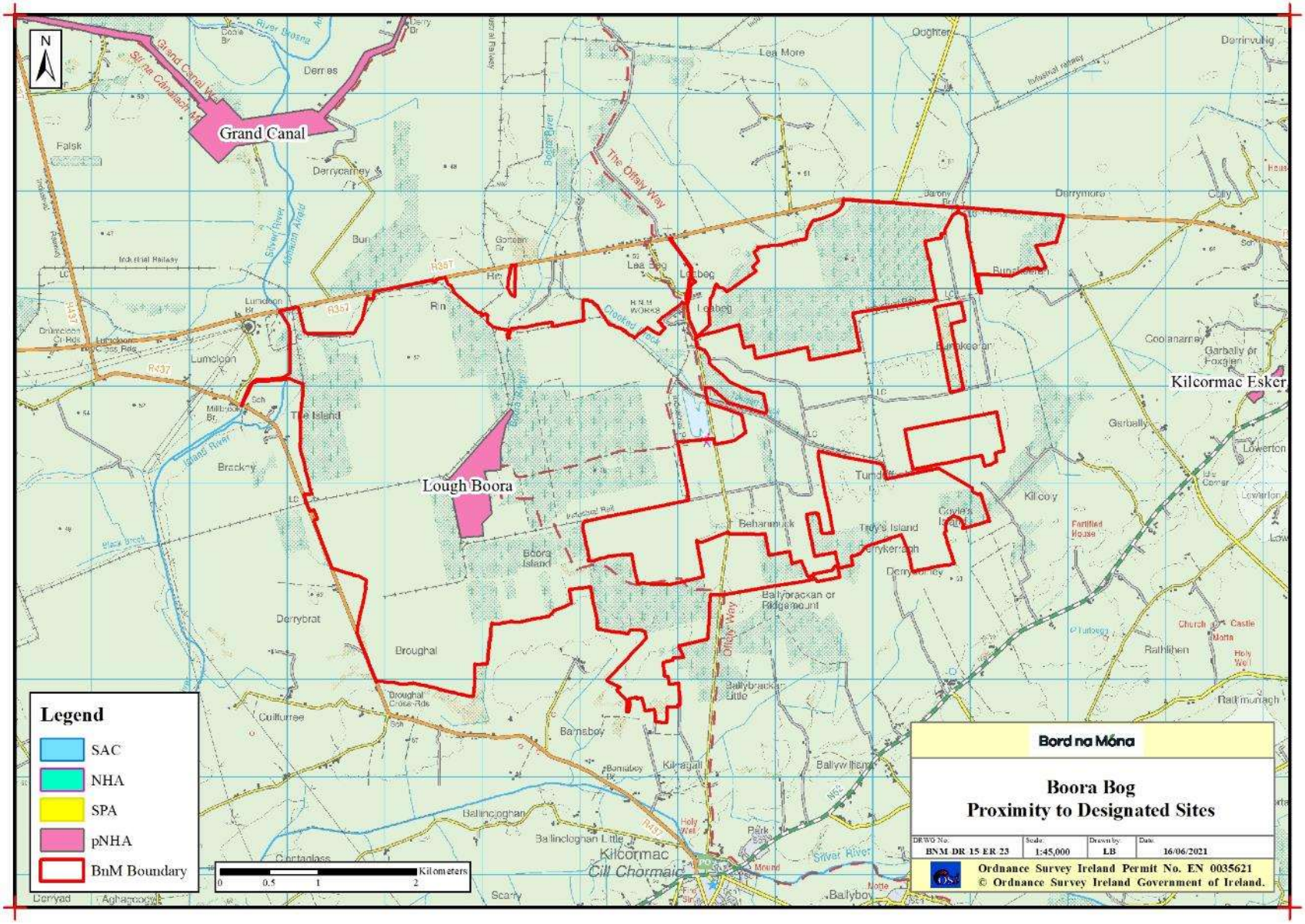


Figure 3.13: Map of Boora Bog showing local context with Designated Sites

3.5 Hydrology and Hydrogeology

Boora Bog currently has a gravity drainage regime. Some sections were pumped in the past but pumping has ceased and pumps have been decommissioned. Hydrological modelling (Figure 8.2 & 8.3) indicates that parts of the bog are natural basin with significant potential for re-wetting, with the assumption that all drains would be blocked. However, as there is significant conifer forestry and amenity infrastructure on site, it is not feasible to block key outfalls that would re-wet all areas. It is likely that a portion of the basins in target areas (Boora west – area recently out of peat production) will re-wet with deeper water, creating a mosaic of wetland habitats, when drains are blocked.

Several lakes have been created at Boora (Tumduff Beag, Boora Lake, Loch an Dochas and Finnamores). Some of these lakes have a very strong alkaline water chemistry, with vegetation characterised by Stoneworts, which is indicative of underlying calcareous marls. These calcareous sub-soils underlie parts of Boora Bog are exposed in places. Other sections are underlain by blue-silty clay/marl, which is less calcareous, and poor fen vegetation is indicative of this sub-soil type. Glacial mixed till/gravel underlies other sections of the bog and these areas tend to be drier and colonised with Birch woodland.

Boora Bog is located in the Lower Shannon Catchment (WFD Catchment_id 25A). Two WFD Sub-catchments include Boora Bog namely the BROSNA_SC_O50 and the BROSNA_SC_070.

The bog is flanked to the south and west by the Silver [Kilcormac] River, but is also drained by the Boora Stream, the Pollagh Stream [Brosna], and the LEA_BEG, all of which flow northwards to the Brosna River.

One outfall and associated silt pond infrastructure is present at the northwest of the bog to manage discharge to the Silver [Kilcormac] – and all remaining drainage flows are towards this location (Figure 3.13). The recently extracted cutaway bog has field drains running in a general north-northwest to south-south east orientation.

Boora West is located mainly in an area with a Locally Important Aquifer zone- i.e. Bedrock which is Moderately Productive only in Local Zones, whilst Boora East is located in an area with a Regionally Important Aquifer - Karstified (diffuse).

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.

Regionally important aquifers are those in which the network of fractures, fissures and joints, through which groundwater flows, is well connected and widely dispersed, resulting in a relatively even distribution of highly permeable zones. There is good aquifer storage and groundwater flow paths can be up to several kilometres in length. There is likely to be substantial groundwater discharge to surface waters ('baseflow') and large (>2,000 m3/d), dependable springs may be associated with these aquifers.

The bog is located in an area mapped by GSI as of medium or high 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 where PCAS activities are proposed.

The underlying geology at Boora Bog is Visean Limestones (undifferentiated), along with Waulsortian Limestones, described as massive unbedded lime-mudstone. Subsoils underlying extant peat are significantly calcareous, and glacial sub-soil mounds and ridges are being exposed in places.

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. 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 bog lands 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 Boora Bog.

Silt ponds are the key silt control infrastructure to control potential emissions from industrial peat production sites. As required under licence, BNM have several 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. Silt pond decommissioning will be considered when sites are deemed to be on a trajectory of environmental stability and peatland rehabilitation has been completed.

Boora bog has 1 treated surface water outlets to the Brosna River IE_SH_25B090761, via the Silver River IE_SH_25S020700 and the Boora River IE_SH_25B080100. Peat extraction was identified as a pressure in the second cycle of the river basin management plan for the Silver and Boora rivers and is indicated as remaining so in the third cycle, currently under preparation, with a Brosna River remaining as not under pressure from peat.

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.

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 3.7mg/l and COD 100mg/l.

Initial monthly ammonia concentrations in February & March 2021 have a range of 0.038 to 0.259mg/l with an average of 0.149mg/l (Table 3.1).

From an analysis of any monitoring over the past 3 yrs. of the IPC licence environmental monitoring of some of the discharges from this bog, indicate that results were under the ELV for SS and trigger levels for ammonia and COD.

Bog	SW	Monitoring	pH	SS	TS	Ammonia	TP	COD	Colour
West Boora	SW-11	Q2 20	7.6	4	481	0.916	<0.05	52	183
West Boora	SW-11	Q3 18	7.7	5	358	1.5	0.05	52	173
West Boora	SW-11	Q1 17	7.5	28	412	1.5	0.05	57	130

Table 3.1. Decommissioning and Rehabilitation Programme Water Quality Monitoring.

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

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

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

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

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

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

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

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

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

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

Water will still discharge from designated emission points when rehabilitation at Boora Bog has been completed. This discharge will have improving water quality and there will be increased wetland attenuation, meaning slower release of water. his is expected to have a positive impact on status of downstream watercourses.

3.7 Fugitive Emissions to air

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

3.8 Carbon emissions

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

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

It is expected that Boora Bog can become a reduced carbon source following rehabilitation. The potential of any cutaway site to develop as a reduced carbon source/carbon sink in the longer-term depends on land-use, the success of the rehabilitation measures, the extent of optimal re-wetting and hydrological conditions, the extent of development of *Sphagnum*-rich or other peat-forming habitats, the balance of carbon fluxes from different cutaway habitats and future climatic conditions. Some of the cutaway is expected to develop Reed Swamp and fen habitats with alkaline emission factors. This site is expected to develop a mosaic of fen, Reed swamp, wet woodland and scrub. Birch woodland is expected to develop on the drier mounds and peripheral headlands. Part of the site is planted with conifer forestry and the site will continue to be used for amenity.

3.9 Current ecological rating

Most of Boora West can be rated as having a **high local – national ecological value (C-B)** as it is dominated by a significant area of naturalising cutaway habitats in good condition and contains sites, habitats and species of a national interest such as the Boora lake pNHA-Mesolithic site, rich fen and Alder Buckthorn.

Regarding Boora East, it is rated as having a **national ecological value (B-C)** as it is dominated by a significant area of naturalising cutaway habitats in good condition and contains sites, habitats and species of significant regional-national interest. Boora East (including the surrounding area) attracts some wintering wader species at nationally important numbers. The presence of the only remaining Grey Partridge population in Ireland in this area adds to its value.

3.9 Boora Bog site charactereisition summary

- A large part of Boora Bog has been cutaway for some time.
- Significant rehabilitiation has already been carried at at Boora.
- There has been extensive development of cutaway habitats including wetlands, scrub and bog woodland.
- The general area has many features of high biodiversity value including the presenece of Grey Partridge, breeding bird species and use of the area by wintering water birds.
- The site has seen significant development of amenity over the years.
- Extensive conifer forestry has also been developed on site.
- Rehabilitiation will focus on those area that were recently in peat extraction and are largely bare peat.
- Peat deths in this section are variable and cutaway in part.
- The site has a gravity drainage regime.
- Rehabilitiation measures will focus on re-wetting residual peat.
- Rehabilitiation will focus on not impacting on other current land-uses such as amenity and confier forestry, but will intergrate re-wetting with these existing land-uses.

4. CONSULTATION

4.1 Consultation to date

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

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

- General consultation with range of stakeholders at annual Bord na Mona Biodiversity Action Plan review days 2010-2018.
- Midlands & East Regional WFD Operational Committee (River Basin Management Plans).
- 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).
- Ongoing consultation with Coillte regarding forestry management (forestry leased to Coillte),
- Long-term and ongoing engagement with the Grey Partridge Conservation Project (NPWS),
- The long-term development of Lough Boora Discovery Park (Offaly County Council, Failte Ireland and multiple stakeholders),
- The long-term development of Boora Sculpture Park (artists, Offaly County Council and multiple stakeholders);
- Long-term engagement with angling club at Finnermores,
- Bird surveys and monitoring carried out by Birdwatch Ireland for Bord na Móna,
- Ongoing development of cycle tracks (Offaly Leader, Offaly County Council and Failte Ireland);
- Guided walks during the period 2010-2019 for groups like Offaly Naturalists Field Club, National Biodiversity Data Centre, Irish Garden Plant Society,
- The Boora Bioblitz 2012 in association with National Biodiversity Data Centre and multiple partners and contributors,
- development of a management plan for Lough Boora with local stakeholders (Birdwatch Ireland 2018);
- Deep Mapping – Lough Boora Sculpture Park (2019) (Tim Collins and Reiko Goto Collins).
- Proposed Sensory Garden Project (Leamore Leabeg Community Group and Kilcormac Development Association).
- The proposed development of the nearby Derrinlough Windfarm in Drinagh and Clongawney Bogs and potential further amenity linkage (walking and cycling tracks).

The ecology and amenity potential of Boora has been studied in detail in the past as part of the development of and study of Lough Boora Discovery Park (Barron et al. 1994, Heery and Finney 2009, Copland 2010, Copland 2015, Egan 1998, Lally et al. 2012, Renou-Wilson et al. 2008), Rowlands and Feehan 2000, Trodd 2003).

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

To inform the current Plan, both national and local stakeholders, including neighbours whose land adjoins Boora 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 Boora Bog (see Appendix XI).

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 both the current and previous drafts of the rehabilitation plan for Boora Bog – these are summarised below.

4.2.1 Assessments of rehabilitation

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

4.2.2 Restoration scope

Restoration/rehabilitation of marginal habitats was raised by IPCC and BCI as worthy of consideration within the rehabilitation measures to support carbon sequestration and biodiversity objectives. Offaly County Council also requested that the after use of the BnM bogs be considered as part of PCAS.

4.2.3 Monitoring

Further details on monitoring of ecological metrics, and how and where reporting on this monitoring would take place, was raised the IPCC, University College Dublin and Trinity College researchers in their respective submissions. Butterfly Conservation Ireland also suggested that monitoring of Large Heath butterfly be considered to assess the success of the proposed rehabilitation actions.

4.2.4 Flooding

The IFA, The Department of Agriculture Food and the Marine, individual local residents, Offaly County Council 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 Amenity

Offaly County Council raised serval issues around amenity at LBDP and potential future development of amenity in association with the Offaly County Development Plan and other relevant plans.

4.2.6 Other issues

Other issues (raised by IPCC) included after use of the bog and turf cutting on the margins of the bog (outside of the area owned by Bord na Móna).

Offaly County Council expressed concerns regarding potential issues with security, fire risk and water pollution arising as a result of PCAS.

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

The NARGC raised the issue of Grey Partridge conservation and management.

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. Consultation

BnM carried out extensive consultation has part of the process of developing the rehabilitation plan for Boora. This is ongoing with a dedicated Community Liaison Officer communicating to affected and interested parties. A website has been developed to make information available. This will be continually updated. It is expected that some PCAS Bogs will become demonstration sites so that interested stakeholders can come to visit and observe the measures on the ground.

4.3.2 Assessments of rehabilitation

AA screening will be undertaken on all the bogs as part of PCAS and this is currently being undertaken by external consultants for Boora 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) has been undertaken on all the bogs in PCAS (Appendix XII). 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. Both archaeological sites RMP OF023-005--- Habitation Site and SMR OF023-026--- - Redundant Record should be avoided by the rehabilitation works. Bord na Móna aim to achieve this through including all known archaeology in the planning process of rehabilitation works and implementing and exclusion or buffer zone around these features. These measures should sufficiently protect any archaeology in these areas, during any ground works 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.

4.3.3 Restoration scope

As part of the PCAS, all restoration/rehabilitation options have been developed to support climate action and biodiversity objectives. Other issues such as existing amenity, social impacts, industrial history, archaeology were not part of the direct scope of PCAS but were considered when developing the rehabilitation plan. After use of the bog is outside the scope of PCAS. However, it is envisaged that potential after uses of Boora Bog for instance, amenity walkways/cycleways should not be adversely impacted by PCAS and will be supported and enabled by the proposed rehabilitation measures. Rehabilitation will lead to the development of a stable diverse re-wetted cutaway landscape that will have added benefits for amenity in the future.

4.3.4 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 Boora 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 Boora Bog.

4.3.5 Flooding or other impacts on adjacent land.

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 be adversely affected, 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. No issues were identified.

The rehabilitation measures proposed at Boora Bog 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 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.

4.3.6. Future management

Boora is part of the Lough Boora Discovery Park. It will continue to be managed for amenity and biodiversity into the future. There will be more opportunities for other biodiversity/conservation management that are not in the scope of PCAS. Public rights of way will be facilitated.

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.

Bord na Móna considers issues regarding estate security, fire risk, invasive species and water pollution of utmost importance. BnM intends to maintain security and manage fire risk over the entirety of the estate. In this regard, PCAS activities, should have no detrimental impact on these issues. Regarding water pollution, BnM is regulated by the EPA and as such adheres to the strict water pollution measures laid out by the same.

4.3.7 Amenity

Creating amenity such as walking tracks is not part of the direct scope of PCAS. However, PCAS will enable and support future amenity development. Boora is the core of Lough Boora Discovery Park and cycle tracks and walking routes already exist through the site. There can be further opportunities to extend amenity at this site. Any future amenity can be positively aligned and integrated to after-use plans following the completion of the proposed rehabilitation at Boora Bog. Rehabilitation measures proposed for Boora Bog do not need to be amended to integrate any future amenity track positioned along the margin of the former production bog or along the former bog railway.

4.3.8. Other issues

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

Security: It is the intention of Bord na Móna to keep secure the estate and ensure that any anti social behaviour that occurrs within the estate is reported and dealth with by the appropriate authorities.

Bord na Móna will continue to support the conservation of Grey Partridge in the wider landscape around Boora Bog.

Forestry at Boora is currently managed by Coillte and the forestry will be managed via Forestry Service guidelines and via the Forestry Service regularory regime.

4.3.9 Concluding statement.

- Some parts of Boora bog is largely stabilised and developing a mosaic of habitats already. This will not be radically changed.
- No specific issues were raised during consultation that required significant changes to the substance of the rehabilitation plan.
- Issues raised by several consultees in relation to potential impacts on adjacent land had already been accounted for during the hydrological analysis and assessment, and corresponding adaptations to incorporate Drainage Management Plan mitigation measures.
- Several marginal drains will not be blocked to avoid impacts on adjacent lands, Coillte forestry, rights of way or turf-banks. This does not change the overall rehabilitation goals and outcomes and can be integrated with the other rehabilitation measures to allow cutaway re-wetting.
- No changes were required to the rehabilitation plan to enable any future potential amenity.
- A key land-use at Boora is amenity. This will be continued to be supported and enabled via rehabilitiation.

5. REHABILITATION GOALS AND OUTCOMES

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

- Meeting conditions of IPC Licence.
- Stabilisation or reduction in water quality parameters of water discharging from the site (e.g. suspended solids).
- Reducing pressure on receiving water-bodies that have been classified as At Risk from peatlands and from peat extraction, via stabilization or improving water-quality from this bog, and therefore, reducing pressures.
- Optimising hydrological conditions for **climate action benefits as part of PCAS**.
- Carrying out an intensive rehabilitation measures in the area that is recently out of peat extraction (including hydrological management, drain-blocking, re-profiling, wetland creation, fertiliser application, seeding of vegetation &, inoculation of *Sphagnum,* where appropriate).
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich raised bog vegetation communities on deep residual peat, where possible.
- Optimising or enhancing hydrological conditions for the development of Reed Swamp and fen on shallow more alkaline peat and other subsoils.
- A significant part of the site has already largely vegetated and stabilised (See Figure 3.2, 3.5-3.10) and is used for a variety of land-uses. These areas are considered rehabilitated. The aerial photo demonstrates the contrast between the older vegetated cutaway and areas at the western part of the site that have recently come out of peat extraction.
- Supporting ongoing amenity land-use. Integrating rehabilitation measures with current amenity infrastructure on site. It is not proposed to carry out any rehabilitation actions to change or negatively affect any amenity infrastructure.
- Supporting ongoing cultural use. Integrating rehabilitation measures with the Lough Boora Sculpture Park. It is not proposed to change any conditions around the Lough Boora Sculpture Park.
- Integrating rehabilitation measures with existing conifer forestry. It is not proposed to change or affect any conifer or commercial forestry via this scheme. The future forestry management of these areas will be defined by Coillte.
- Integrating rehabilitation measures with future potential amenity projects (e.g. proposed sensory garden project). It is not proposed to change any conditions around the area proposed for this project.
- Enhancing existing wetlands and re-wetting peat in the older cutaway, where possible and where feasible. Any measures will be positively aligned with the above land-uses.
- Support Grey Partridge conservation in adjacent lands, where possible.
- Optimising hydrological conditions for the protection of any exposed archaeological structures, their retention in situ and preservation into the future, where possible.
- The main goal and outcome of this plan is the successful rehabilitation (environmental stabilisation) of peatlands used for industrial peat production at the bog in a manner that is acceptable to both external stakeholders and to Bord na Móna and which optimise climate action and other ecosystem service benefits.

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

- It will take some time for stable naturally functioning habitats to fully develop across the entirety of Boora 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 (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. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.
- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as such the development of new habitat to support biodiversity and local attenuation of water flows from the bog.
- WFD status in receiving water bodies can be affected by peatlands and peat extraction, but is also affected by other sources such as agriculture. In addition, receiving water bodies that are assessed as At Risk from peatlands and from peat extraction are likely to have several contributary sources of impacts (private peat extraction and Bord na Mona).
- Bord na Móna are also planning rehabilitation measures in some adjacent bogs (e.g. Turraun) in 2021. There are expected to be cumulative water quality and other ecosystem service benefits to receiving water bodies such as the River Brosna from rehabilitation more than one bog in the same catchment.
- Current and future land-use at Boora Bog. Rehabilitiation will focus on re-wetting that can be integrated into the current and future land-uses including amenity and conifer forestry.
- Re-wetting in general will benefit the future preservation of most known and unknown archaeological features.

6. SCOPE OF REHABILITATION

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

- The area of Boora Bog (Figure 3.1).
- EPA IPC Licence - Ref. P0500-01. 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. Boora Bog is part of the Boora Bog Group.
- The proposed Scheme is designed to exceed the stabilisation requirements as defined by the IPC Licence. This scheme is designed to enhance the ecosystem services of Boora Bog, in particular, optimising **climate action benefits of the area recently out of industrial peat extraction**. The proposed interventions will mean that environmental stabilization is achieved (meaning IPC obligations are met) and, in addition, significant other ecosystem service benefits particularly for climate action will be accrued.
- The local environmental conditions of Boora Bog identify wetland creation, dry cutaway measures and deep peat re-wetting as the most suitable rehabilitation approach for the area recently out of peat production at 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 Mount Lucas Bog as **environmental stabilisation** of the site via **optimising climate action benefits, where possible, and integrating rehabilitation with the existing amenity infrastructure, other site infrastructure and land-uses**. The re-wetting of residual peat in the area recently out of peat extraction will be optimised, **setting the site on a trajectory towards the development of peat-forming communities on residual deep peat, and the development of wetlands/Reed Swamp and fen on shallow more alkaline peat and other subsoils.**
- Enhanced Rehabilitation of Boora Bog will support multiple national strategies of climate action, biodiversity action and other key environmental strategies such was the Water Framework Directive.
- The time frame for the delivery of the planned rehabilitation will be undertaken according to available resources and appropriate constraints.
- It is not proposed to carry out any rehabilitation in the marginal cutover bog zone.
- Current land-uses. Lough Boora Discovery Park is an important midlands amenity site. It is not proposed to carry out any intensive rehabilitation actions to change or negatively affect any amenity infrastructure or existing land-uses.

6.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, there is potential for raised bog restoration at some sites where there has not been significant industrial peat extraction and the peat body is largely intact (deep peat sites that are drained). At other sites, most of the peat mass has been removed, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status, etc.) and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland). At Boora Bog, peat depths of 2-3 m only occur within the south-western portion of Boora West and a very small portion of the site overall. By contrast, the smaller remaining sections contains shallower residual peat, most of which is stabilised and has already developed a mosaic of habitats.

- Furthermore, there are local factors (such as topography and drainage) that will influence the future trajectory of this bog. At Boora Bog, a larger proportion of the bog has existing habitat cover of pioneering vegetation, established woodland and previously rehabilitated areas, with only the most recently utilised portions for peat extraction having an un-vegetated surface over deep peat deposits. These need to be considered as part of the wider rehabilitation work.
- **Current land-use.** Lough Boora Discovery Park has integrated several different land-uses during its development. Key land-uses are **amenity** and **forestry**. The Lough Boora Sculpture Park has significant cultural importance. These areas have largely stabilised and are rehabilitated (Finnamores Lakes). Any proposed enhancement measures (ie. targeted drain-blocking) will be positively aligned with current land-uses and will look to facilitate amenity, where possible.. There are proposals to extend amenity infrastructure (towards Boora West) and rehabilitiation will be positively aligned to enable any future amenity development. Re-wetting will be planned as to not to rule out potential future amenity.
- **Designated areas.** A small part of the site is designated as Lough Boora pNHA. This area also overlaps with the IWT-owned area. Proposed enhancement measures (ie. targeted drain-blocking) will be considered and will be positively aligned with the ongoing management of this site, and considered after agreement with the land-owner.
- **Surrounding landscape and neighbours.** Another key constraint is the interaction between the Bord na Móna sites and the surrounding landscape. Care has to be taken that no active rehabilitation management is carried out that could negatively and knowingly impact on surrounding land. This includes any hydrological management on neighbouring farmland, as well as potential changes to the hydrology of surrounding designated 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.
- **Grey Partridge conservation**. Areas adjacent to the Bord na Móna-owned area are managed for Grey Partridge and breeding wader conservation. It is not proposed to carry out any rehabilitation actions to change or negatively affect adjacent Grey Partridge conservation. Rehabilitation within the Bord na Móna-owned areas will look to support Grey Partridge and breeding wader conservation, where possible.
- **Archaeology**. The discovery of monuments or archaeological objects during peatland rehabilitation may potentially constrain the rehabilitation measures proposed for a particular area. While the rehabilitation will optimise hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future, any new archaeology may require rehabilitation measures to be reviewed and adapted. If this occurs, rehabilitation measures will be reviewed and adapted. An archaeological impact assessment of the proposed rehabilitation at Boora Bog has been carried out (Appendix IX). There is known archaeological features at Boora. Rehabilitation in archaeological zones has been avoided or amended (e.g. buffers in line with Best Practice) to avoid or minimise impact to any archaeological features (Figure 8.4 & Appendix IX).
- **Public Rights of Way**. Where a public right of way or similar burden exists on Bord na Móna property, consideration will be given to ensuring that this remain intact where possible. In some instances, depending upon previous land uses and management, alternative solutions may be required. These will be explored in consultation with local communities and statutory bodies during the consultation work associated with the decommissioning and rehabilitation work described here. At least 1 no. right of way intersects the bog boundary for Boora, at Leabeg.

6.2 Key Assumptions

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

6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- The longer-term raised bog restoration trajectory of the site. The plan covers the short-term rehabilitation **actions** and **a monitoring and after-care programme** to monitor the rehabilitation during the Scheme and to respond to any needs. It is expected that this rehabilitation plan will set the site on an enhanced and accelerated trajectory towards stabilisation and deep peat re-wetting. The plan does not set any goals or outcomes, for example, the extent (specific area) of active raised bog habitat (ARB) that may develop at this site in the long-term. This is beyond the scope of this rehabilitation plan.
- This plan is not intended to be an after-use or future land-use plan for Boora Bog.
- The longer-term management of this site, potentially as a nature conservation site, or for amenity, or for other uses in the future.
- Land leased to Coillte. This rehabilitation plan does not cover conifer forestry management on lands leased by Coillte.
- BnM Leabeg Offices. It is not intended to carry out measures in this area.
- Lough Boora Visitor Centre. It is not intended to carry out any rehabilitation measures that would affect the Lough Boora Visitor Centre.
- BOGFOR and biomass trials. It is not proposed to carry out any rehabilitation measures that would affect these areas. These areas are considered rehabilitated through land-use.
- Areas developed as farmland in the 1980s-1990s and sold to local farmers are not considered as part of the scope of this rehabilitation plan.

7. CRITERIA FOR SUCCESSFUL REHABILITATION

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

The key objective of this 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 potential key emissions (e.g. suspended solids).

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

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

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

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

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

As the monthly monitoring program at Boora 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.

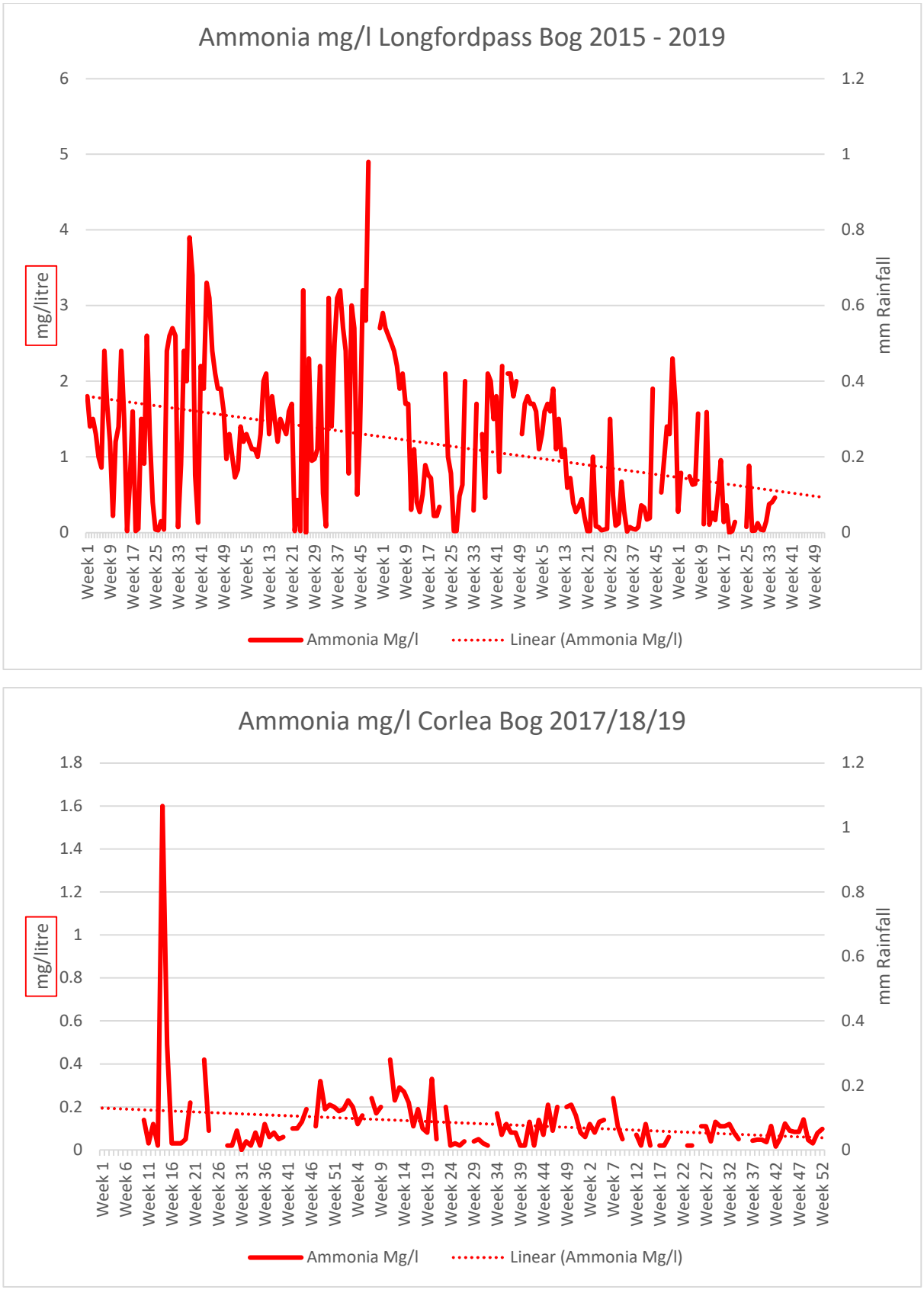


Figure 7.1. Ammonia trends at Longfordpass and Corela 2015-2019.

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 deep peat re-wetting). This will be measured by an aerial survey after rehabilitation has been completed.
- Accelerating the trajectory of the former area of industrial peat extraction towards becoming a reduced carbon source/carbon sink. This will be measured through habitat mapping and the development of cutaway bog condition assessment. This cutaway bog condition assessment will include assessment of environmental and ecological indicators such as vegetation cover, vegetation communities, presence of key species, *Sphagnum* cover, bare peat cover and water levels (similar to ecotope mapping). Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Reduction in carbon emissions. This will be estimated via a combination of habitat condition assessment and application of appropriate carbon emission factors derived from other sites. Baseline monitoring (habitat condition) will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Setting the site on a trajectory towards establishment of a mosaic of compatible habitats including wetland, Reed swamp, poor fen, wet woodland, 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. It will take some time for stable naturally functioning habitats to fully develop at Boora Bog. This will be demonstrated and measured via aerial photography, habitat mapping and cutaway/habitat condition assessment. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Improvement in biodiversity and ecosystem services. This will be demonstrated by metrics outlined in Section 9.1 that can be used to measure changes in ecosystem services (e.g. water quality parameters, development of pioneer habitats, breeding bird monitoring). This will be measured by collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future. These metrics will be defined in the context of the overall Scheme resources and after consultation with stakeholders.

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

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

			Establishment of a baseline for future monitoring of bare peat, vegetation establishment and habitat condition.	
IPC validation	Key water quality parameters Ammonia, Phosphorous, Suspended solids, pH and conductivity	Reduction or stabilisation of key water quality parameters	Water quality monitoring. Started in advance of the proposed rehabilitation.	2021-2023
IPC validation	Reducing pressure from peat production on the local water body catchment (WFD)	No decline in the WFD status of the local river catchment related to this bog	EPA WFD monitoring programme	WFD schedule
Climate action verification	Optimising the extent of suitable hydrological conditions to optimise climate action	Optimal extent of suitable hydrological conditions	Aerial photography and Habitat mapping to map extent of suitable hydrological conditions. Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	2021-2025
Climate action verification	Reduction in carbon emissions.	Reduction in carbon emissions	Carbon emissions – estimated using a high bog condition assessment and appropriate carbon emission factors.	2021-2025
Climate action verification	Setting the site on a trajectory towards establishment of a mosaic of compatible habitats	Establishment of compatible cutaway habitats	Habitat map, Cutaway bog condition map Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	2021-2025

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

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

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 (Figure 8.2 & 8.3) 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 8.3) indicates those areas that are likely to re-wet when drains are blocked, based on the current topography, and areas where water levels may have to be modified, where needed. Enhanced rehabilitation measures will look to optimise hydrological conditions for re-wetting peat in other areas. This planning is also essential for matching the most sustainable rehabilitation methodology to the most suitable cutaway environment to maximise the benefits of the resource outlay (maximising cost/benefit).

The rehabilitation actions will be a combination of PCAS measures to re-wet peat. The distribution of these measures is provisionally outlined in Figure 8.4. (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 areas out of recent peat extraction at Boora bog will include**:**

- Initial hydrological modelling indicates that a significant part of the area that has recently come out of peat extraction will develop a mosaic of wet habitats. Hydrological management will look to optimise summer water levels to maximise the development of wetland vegetation (by looking to set water depths close to the peat surface and at < 0.5 m, where possible). Water-levels will be adjusted at outfalls and by adjusting piped drainage. More sustainable permanent gravity drainage solutions will be examined.
- Intensive drain blocking to create wetlands, and the introduction of Reeds and other Rhizomes;
- Management of water levels with overflow pipes;
- Re-alignment of piped drainage;
- Re-wetting the deep peat and some shallow peat areas of the bog using berms and field re-profiling. This enhanced measure seeks to create large (c. 45m x 60m) flat areas or cells of shallow (< 10 cm) water conditions on bare peat, across multiple fields that are enclosed by shallow berms to retain shallow surface water;
- Re-wetting some deep peat areas of the bog through field drain blocking using a dozer to create peat barriers (up to seven every 100 m along each field drain);
- Regular drain blocking (3/100) on dry cutaway adjacent to wetland mosaics, along with the blocking of outfalls and management of water levels;
- Field re-profiling on deep peat fields using a screw leveller, along with drain blocks, drain infilling and keyed berms across the fields, in conjunction with outfall management;
- Inoculation of *Sphagnum* on compatible residual deep peat areas;
- Targeted fertiliser applications on bare peat areas to accelerate vegetation establishment on headlands and high fields.

Measures for other areas at Boora bog will look to integrate rehabilitation with existing site infrastructure and land-use. Any rehabilitation will look to balance residual peat re-wetting and enhancement of wetland habitats with needs of the infrastructure and land-uses. These will include**:**

- Targeted drain blocking around existing wetlands or standing water to create/promote the spread of wetland habitats;

- Optimising water retention in wetland areas, including placement of berms where required;
- Regular drain blocking (3/100) in targeted dry cutaway adjacent to wetland mosaics, along with the blocking of outfalls and management of water levels;
- 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 water quality parameters meet targets 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).

An indication of the areas for these various measures is shown in Table 8.1 and in Figure 8.4.

Table 8.1 Enhanced rehabilitation measures and target area at Boora 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	0
	DPT2	More intensive drain blocking (7/100 m) + blocking outfalls and managing overflows	14.6
	DPT3	More intensive drain blocking (max 7/100 m), + field reprofiling with screw leveller +drain infilling +cross berms + blocking outfalls and managing overflows	0
	DPT4	Berms and field re-profiling (45m x 60m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	122.75
	DPT5	Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	0
Dry cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	119.8
	DCT2	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	15.6
	DCT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows + targeted fertiliser treatment	0
Wetland cutaway	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	0
	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	0
	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	67.7
	WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	113.3
	WLT5	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	0
Marginal land	MLT1	No work required	74.8
	MLT2	More intensive drain blocking (max 7/100 m)	0
	MLT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows with + boundary berm	0
Other		Largely rehabilitated. Assessment will consider additional enhancement measures that align with current land-use, amenity and constraints	1196.9
Other		Silt-ponds	0.4
Other		Constrained Areas	126.4
Other		Archaeology Constrained Areas	0.25
Total			1852.7

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

- Seek formal approval of the enhanced plan, noting the alternative standard plan should funding from the proposed Scheme not materialise, from the EPA;
- Agree an *ex ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator;
- Develop a detailed site plan with detailed site drawings outlining how the various rehabilitation methodologies (within the proposed PCAS) will be applied to Boora Bog. This will take account of peat depths, topography, drainage and hydrological modelling. (See Figure 8.4 for an indicative view of the application of different rehabilitation methodologies);
- A hydrology and drainage management assessment of the proposed enhanced rehabilitation measures has been carried out , with no significant issues identified;
- A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation has been carried out. The results of this assessment have been incorporated into the rehabilitation plan to minimise known archaeological disturbance, where needed;
- A review of issues that may constrain rehabilitation such as amenity, forestry, other land-uses, known rights of way, archaeology, turbary, and existing land agreements has been carried out and incoprorated into the rehabilitiation plan, where needed;
- A review of remaining milled peat stocks has been carried out. All peat stocks will eventually be removed.
- An ecological appraisal of the potential impacts of the planned rehabilitation such as the presence of sensitive ground-nesting bird breeding species (e.g. breeding waders) or larval webs of Marsh Fritillary butterfly, etc has been carried out.
- Ensure all activities comply with the environmental protection requirements of the IPC Licence.
- Carry out Appropriate Assessment of the Rehabilitation Plan. Incorporate any required mitigation measures from the AA in the plan for the delivery of rehabilitation and decommissioning across the site.
- See Boora Decommissioning and Rehabilitation Plan – Addendum 1 for more details.
- Track delivery of mitigation measures (AA) and other environmental control measures during the implantation of the rehabilitation plan.

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

- Carry out proposed measures as per the detailed site plan. This will include a combination of drain blocking, peat field re-profiling, cell-bunding and fertiliser applications targeting headlands, high fields and other areas. 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 potential
- from the site during the rehabilitation phase; and
- Submit an *ex post* report to the Scheme regulator to verify the eligible measures to be carried out in year 1 of the Scheme, and an *ex ante* estimate for year 2 of the Scheme; and so on for each year of the proposed Scheme

8.3 Long-term (>3 years)

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

8.4 Timeframe

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

8.5 Budget and costing

Bord na Móna (BnM) understand that it is the Minister's intention to impose an obligation on Bord na Móna to develop a package of measures, 'the proposed Scheme', for the enhanced decommissioning, rehabilitation and restoration of cutaway peatlands (PCAS). It is understood that additional costs of the proposed Scheme will be supported by the Government through the Climate Action Fund. However, only the additional costs associated with the additional and enhanced rehabilitation, i.e, measures which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support.

The enhanced decommissioning, rehabilitation and restoration of the peatlands funded by the proposed Scheme will deliver benefits across climate action (GHG mitigation through reduced carbon emissions and acceleration towards carbon sequestration), enrich the State's natural capital, increase eco-system services, strengthen biodiversity, improve water quality and storage attenuation as well as developing the amenity potential of the peatlands.

Bord na Móna maintains a provision on its balance sheet to pay for the future costs of **standard** rehabilitation and decommissioning when industrial peat extraction ceases. This is updated every year - for more information see the Bord na Móna Annual Report (Bord na Móna 2020). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.

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

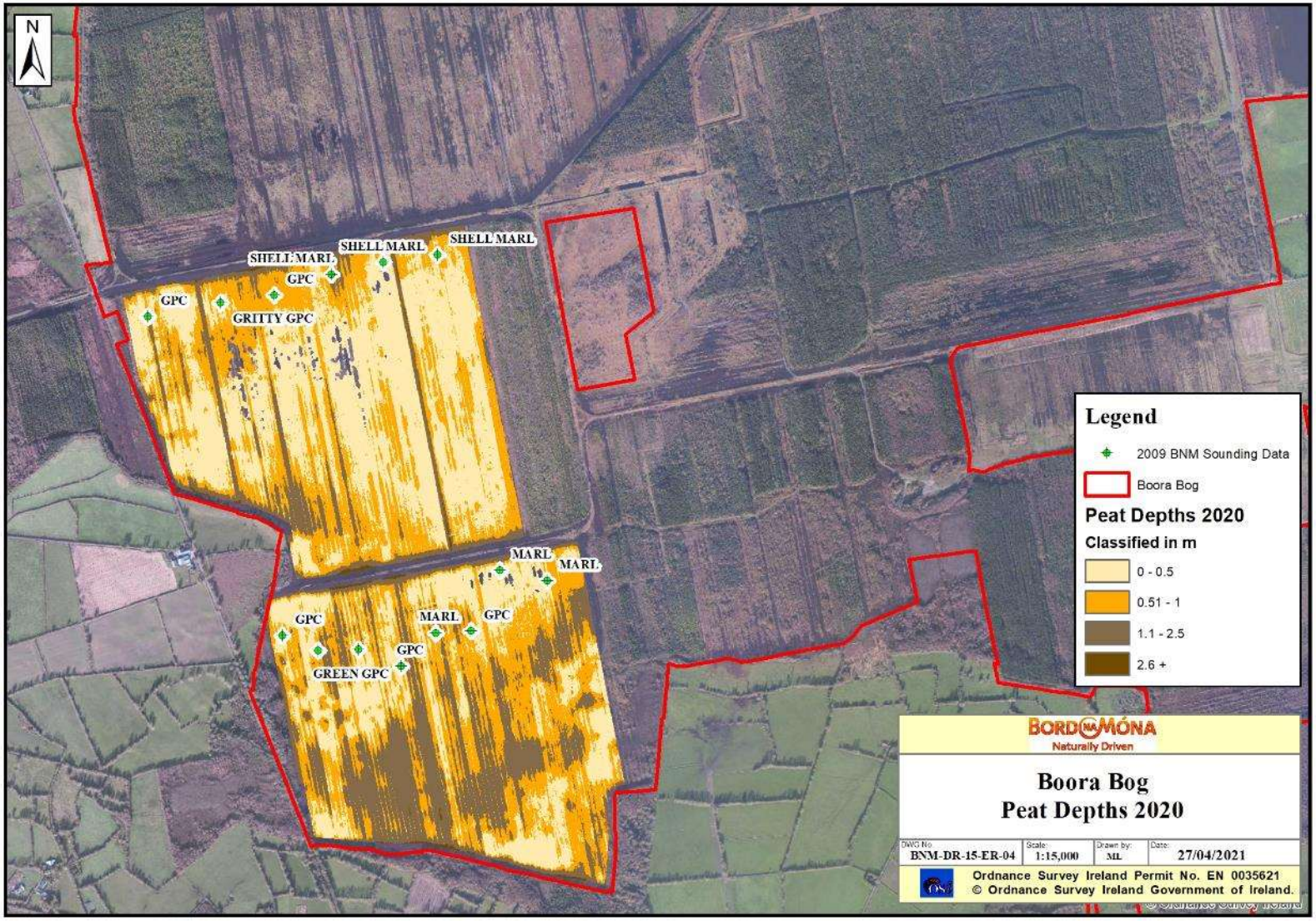
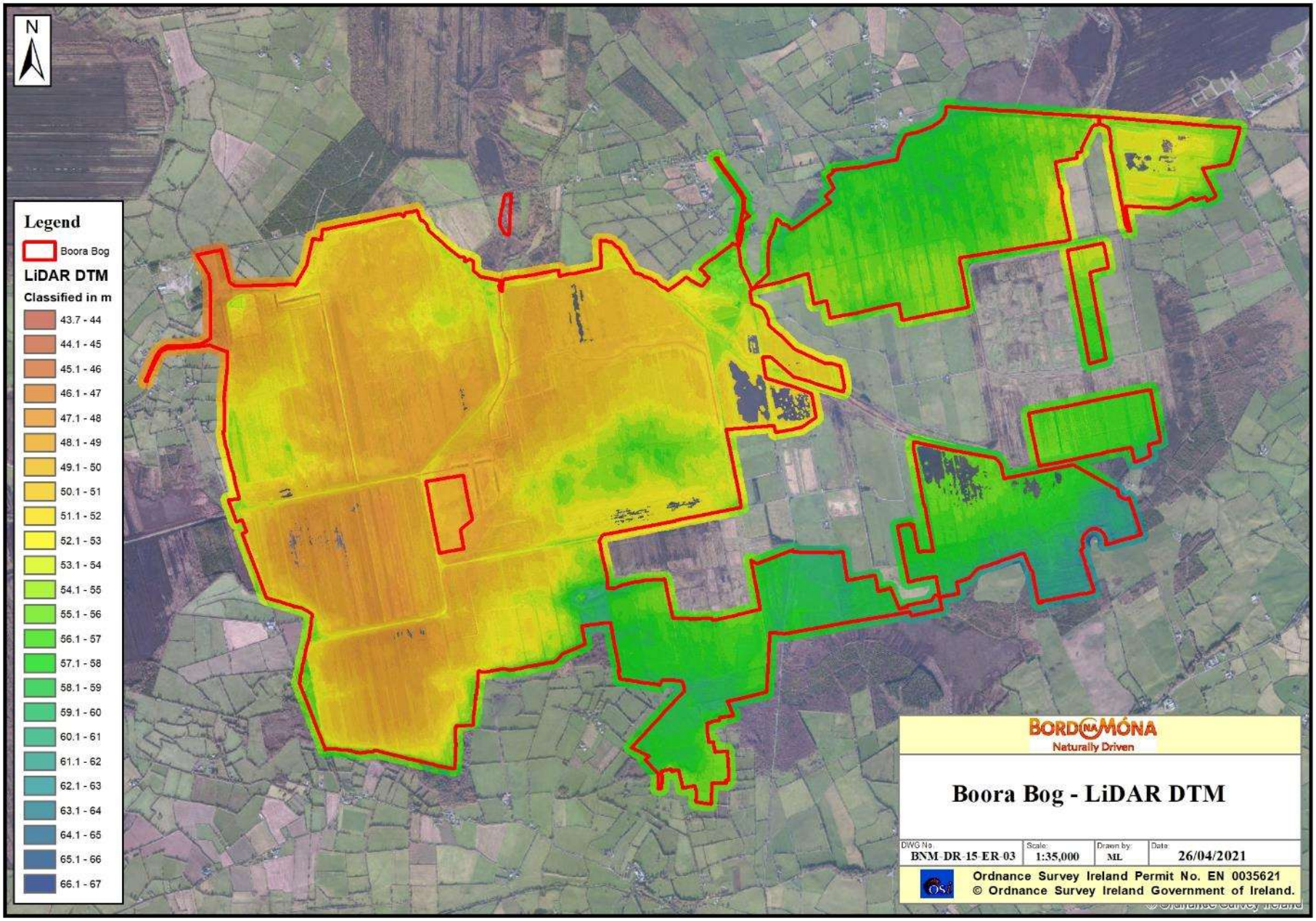


Figure 8.1. Peat depth map for Boora Bog. The majority of the south west of Boora West is characterised as deep peat cutover bog.


N
Legend
Boora Bog
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66.1 - 67
BORD NA MÓNA
Naturally Driven
Boora Bog - LiDAR DTM
DWG No. BNM-DR-15-ER-03
Scale: 1:35,000
Drawn by: ML
Date: 26/04/2021
Ordnance Survey Ireland Permit No. EN 0035621
© Ordnance Survey Ireland Government of Ireland.

Figure 8.2. LIDAR topography map of Boora Bog. Low areas and basins are orange-yellow, more elevated areas are blue-green. The majority of the bog slopes towards the east or south east

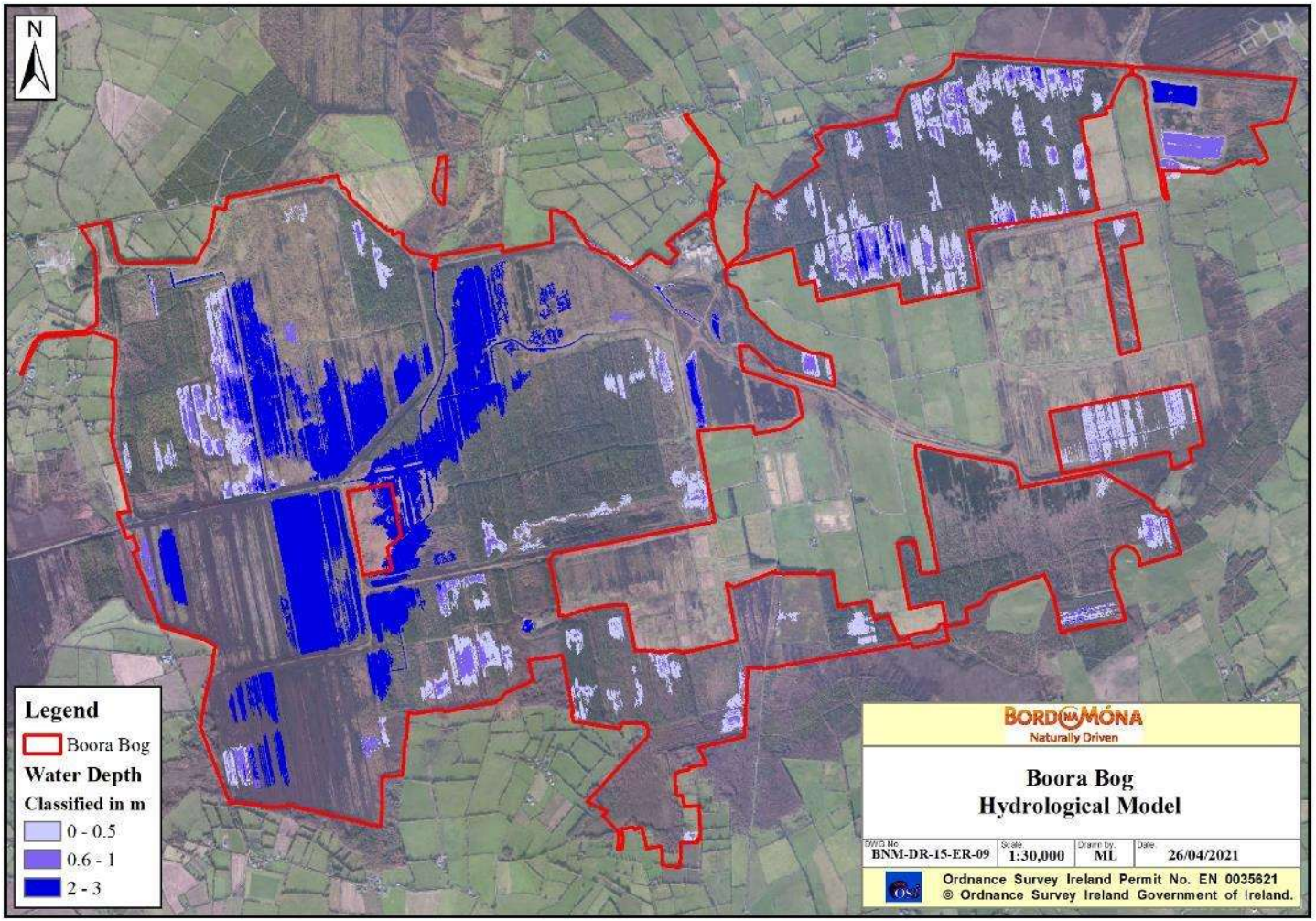


Figure 8.3. Hydrological modelling for Boora Bog showing range of potential water depths based on current topography. This modelling makes assumptions that all drains will be blocked. For avoidance of doubt, areas of forestry or used for amenity will not be re-wetted.

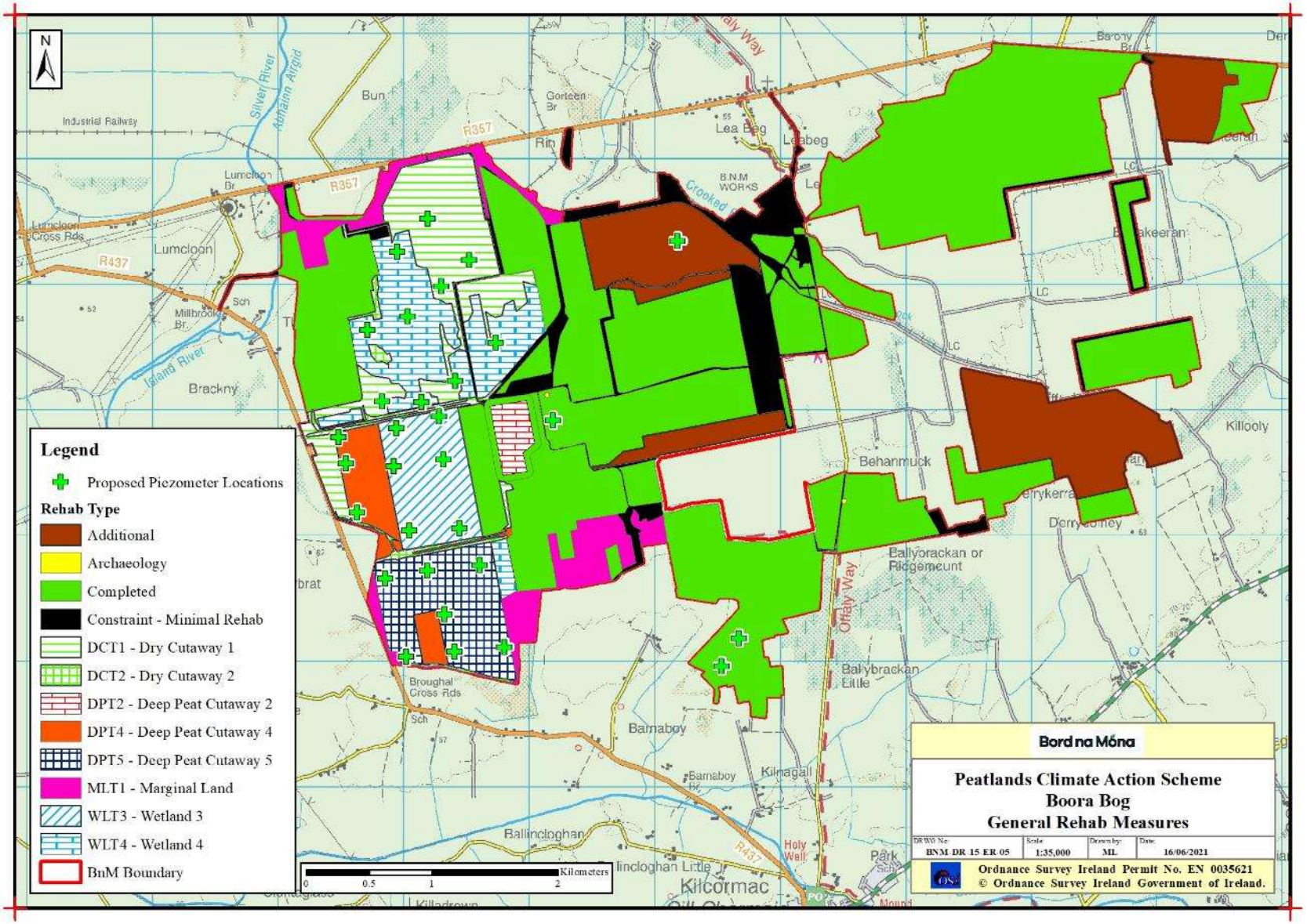


Figure 8.4. Indicative Enhanced Rehabilitation Plan for Boora Bog. Note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.

9. AFTERCARE AND MAINTENANCE

9.1 Programme for monitoring, aftercare and maintenance

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

- There will be **initial quarterly monitoring assessments** of the site to determine the general status of the site, the condition of the silt ponds, assess the condition of the rehabilitation work, monitoring of any potential impacts on neighbours land, general land security, boundary management, dumping and littering.
- The number of these site visits will reduce after 2 years to bi-annually and then after 5 years to annual visits.
- These monitoring visits will also consider any requirements for further practical rehabilitation measures.
- The **baseline condition of the site will be established** post-rehabilitation implementation by using an aerial survey to take an up to date aerial photo, when rehabilitation is completed. This will be used to verify completion of rehabilitation measures. The extent of bare peat will be assessed using this baseline data, and habitat maps will be updated, if needed.
- **Water quality monitoring** at the bog will be established. The main objective of this water quality monitoring will be to establish a baseline and then monitor the impact of peatland rehabilitation on water quality from the bog.
- In order to assist in monitoring surface water quality from this bog, it is planned to increase the existing licence monitoring requirements to sampling for the same parameters to every month during the scheduled activities and for a period up to two years. post rehabilitation, depending on the period required to confirm that the main two parameters, suspended solids and ammonia are remaining compliant with the licence emission and trigger limit values and there is an improving trajectory in these two parameters i.e. reduction in concentration.
- This new sampling programme commenced in November 2020 and is enabling a baseline to be established, with sampling to progress during the scheduled works, and for a period of up to 2 years post rehabilitation. Depending on the period required to confirm that the main two parameters, suspended solids and ammonia as remaining compliant with the licence emission and trigger limit values and there is an improving trajectory in these two parameters i.e. reduction in concentration, the monitoring programme and intensity will be periodically reviewed and amended.
- In the preparation of this monitoring programme, Bord na Mona have been providing the Local Authority Water Programme (LAWPRO) with details of the surface water emissions points associated with this bog and will be amending some of the proposed monitoring locations on foot of this engagement. LAWPRO have in turn provided details of their 2021 monitoring programme and these are included in the Water Quality Map.
- This is necessary to ensure that there is alignment with the WFD monitoring programme and that where possible, the monitoring programme will enable any improvements in water quality or establishing trends to be quantified against any available WFD monitoring data. It will also enable the periodic sharing of data which will inform the monitoring reports, success criteria and enable LAWPRO under the Water Framework Directive to track any changes in pressures and be aware of changes in water chemistry.
- This enhanced monitoring programme will aim to include a minimum of 70% of a bog's drainage catchments, whatever number of surface water outlets these include.

- Monitoring results will be maintained, trended every six months and reported on each year and as required, as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, and will be provided to LAWPRO and the EPA as required to inform progress and national monitoring requirements under the WFD. These results will also be available in April each year as a requirement of the Annual Environmental Report at www.epa.ie.
- The parameters to be included as per condition 6.2 of the IPC Licence include monthly monitoring for pH, Flow, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour & COD. In addition, DOC has been included as a parameter to try and identify any changes in carbon in the surface water, and where required by LAWPRO, to assist in investigating other changes in water chemistry, the series of parameters can be reviewed and amended.
- 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 rehabilitation. These proposed monitoring measures will be funded by the proposed Scheme or additional other funding. Monitoring of climate action and other ecosystem service benefits will be designed to take account of the requirements of monitoring benefits of the overall Scheme and will be stratified; that is not all monitoring will be carried out in each site. These are defined as:

- Vegetation and habitat monitoring will be carried out using a 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. 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

Atherton, I, Bosanquet, SDS & Lawley, M (2010). Mosses and liverworts of Britain and Ireland - a field guide. British Bryological Society.

Anderson, R., Farrell, C., Graf, M., Muller, F., Calvar, E., Frankard, P., Caporn, S., Anderson, P. (2017). An overview of the progress and challenges of peatland restoration in Western Europe. Restoration Ecology, Issue 2 Pages 271-282.

Barron, S., Egan, T., Feighery, T., Fleming, E., Healy, K., O'Boyle, D., O'Hora, A. and O'Riordan, P. (1994). Lough Boora Parklands Pre-feasibility study by Boora Enterprise Group. Brosna Press, Ferbane, Ireland.

Bord na Móna 2014. Blocking Drains in Irish raised bogs. The Bord na Móna Raised Bog Restoration Project. Cris, R. Buckmaster, S. Bain, C. Reed, M. (Eds) (2014) Global Peatland Restoration demonstrating SUCCESS. IUCN UK National Committee Peatland Programme, Edinburgh. http://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/IUCNGlobalSuccessApril2014.pdf

Bord na Móna. 2016. Bord na Móna Biodiversity Action Plan 2016-2021. Brosna Press, Ferbane. http://www.bordnamona.ie/wp-content/uploads/2016/04/Biodiversity-Action-Plan-2016-2021.pdf.

Bord na Móna (2020). Bord na Móna Annual Report 2020. https://www.bordnamona.ie/wp-content/uploads/2020/07/M12822-BORD-NA-MONA_Annual-Report-2020_WEB2.pdf

Bonn, A., Allott, T., Evans, M., Joosten, H. & Stoneman, R. (2017) Peatland restoration and ecosystem Services-science, policy and practice. Cambridge University Press.

Carroll, J., Anderson, P., Caporn, S., Eades, P., O'Reilly C. & Bonn, A. 2009. Sphagnum in the Peak District. Current Status and Potential for Restoration. Moors for the Future Report No 16. Moors for the Future Partnership.

Clarke, D. and Rieley, J. 2010. Strategy for responsible peatland management. International Peat Society, Finland.

Clarke, D. (2010). Brown Gold. A history of Bord na Móna and the Irish peat industry. Gill Books.

Collins, T. and Collins R. G. (2019). Deep Mapping Lough Boora Discovery Park. https://collinsandgoto.com/deep-mapping-lough-boora-sculpture-park/

Copland, A. (2010). Birds on Cutaway Peatlands at Boora, Co. Offaly. Internal report, Bord na Móna.

Copland, A. 2015. Assessment of environmental and community opportunities for three cutaway peatland sites in the Lough Boora Discovery Park: Drinagh, The Derries and Turraun. Cutaways for Communities: Conservation, Recreation, Education. Unpublished report prepared for Offaly Local Development Company in association with Bord na Móna.

Cross, J.R. (2006). The Potential Natural Vegetation of Ireland. Biology and Environment: Proceeding of the Royal Irish Academy, Vol. 106B, No. 2, 65-116 (2006).

Department of Communications, Climate Action and Environment 2019. National Climate Action Plan 2019. https://www.dccae.gov.ie/en-ie/climate-action/publications/Pages/Climate-Action-Plan.aspx

Department of Housing, Planning, Community and Local Government 2017. Public consultation on the River Basin Management Plan for Ireland. Department of Housing, Planning, Community and Local

Government. https://www.housing.gov.ie/sites/default/files/public-consultation/files/draft_river_basin_management_plan_1.pdf

Department of Arts, Heritage and the Gaeltaght 2015. National Peatland Strategy. Department of Arts, Heritage and the Gaeltacht.

http://www.npws.ie/sites/default/files/general/Final%20National%20Peatlands%20Strategy.pdf

Eades, P., Bardsley, L., Giles, N. & Crofts, A. (2003). The Wetland Restoration Manual. The Wildlife Trusts, Newark.

Egan, T. (1998). A pilot project for the utilisation of cutaway bogs in West Offaly. In: Towards a conservation strategy for the bogs of Ireland (eds G. O'Leary and F. Gormley), pp. 119-126. Irish Peatland Conservation Council, Dublin.

Environment Agency (2013). The Knotweed code of practise. Managing Japanese Knotweed on development sites. Environment Agency, Bristol, UK. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/536762/LIT_2695.pdf

European Commission (2013). Interpretation manual of European Union Habitats. European Commission DG Environment Nature ENV B.3.

EPA (2019). http://gis.epa.ie/Envision. EPA Envision Map Viewer. (Last Viewed: 31/12/2019).

EPA (2020). Guidance on the process of preparing and implementing a bog rehabilitation plan. http://www.epa.ie/pubs/reports/enforcement/guidanceontheprocessofpreparingandimplementingabogrehabilitationplan.html

Farrell, C. A. and Doyle, G. J. 2003. Rehabilitation of Industrial Cutaway Atlantic Blanket Bog, NW Mayo, Ireland. Wetlands Ecology and Management, 11, 21-35.

Fernandez, F., Connolly K., Crowley W., Denyer J., Duff K. & Smith G. (2014) Raised Bog Monitoring and Assessment Survey (2013). Irish Wildlife Manuals, No. 81. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin, Ireland.

Gann, G.D., McDonald, T., Walder, B., Aronson, J., Nelson, C.R., Jonson, J., Hallett, ,J.G., Eisenberg, C., Guariguata, M.R., Liu, J., Hua,F., Echeverría, C., Gonzales, E., Shaw, N., Decleer, K. & Dixon, K.W. (2019). International Principles and Standards for the practice of Ecological Restoration. Restoration Ecology 27(S1): S1–S46.

Grand-Clement, E., Anderson, K., Smith D., Angus, M., Luscombe D.J., Gatis, N., Bray L.S., Brazier R.E. (2015). New approaches to the restoration of shallow marginal peatlands Journal of Environmental Management 161.

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

Heery, S. and Finney, K. (1999). Lough Boora Parklands. Habitat Survey and Conservation Evaluation. Unpublished Report to the Lough Boora Parklands Group. Heritage Council, Ireland.

Hinde, S., Rosenburgh, A., Wright, N., Buckler, M. and Caporn, S. 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. Moors For The Future Partnership.

Holden, J., Walker, J., Evans, M.G., Worrall, F., Bonn, A., 2008. In: DEFRA (Ed.), A Compendium of Peat Restoration and Management Projects.

Joosten, H. and Clarke, D. 2002. Wise Use of mires and peatlands – Background and Principles including a framework for Decision-making. I.M.C.G. – I.P.S., Jyväskylä, Finland.

Lally, H., Gormally, M., Higgins, T. and Colleran, E. (2012). Evaluating Different Wetland Creation Approaches for Irish Cutaway Peatlands Using Water Chemical Analysis. Wetlands 32:129-136.

Lindsay, R., 2010. Peatbogs and Carbon: a Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change (Report to RSPB Scotland, Edinburgh).

Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. & Fernandez Valverde, F. (2017) Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

McBride, A., Diack, I., Droy, N., Hamill, B., Jones, P., Schutten, J., Skinner, A. and Street, M. 2011. The Fen Management Handbook, (2011), Scottish Natural Heritage, Perth.

Minayeva, T. et al. (2017). Towards ecosystem-based restoration of peatland biodiversity. Mires and Peat, Volume 19 (2017), Article 01, 1–36, http://www.mires-and-peat.net

McDonagh, E. (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service. https://www.npws.ie/sites/default/files/publications/pdf/McDonagh_1996_Drain_Blocking_Raised_Bogs.pdf.

NPWS. (2014). Review of the raised bog Natural Heritage Area network. Department of Arts, Heritage and the Gaeltacht.

NPWS. (2017a). National Raised bog Special Areas of Conservation management plan. Department of Arts, Heritage and the Gaeltacht. https://www.npws.ie/sites/default/files/files/FOR%20UPLOAD%20Plan(WEB_English)_05_02_18%20(1).pdf

NPWS. (2017b). Actions for biodiversity 2017-2021. Ireland's 3rd national biodiversity plan. Department of Arts, Heritage and the Gaeltacht. https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf

NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill. https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol2_Habitats_Article17.pdf

NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2). National Roads Authority.

NRA (2010). Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. National Roads Authority.https://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf.

Quinty, F. and L. Rochefort, 2003. Peatland Restoration Guide, second edition. Canadian Sphagnum Peat Moss Association and New Brunswick Department of Natural Resources and Energy. Québec, Québec.

Regan, S., Swenson, M., O'Connor, M. & Gill, L. (2020). Ecohydrology, Greenhouse Gas Dynamics and Restoration Guidelines for Degraded Raised Bogs. EPA RESEARCH PROGRAMME 2014–2020. Report

No.342. (2014-NC-MS-2). EPA Research Report. Prepared for the Environmental Protection Agency by Trinity College Dublin. www.epa.ie.

Renou-Wilson, F., Keane, M., McNally, G., O'Sullivan, J. and Farrell, E.P. (2008). Developing a forest resource on industrial cutaway peatland. The BOGFOR programme. COFORD, Dublin.

Renou-Wilson F., Bolger T., Bullock C., Convery F., Curry J. P., Ward S., Wilson D. & Müller C. (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency. Johnstown Castle, Co. Wexford.

Renou-Wilson, F., Wilson, D., Rigney, D., Byrne, K., Farrell, C. and Müller C. (2018). Network Monitoring Rewetted and Restored Peatlands/Organic Soils for Climate and Biodiversity Benefits (NEROS). Report No. 238. Report prepared for the Environmental Protection Agency. Johnstown Castle, Co. Wexford.

Rowlands, R. and Feehan, J. (2000). The ecological future of industrially milled cutaway peatlands in Ireland. Aspects of Applied Biology, 58, 263-270.

Schouten, M.G.C. (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; Staatsbosbeheer, the Netherlands; Geological Survey of Ireland; Dublin.

Smith, G., O'Donoghue, P., O'Hora, K. & Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council.

Stace, C. A. (1997). New Flora of the British Isles. Cambridge: Cambridge University Press.

Thom, T., Hanlon, A., Lindsay, R., Richards, J., Stoneman R. & Brooks, S. (2019). Conserving Bogs – Management Handbook. https://www.iucn-uk-peatlandprogramme.org/sites/default/files/header-images/Conserving%20Bogs%20the%20management%20handbook.pdf

Trodd, W. (2003). Assessment of aquatic habitats in Turraun Nature Reserve for restoration management and use of Chironomidae (diptera: insecta) as indicators of water quality. Unpublished PhD thesis, University College Dublin.

Wilson, D., Renou-Wilson, F., Farrell, C., Bullock, C. and Muller, C. (2012). Carbon Restore – the potential of restored Irish peatlands for carbon uptake and storage; CCRP Report. EPA Wexford.

Wilson, D., Dixon, S.D., Artz, R.R., Smith, T.E.L., Evans, C.D., Owen, H.J.F., Archer, E., & Renou-Wilson, F. (2015). Derivation of greenhouse gas emission factors for peatlands managed for extraction in the Republic of Ireland and the UK. Biogeosciences Discuss., 12, 7491–7535.

Wheeler, B. D., & Shaw, S. C. (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction. London: HMSO.

Wittram, B. W., Roberts, G., Buckler, M., King, L., & Walker, J. S. (2015). A Practitioners Guide to Sphagnum Reintroduction. Edale: Moors for the Future Partnership.

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 Boora Bog (Figure 3.1).
- EPA IPC Licence - Ref. P0500-01. 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. Boora bog is part of the Boora Bog group.
- The current condition of Boora Bog. Pioneer cutaway vegetation is developing across parts of the site, whilst some parts have already been stabilised/rehabilitated whilst other remain unvegetated .
- 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 Boora Bog will be left unblocked as blocking boundary drains could affect adjacent land.

Rehabilitation goals and outcomes

The key rehabilitation goal and outcome for Boora 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 residual peat in the former area of industrial peat production to offset potential silt run off and to encourage development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat.

- That there is a stabilising/improving concentration of suspended solids and ammonia associated with the measures undertaken to stabilise the peat surface by the blocking of the internal drainage system and the maximised rewetting of the peat surface. This will be demonstrated by developing a stable or downward trajectory of water quality indicators (suspended solids and ammonia) towards what would be typical of a re-wetted cutaway bog. This will be measured via water quality monitoring (suspended solids and ammonia).
- That the main watercourses associated with surface water from this bog are excluded in the EPA's list of peat pressure water bodies as reported in the River Basin Management Plans. Where the watercourse has been identified as under pressure from peat extraction, that the intervening EPA monitoring programme associated with its Programme of Measures for this water body shows positive improvements in water quality impacts that were attributable to the original peat extraction activity.

Rehabilitation indicators

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

Rehabilitation measures: (see Figure Ap-1)

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

Timeframe:

- 2021. 1st phase of rehabilitation. Field drain blocking and water-level management.
- 2021. 2nd phase. Further realignment of piped drainage and other re-wetting measures dependent on success of 1st phase re-wetting, as determined by pump management, 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.

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	137.4
Dry cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	135.4
Wetland	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	181.0
Marginal Land	MLT1	No work required	311.1
Other	Silt Pond	Silt ponds	0.4
Other	Completed	Rehabilitation Complete	960.7
Other	Constraint	Rights of Ways and constrained areas/buffers/Archaeology	126.6
Total			**1852.7**

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 required assessment and planning procedures.

Validation and IPC Licence surrender

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

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

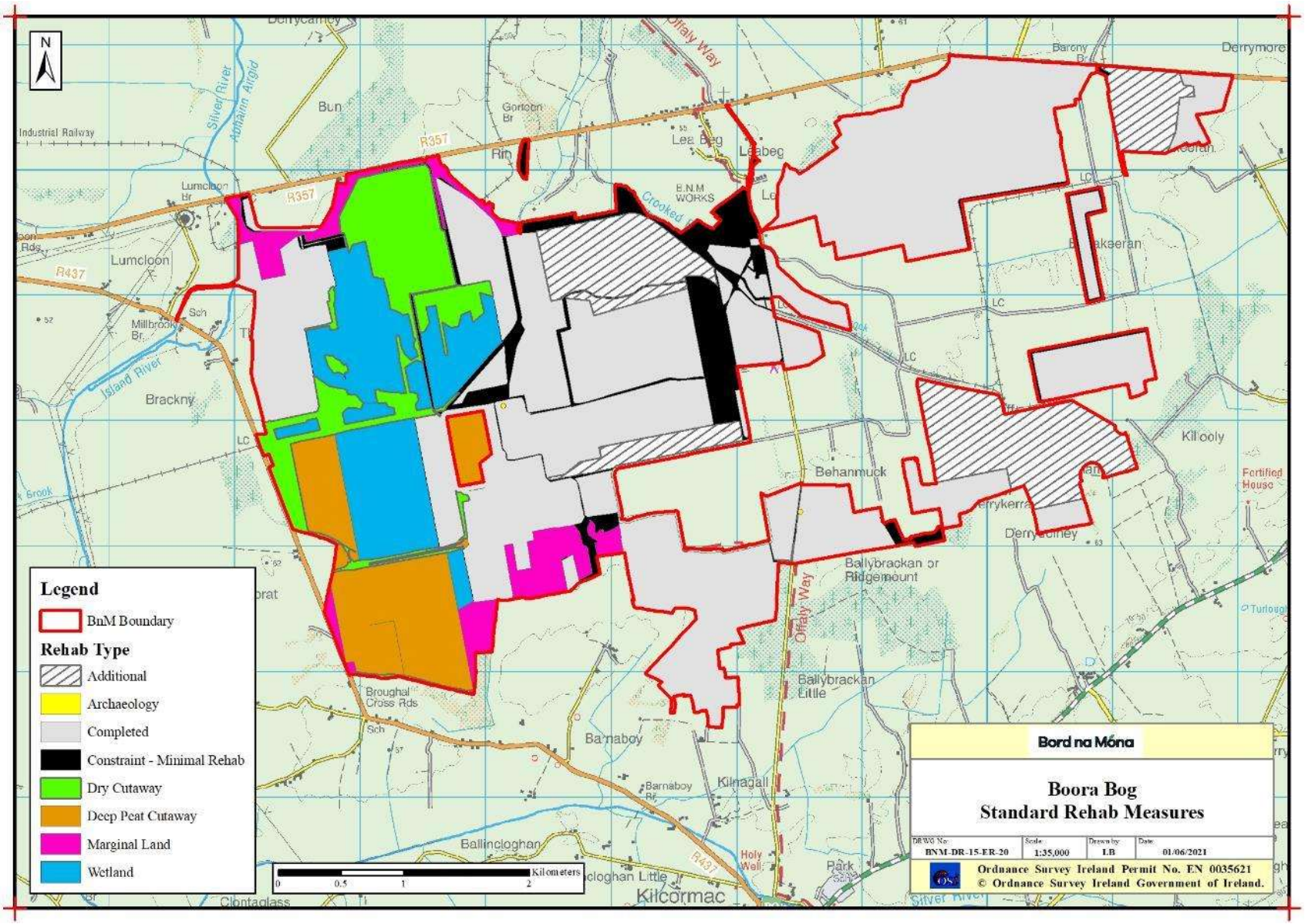


Figure Ap-1. Indicative standard rehabilitation plan for Boora Bog.

APPENDIX II: BOG GROUP CONTEXT

The Boora group of bogs are sited between Killeigh (Offaly) in the East to Banagher (Offaly) in the West and between Kinnitty (Offaly) in the south and Clara (Offaly) in the North. The River Shannon is the major river catchment for the area with a smaller area lying within the Barrow catchment.

The Boora Group is one of the oldest bog groups in Ireland. Bord na Móna was set up in 1946 and it commenced the development of the Boora Bogs in 1946 with milled peat production commencing in 1955. Milled peat was produced in the Boora Bog for the supply of fuel peat to the power station in Ferbane which commenced power generation in 1957 and closed in 2001. The Boora bogs were also developed for the supply of milled peat to the Derrinlough Briquette factory, which commenced production in 1957.

Much of the Boora Bog complex became cutaway as it was in peat production at an early stage. A number of rehabilitation measures comprising naturalisation and development of alternative after-uses have been already explored at the Boora Bog Group, including coniferous forestry, biomass, agricultural grassland, amenity use, rare species conservation management (specifically Grey Partridge) and wetland creation. Some of this was carried out in the 1980s While agricultural fields and coniferous forestry have been developed successfully on the cutaway bogs at Boora, it was found that these require financial investment that at this time exceeds any potential commercial output value. The Lough Boora Discovery Park encompasses all areas relating to amenity and biodiversity. www.loughboora.com.

The bogs in The Boora Bog Group have been used in the past to supply milled peat for the horticultural market, local power stations (Ferbane, Shannonbridge and West Offaly Power) and Derrinlough Briquette factory.

A breakdown of the component bog areas for the Boora Bog Group IPC License Ref. PO500-01, and current, indicative Peat Production Status, is outlined in Table Ap-2. These areas are also outlined on Figure AI-2 (Map of the Boora Bog Group).

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

Bog	Area (Ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Killaun	359.5	Cutover Bog Industrial peat production commenced at Killaun Bog in 1996 and ceased in 2020. Only the upper most layers of peat have been harvested. Deep peat reserves remain on site. Killaun is considered a deep peat cutover bog.	Killaun Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat. Most of the former production area is bare peat.	2020	Draft 2017
Boora	1,842.4	Cutaway Harvested since the 1950's resulting in the exhaustion of the commercially viable peat resource at the bog. The majority of Boora Bog is considered a shallow peat cutaway bog. Some areas of deep peat persist at this site.	The majority of Boora bog has already been rehabilitated. A significant area of cutaway bog has been re-wetted, developed as conifer forestry (Coillte) and developed as farmland (1980s). This site now forms the core of Lough Boora Discovery Park.	2020	Finalised 2021

Pollagh/ Cornalaur	280.8	Cutaway At Pollagh Bog, industrial peat production began in 2004 and ceased in 2020. Peat reserves of variable depth remain on site. Some deep peat areas remain. Pollagh is considered a cutover bog with variable peat depths.	Pioneer emergent peatland vegetation communities are developing throughout the bog. The adjacent Cornalaur Bog was never developed for peat production.	2020	Finalised 2021
Noggusboy	917.4	Cutaway Bog Industrial peat production commenced at Noggusboy during the 1950's and ceased in 2020. Long-term peat extraction has exhausted commercially viable peat reserves on this bog. Noggusboy is considered a shallow peat cutaway bog.	Part of the site was developed for conifer forestry by Coillte. Part of the site was developed as Cloghan Lake, as part of Lough Boora Discovery Park, in 1999. There is some emerging naturally colonising cutaway.	2020	Draft 2017
Drinagh	1,339.1	Cutaway Bog Industrial peat production commenced at Drinagh during the 1950's and ceased in 2020. Some small pockets of deep peat reserves remain in parts of Drinagh Bog but most of the commercially viable peat reserves have been exhausted. Drinagh is considered a shallow peat, cutaway bog.	Drinagh East is cutaway and has been extensively rehabilitated as wetland. This part of the site has extensive development of naturally functioning peatland habitats. Some Coillte conifer forestry is also present. There is some emerging naturally colonising cutaway in Drinagh West.	2020	Draft 2017
Killaranny	242.8	Cutover Bog Industrial peat production commenced at Kilaranny during the 1980's. Deep peat reserves remain on much of the bog. Kilaranny is considered a deep peat cutover bog.	Kilaranny Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat. A portion of the site is leased by NPWS since 2011 as a re-location area for turf cutters from nearby Clara Bog SAC.	2020	Draft 2017
Oughter	352.9	Cutaway Development of Oughter Bog commenced in the 1960's. Industrial peat production ceased in 2012. Shallow peat depths remain over much of the former production bog area. Oughter is considered a shallow peat cutaway bog.	The site has naturally been re-wetting and there is already significant natural colonisation. Part of the site has been developed as the Midlands National Shooting Centre of Ireland.	2012	Finalised 2021
Galros	191.5	Cutover Bog Industrial peat production commenced at Galros during the 1980's and ceased in 2020. Some areas of deep peat remain on the former production area. Galros is considered a cutover bog of variable peat depth.	Galros Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat. Some naturally emerging cutaway habitats are developing in part of the site.	2020	Draft 2017
Clongawny More	987.2	Industrial peat production commenced at Clongawny More during the 1950's and ceased in 2020. Some pockets of deep peat persist, particularly in the south-	Part of the site rehabilitated, as part of Lough Boora Discovery Park, in 1999.	2020	Draft 2017

		western portion of the former production area. Clongawny More is considered a cutover bog with variable peat depths throughout the site.	Some Coillte conifer forestry is also present. The site has naturally been re-wetting and there is already significant natural colonisation. BnM currently have submitted an application for renewable energy development on this bog.		
Derrinboy	305.7	Cutover Bog Derrinboy was first developed by BnM in the 1980's. Peat production ceased at Derrinboy in 2020. This bog was used to supply horticultural peat. Only the upper layers of peat have been harvested. Derrinboy is considered a deep peat cutover bog.	Derrinboy Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat.	2020	Draft 2017
Moneitta	707.5	Cutover Bog Moneitta was first developed by BnM in the 1970's. Peat production ceased at Monietta in 2020. This bog was used to supply horticultural peat. Only the upper layers of peat were harvested. Moneitta is considered a deep peat cutover bog.	Moneitta Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat.	2020	Draft 2017
Boora Lemanaghan Rail_Link	6.9	N/A	Not applicable	N/A	N/A
Derries	368.2	Cutaway Bog Development of The Derries Bog commenced in the 1960's. Industrial peat production ceased in 2005. Shallow peat depths remain over much of the former production bog area. The Derries Bog is considered a shallow peat cutaway bog.	Wetland rehabilitation carried out over part of site in 1999. Amenity trackway development in 2015. Part of the Lough Boora Discovery Park. The site has now been extensively naturally colonised and is a mosaic of wetland and Birch woodland habitats.	2005	Finalised 2021
Turraun	534.5	Cutaway Bog Development of Turraun Bog commenced in the 1950's. Industrial peat production ceased in 2018. Turraun is considered a shallow peat cutaway bog.	Wetland rehabilitation carried out over part of area in 1999 as part of the Lough Boora Discovery Park. This section of the site has now been extensively naturally colonised and is a mosaic of wetland and Birch woodland habitats.	2018	Finalised 2021
Derryclure	327.6	Cutover Bog Derryclure was first developed by BnM in the 1980's. Peat production ceased at Derryclure in 2020. This bog was used to supply horticultural peat. Only the upper layers of peat were harvested. Derryclure is considered a deep peat cutover bog.	Derryclure Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat.	2020	Draft 2021
Lemanaghan	1,253.7	Cutover Bog Industrial peat production commenced at Lemanaghan during the 1950's and ceased in 2019. Varied peat depths across the site. Deep peat reserves remain on	Lemanaghan Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat.	2020	Draft 2017

		much of the former production area of Lemanaghan Bog. It is considered a cutover bog.	There are some naturally emerging cutaway habitats.		
Belair North	565.7	Cutover Bog Belair North was first developed by BnM in the 1960's. TPeat production ceased at Belair North in 2020. This bog was used to supply horticultural peat. Only the upper layers of peat were harvested. Belair North is considered a deep peat cutover bog.	Belair North Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat.	2020	Draft 2017
Derrybrat	171.6	Cutaway Bog Industrial peat production commenced at Derrybrat during the 1950's and ceased in 2016. Derrybrat has shallow peat depths across the site. It is considered a shallow peat cutaway bog.	The site has been partially rehabilitated and there is already significant natural colonisation. Some conifer forestry has been developed by Coilte on the site.	2016	Finalised 2021
Belair South	228.8	Cutover Bog Belair South was first developed by BnM in the 1970's. Peat production ceased at Belair South in 2020. This bog was used to supply horticultural peat. As a result, only the upper layers of peat were harvested. Belair South is considered a deep peat cutover bog.	Belair South Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat.	2020	Draft 2017
Boora Bog Group Total	**10,983.7**				

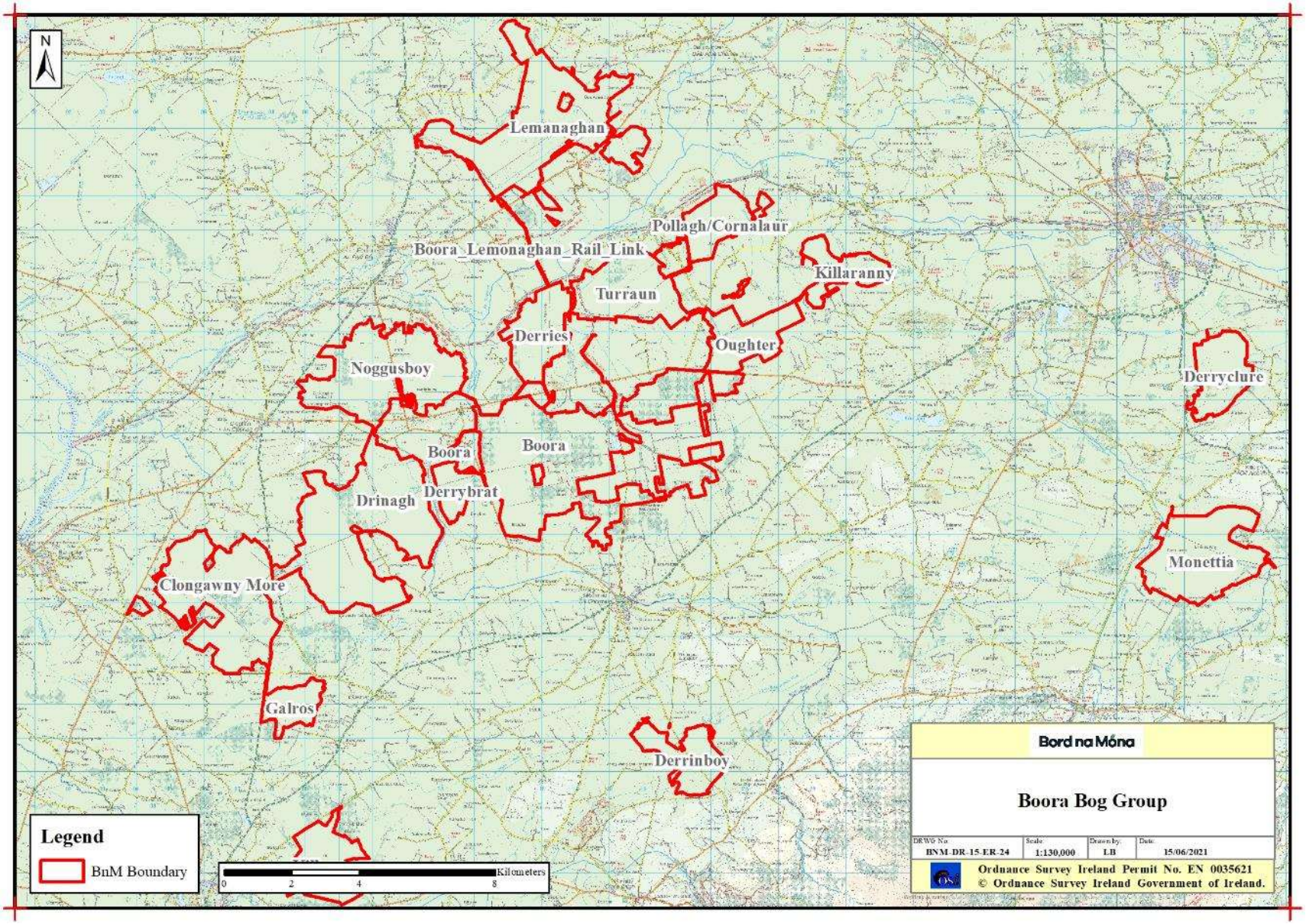


Figure Ap-2: Boora Bog Group

APPENDIX III: ECOLOGICAL SURVEY REPORT

Ecological Survey Report

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

Bog Name:	**Boora East**	**Area (ha):**	594.9 Ha (1420.5 acres)
Works Name:	Boora	**County:**	Offaly
Recorder(s):	MMC & DF	**Survey Date(s):**	19-23/08/2011

Habitats present (in order of dominance)

The most common habitats present at this site include:

- Emergent wetland and Reedbed communities with stands of Bulrush (pTyph), Bottle Sedge (pRos), Horsetails (pEq), and Bog Cotton (pEang). Found in mosaic with open water. (Codes refer BnM classification of pioneer habitats of production bog.
- Birch scrub (oBir, cBir) and woodland (BirWD) – frequently in mosaic with poor fen and wetland communities.
- Poor fen communities dominated by Soft Rush and Bog Cotton (pJeff, pEang) – frequently in mosaic with wetland and scrub.
- Disturbed vegetation (DisTuss, DisWill), calcareous grassland (gCal) and Purple Moorgrass-dominated grassland. Found along the cycle track and in other dry open parts of the site.
- Limestone/marl lakes (FL3)
- Conifer plantation (WD4) planted on cutaway bog. (Codes refer to Heritage Council habitat classification, Fossitt 2000),
- Raised bog (PB1) – small remnant dry sections.

Description of site

Boora East is located in Co. Offaly, 4.5 km north of Kilcormac. The Bord na Móna Works and Offices is located at Leabeg and is part of the Boora bog. The overall Boora bog is divided into two main sections, Boora East and Boora West for ease of survey. The minor road that connects Leabeg and Kilcormac is the main division between these two sections, with all of the BnM property to the east of the road described in this report.

Boora East contains a large area of rehabilitated cutaway. This bog is one of the older bogs that went into production at the beginning of industrial peat production and therefore has some of the oldest developing cutaway. Much of the cutaway has been rehabilitated as agricultural grassland, conifer plantation, or as part of the Lough Boora Parklands. The rehabilitation of the cutaways of Lough Boora Parklands has been described in detail by Egan (2008). The improved grassland developed in the 1980' and 1990s has been sold to local farmers and a large area of cutaway "known as the Marl square' has since been sold to the NPWS. This has fragmented the current BnM properly somewhat into several 'isolated' sections. For ease of description, each of these sections is described separately as a sub-section.

Finnermores Lakes

The Finnamores lakes are located at the north-east corner of the site. This area is now managed by a local angling club. Two fishing lakes were constructed on the site by digging into the glacial sub-soil, creating a basin and using the spoil around the lake to create embankments. Both lakes are relatively shallow with a calcareous water chemistry and there is likely to be influence from underlying marl and glacial sub-soil/gravel. The lakes attract some water birds with Mallard, Tufted Duck, Little Grebe and feral geese all present. However, there is not a

significant amount of riparian or emergent vegetation cover around the lake edges, meaning that potential for breeding by these species is low.

The use of the spoil from the lake basins around the lake margins has had the effect of creating relatively diverse calcareous grassland. This grassland is still in the pioneer phase and is still developing. There are sections that were initially re-seeded and are dominated with clover, Perennial Ryegrass and other species. However, the grassland around the lakes is notable for the number of Common Spotted Orchids and other Spotted Orchid species that are present. Marsh Helleborine is also present in places as well as fragrant Orchid. This grassland also attracts a diverse range of butterfly species with Common Blue, Red Admiral, Meadow Brown and Peacock all present. Orange-Tip, Green-veined White, Ringlet and Small Heath were all numerous earlier in the season. Some scrub (Birch and Gorse) is beginning to spread into this grassland in places, particularly along the northern margin.

The wetlands that have developed associated with the lakes are quite diverse, structurally and at species level. The wetlands in the central area flocks of roosting Lapwing and other wintering or passage waders. Red-necked Phalarope is one rare species that has been recorded in 2009 and 2010. Lapwing, Redshank and Ringed Plover also breed in this wetland. The water-level in the wetland is generally much shallower and there is developing stands of Bottle Sedge and Grey Bulrush in the shallower sections. The central wetland margins are vegetated with Bog Cotton-dominated vegetation (pEang) and Bottle Sedge-dominated vegetation.

The wetland located adjacent to the northern lake has a highly calcareous water chemistry. This wetland is quite structurally diverse and is infilling with stands of Common Reed and Bottle Sedge. The western margin adjacent to the lake has some diverse sedge-rich vegetation dominated by Yellow Sedge (pVir). This community is associated with potential rich fen sites. Further east there is extensive tufa precipitation out of the water along around the wetland margins, creating a layer of tufa over the remnant peat or marl that forms the surface. There are some sections where there is extensive development of Charophtyes in the shallow water. Some of the wetland vegetation with stands of Bottle Sedge, Common Reed and open areas of water have scattered standing-dead conifers. These are likely to have colonised naturally from the adjacent conifer plantation. On the cutaway prior to the development of the wetland. When the wetland was created, these trees died. However, they are still standing dead after a significant period of time. Common Reed is continuing to spread in this area. Several high fields divide the wetland into sections and these are generally vegetated with Heather, scrub (Birch and conifers), Purple Moorgrass and Bog Cotton along the water's-edge. One clump of Black bog-rush is located in this area. Greater Tussock Sedge was also noted along with False-Fox sedge. This wetland is located quite close to a similar area in Oughter where there was development of potential rich fen caused by springs.

Further south there is similar wetland development. The eastern margin adjacent to the conifer plantation has some typical Birch scrub mosaic and poor fen dominated by Soft Rush. There is one particular wetland area that extends into the conifer plantation that is developing typical fen carr woodland. The wetland vegetation is dominated by Bottle Sedge while the scrub is dominated by Willow.

The southern end of the site contains a large rabbit population. The rabbits have had a significant impact on the development of the vegetation with a low-cropped grass sward adjacent to the lake and areas of bare peat on the embankment stripped of most vegetation apart from Brambles. There is some open and closed Birch scrub developing in this area. Some of the open scrub also has Purple Moorgrass-dominated grassland with high cover of Devil's-Bit, which may have potential for Marsh Fritillary.

The eastern section of Finnamores was developed as a conifer plantation by Coillte. Some of this plantation failed due to flooding during the development of the wetlands. This entire plantation has now been designated as being for general biodiversity on the Coillte map viewer (Management objective). The aerial photo of this plantation indicates that the plantation is quite poorly developed. This plantation borders the main Cloghan-Blueball road and there does seem to be some better developed trees along the road.

Tumduff Mór wetlands

The Tumduff Mór wetlands are located in the south-east corner of the site. As well as the extensive wetland development, there is also a large area of Birch scrub and some conifer plantation. The wetlands were mainly developed in a natural hollow in conjunction with high fields and embankments used by the railway and for travel paths. The main outfall is located at the north-west corner. Water flows out of the wetland over a rock-based channel and into the main drainage system, which directs the water west towards the Boora River.

The deepest part of the wetland is the west side, and the wetland gets progressively shallower towards the east. These shallower sections become more and more in-filled with emergent wetland vegetation. These are complex mosaics of single-species stands of Common Reed, Grey Bulrush, Reedmace, Bottle Sedge and Horsetails. The

wetlands are divided into several sections by long high fields. These fields have largely vegetated with scrub, poor fen and wetland vegetation. Some fields have been opened to allow water flow between various sections. The southern margin of the wetland has extensive emergent vegetation that is developing in mosaic with open water between the high fields with scrub. This structurally diverse zone is popular with wildfowl as there is significant amount of cover. The drier section to the south is re-vegetating with Birch scrub. Much of this is becoming quite dense and closed and maturing to Birch woodland. Former travel paths are now fairly inaccessible. Signs of Fallow Deer were noted in this area. The northern margin is relatively narrow with some Purple Moorgrass-dominated grassland developing on the embankment of the old railway. Much of the embankment is still a bare peat mosaic and is slow to vegetate (probably used as travel path/access in the past). Birch scrub is developing along the margins of the wetland in association with poor fen dominated by Soft Rush and or Bog Cotton.

The eastern side of the wetland is divided from the western side by a high field/embankment, although there is likely to be some drainage links. This eastern wetland is much shallower and this has allowed a diverse wetland structure to develop. As with the other section, there are stands of Common Reed, Reedmace, Bulrush, Bottle Sedge and Horsetails. Horsetail-stands are more common in this section and probably reflect the shallower water, which tends to get quite low during the summer, exposing bare peat mud beds. There is also some development of aquatic communities of Charophytes in this section, which reflects the more calcareous water chemistry. Tufa is also precipitating out of the water onto the exposed bare peat fields that dry out during the summer. Emergent stands of vegetation are also to be found along the southern margin, forming mosaic with open water between higher fields vegetated with Birch scrub. The northern margin is mostly dominated by a narrow strip of dry heath, bare peat and Purple Moorgrass mosaic, along the old railway embankment.

Further east of the wetland there is generally Birch scrub developing within the BnM property. This area of scrub seems to have enclosed quite quickly compared to the aerial photos. There is some Birch woodland with mature Pine developing on the margins of the site and Pine and Heather are colonising some small areas on the cutaway. There is a large open area between the two BnM properties (wetland and forestry) that is owned by the Grey Partridge Conservation Trust. This zone of the cutaway is dominated by bare peat and is slow to re-colonise. There are scattered clumps of Soft Rush and some Birch saplings present, while further east, Bog Cotton begins to become more common.

South of this wetland there is also a substantial area of dense Birch scrub, poor fen mosaic dominated by Soft Rush, and developing Birch woodland. This area is slowly enclosing and becoming inaccessible. Further south there is some more open ground with more-frequent bare peat adjacent to the boundary. Part of this has been utilised as a travel path in the past. It is quite dry with patchy Birch, Soft Rush and Heather appearing between denser clumps of Birch scrub. Further east there are some patches of more established dry Heath and Purple Moorgrass-dominated grassland that are rapidly being colonised by Birch. There has been some recent drainage and reclamation work carried out in this area by an adjoining land-owner. A drain draining some of the adjacent farmland has been deepening and cleaned. There has also been some reclamation of a mostly bare peat area along the margin and a new fence has been erected. A new drain has also been dug through the Birch scrub. This may be in preparation for future reclamation.

There are several conifer plantations attached to the Tumduff wetlands area. These have mainly been developed along the southern side on higher ground. The main plantation is located at the south-west end and is primarily Lodgepole Pine. Much of this is poorly developed and has been designated by biodiversity on the Coillte map viewer (Management objective). Further east there is another block of forestry at Derrydolney. This plantation is younger and is part of the experimental BOGFOR trial. The last plantation is found at Coyle's Island. This plantation is more mature than some of the other plantations. It now seems to be dominated by Birch although it is a mixed stand and there is Sitka Spruce through it. The Birch has now overtaken the Spruce and generally completely shades it.

Tumduff Beag lake

This small man-made lake was created from cutaway along the Leabeg-Kilcormac road, along with Boora Lake. It is now a focus point for the Lough Boora Parklands as there is a large bird hide built along the road. It has developed as a wetland with an increasingly diverse structure. Little Grebe and Mute Swan have bred at this site along with other species. There are several 'islands' within the lake that are used by roosting Lapwing and Curlew during the winter. Stands of Grey Bulrush, Reedmace and Bottle Sedge are developing within the lake and creating Reedbeds and emergent vegetation. A single stand of Common Reed is also present at the north-east corner of the site.

The lake is surrounded by mainly Purple Moorgrass-dominated grassland (gMol). One notable feature is the abundance of Devil's-Bit within this grassland in some sections. (There may be potential for Marsh Fritillary,

although there may not be enough shelter in places and it is likely that if Marsh Fritillary is present here, then it would have been spotted). Another unusual species found around the lake in this habitat is Cow-Wheat, which is an uncommon species of cutaway. There are also some patches of Birch and Willow scrub. Dry Heath with Heather is also present, particularly along the road embankment. There are some indications of plant community zonation developing in places as this site matures. Dry heath with Heather dominates the higher drier ground. Of interest is the fact that this dry heath still contains some bare peat cover and seems to be one of the slowest zones, or vegetation communities to fully create a 100% vegetation cover. This gives way to Purple Moorgrass-dominated grassland, which in turn transitions to emergent or riparian vegetation on the water's-edge dominated by Bottle Sedge or in some cases Bog Cotton. One notable feature is the development of some hummocks of *Sphagnum. subnitens* in the damper lower zone along the road and in the north-west corner. *Sphagnum capillifolium* and *S. palustre* are also present. This is probably due to the influence of remnant acidic peat left along the road that could not be put into production. It may also be an indication that the water chemistry of this lake is less calcareous compared to Loch an Dochas. No Charaphyte growth was noted in the lake but there was some growth in the main drain that serves as an outfall.

Some calcareous grassland with abundant Knapweed and Glaucous Sedge is present along the southern side of the site on higher ground where the peat is thin or has been totally removed. Some of this grassland is being covered with Brambles and Willowherb and will slowly develop into scrub. Red Admiral and numerous Meadow Brown were on the site during the survey.

Southern Biomass area

This area is located at the southern end of the site in Ballybracken. It is located adjacent to the Leabeg-Kilcormac Road. It includes some conifer forestry developed by Coillte. Like many of the other plantations it is variable in quality.

This section also includes the Willow biomass trial. Adjacent to this area there is some cutaway along the road. This is being colonised by Heather, Birch scrub and Purple Moorgrass. There is also still a significant portion of bare peat still visible. Production was not as deep in this area.

Further south there is some Birch woodland, scrub, cutover bog and remnant raised bog. The scrub/Birch woodland area along the road is occupied by squatters. The cutover bog is still active and the remnant high bog is still being cut for domestic sod turf. There is only a small area of high bog left and this is quite dry and dominated by Heather cover.

Northern Conifer plantation

This large area of mainly conifer plantation was developed by Coillte and extends from Leabeg to Finnamores. Conifers. It was planted in the 1990's and is at a post-thicket stage. There has been no significant thinning of any compartments. Lodgepole Pine was the main species planted as well as some Norway Spruce and Sitka Spruce. Some broadleaves were also planted in various compartments. This conifer plantation varies in quality and some is poorly developed. One compartment along the southern side of the plantation is described as being 'open'.

There is a travel path along the northern boundary of the plantation. This links Oughter bog to the Boora Works. The plantation borders the Cloghan-Blueball Road and some scrub has developed along the margin. There is also some minor scrub development with Gorse and Birch at the north-east margin, adjacent to the Finnamores.

South-eastern conifer plantations

This plantation is located adjacent to the Grey Partridge Conservation Project and north of Tumduff Mor wetlands. It is a mixed plantation with some blocks of conifers, some mixed stands and some blocks of broad-leaves. About a third of the plantation has been designated for biodiversity while the other section is classed as timber production (Coillte mapviewer - Management objective). The eastern side seems to be poorly developed with substantial Birch development amongst the conifers.

There is an additional plantation to the north of the above area that is located adjacent to the east side of the 'Marl Square'. This plantation is a series of blocks of different conifer and broadleaf crop types that was planted for the BOGFOR forestry trial.

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

None

Adjacent habitats and land-use

The surrounding landscape is typically low-lying and contains farmland with improved grassland, much of which has been reclaimed from peatland. A significant part of Boora East was developed into improved grassland by Bord na Móna and has been sold to local farmers. A significant area of former cutaway (Marl Square) also been sold to the NPWS and is now managed specifically for Grey Partridge with a range of open and disturbed grassland habitats. Other adjacent habitats include those of reclaimed cutover bog such as conifer plantation (WD4), improved grassland (GA1) and wet grassland (GS4). There is also some high bog (PB1) remnants and active cutover bog (PB4) around the margins that are not in ownership by BnM. The margins around the cutaway are typically dominated by scrub (WS1) and Birch woodland (WN7) developing on peat remnants.

Watercourses (major water features on/off site)

- There are several constructed wetlands and fishing lakes in this section (Tumduff Beag, Tumduff Mór and Finnamores). Tumduff Beag, Tumduff Mór and Finnamores wetlands all have calcareous water chemistry. Parts of the Finnamores wetlands are very strongly calcareous with tufa being deposited on the marl.
- Tumduff Beag and Tumduff Mór are linked to the Tumduff Brook, a small stream that flows north-west to the Boora River.
- Finnamores is linked to a small channelized stream that flows north towards the Little Brosna River.
- East Boora is within the Shannon catchment.

Peat type and sub-soils

The majority of the exposed peat is fen peat. There are some pockets of more acidic peat towards the south of the site, adjacent to the Leabeg-Kilcormac road, and around the margins.

The underlying sub-soils are significantly calcareous. Lake marls and glacial gravels/sub-soils are dominant.

Fauna biodiversity

Birds

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

- Snipe, Little Grebe, Reed Bunting, Lapwing, Heron, Mute Swan (2 adults and 4 cygnets), Mallard (8), Greenshank (2), Raven, Lapwing (150), Curlew (~50), Blue Tit, Redpoll and Sedge Warbler.
- Swallows were feeding over the lake in a mixed group with Sand Martins.
- Wood Pigeon was recorded on a nest in scrub around Tumduff Beag (particularly late in the season).
- Wheatears were using Tumduff Mór (passage migrants).
- A Marsh Harrier was also spotted on Tumduff Mor.
- The above species list reflects the seasonality of the survey. In addition, there are detailed lists of various types of fauna recorded in Boora within Heery (1999). There are several surveys of breeding birds for sub-sections such as Tumduff Mór and the site is regularly counted for wintering waders and wildfowl by BirdWatch Ireland for the IWeBs survey. Overall species diversity and use by wintering waders and wildfowl in the wider area (including farmland) is significantly greater.

Mammals

Several mammals and signs of mammals were noted on the site during the survey.

- Fox, Badger, Hare
- There is an extensive Rabbit colony at the southern end of Finnamores.
- Otter have been recorded in the area in the past.
- Signs of Fallow Deer were noted along the southern side of Tumduff Mor, within the Birch scrub/woodland.
- Red Deer have also been noted in the area. These have probably been released for hunting.

Other species

- Butterflies in the eastern section of the site included Red Admiral, Common Blue (Finnermores), Meadow Brown (numerous), Small Copper (Tumduff), Small Heath, Speckled Wood, Large White, & Peacock.

Fungal biodiversity

N/A

Ecological Survey Report

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

Bog Name:	**Boora West**	**Area (ha):**	1322.9 ha, (3269.1 acres)
Works Name:	Boora	**County:**	Offaly
Recorder(s):	MMC & DF	**Survey Date(s):**	17-19/05/2011

Habitats present (in order of dominance)

The most common habitats present at this site include:

- Emergent wetland and Reedbed communities with stands of Bulrush (pTyph), Bottle Sedge (pRos), Horsetails (pEq), and Bog Cotton (pEang). Found in mosaic with open water. (Codes refer BnM classification of pioneer habitats of production bog.
- Birch scrub (oBir, cBir) and woodland (BirWD) – frequently in mosaic with poor fen and wetland communities.
- Poor fen communities dominated by Soft Rush and Bog Cotton (pJeff, pEang) – frequently in mosaic with wetland and scrub.
- Disturbed vegetation (DisTuss, DisWill), calcareous grassland (gCal) and Purple Moorgrass-dominated grassland. Found along the cycle track and in other dry open parts of the site.
- Limestone/marl lakes (FL3) (Loch an Dochas and Boora Lake)
- Embryonic bog community (PBa with *Juncus*). This community represented by a mat of *Sphagnum* sp. cover is found close to the western boundary of the site adjacent to a section of conifer plantation.
- Conifer plantation (WD4) planted on cutaway bog. (Codes refer to Heritage Council habitat classification, Fossitt 2000),
- Broad-leaved plantations planted on cutaway bog (WS2)
- Calcareous grassland (GS1) – Mesolithic site
- Poor fen (PF2) - former Lough Boora
- Birch woodland (WN7) – former Lough Boora and around the site
- Rich fen (PF2) – former Lough Boora
- Raised bog (PB1) – small remnant dry sections.

Description of site

Boora West is located in Co. Offaly, 4.5 km north of Kilcormac. The Bord na Móna Works and Offices is located at Leabeg and is part of the Boora bog. The overall Boora bog is divided into two main sections, Boora East and Boora West for ease of survey. The minor road that connects Leabeg and Kilcormac is the main division between these two sections.

Boora West contains a large area of cutaway. This bog is one of the older bogs that went into production at the beginning of industrial peat production and therefore has some of the oldest developing cutaway. Much of the cutaway has been developed as conifer plantation by Coillte, or as part of the Lough Boora Parklands. A significant portion of cutaway within the Lough Boora Parklands has been actively rehabilitated and this includes the construction of two lakes and a large wetland area (Leabeg wetlands). The western side still has some active peat production and younger pioneer cutaway developing in production-related cutaway. There is a railway along part of the northern boundary that connects the Boora yard and workshop to the Boora bog group. The Lough Boora Mesolithic site is located towards the centre of the site and is part or a former lake basin. This area is less developed and contains several features of significant ecological interest. Part of this area is designated as a potential National Heritage Area. Further south there is some other cutaway that has been developed as wetlands (South Boora wetlands). A large part of the former southern cutaway area has now been sold to the National

Parks and Wildlife Service and is actively managed for Grey Partridge conservation. For ease of description the site is further sub-divided into several sub-sections.

Mesolithic site , Boora Lake and surrounding areas

This area is located towards the centre of the site. It is almost surrounded by conifer plantation and can be accessed by the main cycle path, which runs through this section. The majority of this section is not significantly developed. However, deep drains and silt ponds were dug through this area. Much of the former Boora lake basin was also ditched and developed into fields. However, there were probably parts of the wettest sections and the Mesolithic storm beach that were not stripped of vegetation.

The Mesolithic storm beach contains diverse calcareous grassland (GS1). This is characterised by scattered exposed limestone rock that is interspersed with wild flowers and grasses. Species such as Mountain Everlasting, Birdsfoot, Carline Thistle, Ox-eye Daisy, Coltsfoot, Long-leaved Plantain, Creeping Willow, Glaucous Sedge and Knapweed are frequent. The moss cover is characterised by abundant *Ctenidium molluscum.* Later in the summer the site is covered in Marsh Helleborine. Other orchids such as Common Spotted Orchid and Fragrant Orchid are also common. Bee Orchid and Butterfly Orchid has also been recorded. Birch, Willow, Hawthorn and Pine saplings and young trees are present. Areas with some peat are generally colonised with Purple Moorgrass. Species such as Devil's-Bit, Carnation Sedge and Milkwort are associated with this type of grassland. To the west there is increased cover of Heather where the peat becomes somewhat deeper (dHeath and gMol). Further south there is much more Birch scrub. There are patches of calcareous grassland and Purple Moorgrass-dominated grassland throughout this scrub. This area is bordered in the south by a deep drain and riparian zone. Along the riparian zone there are piles of limestone spoil, probably from old drainage works. Elements of esker and calcareous grassland flora (GS1) are associated with these piles such as Columbine, Hartstongue and Mountain Everlasting.

The former Boora lake basin now contains a small area of developing Birch woodland (WN7) surrounded by Birch and Willow-dominated scrub that is mainly spreading into poor fen type vegetation. The Birch woodland is generally dry and poorly developed. The ground cover is dominated by scattered Bramble and or Purple Moor-grass with patches of moss cover and bare peat. Typical species include Broad Buckler Fern, Ivy, Devil's-Bit, Elder, Guelder Rose, Bog Myrtle and Twayblade. The Birch woodland is developing over areas that were initially drained as the drains are still present. However, some of the trees are probably developing prior to this drainage work. Other species present include Alder and a single Yew. Alder Buckthorn was also noted within the woodland and around the edges developing in the scrub. The poor fen (PF2) is dominated by either Purple Moorgrass and/or Heather. Other typical species include Tormentil, Devil's-Bit, Carnation Sedge, Board Buckler Fern, Cross-leaved Heath, Creeping Willow and Bramble. Scrub is patchy throughout and forms a mosaic with the open areas. The ground is quite treacherous with tall tussocks and cracks in the peat, although it was quite dry. Towards the western side there is a narrow band of rich fen (PF1) vegetation where indicator species such as Saw Sedge and Black Bog-rush are present. This area is quaking in sections. Other species include Greater Tussock Sedge and Bog Thistle. This rich fen (PF1) area is still dominated by Purple Moor-grass in parts. There are indications that this area is drying and the rich fen habitat area is diminishing. Towards the NW corner there is a small remnant section of high bog that remained uncut, although it was still ditched. This area is quite dry and dominated by Heather. There is a somewhat semi-natural transitional zone between the raised bog down a slope to the rich fen zone.

Leabeg Wetlands

This area includes the large area of wetlands to the north of Boora that extends from the new Lough Boora lake west to the conifer plantation. Wetland enhancement work has been carried out in this area in the past with drain-blocking and the creation of a berm through the site to hold water over a greater area. This has been extremely effective with the result that wetlands communities (pTyph, pPhrag, pRos, pEqf) with open water have established and these are found in mosaic with scrub (oBir, oWill) and poor fen communities. Further south towards the Boora Parklands bike trail the conditions are somewhat drier and pioneer grassland (gCal) and disturbed vegetation communities (DisTuss, DisWill) are more common.

Some of the most diverse wetland vegetation surveyed so-far is found in the Leabeg wetlands. Typically there are stands of Bottle Sedge and Bog Cotton-dominated areas. However, these communities are somewhat more diverse compared to younger pioneer cutaway communities recorded at other bogs. Other species such as Water Horsetail, Marsh Horsetail, Pondweed sp., Jointed Rush, Soft Rush, Bulbous Rush, Mint, Gypsywort, Cuckoo Flower, Floating Sweet-grass and other Sedges are frequently found within these wetland communities. These

emergent wetland species can also be found with areas dominated by Bulrush. Both Common Reed and Grey Bulrush are less frequently found within the wetland areas but can create large mono-dominant stands. Willow is scattered through these wetland communities and scrub dominates some higher fields that divide the various lower sections. Further west the wetland communities seem to be somewhat eutrophic with significant and dense wetland vegetation growth.

South Boora wetlands

This area is located to the south of Boora and adjacent to the Grey Partridge Project area to the south. Conifer forestry borders this area to the north. There has been some wetland enhancement works carried out in the past. More work has recently been carried out (2009-2010) with the blocking of the main outflow with the result that the water level has been raised and there is now more water pushed over the overall area. This has had some effect on the more mature vegetation to the west by creating some drowned scrub dominated by Willow. The main wetland communities include open water in mosaic with patchy poor fen vegetation represented by Bog Cotton, Soft Rush and Bottle Sedge. This vegetation is best developed along the drains, particularly towards the east side. Willow has also developed along the drains but the recent raising of the water level may mean some of this Willow dies back. Bulrush-dominated vegetation is also developing (pTyph). The wetland development is a younger stage compared to the Leabeg wetlands and there is also a significant amount of bare peat. The vegetation development seems to be younger towards the east and this seems to be where there has been more recent re-wetting of previously dry bare peat.

This wetland attracts breeding waders and two pairs of Lapwing were recorded at the time of the survey. Little grebe and a family of Mallard were also present. Redshank have been recorded breeding in the past.

South-east section (including the Bogfor trial area)

Peat production has been much less intensive in these marginal sections of Boora. The Bogfor trial was established on typical dry cutaway. This area is fenced. Some of the planted trees have established but many of the trees seem to be in check. Mixtures of conifers and broad-leaved trees were planted. Birch, Lodgepole Pine and Willow have also naturally colonised within the site along with Soft Rush, Bramble, Raspberry and some Heather. This area is fenced but the fence is now degraded. The vegetation is quite dense.

West of the BOGFOR trial there is a small area of open cutaway that is establishing on higher bog. This section is also located adjacent to the road between Leabeg and Kilcormac. Tall Birch and patchy Heather is established along the drains but between the drains there is mainly bare peat and Bog Cotton. Lodgepole Pine is naturally colonising this area towards the southern side and adjacent to conifer plantation on the margins. The peat is quite dry and *Campylopus* sp. is colonising the Bog Cotton areas. Several fields within this section are completely bare. Some *Sphagnum* spp. is present in some of the drains, but most of the drains are dry. A pond seems to have been excavated in one field, and this is also developing *Sphagnum* spp. cover.

South of the BOGFOR trial and some conifer plantation there is another section of cutaway that is almost completely re-vegetated. This area is also characterised by deep peat that has been extensively naturally colonised by Birch and Pine forming closed scrub, while the open sections are now covered in tall Heather, forming dry heath in mosaic with the Birch scrub.

Further south there is a relatively large area of ditched high bog that may have been undeveloped for peat production, or peat production was minimal. This area is also characterised by very thick impenetrable closed Birch scrub/ woodland along the margins. Further south the scrub opens somewhat and the open Birch is scattered over dry tall Heather. Some *Sphagnum* appears in the drains in this area. Cattle have broken into this area on occasion with some poaching and grazing. Some high bog within the BnM GIS site boundary has been fenced off and is now grazed by cattle.

North West Boora

This area includes the on the western side of Boora from the central rail line northwards. The majority of this section of the site is classed as cutaway and is no longer used for peat production. However a small area immediately to the north of the railway line was still used for peat production. Several access routes are still active through this section of the site. Approximately 200mm of peat was all that remained, under which limestone gravel was located.

The cutaway areas had re-vegetated, mainly with a mixture of Birch scrub (oBir, cBir) with open habitats such as grassland (gCal) and poor fen (pJeff). Several raised mounds are located this area as a result of peat production exposing some underlying gravel hills. These mounds were becoming colonised by a mixture of disturbed vegetation (DisCf), grassland (gCal) and Birch scrub.

A small area (0.15ha) of embryonic bog community (PBa) is located alongside a section of conifer plantation close to the north-western boundary of the site. This habitat was dominated by *Sphagnum cuspidatum* and also contained Sundew, Soft Rush and Bog Cotton.

The north west corner of the site (to the north of the conifer plantation and adjacent to the old power station site) contained areas of calcareous grassland, scrub and conifer plantation. The areas of calcareous grassland were dry and scrub was encroaching on these areas. The Silver River flows along the western boundary of the site in this area. The riparian area comprised trees and scrub mainly. Otter have been spotted close to this point in the past and the river appeared to provide excellent habitat for Otters.

The Deer population appeared to be quite high in this section of the site.

South West Boora

This area encompasses the area directly to the south of the central rail way line. The area immediately to the south of the central rail way line was a mixture of bare peat production fields and re-vegetated cutaway. The pioneer vegetation was a mixture of Birch scrub (eBir and oBir), poor fen vegetation (pEang and pJeff) with some small areas of open water. At the time of the ecological survey some areas of vegetation were being removed in order to open these areas up for further peat production.

The south west corner of the site was mainly in full peat production and was, for the most part, bare peat. A small area to the south of the railway line and immediately to the west of the conifer plantation had developed into a wetland. This area comprised of areas of open water, reed beds and poor fen vegetation. Three pairs of Lapwing were observed in this area along with one pair of Mallard, Redshank have also been recorded in this area in the past.

Red Data Book species

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

It is widely distributed in disturbed grassland on both sides of the cycle track from the Lough Boora Triangle and past the Tippler Bridge to the new sculpture - From Earth to Sky. This area has patches of disturbed gravel and glacial material that were excavated from the canal-watercourse and spread out and mixed with peat. This has created a suitable habitat from this species. It is also found around the Boora works on disturbed gravel.

This species is not likely to have been present on the site prior to the development of the cutaway. Subsequent development of the site including construction of railways on gravel embankments, construction of drains and silt pond have created suitable exposed areas up of calcareous rich material that this species prefers. In the long-term, it could be expected that these spoil heaps and exposed gravel patches will re-vegetate with grassland and scrub, which may not favour this species. This species has not been recorded at the Mesolithic site (which would also be expected to provide suitable habitat for this species), and has not been recorded around other parts of the cycle track.

Alder Buckthorn (*Frangula alnus*) is a very rare shrub/tree that is usually found in rocky places associated with limestone pavement at lake margins and boggy places such as Birch woodland. It is a Red Data Species (Curtis and McGough 1988) whose status is rare.

Several individuals (young and older trees) were recorded around and within the Birch woodland developing on the old Boora lake. This species seems to be spreading.

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

Lough Boora pNHA (NPWS site code 001365)

This pNHA is located in the centre of the Lough Boora Parklands. Lough Boora was originally designated as an Area of Scientific Interest due to its geographic interest (Farrell 1972). It incorporates part of the former Lough Boora basin and part of the Boora River that flows north. Part of the pNHA is now owned by the Irish Wildlife Trust. The landscape of this area has been significantly changed by Bord na Móna operations in the past. The original Lough Boora lake was drained and the raised bog surrounding the lake has now been cutaway. This exposed the Lough Boora Mesolithic Site, a storm beach of a more ancient lake.

The pNHA now includes the majority of the remaining intact former Boora lake basin, conifer plantation (planted on cutaway) old silt ponds and drainage systems and part of the old Boora River, which is now channelized in deep embankments. The former lake basin now contains Birch woodland (WN7), some rich fen (PF2) and scrub (WS1) spreading over poor fen (PF2) communities. Other habitats within the pNHA include some remnant high bog (PB1), which is now dried out and dominated by Heather. The majority of the diverse calcareous grassland that has developed on association with Lough Boora Mesolithic storm beach is actually excluded from the PNHA boundary. The actual pNHA boundary of this site should be revised.

Lough Boora NPWS site synopsis

'This drained lake, surrounded by cutaway bog, lies 5 km north-west of Kilcormac. Previously a post-glacial lake, it was impounded and much reduced, in size by raised bog development. The drained lake-bed consists of shallow fen peat overlying calcareous shell-marsh.
The surface of the western portion has been left undisturbed allowed plant colonisation and regeneration. This includes Birch (*Betula pubescens*) and Willow (*Salix* sp.) with a ground flora of Bog-myrtle (*Myrica gale*), Common Cottongross (*Eriophorum angustifolium* and Ling Heather (*Calluna vulgaris*). Along with these acid-loving plants are other base-loving fen species such as Great Fen-sedge (*Cladium mariscus*), Marsh Cinquefoil (*Potentilla palustris*) and Ragged-robin (*Lychnis Flos-cuculi*). The site also contains various orchids including Fragrant Orchid (*Gymnadenia cojopsea*) and Lesser Butterfly-orchid (*Platanthera bifolia*). The above forms part of a 1972 'An Foras Forbartha' description of the site. A recent (April 1994) aerial view of the site appears to confirm this ecological status.
The peatland and former lake has been drained by Bord na Móna but otherwise the site is now mostly undisturbed. Archaeological excavations have revealed evidence of past human activities. The site has supplied the earliest evidence of an Early Mesolithic hunter gatherer settlement in the Irish Midlands at about 7000 B.C.

Lough Boora is of interest botanically due to the mixture of fen and bog species on the former peatland lake-bed. Its importance archaeologically gives added dimension to the site quality.'

Adjacent habitats and land-use

The surrounding landscape is typically low-lying and contains farmland with improved grassland, much of which has been reclaimed from peatland. Land to the south of the site was developed into improved grassland by Bord na Móna and has been sold. A significant area of former cutaway to the south of the site has also been sold to the Grey Partridge Conservation Trust and is now managed specifically for Grey Partridge with a range of open and disturbed grassland habitats. Other adjacent habitats include those of reclaimed cutover bog such as conifer plantation (WD4), improved grassland (GA1) and wet grassland (GS4). There is also some high bog (PB1) remnants and active cutover bog (PB4) around the margins that are not in ownership by BnM. The margins around the cutaway are typically dominated by scrub (WS1) and Birch woodland (WN7) developing on peat remnants.

Watercourses (major water features on/off site)

- The Boora River drains the central section and flows north from the former, now drained Lough Boora, and eventually flow to the River Brosna. This river is now embanked in a deep channel and is more typical of a drainage ditch with extensive sections colonised by Common Reed, Grey Bulrush and Pondweed.
- The Silver River flows south along the north-west corner of the site. A channelized stream flows into this river.
- The Crooked Brook flows through channelized embankments along the north side of Boora Lake.
- There are two constructed lakes within Boora west (Boora Lake and Loch an Dóchas), both of which are part of the Lough Boora Parklands.
- West Boora is within the Shannon catchment.

Peat type and sub-soils

The majority of the exposed peat is fen peat. The south-east sections have some higher bog where *Sphagnum* peat (high bog) has been re-colonised with Heather, Birch and frequent Lodgepole Pine in places.

The underlying sub-soils are significantly calcareous. Lake marls and gravels are dominant.

Fauna biodiversity

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

- Redpoll, Blackbird, Wren, Goldcrest, Chaffinch, Willow Warbler, Snipe, Chiffchaff all recorded around the new Lough Boora area and adjacent conifer plantations.
- Blackcap and Chaffinch both using the Birch woodland of the Mesolithic site.
- Sedge Warbler, Willow Warbler, Moorhen, Heron, Lapwing (2 pairs) and Water Rail were recorded in the Leabeg wetlands.
- Little Grebe, Mallard and Lapwing were present in the South Boora wetlands.
- Dingy Skipper and Common Blue using old railway line to the west of the Lough Boora fen area.
- The western side of the site contained Coal Tit, Snipe, Skylark, Cuckoo, Wren, Robin, Grey Crow, Rook, Raven, Magpie, Willow warbler, Grasshopper Warbler, Swallow, Swift, Pheasant, Moorhen, Woodcock and Blackcap.
- The wetland in the south western section of the site (next to the conifer plantation) contained three pair of Lapwing and two pairs of Mallard. Redshank have been recorded there in the past.
- Butterflies in the western section of the site included Green-veined White, Orange Tipped, Dingy Skipper and Common Blue. The Cinnabar Moth was also observed.
- In addition, there are detailed lists of various types of fauna recorded in Boora within Heery (1999).

Activities on the site

Activities on the site include:

- Lough Boora Parklands – amenity area with walking, cycling and fishing.
- Sculpture Park and Conifer forestry

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

- Bog restoration/rehabilitation measures will be restricted to within the footprint of the proposed rehabilitation area.
- The proposed rehabilitation will have due regard to noise limits and hours of operation (i.e. dusk and dawn) to minimise any potential disturbance on resident and local fauna that utilise the site and immediate environs.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- The proposed activities will be restricted to daylight hours and there will be no requirement for artificial lighting.
- Silt ponds will be inspected and maintained as per the IPC Licence.
- During periods of heavy precipitation and run-off, activities will be halted.
- Measures will be carried out using a suitably sized machine and in all circumstances, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.
- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
- Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Vehicles will never be left unattended during refuelling.
- No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
- All plant refuelling will take place using mobile fuel 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

Invasive flora species have been recorded at Boora Bog, including Parrots Feather *Myriophyllum aquaticum* and *Rhododendron ponticum* . Within systems where it has established, internal spread of Parrots Feather by natural means is common, principally occurring via vegetative fragmentation that is induced naturally or by human-related disturbance and through the dispersal of rhizomes (Global Invasive Species Database 2005; CABI 2007). The species only reproduces asexually through vegetative fragmentation. Small infestations may be removed by hand, but measures will have to be in place to prevent inadvertent dispersal into rewetted areas. This will include the identification in advance of all infested systems or waterbodies, classification of same as constrained areas, and the implementation of checks on machinery/equipment to prevent transfer between systems within Boora Bog. All measures will follow Best Practice. In addition the use of Light-excluding benthic barriers, such as jute matting or other similar methods, may be used to bring about control / prevent spread by wildfowl (a possible vector for dispersal).

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

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

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

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

In addition to the above, Best Practise measures around the prevention and spread of Crayfish plague[3] /other aquatic invasive species such as Parrots Feather 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 Boora Bog Group (Ref. P0500-01). 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 Boora 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) understand that it is the Minister's intention to impose an obligation on Bord na Móna to develop a programme of measures, 'the proposed Scheme', for the enhanced decommissioning, rehabilitation and restoration of boglands (PCAS) 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. 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 the proposed **Scheme (PCAS)**.

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

6 National Biodiversity Action Plan 2016-2021

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

7 National conservation designations

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

Boora Bog overlaps one site, a pNHA designated for nature conservation.

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.

Boora Bog is located in an area classified by Offaly County Council as of high sensitivity with amenity value[4].

11 National Archaeology Code of Practise

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

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

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

[4] https://www.offaly.ie/eng/Services/Planning/Development-Plans/County-Development-Plan-2014-2020/Volume-1-9-10-14-FINAL-pdf.pdf

- BNM must ensure that any archaeological objects discovered on Bord na Móna lands are reported immediately to the Duty Officer of the National Museum of Ireland.
- Bord na Móna will endeavour to adhere to this code of practise during the peatland rehabilitation phase and appropriate archaeology mitigation is carried out before and during cutaway peatland rehabilitation. An Archaeological Impact Assessment has been carried out for the proposed rehabilitation at this site (Appendix IX). The recommendations of this assessment will be incorporated into the rehabilitation plan to minimise impacts on known archaeology. In addition, Bord na Móna will adhere to the Archaeology Code of Practise relating to management of stray archaeological finds that may arise during cutaway peatland rehabilitation and decommissioning.

12 Bord na Móna Biodiversity Action Plan 2016-2021

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

One example of a key CBD target is:

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

The EUs headline target for progress by 2020 is to:

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

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

13 Bord na Móna commitments

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

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

In line with Bord na Móna's accelerated decarbonisation programme, the company has also committed to a significantly larger rehabilitation target. This is reflected in our plans to rehabilitate a further 20,000 hectares of cutaway and cutover bog to wetland and woodland mosaics by 2025. In addition, we plan to restore a further

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

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

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

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

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

APPENDIX VII. DECOMMISSIONING

1. Condition 10 Decommissioning

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

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

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

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

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

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

Item	Description	Boora Bog Decommissioning Plan
1	Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices	Clean-up of Bog
2	Cleaning Silt Ponds	Cleaning Silt Ponds
3	Decommissioning Peat Stockpiles	Peat Stockpile Management via Levelling
4	Decommissioning or Removal of Buildings and Compounds	Not relevant
5	Decommissioning Fuel Tanks and associated facilities	Decommissioning and De-Gassing Mobile Fuel Tanks
6	Decommissioning and Removal of Bog Pump Sites	Where Applicable
7	Decommissioning or Removal of Septic Tanks	De-sludge Septic Tank

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

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

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

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

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

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

waste.

7.3.3 The ultimate destination of the waste.

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

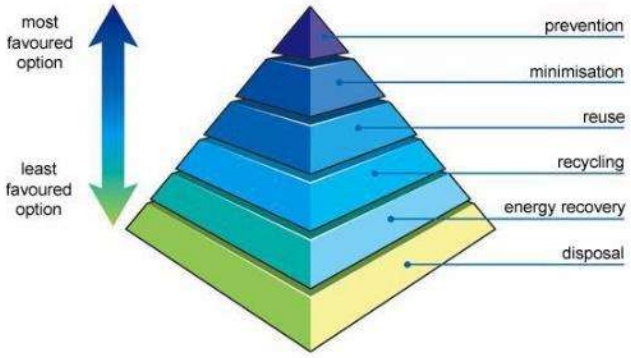
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

7.3.6 Details of any rejected consignments.

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

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

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



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

2. Enhanced Decommissioning.

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

Item	Enhanced Decommissioning Type	Boora Bog Decommissioning Plan
1	Removal of Railway Lines	Removal of Railway Lines
2	Decommissioning Bridges and Underpasses	Where Applicable
3	Decommissioning Railway Level Crossing	Decommissioning Railway Level Crossing
4	Restricting Access (bogs and silt ponds)	Restricting Access to Bog.
5	Removal of High Voltage Power Lines	Where 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 cannot be re-wetted due to boundary constraints. Dry cutaway may also develop in situations where there a relatively steep slope that inhibits re-wetting. The majority of dry cutaway will develop towards grassland, heath, scrub and dry woodland habitats.

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

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

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

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

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

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

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

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

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

APPENDIX IX. 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 P0500-01, Boora Group of Bogs in Counties 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 Boora 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 P0503-01 IPPC Licence Extractive Waste Conditions

2.1 Condition 7.5 Extractive Waste Management
The licensee shall draw up a Waste Management Plan (to be known as an Extractive Waste Management Plan) for the minimisation, treatment, recovery and disposal of extractive waste. This Plan shall meet the requirements of regulation 5 of the Waste Management (Management of Waste from the Extractive Industries) Regulations,2009. The Plan shall be submitted for agreement by the Agency by the 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 Boora 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 Boora Bog Licence P0500-01.
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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

Bog Name	Contact Organisation	Contact Name	Date of Issue	Communication Format	Date Response Received	Response format
Boora	Offaly County Council - Chief Executive	General E-mail Contact	30/04/2021	E-mail		
Boora	Offaly County Council - Senior Planner	General E-mail Contact	30/04/2021	E-mail		
Boora	Offaly County Council - Director of Services	General E-mail Contact	30/04/2021	E-mail		
Boora	Offaly County Council -	General E-mail Contact	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	Offaly County Council - Heritage Officer	General E-mail Contact	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Edenderry District*	*Cllr. Mark Hackett (markhackettgreen@gmail.com)*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Edenderry District*	*Cllr. Noel Cribbin (noelcribbin@yahoo.com)*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Edenderry District*	*Cllr. Eddie Fitzpatrick (eddiefitzp@eircom.net)*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Edenderry District*	*Cllr. John Foley (cllr.johnfoley@gmail.com)*	30/04/2021	E-mail		

Boora	*Offaly County Councillors - Edenderry District*	*Cllr. Robert McDermott (robert@edenprint.ie)*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Edenderry District*	*Cllr. Liam Quinn (liamjq@gmail.com)*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Birr District*	Cllr. John Carroll	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Birr District*	*Cllr. John Clendennon*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Birr District*	*Cllr. Eamonn Dooley*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Birr District*	*Cllr. John Leahy*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Birr District*	*Cllr. Clare Claffey*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Birr District*	*Cllr. Peter Ormond*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Tullamore District*	*Cllr. Neil Feighery*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Tullamore District*	*Cllr. Tony McCormack*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Tullamore District*	*Cllr. Declan Harvey*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Tullamore District*	*Cllr. Sean O'Brien*	30/04/2021	E-mail		

Boora	*Offaly County Councillors - Tullamore District*	*Cllr. Ken Smollen*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Tullamore District*	*Cllr. Frank Moran*	30/04/2021	E-mail		
Boora	*Offaly County Councillors - Tullamore District*	*Cllr Danny Owens*	30/04/2021	E-mail		
Boora	TD Laois/Offaly	*Barry Cowen*	30/04/2021	E-mail		
Boora	TD Laois/Offaly	*Charlie Flanagan*	30/04/2021	E-mail		
Boora	TD Laois/Offaly	*Sean Fleming*	30/04/2021	E-mail		
Boora	TD Laois/Offaly	*Carol Nolan*	30/04/2021	E-mail		
Boora	TD Laois/Offaly	*Brian Stanley*	30/04/2021	E-mail		
Boora	Eastern and Midland Regional Assembly	General E-mail Contact	30/04/2021	E-mail		
Boora	Environmental Protection Agency	Multiple Staff Members	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	National Parks and Wildlife Service	Multiple Staff Members	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	NPWS Regional Network	Multiple Staff Members	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	Dept of the Housing Local Government and Heritage	Malcom Noonan (Minister of State at the Department of Housing, Local Government and Heritage)	04/02/2021	E-mail		
Boora	National Monuments Service	General E-mail Contact	30/04/2021	E-mail		

Boora	National Museum of Ireland (Irish Antiquities Division)	Isabella Mulhall	30/04/2021	E-mail	28/12/2020	E-mail
Boora	Minister for Environment, Climate and Communications	Minister - Eamon Ryan	04/02/2021	E-mail		
Boora	Dept of Environment, Climate and Communications	Multiple Staff Members	30/04/2021	E-mail		
Boora	Minister of state for Agriculture with responsibility for Land use and Biodiversity	Pippa Hackett Minister of State for Land Use and Biodiversity)	04/02/2021	E-mail		
Boora	Inland Fisheries Ireland	General E-mail Contact	30/04/2021	E-mail		
Boora	Waterways Ireland	General E-mail Contact	30/04/2021	E-mail		
Boora	The Heritage Council	General E-mail Contact	30/04/2021	E-mail		
Boora	An Forum Uisce (The Water Forum)	General E-mail Contact	30/04/2021	E-mail		
Boora	OPW	General E-mail Contact	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	Inland Waterways Association Offaly	General E-mail Contact	30/04/2021	E-mail		
Boora	An Taisce	General E-mail Contact	30/04/2021	E-mail		
Boora	Friends of the Earth	General E-mail Contact	30/04/2021	E-mail		
Boora	Friends of the Irish Environment	General E-mail Contact	30/04/2021	E-mail		
Boora	Birdwatch Ireland	General E-mail Contact	30/04/2021	E-mail		

Boora	Irish Peatlands Conservation Council	General E-mail Contact	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	Irish Wildlife Trust	General E-mail Contact	30/04/2021	E-mail		
Boora	Bat Conservation Ireland	General E-mail Contact	30/04/2021	E-mail		
Boora	Woodlands of Ireland	General E-mail Contact	30/04/2021	E-mail		
Boora	Butterfly Conservation Ireland	General E-mail Contact	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	Community Wetlands Forum (part of Irish Rurallink)	General E-mail Contact	30/04/2021	E-mail		
Boora	Turf Cutters and Contractors Association	Postal Address	15/01/2021	Post		
Boora	Offaly Public Participation Network (PPN)	General E-mail Contact	30/04/2021	E-mail		
Boora	Sustainable Water Action Network (SWAN)	General E-mail Contact	30/04/2021	E-mail		
Boora	Irish Farmers Association (Laois Offaly and Westmeath Office)	General E-mail Contact	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	Irish Farmers Association (Head Office)	General E-mail Contact	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	National Association of Regional Game Councils	General E-mail Contact	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	ICMSA (Irish Creamery Milk Suppliers Association)	General E-mail Contact	30/04/2021	E-mail	Ongoing Dialogue	E-mail

Boora	ICSA (Irish Cattle and Sheep Farmers Association	General E-mail Contact	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	Midlands & East Regional WFD Operational Committee	General E-mail Contact	30/04/2021	E-mail		
Boora	Shannon Flood Risk State Agency Co-ordination Working Group	General E-mail Contact	30/04/2021	E-mail		
Boora	CARO (Climate Action Regional Office) Eastern and Midlands	General E-mail Contact	30/04/2021	E-mail		
Boora	Irish Raptor Study Group	General E-mail Contact	30/04/2021	E-mail		
Boora	Coillte	Multiple Staff Members	30/04/2021	E-mail	Ongoing Dialogue	E-mail
Boora	Waterways Ireland	Multiple Staff Members	30/04/2021	E-mail		

Table APXI -2 Response summary from Consultees contacted

Organisation	Summary of Response by Stakeholder	BnM Response
Offaly County Councillors - Birr District	Cllr. Peter Ormond contacted BnM to make submission on the rehabilitation of Offaly bogs on behalf of Fianna Fáil councillors on Offaly County Council. A number of concerns were raised in the submission; 1) Advised that the Fianna Fáil council members are concerned at the short notice period prior to the end of the consultation process for PCAS 2) Request for details on the consultation process by BnM to date 3) Advised that PCAS should be considerate of the social, cultural, economic, industrial and ecclesiastical history of the region in which it takes place 4) Expressed interest and support for comments regarding natural capital by BnM staff during interviews with The Irish Times 5) A number of specific questions were asked of BnM including; • What is the acreage of each of the bogs covered by this submission and what percentage of that total area will be re-wetted or regenerated? • Given that peat production has long ceased in Derries, Oughter and Pollagh bogs are we correct in assuming that re-wetting of these two bogs is the only option? • Please clarify what amenity opportunities exists for these three bogs? • What opportunities have been examined and have any plans been considered? • Will the swing bridge over the Grand Canal at Turraun and the Bridge north of that bridge over the river Brosna linking Lemonaghan bog to Boora bog remain in place? • How is the stewardship of the cutaways going to be addressed? • Will there be a risk assessment carried out in relation to Outfalls, Deep Drains, and Silt Ponds? • Will fire breaks be provided in each of the bogs? • What plans are being put in place to protect the environment from fire risks? • The need to enforce litter control cannot be overstated.	Response 26/01/2021, acknowledgement, all concerns addressed in future drafts of rehab plans and that stakeholder engagement had been increased by 3 weeks. BnM have an extensive community consultation process ongoing with a dedicated Community Liaison Officer communicating to affected and interested parties. There is ongoing consultation. A wide variety of issues were considered when planning rehabilitation. Boora already has significant amenity and social value, and its former industrial heritage has been recognised. There will be scope for potential future amenity, but this is not part of the scope of PCAS. The primary scope of PCAS is re-wetting and climate action. Other land-uses such as commercial forestry etc are not appropriate. Hydrological assessments have been carried out of the rehabilitation plan to assess impacts on adjacent land. Options for the decommissioning of the swing-bridge in the future are being considered. Currently it will remain in place until rail usage is discontinued. Boora is part of the Lough Boora Discovery Park and will remain so for the foreseeable future. BnM have considered fire risk as part of its overall care and maintenance programme of its bogs. Re-wetting will significantly reduce fire-risk and the impacts of fire in the future.

Offaly County Council	Request for all draft rehabilitation plans in Co. Offaly.	BnM provided the requested documents. A virtual meeting, including a general PCAS presentation, was held for Offaly County Council on 10/02/2021
Offaly County Council	Offaly County Council e-mailed a submission to outline potential for integration of PCAS with opportunities regarding the Offaly County Council Inaugural Digital Strategy 2020-2022.	A meeting on Offaly's digital strategy was held between BnM and Offaly County Council on 04/03/2021.
Offaly County Council	Submission provided on behalf on Offaly County Council on a number of PCAS bogs including Boora on 22/02/2021. Key points raised were; 1) Requested that details of security fencing to be identified and detailed on plans. 2) Long term rehabilitation plan to be provided addressing above areas of consideration post 2024 if required. 3) Public Rights of Way access locations are to be maintained with relevant stakeholders and marked on drawings. 4) A number of technical issues with draft rehabilitation plans. 5) Advised BnM to carefully consider after use of bogs as part of PCAS 6) Request that the impact of PCAS on surrounding roads be considered as part of rehabilitation plans. 7) Advised that long term management (post 2024) is considered by BnM. 8) Advised that Appropriate assessment and the habitats directive are taken into account by BnM. 9) Advised that BnM consider management of flooding & water pollution, fire risk, invasive species and waste management as part of PCAS.	A virtual meeting/general presentation on PCAS to between BnM and Offaly Councillors and OCC personnel was conducted on 10/02/2021. BnM provided further PCAS documentation on request, via e-mail on 27/01/2021. Refer to Section 4 for response on issues raised. Dialogue with Offaly County Council is ongoing.
NPWS Regional Network	NPWS responded through e-mail thread on the 02, 03,07,09/12/2020 in relation to all PCAS bogs. The main points discussed were to advise of the requirement to investigate if assessment under the SEA and Birds directives for each site.	BnM acknowledged via e-mail to address queries on 09/12/2021. Also, a phone conversation with local NPWS Conservation Ranger on discussed biodiversity and rehabilitation measures on PCAS bogs including Boora Bog.
National Museum of Ireland (Irish Antiquities Division)	Responded through e-mail 28/12/2020 in relation to all PCAS bogs. Issues raised were; 1) The request that due diligence be taken during works to protect any archaeologically significant findings or areas 2) The NMI reiterated the importance of peatlands for the preservation of archaeology and requested they be consulted as part of any EIA undertaken	BnM acknowledged and responded via e-mail on 28/12/2020 to assure BnM will give due cognisance to all points within all rehabilitation plans for Boora Bog. A virtual meeting on PCAS between BnM and NMI was held on 18/01/2021

Irish Farmers Association	Responded to consultation regarding Boora Bog and the PCAS project at large on multiple dates throughout ongoing discourse. 1) Potential for flooding on adjacent lands. 2) Health and Safety 3) Perceived potentially detrimental impact of PCAS on property value 4) Reiterated the desire of the IFA that people who have been cutting turf on bogs should retain this right.	A working group has been established at a high level between BnM and IFA on various issues including PCAS. A meeting was held between BnM and IFA representatives on 18/02/2021 to present details on PCAS. Dialogue is ongoing.
The Heritage Council	Responded to consultation via e-mail on 04/01/2021 asking for more information on PCAS in general and looking to be involved in any seminar or information events.	BnM responded via phone conversation on 11/01/2021. Dialogue is ongoing.
The Irish Wildlife Trust	Responded to consultation via e-mail on 01/02/2021 to acknowledge receipt of PCAS plans and indicate desire to make a submission. Submission received on 23/03/2021 supporting the PCAS scheme and specifically requesting: 1. Consideration of statutory protection for rehabilitated bogs; 2. Consideration for re-wilding in determining future habitats and species presence, including species re-introductions; 3. Appropriate monitoring is established.	BnM responded via email and phone throughout February and March. A virtual meeting/PCAS presentation was held for IWT on 17/02/2021. Dialogue is ongoing. There will be further consultation regarding the IWT—owned area and potential measures that could be carried out in this area.
Trinity College	A researcher at Trinity College, Dublin, made a submission on PCAS by e-mail 24/01/2021. The following points were raised; 1) Advised that the consultation phase of the project should be given more time 2) Advised that there is little evidence of pre-project and post-project measurement 3) Advised that further community engagement with local stakeholders and research-based stakeholders would benefit the project	BnM acknowledged and will give due cognisance to all points raised in the submission by Trinity College Researcher in the rehabilitation plan for Boora Bog and other PCAS projects. BnM raised responded via e-mail.
Dept. of Agriculture, Food & the Marine (DAFM)	Submission by e-mail to express support for PCAS in general. Submission recommended; 1) That local landowners and stakeholders be considered as part of the consultation process. 2) EIA assessment be carried out prior to PCAS works. 3) Hydrological assessments are carried out with a view to protecting adjoining lands from adverse impacts.	BnM acknowledged and responded via e-mail on 02/03/2021 to assure that all points raised within the submission will be considered. A virtual meeting/PCAS presentation was held for DAFM on 11/12/2020. BnM has and is continuing to engage with land-owners. Legal advice to date is that the scheme does not come under the EIAR Directive. Hydrological assessments have been carried out of the rehabilitation plan to assess impacts on adjacent land.

Butterfly Conservation Ireland	Responded to consultation via e-mail with multiple submissions on various PCAS Bogs. Concerns raised were: 1) Alterations to the text of the rehab plan. 2) Request for all turf cutting on BnM land to end. 4) Suggest monitoring for Large Heath Butterfly or food plant Hare's-tail Cottongrass. 5) Suggested alterations to habitat design in rehab plan to further connect regional high bog habitats and create further raised bog habitat on site. Also, BCI reiterated need to protect valuable habitat such as species rich grassland 6) Advised BnM to ensure that quality habitats already found on site are not damaged by PCAS activities 7) Requested that sensitive or valuable habitats such as dry calcareous grassland remain undisturbed by PCAS	BnM acknowledged via e-mail; Phone conversation with BCI on 19/01/2021. BnM has ceased all peat production including issuing of turf-cutting licences on its lands. Private turbary holders can continue to cut turf where they have rights to do so. The monitoring programme will monitor for Large Heath. Species-rich calcareous grassland in nLBDP, e.g. the Mesolithic site, and other locations will remain undisturbed. Woodland and wetland habitats already established at Boora will remain largely undisturbed. Some areas will be assed to consider options for further re-wetting via targeted drain-blocking.
ICMSA (Irish Creamery Milk Suppliers Association)	Virtual meeting/PCAS presentation organised for 03/03/2021.	A meeting was held by BnM on 03/03/2021 to present details on PCAS to the ICMSA and members. Dialogue is ongoing.
University College Dublin	A researcher from UCD contacted BnM with a submission on PCAS. The researcher suggested that the rehabilitations contain a good level of detail regarding rehab but could be improved by including more detail on water table level monitoring and measuring.	BnM acknowledged and will give due cognisance to all points raised in the submission by UCD Researcher in the rehabilitation plan for Boora Bog and other PCAS projects. Water table monitoring is included in the monitoring plan and piezometers have been installed in Turraun bog to facilitate this monitoring
Office of Public Works	Responded via e-mail 01/12/2020 querying the reason for inclusion of OPW in the PCAS stakeholders list.	BnM responded with and explanation via e-mail on 01/12/2020.
The NARGC	NARGC contaced BnM via email on 30/04/2021 to request rehab plan for Offaly Bogs including Boora. Raised concerns of the potential impacts of PCAS on Grey partridge, request for information on planning applications for windfarm developments in the Boora area,	BnM acknowledged and will give due cognisance to all points raised in the submission by NARGC in the rehabilitation plan for Boora Bog and other PCAS projects.

Local resident A	Contacted BnM by phone. The resident has a landholding at Derrydolney and requested information on PCAS in his area.	Issues resolved during conversation with BnM PCAS Community Liaison Officer
Local resident B	Contacted BnM by phone on 12/05/2021 to raise concerns over land ownership and flooding issues	Issues resolved during conversation with BnM PCAS Community Liaison Officer
Local resident C	Contacted BnM by phone on 17/05/2021 to raise concerns drainage management near his land holding	Issues resolved during conversation with BnM PCAS Community Liaison Officer
Coilte	On site meeting at Boora on 20/05/2021 to discuss forestry actions at Boora and other PCAs Bogs	Dialogue Ongoing
IPCC	Responded to consultation regarding Boora Bog and the PCAS project at large to express support for the project and list a number of comments on how the project might be improved. Contacted Bnm on 21/05/2021 with a submission specific to the Boora Draft Rehab plan. Issues raised included; 1) The cost of amenity development in land use space and its impacts on overall carbon fluxs at Boora. 2) The IPCC requested that marginal Bog Remnants be considered for full rehabilitation 3) IPCC suggested that the inclusion of local community/education groups in the monitoring aspect of PCAS would improve the community outreach of PCAS as a whole. 4)Requested information on where Sphagnum for innoculation would be harvested. 5) Biosecurity and Invasive Species. 6) request for further information on Environmental Controls section of Draft Rehab Plan.	BnM acknowledged on 21/05/2021 and will give due cognisance to all points raised in the submission by IPCC in the rehabilitation plan for Boora Bog and other PCAS projects. BnM raised responded via e-mail. The monitoring and estimation of the 'impact' of amenity on overall carbon fluxes at Boora is beyond the scope of PCAS. However, this would be a worth-while research project that could be considered in the future. All bog remnents within BnM ownership have been assessed for restoration potential. BnM have engaged with the local community in the past in relation to conservation and amenity management and a plan was developed, facilitated by Birdwatch Ireland. Source sites for Sphagnum transfer are currently being assessed. BnM have an extensive community consultation process ongoing with a dedicated Community Liaison Officer communicating to affected and interested parties.
The Department of Agriculture	Contacted BnM with submission on PCAS on 24/05/2021. Advised that BnM strongly consider the risks of hydrological manipulation may have on adjoinging lands and to ensure a satisfactory stakeholder engagement plan is carried out prior to works.	Dialogue Ongoing BnM has and is continuing to engage with land-owners.

Food and the Marine		Hydrological assessments have been carried out of the rehabilitation plan to assess impacts on adjacent land.

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

22

Code of Practice

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

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

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

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

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

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

BORD NA MÓNA Naturally Driven	**Procedure: ENV017**	**Rev: 1**
Title: Archaeological Findings	**Approved: EM**	**Date: 13/10/2020**

1) Purpose

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

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

2) Procedure

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

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

Your Archaeological Liaison Officer is ……

3) Records

Revision Index			
Revision	Date	Description of change	Approved
1	13/19/2020	First release	EMcD
2			

Archaeological Impact Assessment of Proposed Bog Rehabilitation at Boora Bog, Co. Offaly. Dr. Charles Mount. April 2021.

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

Report For

Bord Na Móna Energy Ltd.

Author

Dr. Charles Mount

Bord Na Móna Project Archaeologist

Introduction

The EPA (2020) *Guidance on the process of preparing and implementing a bog rehabilitation plan* notes that the licensee should characterise the bog prior to embarking on detailed planning and implementation. This characterisation should detail how the land is classified in terms of statutory protections, e.g. as European sites, world heritage sites, RAMSAR sites, National Heritage Areas, national monuments, archaeological heritage, etc. This archaeological impact assessment report was prepared by Dr. Charles Mount for Bord na Móna Energy Ltd to fulfil this characterisation in relation to archaeological heritage. It represents the results of a desk-based assessment of the impact of proposed bog rehabilitation of c.1847 hectares at Boora Bog, Co. Offaly on the known archaeological heritage of the bog. The proposed rehabilitation actions will be a combination of measures to create wetlands and re-wet deep peat as outlined in the draft Methodology Paper for the proposed Bord na Móna Decommissioning, Rehabilitation and Restoration Scheme. These enhanced measures for Boora Bog will include:

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

Boora Bog is located c.1.7km north of Kilcormac, Co. Offaly, and north of the R437 road. The overall rehabilitation area occupies the townlands of Ballybrackan Little, Ballybrackan or Ridgemount, Ballywilliam, Barnaboy, Broughal, Bun, Bunakeeran, Derrydolney, Derrymore, Killooly, Kilnagall, Lea Beg, Lea More, Lumcloon, and Rin on OS 6 inch sheets Offaly No. 23. Note that the rehabilitation of most of the area of Boora Bog has already been completed and now forms part of the Lough Boora Parklands.

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

- The IAWU Peatland Survey
- Bord na Mona Re-assessment survey 2009
- The Sites and Monuments Record that is maintained by the Dept of Housing, Local Government and Heritage
- The topographical files of the national museum of Ireland.
- The Excavations database
- Previous assessments

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

Desktop assessment

Recorded Monuments

The Record of Monuments and Places (RMP) for Co. Offaly which was established under Section 12 of the National Monuments (Amendment) Act, 1994 was examined as part of the assessment (DAHGI 1995). This record was published by the Minister in 1995 and includes sites and monuments that were known in Boora Bog before that date. This review established that there is one RMP situated in the proposed rehabilitation area OF023-005--- a Mesolithic habitation site (see Fig. 1 and Table 1).

RMP No.	Townland	Classification	N.G.R. E	N.G.R. N
OF023-005---	Broughal	Habitation Site	21614	21812

Table 1. List of RMPs in Boora Bog.

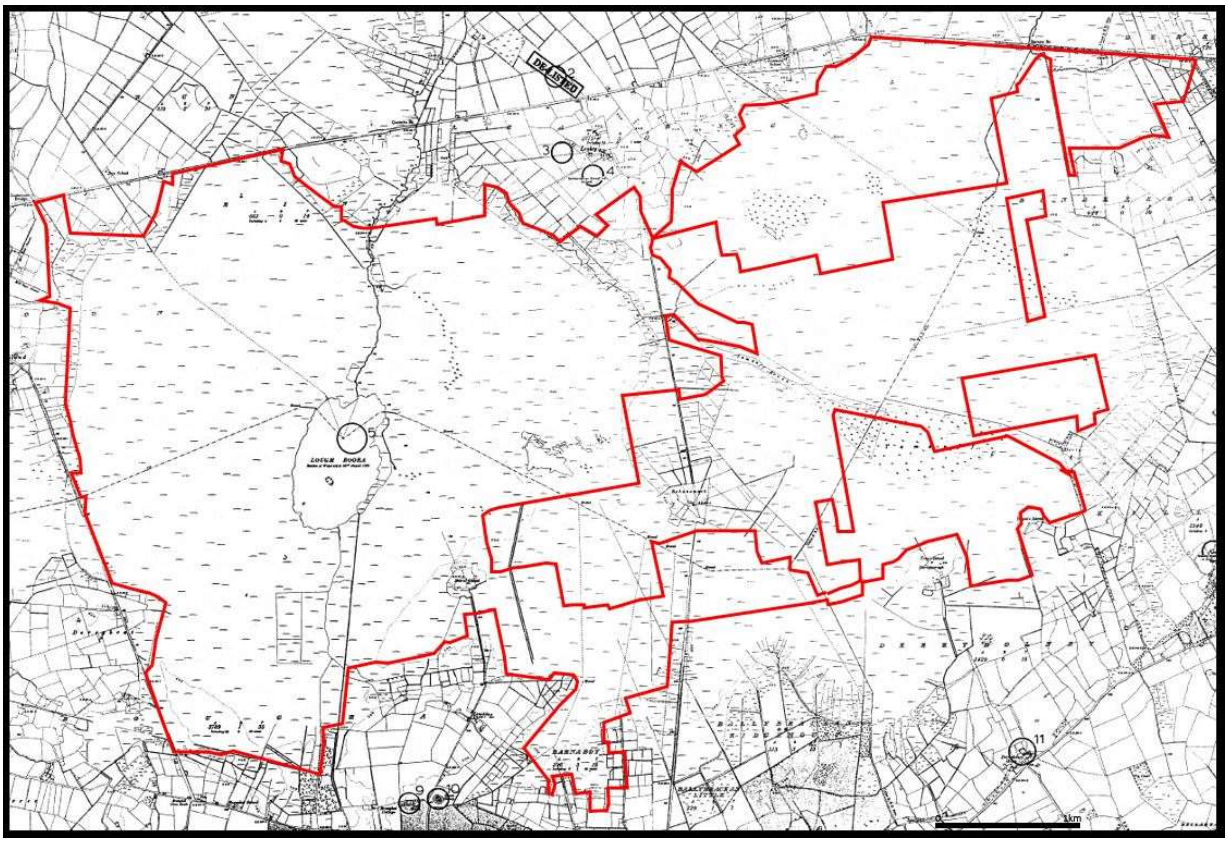


Fig. 1. Boora Bog, Co. Offaly, detail of the Record of Monuments and Places map sheet No. 23. The proposed rehabilitation area is outlined with the red line. There is one Recorded Monument in the rehabilitation area OF023-005--- a Mesolithic habitation site.

National Museum of Ireland

Following the discovery of the early Mesolithic site at Lough Boora (RMP OF023-005---) the National Museum carried out an excavation at the site in 1977 (Ryan 1980). An area over 2000m2 was excavated and revealed several hearths, but no traces of structures. Burnt bone from the hearths was derived from mammals, principally wild pig, birds, including wood pigeon, jay, teal grouse and mallard and fish species including brown trout and eel. The lithic assemblage comprised almost 200 microliths, mostly rod forms,

needle-points and some scalene triangles. The stone assemblage also included about 400 blades, numerous cores, mostly single or dual platform types and three complete polished stone axeheads and axe fragments. Charcoal from hearths associated with microliths produced four radiocarbon dates ranging from 7160-6260 Cal. BC. Other dates associated with botanical work at the site suggest the peat sealing the habitation had begun to form around 6000BC.

Peatland survey

Boora Bog was surveyed by the Irish Archaeological Wetland Unit (IAWU) in 1998 as part of the Archaeological Survey of Ireland Peatland Survey (Unlicensed). Two sightings of archaeological material were made (see Table 1). These archaeological sightings were notified to the Archaeological Survey of Ireland.

SMR_NO	SMR Class	IAWU Cat._No.	IAWU Class	Townland	N.G.R. E	N.G.R. N	Depth BS m
OF023-025----	Platform - peatland	OF-LEG 0001	WOPL	Lea Beg	218372	217472	-
OF023-026----	Redundant record	OF-LEG 0002	WOWO	Lea Beg	218507	217277	-

Table 2. List of sites recorded by the IAWU in Boora Bog.

Sites and Monuments Record

The Sites and Monuments Record (SMR) which is maintained by the Department of Housing, Local Government and Heritage was examined as part of the assessment on the 20th of April 2021. The SMR consists of records included in the RMP and sites and monuments notified to the Dept. since the publication of the RMP. This review established that there is only one entry in the SMR in the proposed rehabilitation area. SMR OF023-026---- is the sighting reported by the IAWU in 1998 as OF-LEG 0002 (see Table 1 and Fig. 2). However, the SMR notes that 'The evidence is not sufficient to warrant its acceptance as the remains of an archaeological monument' and it is classed as a redundant record. This sighting is in an area of the bog that is classified as rehabilitation completed and will not be the subject of works during the current campaign.

Bord na Mona Re-assessment survey 2009

Boora Bog was re-surveyed by the Bord na Mona Re-assessment survey 2009 (License No. 09E0410). At that time most of the bog had gone out of production and become the Lough Boora Parklands and was covered with vegetation, with the eastern side of the bog covered by Loch Dochais and Boora Lake. As a result, it was not possible to field walk these areas. Only the south-western corner of the bog remained in production and was therefore subject to field walking survey. No sites of archaeological significance were identified during the fieldwalking survey of this area.

Reported finds

The topographical files of the National Museum of Ireland were searched for records of finds from the bog in April 2021 (thanks to Isabella Mulhall) and this large quantity of finds are included below in Table 3.

Townland	Museum No.	Description
Broughal	1968:422	Bog Butter
Broughal	1970:8	Bog Butter
Broughal	2013:141	Bog Butter
Broughal	2013:142	Bog Butter with a withy
Broughal	1972:156	Wooden beetle
Broughal	1979:108	Wooden bucket

Broughal	1982:91	Flint blade
Broughal	1983:32	Polished stone axehead
Broughal	2008:15	Wooden Figure
Broughal	2018:13	Bog Butter
Broughal	IA/150/1966	Axehead
Broughal	IA/154/1955	Bog butter and vessel
Broughal	IA/75/1976 and E167	Finds from Mesolithic habitation RMP OF023-005---
Ballybrackan or Ridgemount	1960:40	Bronze leaf-shaped spearhead.
Barnaboy	2001E477:2	Forked wooden object (IAWU survey)
Lea Beg	M1951:15	Bog Butter in hide container
Lea Beg	1969:19	Socketed Spearhead, bronze
Lea Beg	1969:19:1	Socketed Spearhead shaft
Lea Beg	1969:837	Human skull
Lea Beg	1991:3	Utilised pebble too
Lumcloon	1957:32	Bog butter in wooden keg
Lumcloon	1977:2177	Bog butter in bark
Lea More	R1691	Kite-shaped Bronze spearhead
'Boora Bog'	1995:85	Bronze axe head

Table 3. List of archaeological finds from Boora Bog reported to the National Museum of Ireland.

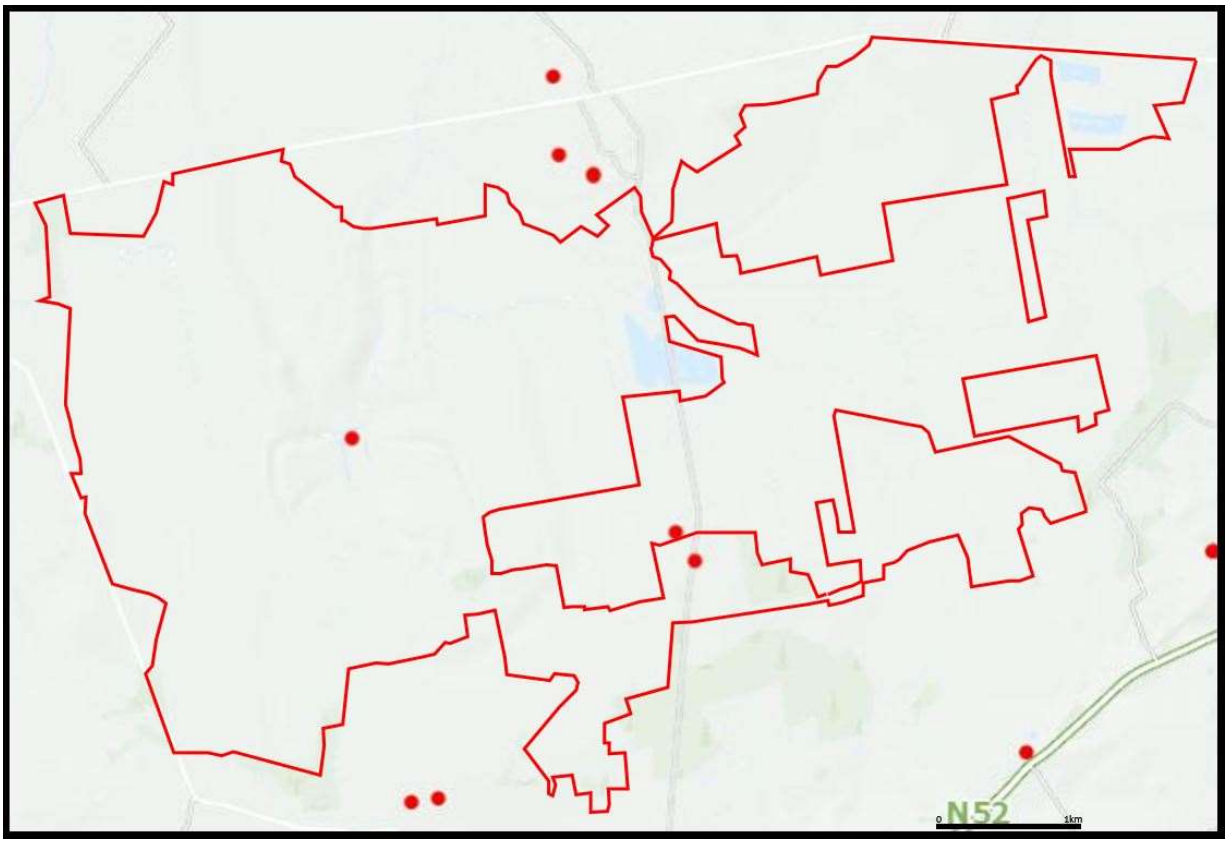


Fig. 2. Boora Bog, Co. Offaly, detail of the Sites and Monuments Record. The proposed rehabilitation area is outlined with the red line. There is one SMR redundant record (OF023-026----) in the rehabilitation area.

Archaeological investigations

Reports of archaeological excavations and licensed monitoring in the study area listed in the excavations database at excvations.ie were examined as part of the assessment. There is one additional report of archaeological investigation carried out in the rehabilitation area (see below).

Lea Beg, Lugh Boora Parklands Non-archaeological 13E0298
Testing was carried out on 29 and 30 October 2013 at the location of the proposed Lough Boora visitors centre at Lea Beg, Co. Offaly on foot of a planning condition. No potential archaeological features were recorded in the four machine-excavated test trenches. As the site is located within a raised bog it was recommended however that any peat removal required during the construction phase be monitored. The testing was followed by archaeological monitoring of preparatory groundworks for a new car park and visitors centre in Lea Beg townland on a site located close to the existing Bord na Móna 'works' complex in Boora (licence No. 13E0398) in 2013. The development site measured 5.4ha in size and was located south of the existing Bord na Móna works and Leabeg offices in Boora. Nothing of archaeological significance was identified during the course of the works.

Previous assessments
Boora Bog has been the subject of an Environmental Impact Assessment Report caried out by Irish Archaeological Consultancy LTD in 2018 for Bord na Móna Energy Limited in relation to IPC Licence P0500-01. The assessment noted the wood identified in the IAWU survey in 1998 and noted that there was a moderate potential for archaeological features to be uncovered during the course of any future development works in Boora Bog.

Impact assessment

There are two known archaeological sites in the rehabilitation area RMP OF023-005--- Habitation Site and SMR OF023-026---- Redundant Record (see Table 4).

RMP/SMR No.	Townland	Classification	N.G.R. E	N.G.R. N
OF023-005---	Broughal	Habitation Site	21614	21812
OF023-026----	Lea Beg	Redundant Record	218507	217277

Table4. Archaeological sites in the rehabilitation area.

Recommendations

Both archaeological sites RMP OF023-005--- Habitation Site and SMR OF023-026---- Redundant Record should be avoided by the rehabilitation works with a 20m buffer zone (see Table 4). Should any previously unknown archaeological material be uncovered during the rehabilitation works, it should also be avoided and reported to the Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

Conclusion

This is a desk-based archaeological assessment and includes a collation of existing written and graphic information to identify the likely archaeological potential of the proposed rehabilitation area. Both archaeological sites, RMP OF023-005--- Habitation Site and SMR OF023-026---- Redundant Record, should be avoided by the rehabilitation works with a 20m buffer zone (see Table 4). Should any previously unknown archaeological material be uncovered during the rehabilitation works, it should be avoided and reported to the Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

References

DAHGI 1995. Recorded Monuments Protected under Section 12 of the National Monuments (Amendment) Act, 1994. County Offaly.

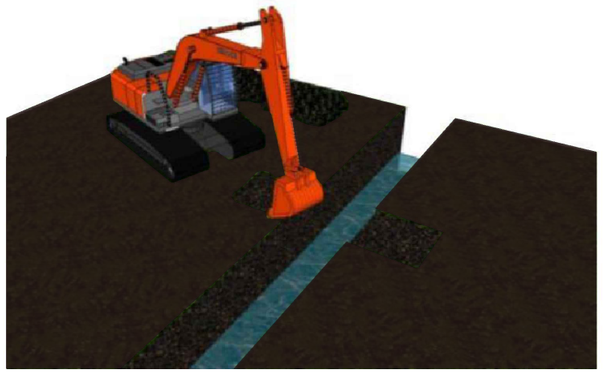
EPA 2020. Guidance on the process of preparing and implementing a bog rehabilitation plan.

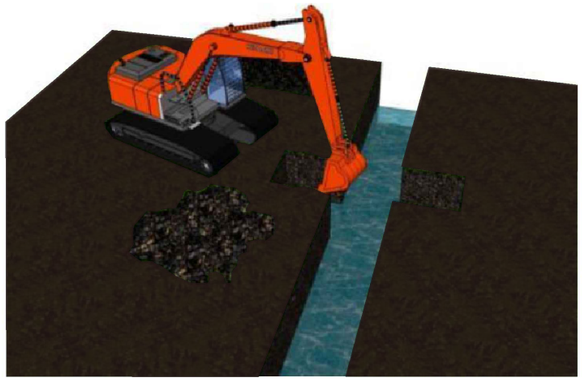
Ryan, M. 1980. An early Mesolithic site in the irish midlands. *Antiquity* 54, 46-7.

Dr. Charles Mount
21 April 2021

Appendix C: Methodology Drawings

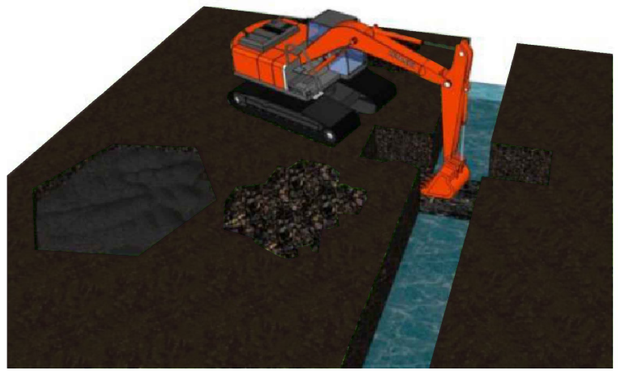
1. Before building drain block, the sides and bottom of the ditch is cleaned using the excavator to remove dry degraded peat, to ensure a good peat-to-peat contact.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

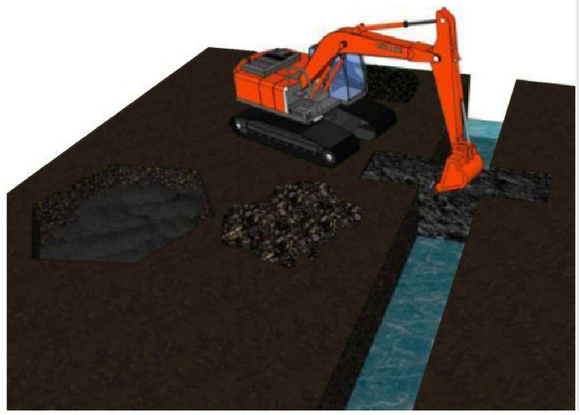




2. Cut key in either side of the drain approximately 500mm deep, and ensure that it is wider than the actual drain.
Remove 500mm of peat from bottom of the drain also and place behind the machine for replacement later.

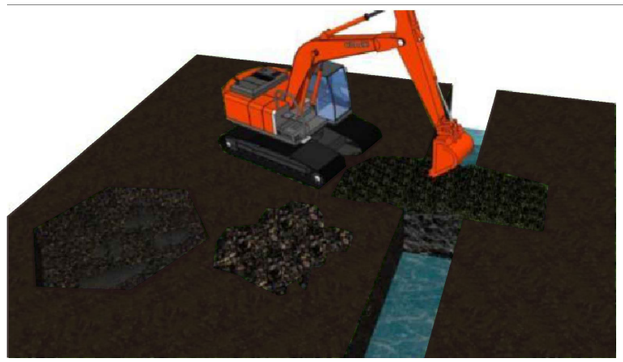
3. Open an area behind machine to be used as a borrow pit. Avoid using the surface layer of peat (top 100-200mm) which is likely to be very permeable. Only use the deeper, more compacted peat to build the drain block.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

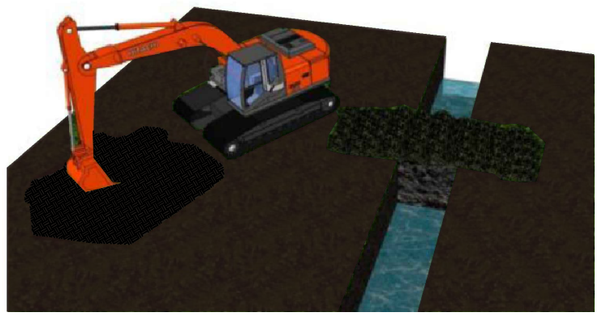




4. Dig out peat from the borrow pit and place into the drain compacting in 300mm layers. Compact the peat firmly using the excavator bucket before laying more peat from the borrow pit.

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

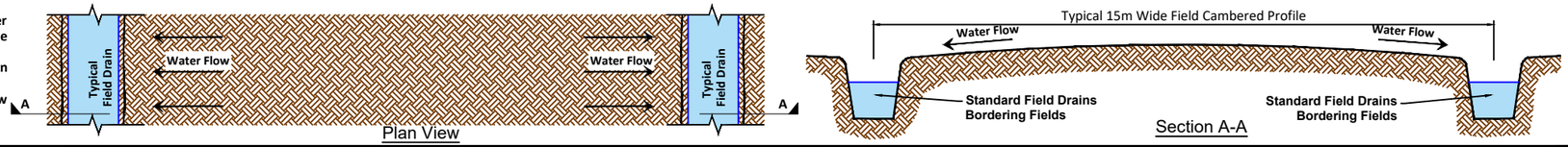
Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.		D.K.	P.N.	P.N.

Date: 18/12/20 Scale : N.T.S. A3 Stage: For Approval

Drawing No.: PCAS-0100-002 Rev: b

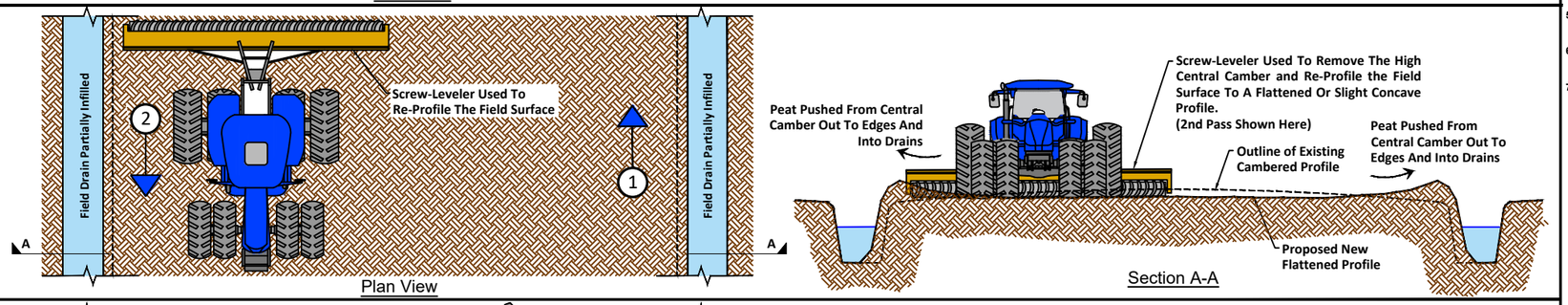
Existing Layout:

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.
On peatlands with increased slopes it will be more advantageous to create shallow depressions.



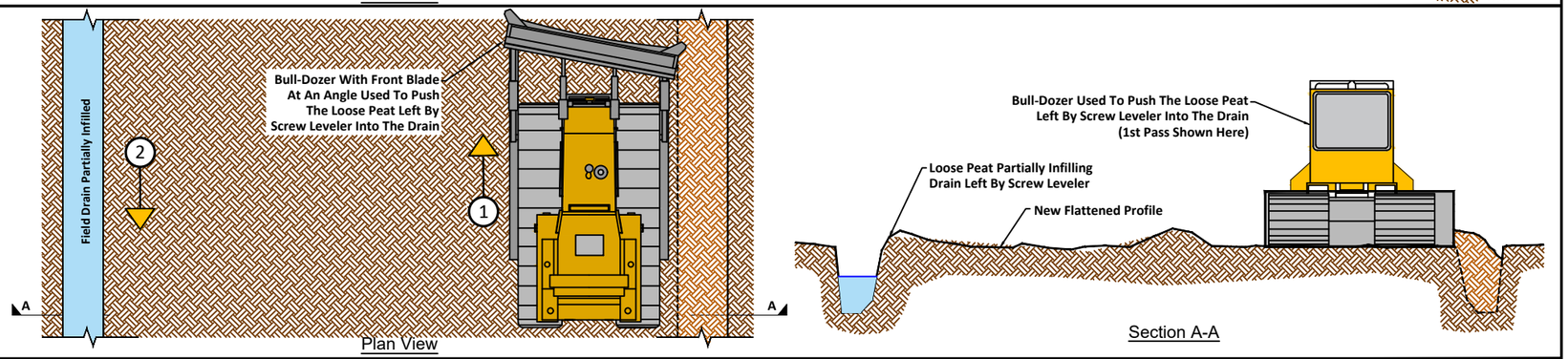
Phase 1
Re-Profiling of Field Surface

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.



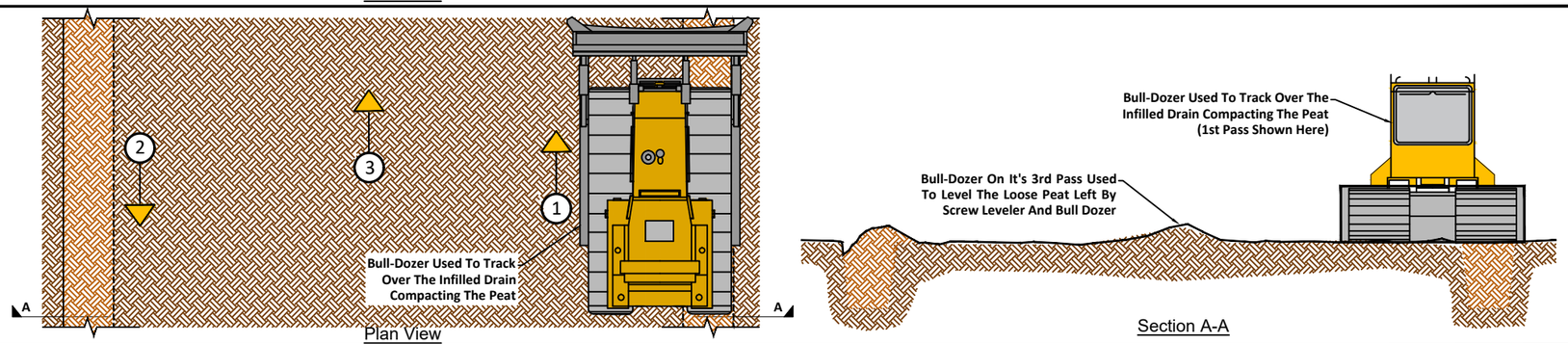
Phase 2
Infilling Of Drains

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.



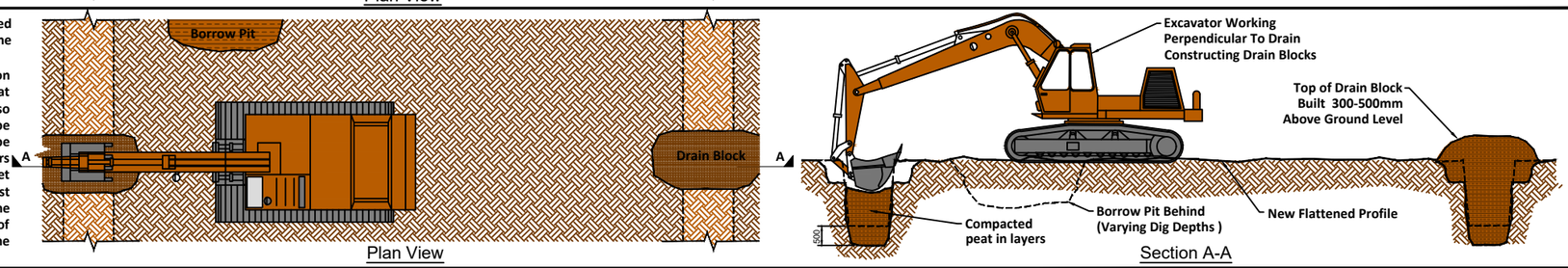
Phase 3
Final Leveling Of Drains & Field

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.



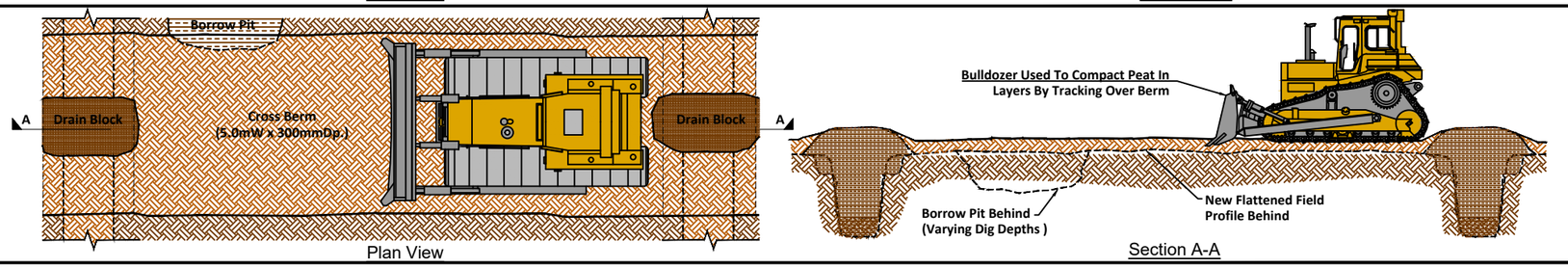
Phase 4
Drain Blocking

(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.
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STATUS

Rev	Description	Issued By	Date
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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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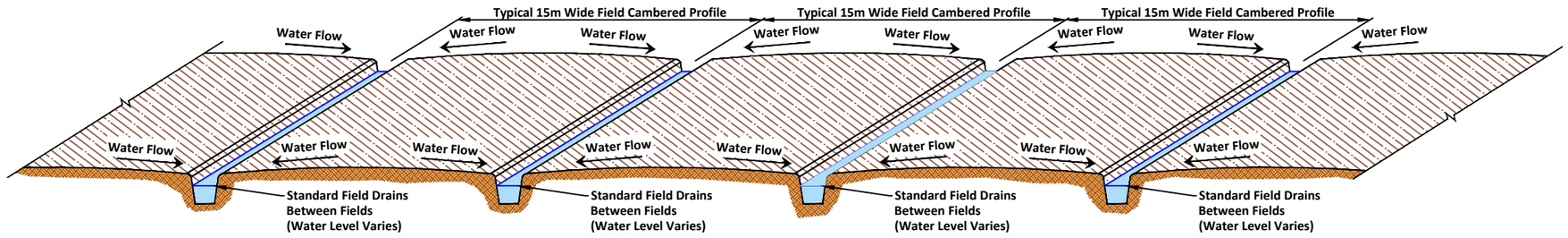
Existing Layout:

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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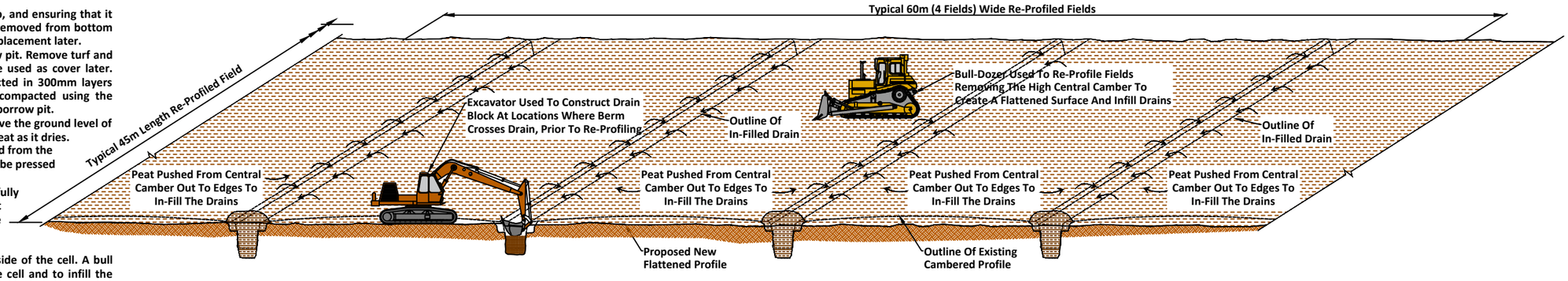
Phase 1
Drain Blocking And Re-Profiling of Fields Surface

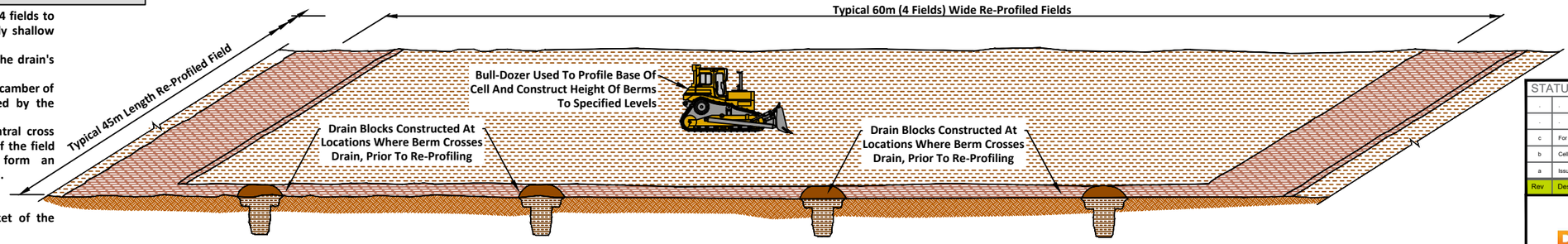
Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement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

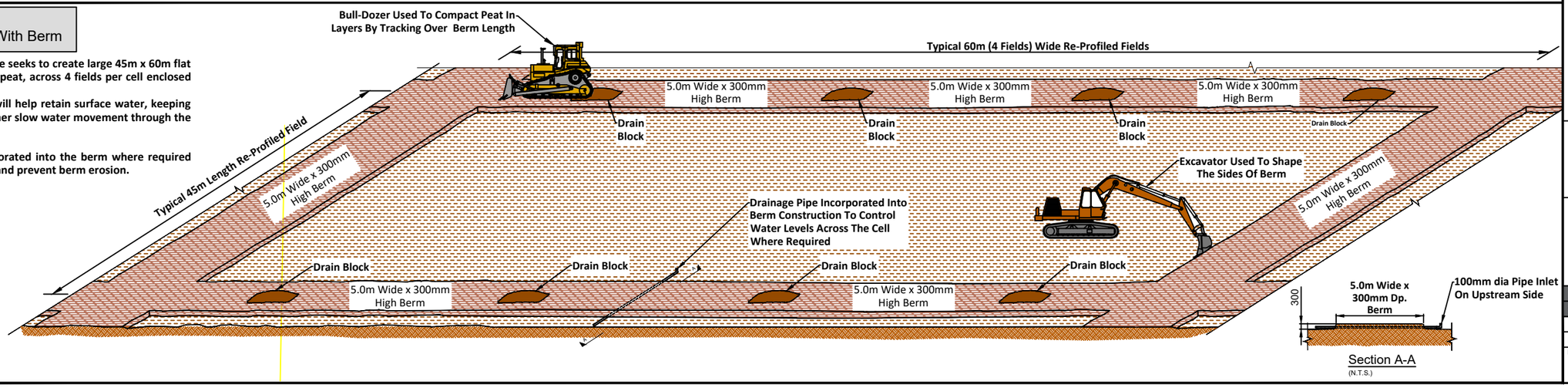
Berms are formed 45m in length and 60m across 4 fields to create an enclosed cell. The berms are relatively shallow (300mm high) and are 5.0 m wide.
An Excavator is used to form a key(5m long) in the drain's edges where the berm crosses.
A strip of peat(5m wide) is taken from the central camber of the 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			
.	.	.	.
.	.	.	.
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
Rev	Description	Issued By	Date

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 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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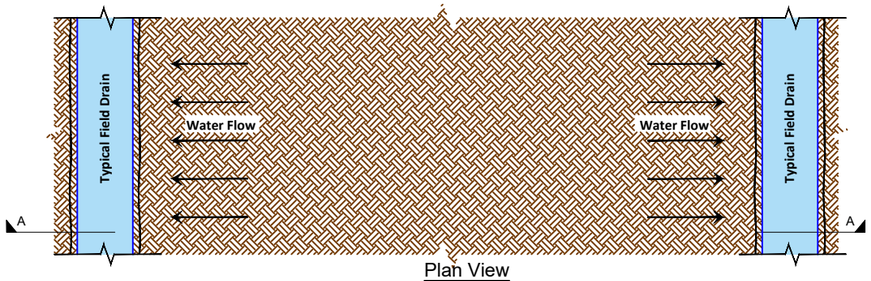
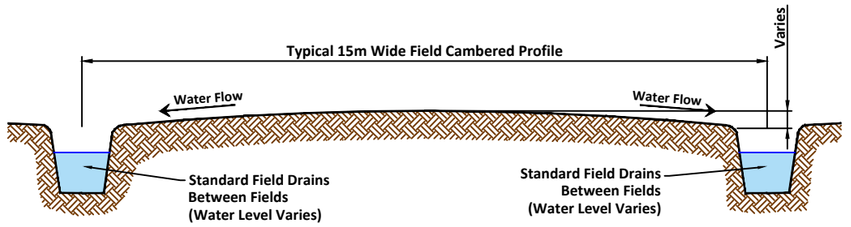
Existing Layout:

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.
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.



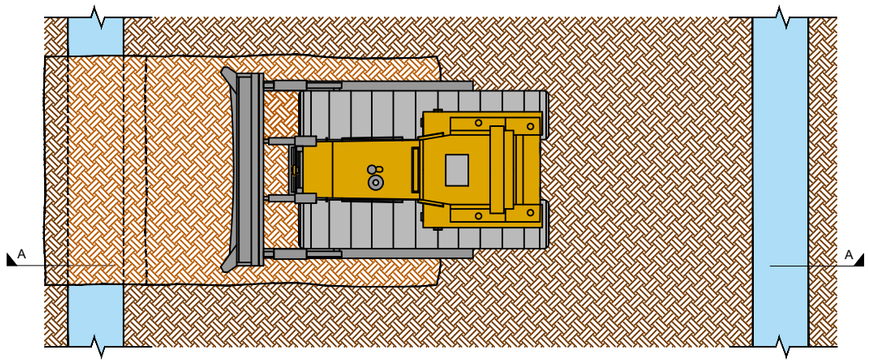
Plan View
(N.T.S.)



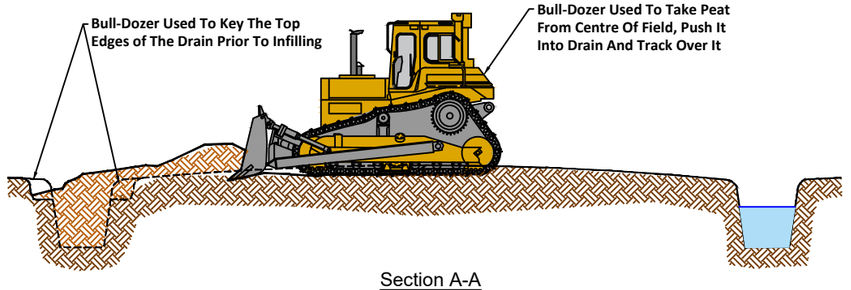
Section A-A
(N.T.S.)

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

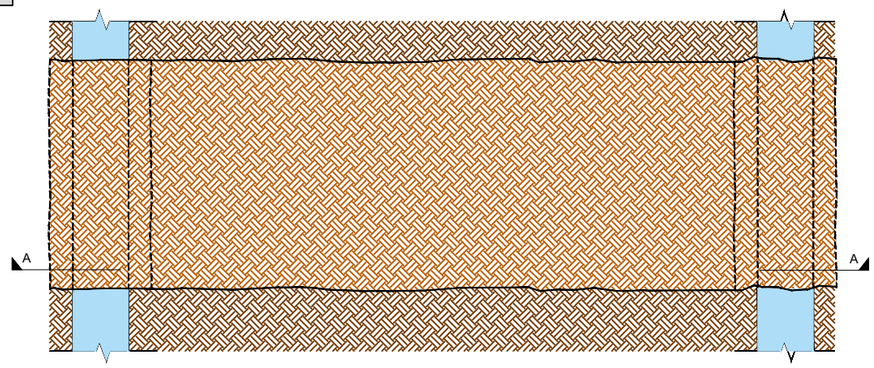


Section A-A
(N.T.S.)

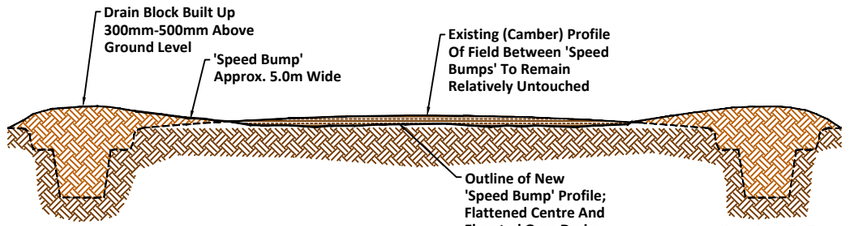
Plan View
(N.T.S.)

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.
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
.		.	.
.		.	.
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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Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

PROJECT:
Peatland Climate Action Scheme
PCAS

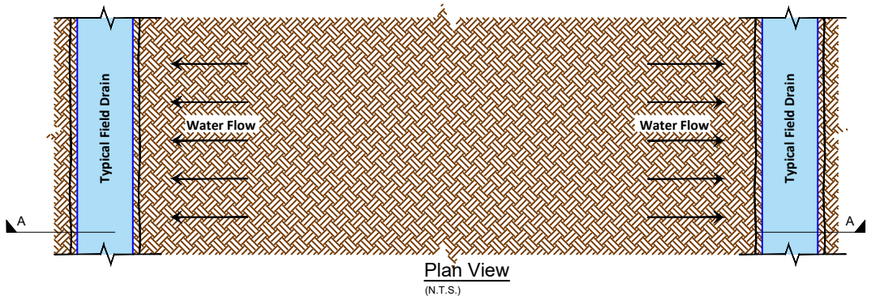
TITLE:
Rehabilitation Method DCT 2
'Speed Bump' Peat Drain Block

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

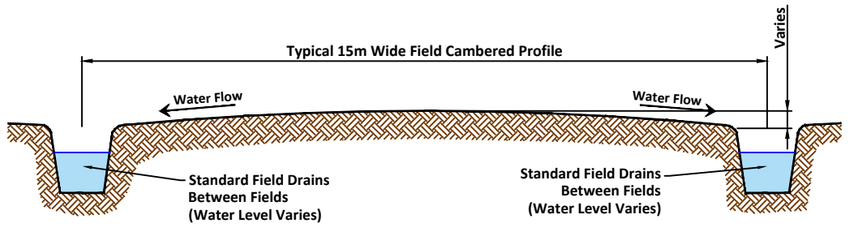
C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-008c_DCT_2_SpeedBumps.dwg

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 Cross berms is to slow the water movement through the bog.



Plan View
(N.T.S.)



Section A-A
(N.T.S.)

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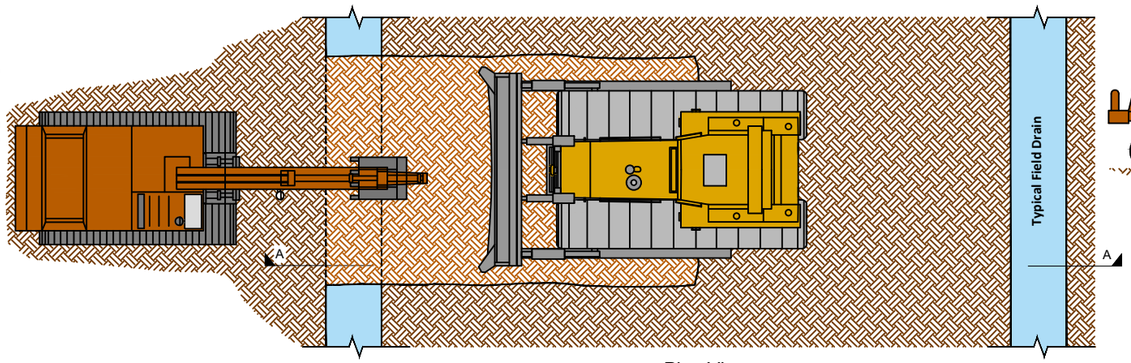
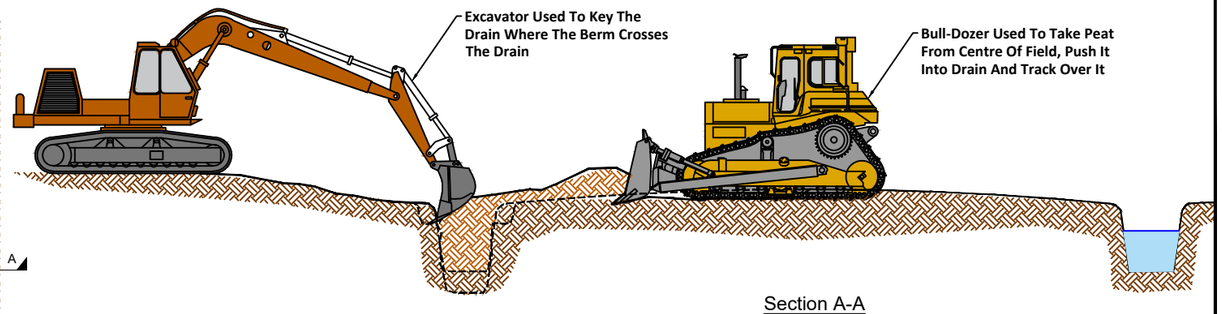
Phase 1
Forming Peat Berm

An Excavator is used to form a key in the drain where the berm crosses.
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.



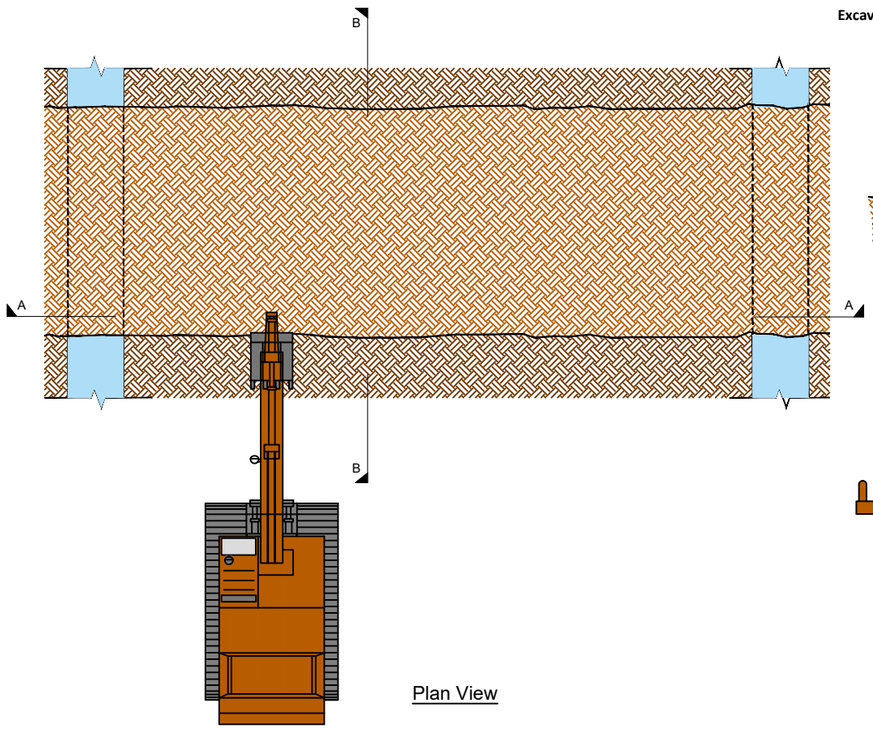
Plan View
(N.T.S.)



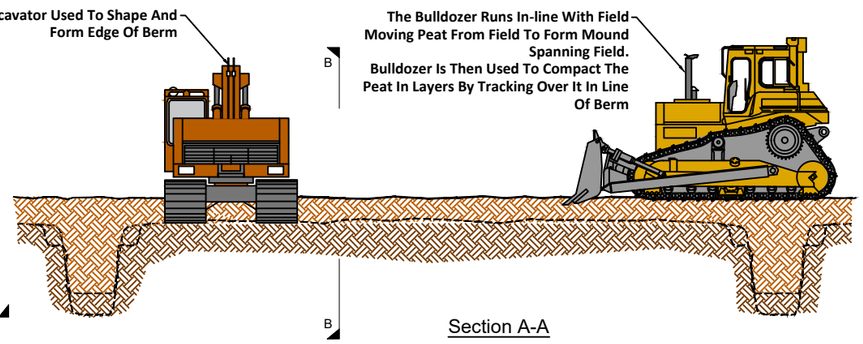
Section A-A
(N.T.S.)

Phase 2
Forming Peat Berm

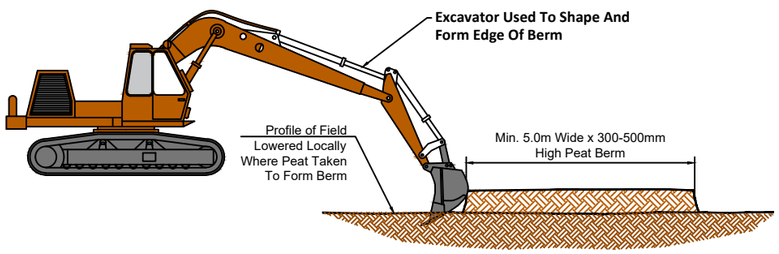
Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form a minimum 5m Wide x 300-500mm High Cross Berm.
The peat material in the berm is compacted in layers by the dozer tracking over it.
The excavator bucket is used to form and shape the edges of the compacted berm.



Plan View



Section A-A



Section B-B

STATUS

Rev	Description	Issued By	Date
.		.	.
.		.	.
c	Berm Dimensions And Details Revised	P.K.	11/03/21
b	Berm Height Increased And Trench Detail Added	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 WLT 3
Peat Berm

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.
Date: 28/01/21		Scale : Not to Scale	A3	Stage: Information
Drawing No.: PCAS-0100-010				Rev: c

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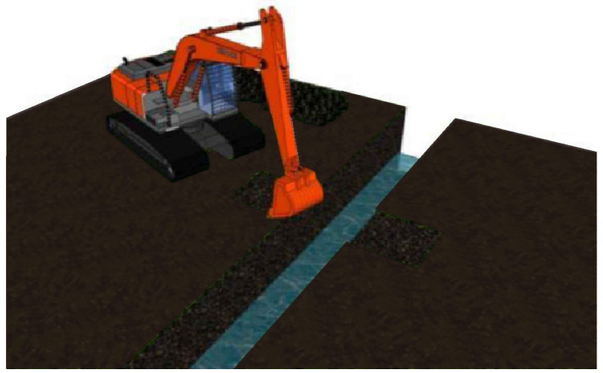
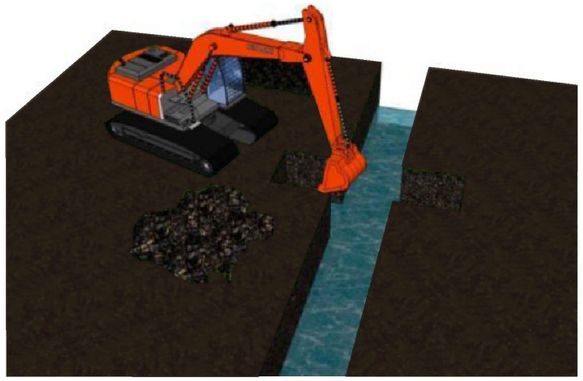
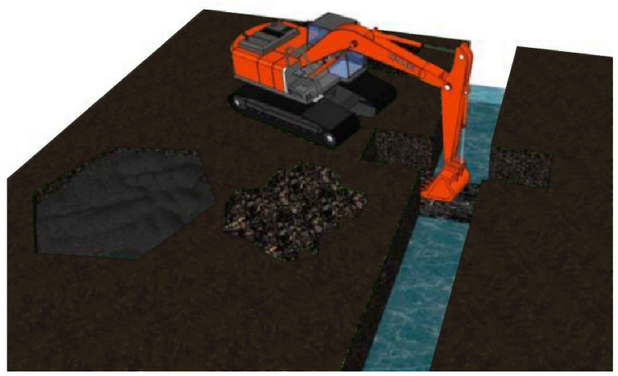
1. Before building of drain blocks, the sides and bottom of the ditch is cleaned using the excavator to remove dry degraded peat, to ensure a good peat-to-peat contact.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

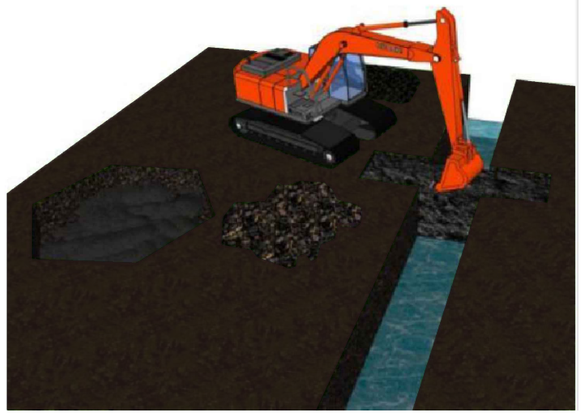




2. Cut key in either side of the drain approximately 500mm deep, and ensure that it is wider than the actual drain.
Remove 500mm of peat from bottom of the drain also and place behind the machine for replacement later.

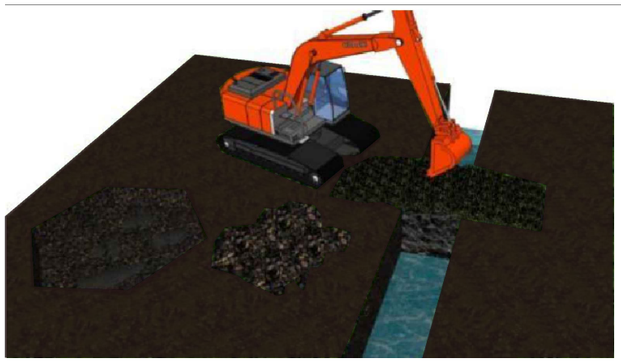
3. Open an area behind machine to be used as a borrow pit. Avoid using the surface layer of peat (top 100-200mm) which is likely to be very permeable. Only use the deeper, more compacted peat to build the drain block.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

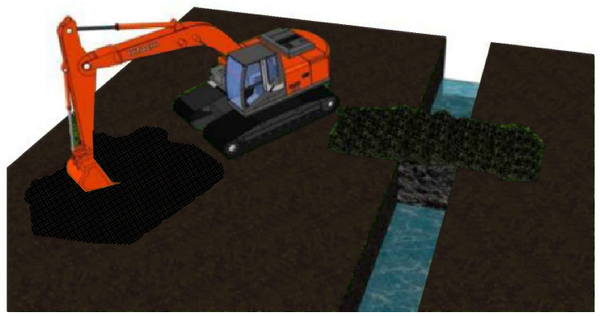




4. Dig out peat from the borrow pit and place into the drain compacting in 300mm layers. Compact the peat firmly using the excavator bucket before laying more peat from the borrow pit.

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 drain block, 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:

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STATUS

Rev	Description	Issued By	Date
b	For Approval	P.K.	25/02/21
a	Issued for Information	P.K.	29/01/21

PROJECT:
Peatland Climate Action Scheme
PCAS

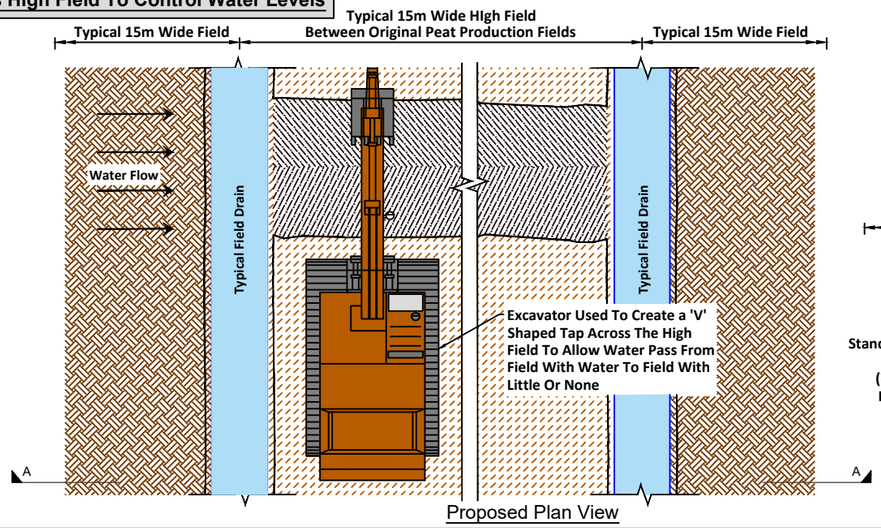
TITLE:
Rehabilitation Method WLT 4
Peat Drain Blocking

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.		D.K.	P.N.	P.N.

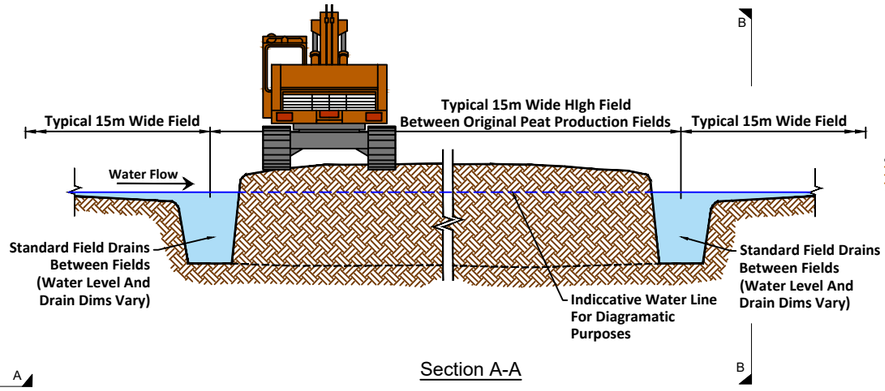
Date: 13/01/21 Scale : N.T.S. A3 Stage: For Approval

Drawing No.: PCAS-0100-011 Rev: b

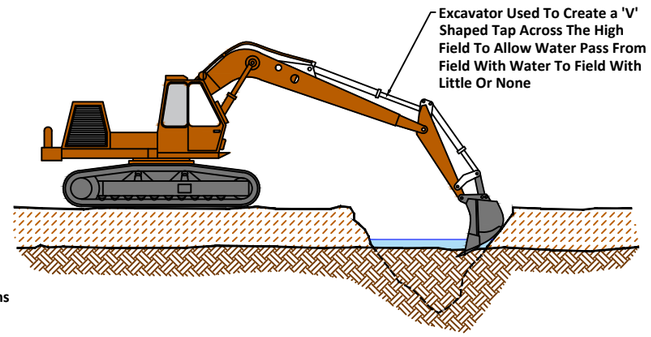
'V' Tap Across High Field To Control Water Levels



Proposed Plan View



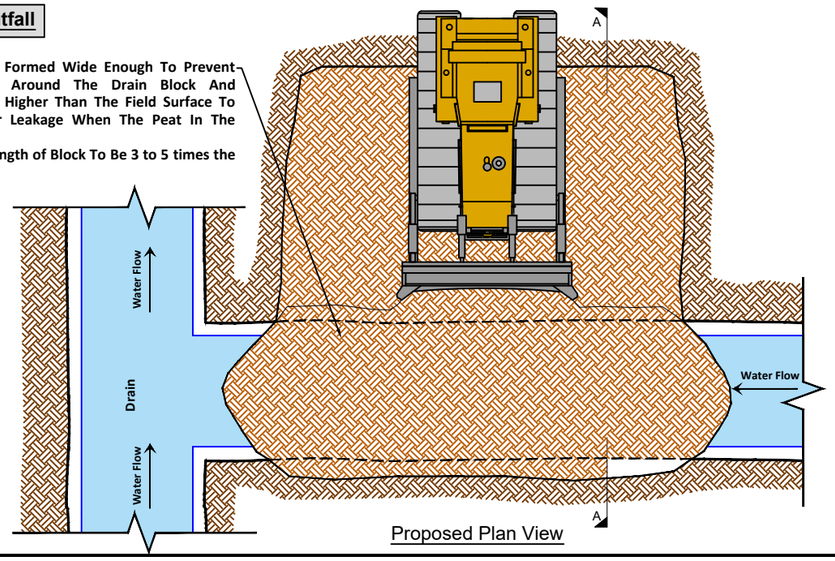
Section A-A



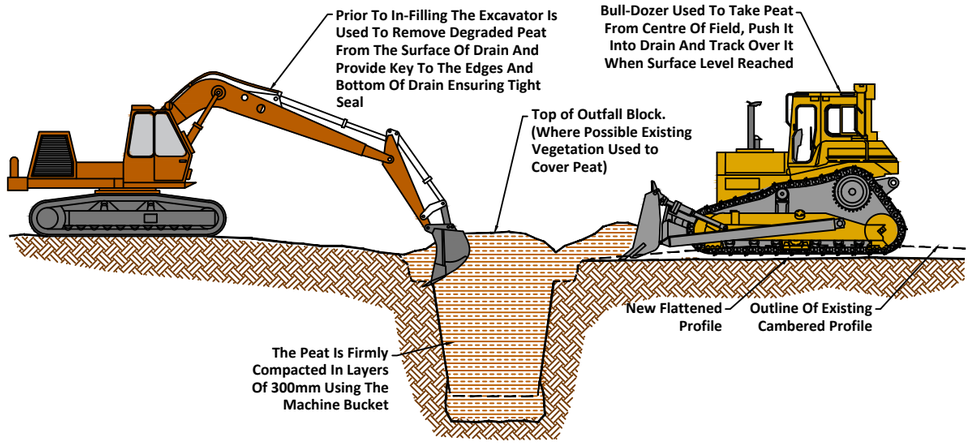
Section B-B

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

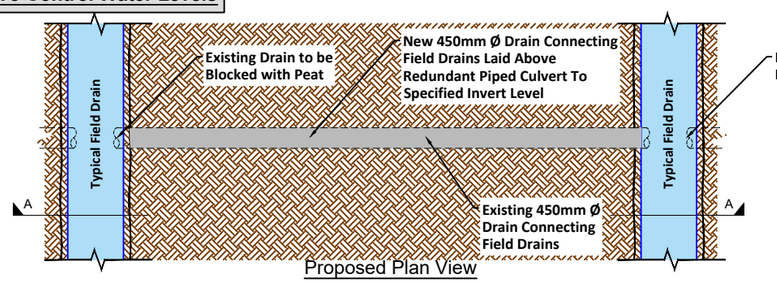


Proposed Plan View

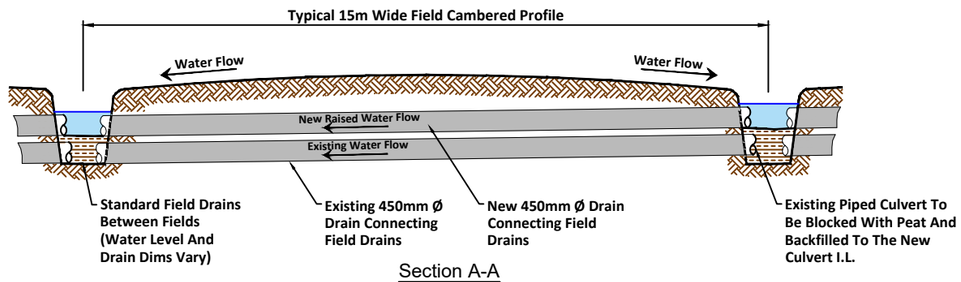


Section A-A

Raise Piped Culverts To Control Water Levels

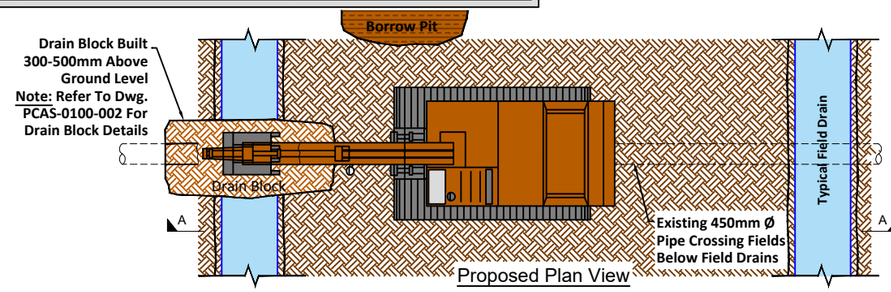


Proposed Plan View

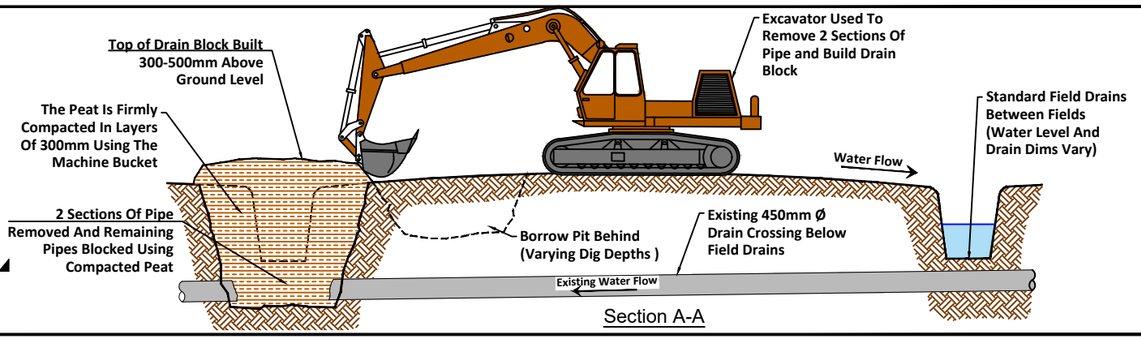


Section A-A

Blocking Of Piped Field Drain Running Below Open Field Drains



Proposed Plan View



Section A-A

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STATUS

Rev	Description	Issued By	Date
d	Piped Field Drain Block Detail Added	P.K.	12/07/21
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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Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

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: d

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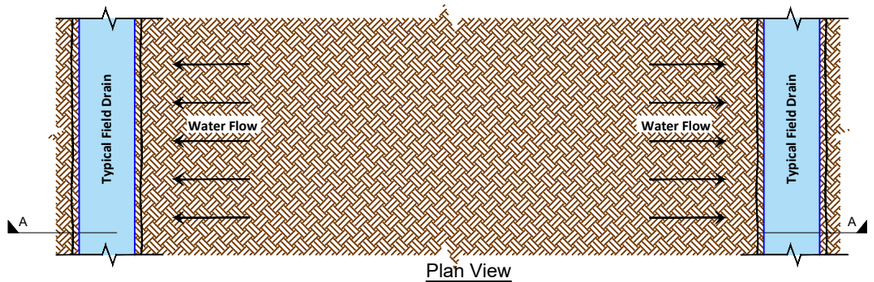
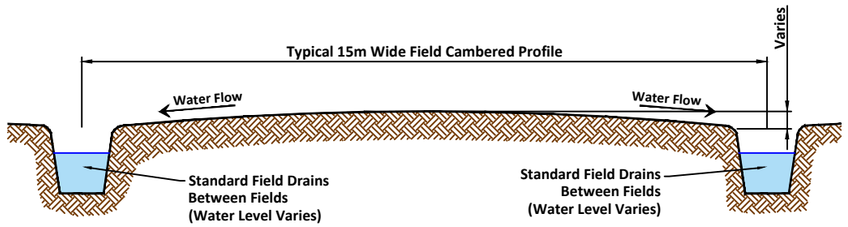
Existing Layout:

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 Cross berms is to slow the water movement through the bog.



Plan View



Section A-A
(N.T.S.)

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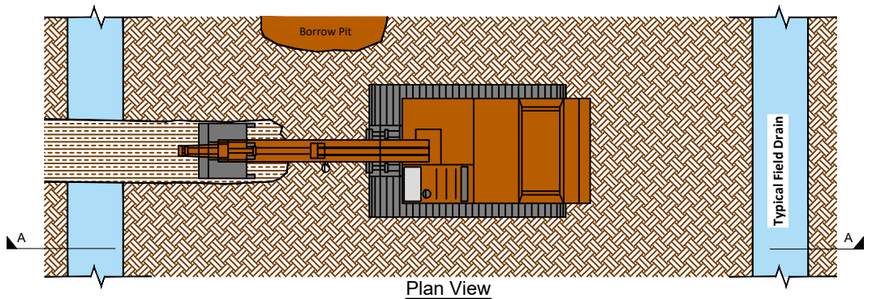
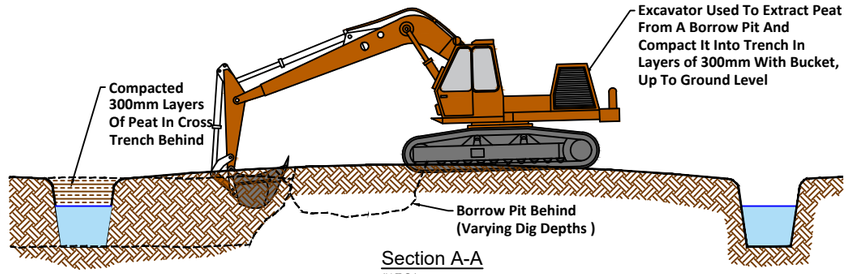
Phase 1
Forming Peat Trench

An Excavator is used to dig a trench approx. 1.2m Wide (4ft. wide excavator bucket) and up to 1.5m Deep where ground conditions allow, along the proposed location of the Berm.
If good 'clay like' ombrotrophic peat exists in trench the peat is turned over and compressed back into trench.
Area behind the machine is used as a borrow pit. Remove degraded peat and 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, until ground level is reached.
Backfill the borrow pit with the degraded peat extracted from the trench and surface of borrow pit.



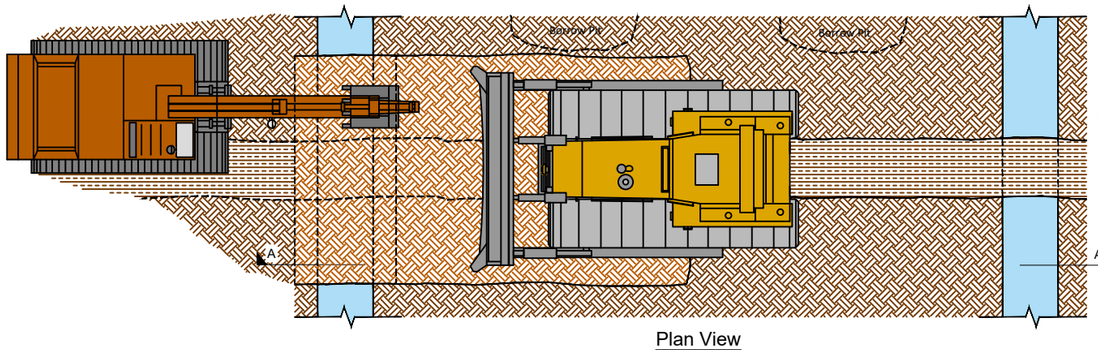
Plan View



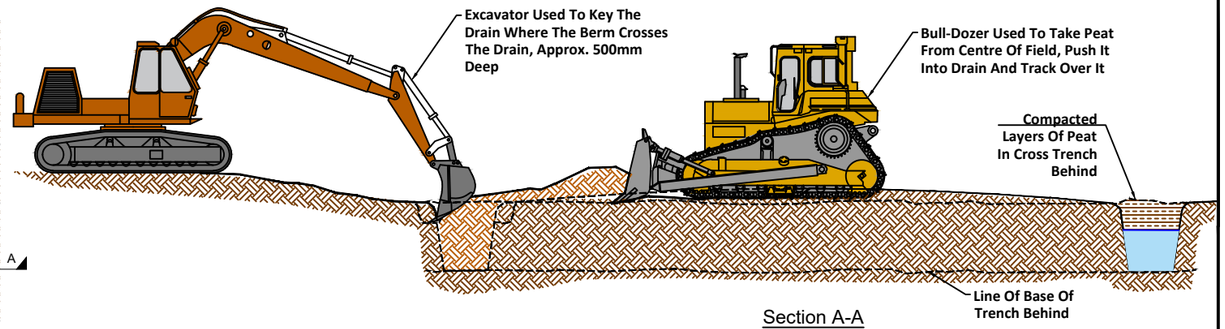
Section A-A
(N.T.S.)

Phase 2
Forming Peat 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.



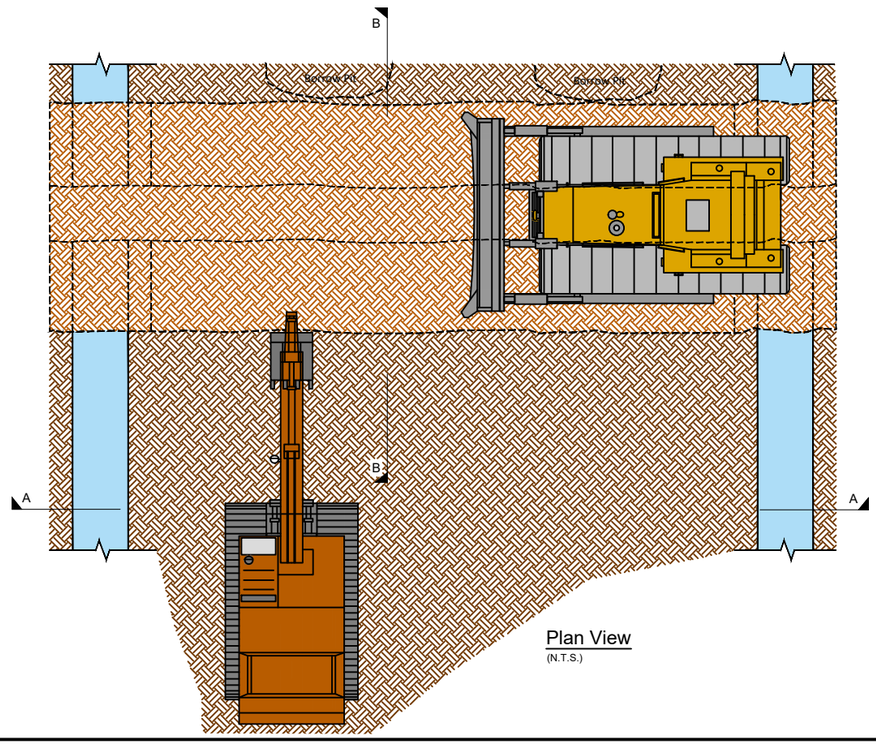
Plan View



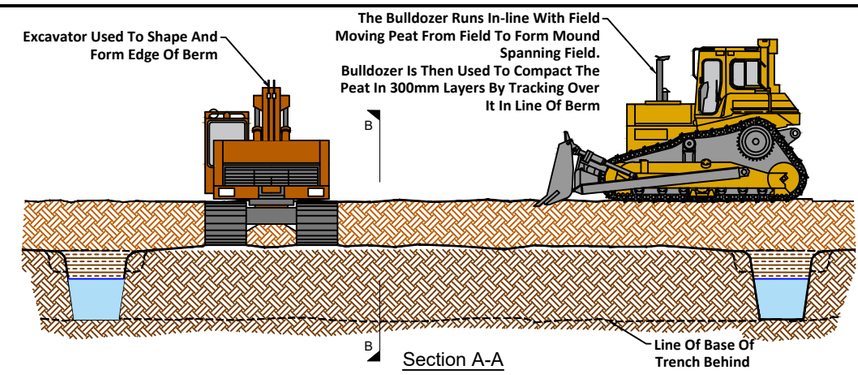
Section A-A

Phase 3
Forming Peat Berm

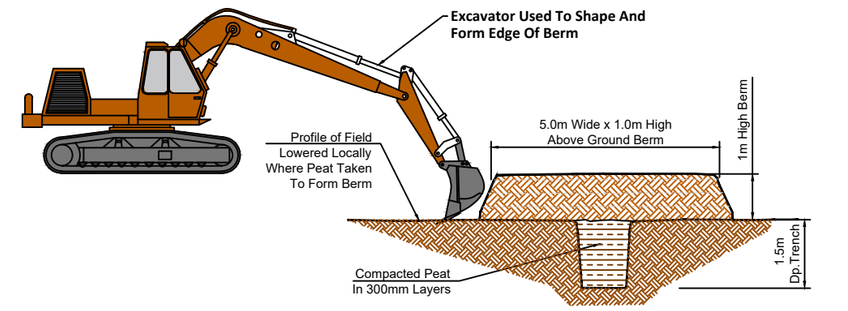
Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form an approximately 5m Wide x 1m High Cross Berm.
The peat material in the berm is compacted in layers of 300mm by the dozer tracking over it.
The excavator bucket is used to form and shape the edges of the compacted berm.



Plan View
(N.T.S.)



Section A-A



Section B-B

STATUS			
a	Issued For Approval	P.K.	12/03/21
Rev	Description	Issued By	Date

BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method
Boundary Berm

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.
Date: 28/01/21		Scale : Not to Scale	A3	Stage: For Approval
Drawing No.: PCAS-0100-015				Rev: a

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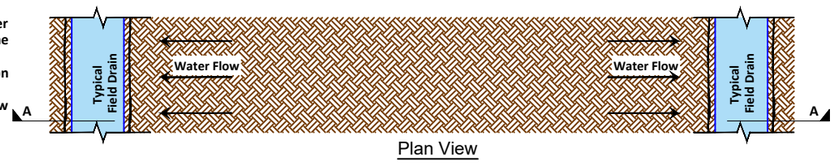
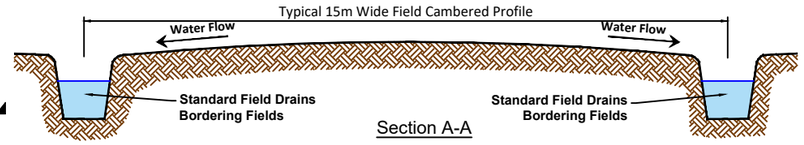
Existing Layout:

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.



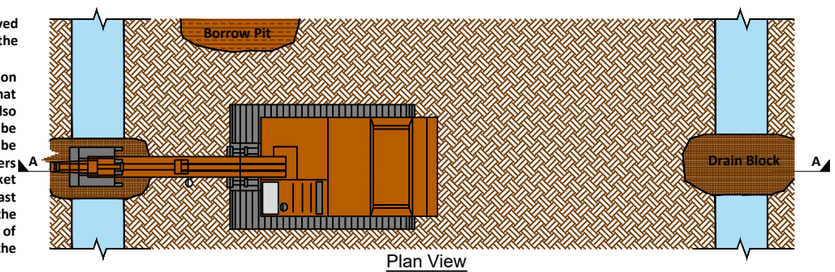
Plan View



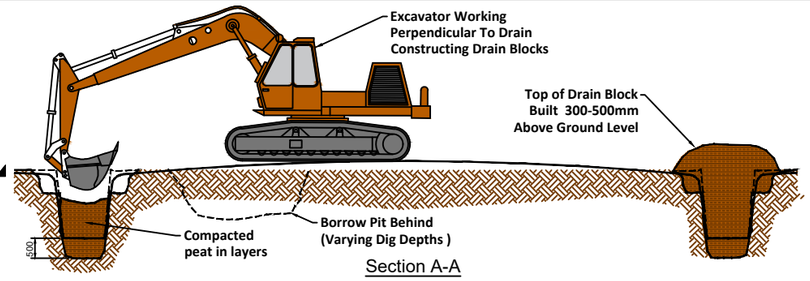
Section A-A

Phase 1
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.



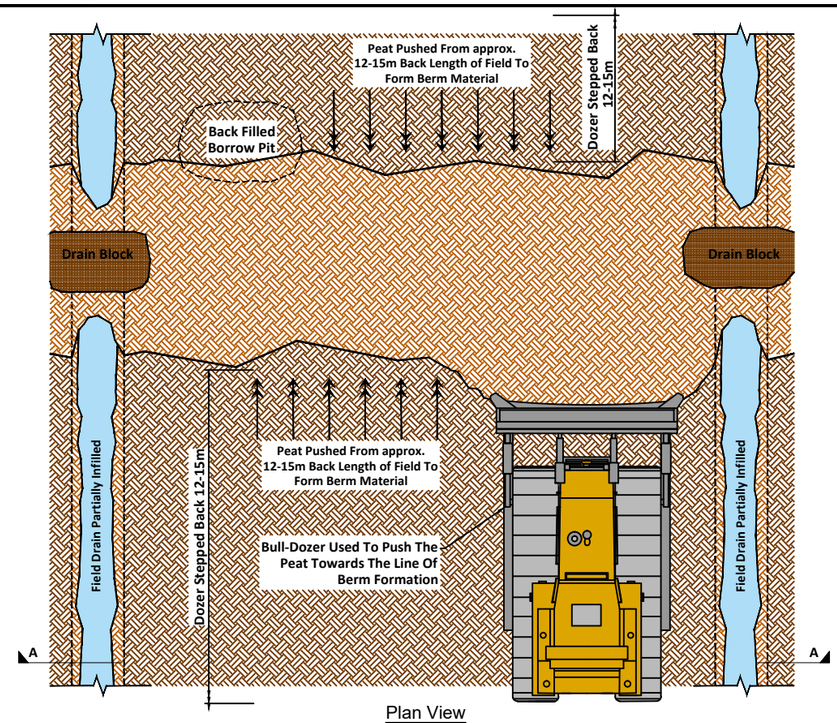
Plan View



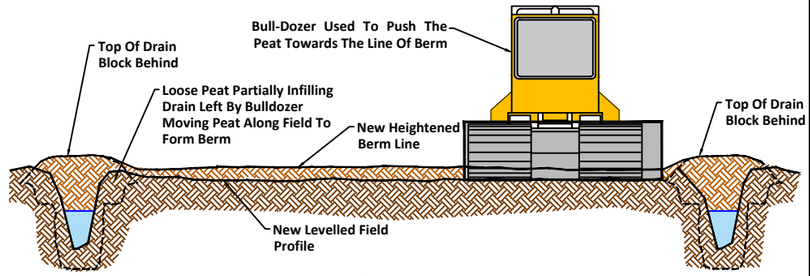
Section A-A

Phase 2
Field Re-profiling And Levelling

Next a Bull-dozer is stepped back 12 - 15m from the line of cross berm and used to take peat and move it towards the line of berm. The peat is pushed using the front bucket in line with the field to the berm location, levelling the profile of the field and removing the camber.



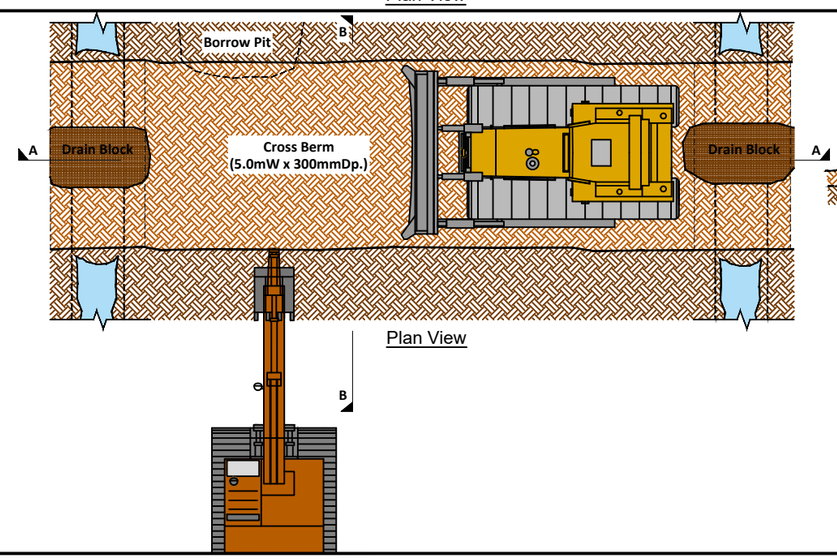
Plan View



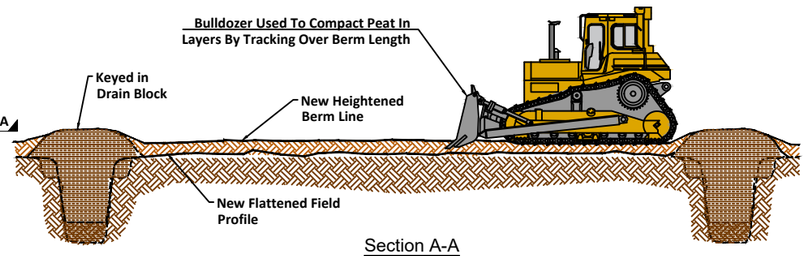
Section A-A

Phase 3
Cross Berm

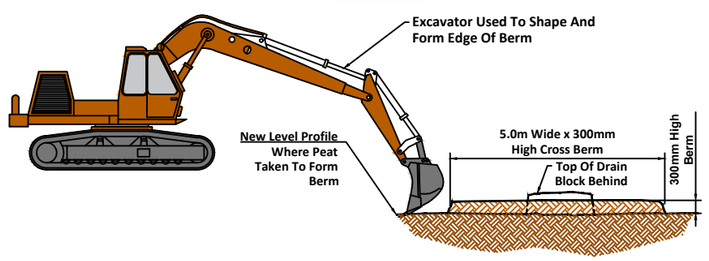
An Excavator is used to form a key(5m long) in the drain's edges where the berm crosses.
Using a Bull-dozer a strip of peat(5m wide) is taken from the central gathered peat pile, pushed into the drain and compacted by the bull-dozer tracking over the drain block.
The peat material in the berm is compacted by the dozer tracking over it in layers forming an approximately 5m Wide x 300mm High Cross Berm.
Berm edge profile is formed and shaped using the bucket of the excavator.



Plan View



Section A-A



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
00	Issued For Information	P.K.	7?/04/21

BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitaion Method DPT 4B
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: 24/03/21		Scale : Not to Scale	A3	Stage: For Approval
Drawing No.: PCAS-0100-016				Rev: 00

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