BORD NA MÓNA

Cutaway Bog Decommissioning and Rehabilitation Plan

Natura Impact Statement

Edera Bog,
Co. Longford

May 2021

Jennings O'Donovan & Partners Limited,
Consulting Engineers,
Finisklin Business Park,
Sligo.
Tel.: 071 9161416
Fax: 071 9161080
email: info@jodireland.com

JENNINGS O'DONOVAN & PARTNERS LIMITED
Project, Civil and Structural Consulting Engineers,
FINISKLIN BUSINESS PARK,
SLIGO,
IRELAND.
Telephone (071) 9161416
Fax (071) 9161080
Email info@jodireland.com
Web Site www.jodireland.com

DOCUMENT APPROVAL

PROJECT	Edera Bog, Co. Longford	
CLIENT / JOB NO	Bord Na Móna	6367
DOCUMENT TITLE	Cutaway Bog Decommissioning and Rehabilitation Plan Natura Impact Statement, Edera Bog, Co. Longford	

	Prepared by	**Reviewed by**	**Approved by**
Document **FINAL**	Name Pat Doherty	Name Dr. Monica Sullivan	Name David Kiely
Date May 2021	Signature	Signature	Signature

Contents

Table of Figures

Table of Appendices

1. SCREENING REPORT FOR APPROPRIATE ASSESSMENT

Bord na Móna have in recent years permanently ceased industrial peat production on a significant area of bog. In line with Bord na Móna's (BnM) 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 Mount Dillon Bog group (Ref. P0/504/01). As part of the condition 10.2 of the IPC license, decommissioning and rehabilitation of cutaway boglands is required. Edera bog, located within the above group, is also to be subject to the above referenced improvements as part of a scheme titled the Peatland Climate Action Scheme (hereafter PCAS). The pertinent detail per BnM bog for both requirements under IPC license condition 10.2 and the proposed PCAS is described in a decommissioning and rehabilitation plan (hereafter 'plan' or 'the plan'), as required under Condition 10.2 of the respective IPC license. It is this plan which forms the subject of the appraisal herein.

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

The enhanced decommissioning to be carried out on the bogs as part of the PCAS includes typically the lifting of rail line, removal of pump sites, removal of buildings (generally porto-cabins) and removal of level crossings.

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

1.1 Appropriate Assessment Process

Under Article 6(3) of the Habitats Directive, an Appropriate Assessment of the implications of any plan or project on a European Site is required before a project is approved. This must include all the aspects of the plan or project which can, either individually or in combination with other plans or projects, affect the conservation objectives of that European Site, in the light of the best scientific knowledge in the field.

The competent national authorities are to authorise a plan, project or activity only if they have made certain that it will not adversely affect the integrity of any European Site.

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

1.1.1 Stages of the Appropriate Assessment Process

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

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

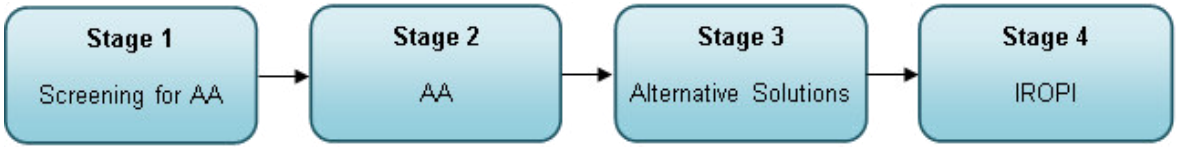


Figure 1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DEHLG, 2009).

1.1.1.1 Stage 1 - Screening for AA

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

1.1.1.2 Stage 2 – Appropriate Assessment

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

1.1.1.3 Stage 3 - Alternative Solutions

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

1.1.1.4 Stage 4 - IROPI

Assessment where no alternative solutions exist and where adverse impacts remain: Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory

measures will or will not effectively offset the damage to the European site will be necessary. European case law highlights that consideration must be given to alternatives outside the project area in carrying out the IROPI test. It is a rigorous test which projects are generally considered unlikely to pass. In any event, the proponent does not purport to place any reliance on Stage 4.

1.2 Statement of Authority

The examination of the impacts to European Sites by the proposed PCAS at Edera Bog has been prepared by Mr. Pat Doherty MSc, MCIEEM, of DEC Ltd. Mr. Doherty is a consultant ecologist with over 17 years' experience in completing ecological impact assessments and environmental impact assessments. Pat has been involved in the completion of assessment reports for proposed developments and land use activities under Article 6 of the Habitats Directive since 2007. He has completed screening reports for Appropriate Assessment and Natura Impact Statement for a wide variety of development and land use activity projects and plans. He has extensive experience completing such reporting for projects located in peatland environments and has a thorough understanding to the issues that may arise from proposed land use activities within such environments. Pat has completed focused certified professional development training in a range of ecological survey techniques and assessment processes. Training has been completed for National Vegetation Classification (NVC) and Irish Vegetation Classification (IVC) surveying, bryophyte survey for habitat assessment and identification, professional bat survey and assessment training, mammal surveying and specific training for bird surveys for wind farm developments. Training has been completed by approved training providers such as CIEEM, British Trust for Ornithology and the Field Studies Council.

Monica Sullivan has a PhD in Environmental Sciences, from Trinity College and is also registered as a Full member of the Chartered Institute of Ecology and the Environment (MCIEEM). She is Principal Environmental Scientist and Lead Ecologist in Jennings O'Donovan and has over 35 years' experience in the Natural Sciences. She has lectured since the mid 1990's – 2017 in invertebrate zoology, ecology and environmental pollution control to both masters and degree students. She was the Freshwater Biology Module examiner for the Institute of Fisheries Management, England. Monica's experience includes Invasive Species surveys, Management Plans, Ecological Surveys, EIA Screenings, Appropriate Assessment screenings (AA), Natura Impact Statements (NIS), otter, badger, freshwater macroinvertebrate and instream flora surveys.

Qualified to doctorate level, Monica previously worked as a partner in an environmental consultancy, undertaking fieldwork and specialising in Environmental Assessments of medium to large scale infrastructural projects and the coordination and management of AA, NIS and Environmental Impact Assessment (EIA) processes. She is currently working on the production and quality control of several hundred forestry licencing AA/NIS applications. She has a clear understanding of the legislative framework governing the extent of environmental investigations, assessments and reports required to secure the necessary approvals on all types of projects. Dr. Sullivan was author and researcher on an Environmental Government Program on Invasive Species. She is chief author of a chapter in the book Zebra Mussels in Europe and has published many papers on the topic. She spent several years working

as both English and Scientific editor for international scientific journals. In 2017, she was expert advisor for 'horizon scan' invasive species workshop.

1.3 Guidelines; Project Approach & Baseline Context

1.3.1 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.
- *Edera Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2021* (2021) as prepared by BnM – 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.

1.3.2 Desktop Review

The Biodiversity baseline information presented in this Appropriate Assessment reporting was collated from site investigations and field surveys, along with publicly available online resources including from the National Biodiversity Data Centre (NBDC), BirdWatch Ireland and their IWeBS dataset and the National Parks and Wildlife Service (NPWS) online webpage, which are regularly updated.

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 Edera Bog were obtained from the four tetrads (i.e. 2km grid squares): N15D; N05Y; N15E; N05Z. These records are provided in Table 1 below.

Table 1: Special conservation interest bird species; Waterbirds; & Annex 2 species Recorded in Tetrad N15D; N05Y; N15E;N05Z

Tetrad	Species Group	Species
N15D; N05Z	SCI Bird Species; Waterbird	Black-headed Gull (*Larus ridibundus*)
N15D	SCI Bird Species; Waterbird	Common Kingfisher (*Alcedo atthis*)
N15D	SCI Bird Species; Waterbird	Herring Gull (*Larus argentatus*)
N05Z	SCI Bird Species; Waterbird	Common Redshank (*Tringa totanus*)

Tetrad	Species Group	Species
N05Z	SCI Bird Species; Waterbird	Grey Heron (*Ardea cinerea*)
N05Z	SCI Bird Species; Waterbird	Little Grebe (*Tachybaptus ruficollis*)
N05Z	SCI Bird Species; Waterbird	Mallard (*Anas platyrhynchos*)
N05Z	SCI Bird Species; Waterbird	Mute Swan (*Cygnus olor*)
N05Z	SCI Bird Species; Waterbird	Northern Lapwing (*Vanellus vanellus*)
N05Z	SCI Bird Species; Waterbird	Tufted Duck (*Aythya fuligula*)
N15E	Annex 2 species	European Otter (*Lutra lutra*)
N15D; N05Z	Annex 2 species	Marsh Fritillary (*Euphydryas aurinia*)

BirdWatch Ireland IWeBS data for 2018/2019 overwintering season has been reviewed. The Lough Ree SPA IWeBS subsites that occur in the vicinity of Edera Bog are subsites 0F033 and 0F034. Table 2 below lists the waterbirds recorded in these subsites during the 2018/2019 overwintering season.

Table 2: IWeBS 2018/2019 Survey Results for Subsites 0F033 and 0F034 of Lough Ree

SubSite Code	Subsite	Species	Sp_Latin	1% National	1% International	Nov	Jan	Mar
0F033	Annagh	Mute Swan	*Cygnus olor*	90	100	13	2	1
0F033	Annagh	Teal	*Anas crecca*	360	5000	6		
0F033	Annagh	Mallard	*Anas platyrhynchos*	280	53000	17		
0F033	Annagh	Tufted Duck	*Aythya fuligula*	270	8900	650		1
0F033	Annagh	Little Grebe	*Tachybaptus ruficollis*	20	4700		1	1
0F033	Annagh	Great Crested Grebe	*Podiceps cristatus*	30	6300	2		
0F033	Annagh	Cormorant	*Phalacrocorax carbo*	110	1200	1		
0F033	Annagh	Grey Heron	*Ardea cinerea*	25	5000	2		
0F033	Annagh	Moorhen	*Gallinula chloropus*				2	
0F033	Annagh	Coot	*Fulica atra*	190	15500	1	3	
0F033	Annagh	Lapwing	*Vanellus vanellus*	850	72300	60		
0F033	Annagh	Black-headed Gull	*Chroicocephalus ridibundus*			1		5
0F034	Saints Island	Mute Swan	*Cygnus olor*	90	100	4		
0F034	Saints Island	Mallard	*Anas platyrhynchos*	280	53000	6		
0F034	Saints Island	Great Crested Grebe	*Podiceps cristatus*	30	6300	2		
0F034	Saints Island	Little Egret	*Egretta garzetta*	20	1100	1		
0F034	Saints Island	Coot	*Fulica atra*	190	15500	2		
0F034	Saints Island	Golden Plover	*Pluvialis apricaria*	920	9300	900		
0F034	Saints Island	Lapwing	*Vanellus vanellus*	850	72300	750		

1.3.3 Baseline Surveys

1.3.3.1 Habitats & Fauna

The information contained herein is based on a range of baseline surveys which have been completed at Edera Bog by Bord na Mona and also Jennings O'Donovan and Partners Limited. As part of the formulation of the Edera Bog Rehabilitation Plan ecological field surveys were completed between 2012 and 2019. Prior BnM Surveys were completed on the following dates: 13th July 2012; December 2013; March 2015 and January 2019.

Surveys to inform the current Appropriate Assessment reporting were carried out on 9th January 2021; 26th February 2021 and 5th March 2021.

Weather conditions during the three surveys were ideal, with light winds, low cloud cover, sunny and dry conditions prevailing.

The 2012 to 2019 surveys were based on an Extended Phase 1 Habitat Survey which involved walking the bog, identifying and mapping habitats, recording bird species of note and recording all signs of non-volant protected mammals as encountered during the survey.

The field surveys completed in 2021 involved a transect survey using the methods applied to the Countryside Bird Survey and the English Winter Bird Survey. Focus during the transect surveys was given to recording the presence of special conservation interest bird species of Lough Ree SPA and other waterbirds. A continuous transect was walked through Edera Bog and all waterbirds seen and heard along the transect route were recorded. Regular stops were made along the transect to scan the bog using binoculars. Given the flat topography of the bog waterbirds were recorded up and in excess of 300m of the transect route. The transect was routed so that the Bilberry River and the six silt ponds at Edera Bog were visited along the transect so that these aquatic habitats could be surveyed for the presence of waterbirds.

The 2021 surveys also involved a survey of all silt ponds on site and the stretch of the Bilberry River flowing through Edera Bog for the presence of otter field signs. These field signs, as described in Neal & Cheeseman (1996) and Bang & Dahlstrom (2006), include:

- mammal breeding and resting places, such as setts, holts, lairs
- pathways
- prints
- faecal deposits
- latrines (and dung pits used as territorial markers)
- feeding signs (snuffle holes)
- hair
- scratch marks

Habitats were identified and mapped during the 2012 – 2019 field surveys and a detailed description of the field survey results is provided as Appendix F Ecological Survey Report to the Edera Rehabilitation

Plan 2021. Figure 6 below provides a habitat map of Edera Bog. Following the completion of these surveys the most common habitats present at Edera Bog identified as:

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

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

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

The eastern extent of the Edera Bog is located within the boundary of the Lough Ree SAC. Approximately 6.51 Ha of Edera Bog are located within the SAC boundary (see Figure 2). This SAC is designated for a range of Annex 1 habitats including eutrophic lakes, orchid-rich calcareous grassland, active raised bog, degraded raised bog, alkaline fens, limestone pavement, bog woodland and alluvial woodland, Field surveys at Edera Bog have confirmed that, with the exception of degraded raised bog, no examples of these Annex 1 habitats of the SAC occur within the footprint of Edera Bog. Figure 2 shows the extent of degraded raised bog occurring within Edera Bog. The extent of degraded raised bog shown on Figure 2 is derived from from field surveys and modelling as per the methods detailed in Mackin et al. (2017b) and NPWS (2017). The total area of degraded raised bog within Edera Bog shown in Figure 2 amounts to approximately 1.4 Ha. The total area of degraded raised bog occurring within the Lough Ree SAC boundary, as shown on Figure 2 amounts to approximately 0.09 Ha. The other habitats of Edera Bog occurring within the SAC are representative of non-Annex 1 improved agricultural grassland and scrub woodland habitat - both of which do not correspond to the qualifying grassland or woodland habitats of the SAC as listed above. The extent of these habitats in the "overlap area" as shown on Figure 2 is derived from Bord Na Móna habitat mapping digital data. .

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

- Fox
- Badger
- Mink
- Pine Marten
- Otter

The identification of otter on site is of note for this screening exercise given that it is a qualifying feature of interest of the Lough Ree SAC. Within the boundary of Edera Bog the onsite silt ponds (as well as the Bilberry River) represent suitable habitat for supporting otters and their holts and couches. During the 2021 surveys at Edera Bog each of the silt ponds on site were surveyed for the presence of otter.

holts and couches as well as field signs indicating the presence of otters. The margins of the Bilberry River flowing through the site were also surveyed. No holts or couches were identified along the Bilberry River or at any of the six silt ponds. An otter spraint was identified during the March 2021 survey on a prominent rock at the southern end of the silt pond ED105. The location of the otter spraint is shown on Figure 3 while an image of the spraint is provided as Plate 1.

Plate 1: Otter Spraint (shown in black) on prominent rock (see Figure 3 for location)

1.3.3.2 Birds

The results of the surveys completed during the over-wintering season between 2013 and 2021 are relevant to this screening exercise given that Edera Bog overlaps Lough Ree SPA, which is designated for its role in supporting a range of over-wintering species. The eastern extent of the SPA overlaps the Edera Bog. Approximately 3.45 Ha of Edera Bog are located within the SPA (see Figure 2). During the surveys between 2013 and 2019, all of which were all completed during the over-wintering bird season, Edera Bog was not identified as a site upon which wetland birds relied. Water rail was the only wetland bird species identified at the site during these surveys. The presence of Marsh Harrier was identified during one of these surveys.

During the January 2021 survey the following waterbirds were recorded (numbers in parenthesis): Mallard (4), Snipe (10); Coot (2) and Water Rail (2).

During the February 2021 survey the following wetland bird species (numbers in parenthesis) were recorded both within and outside Edera Bog: Snipe (29); Mallard (2); Mute Swan (3); Heron (6); Tufted Duck (6); Coot (2); Little Grebe (2); Whooper Swan (4); and Water Rail (1).
Note: Tufted Duck was only recorded within the adjacent SPA.

During the March 2021 survey the following wetland bird species (numbers in parenthesis) were recorded: snipe (12); Mallard (2); Mute Swan (2); Coot (2); Water Rail (2).

The locations of bird observations from the above surveys are presented in Figure 4.

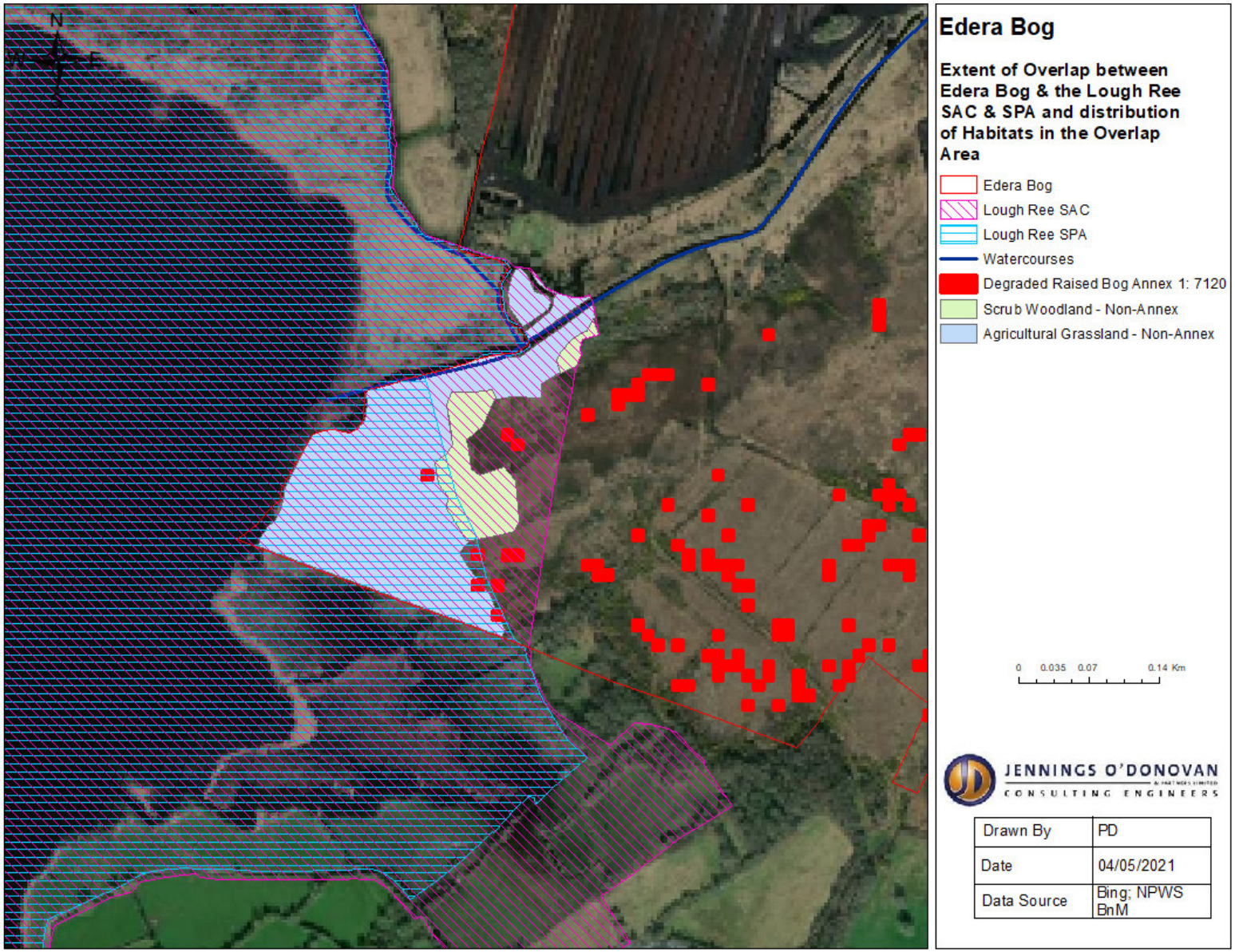


Figure 2: Extent of Overlap between Edera Bog & the Lough Ree SAC & SPA and distribution of Habitats in the Overlap Area

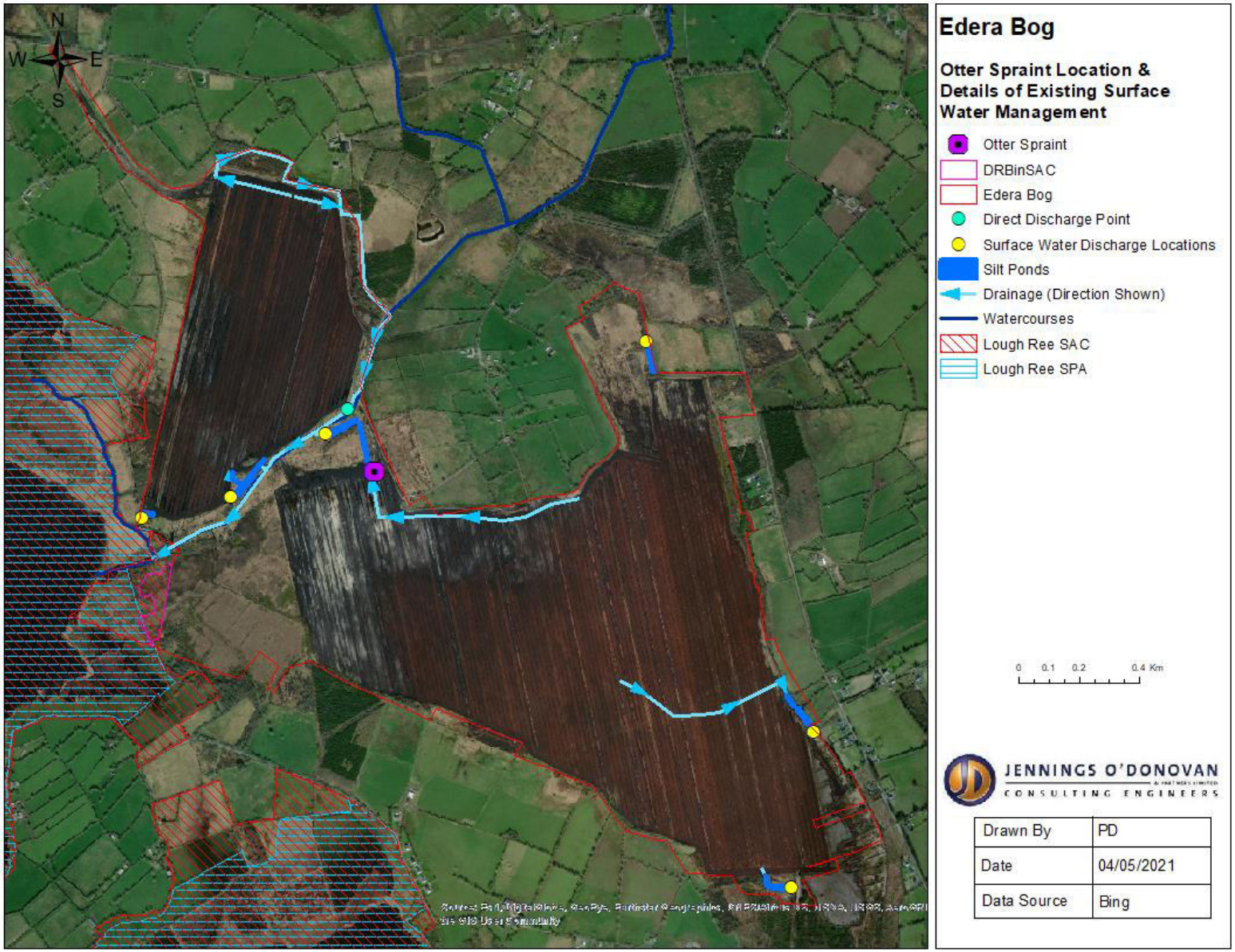


Figure 3: Otter Spraint Location & Details of Existing Surface Water Management

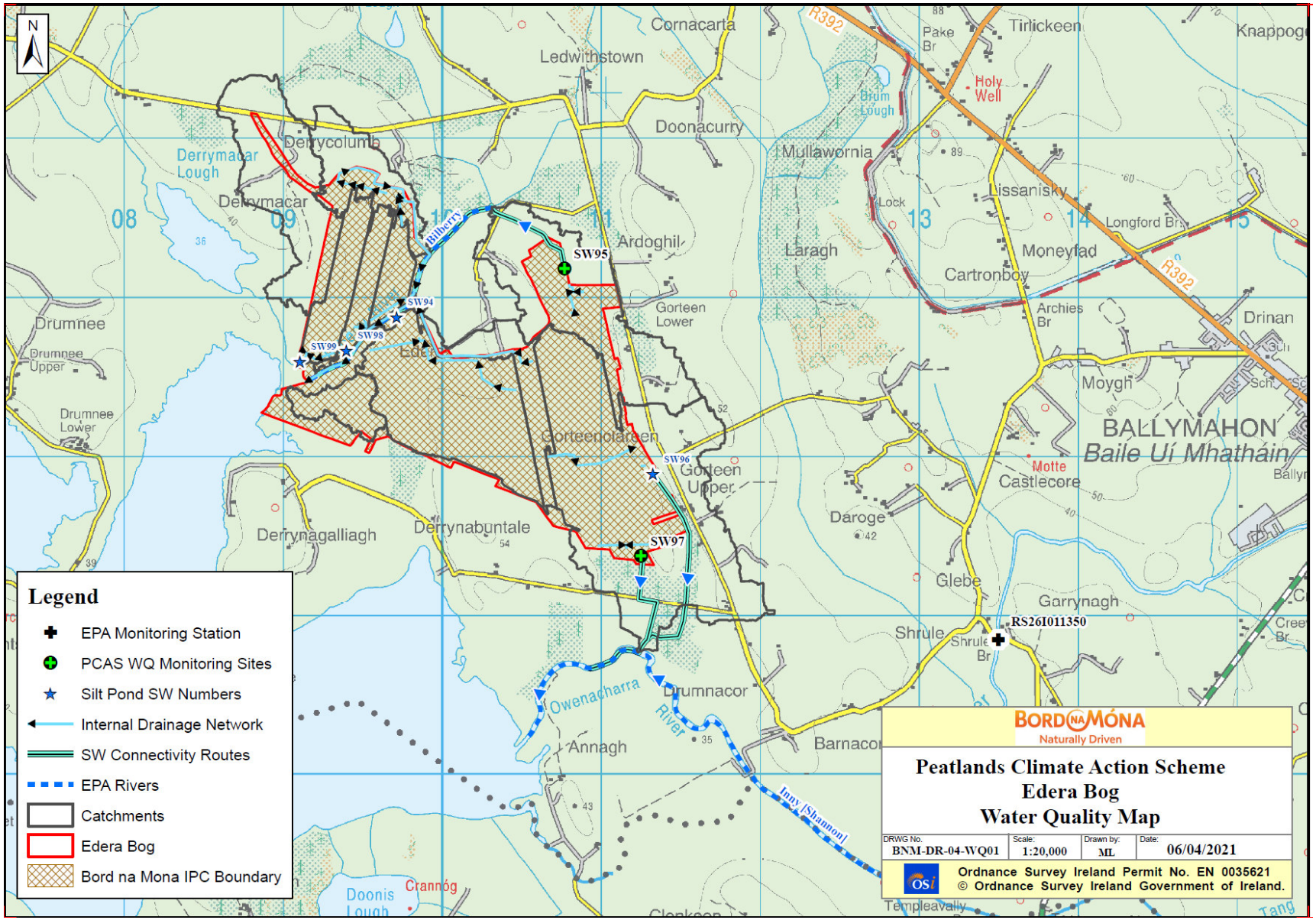


Figure 3a: Location of SW Monitoring Points

Figure 4: 2021 Winter Bird Survey Results

1.3.4 Baseline Water Quality

Edera Bog is located in the Shannon catchment and straddles the Bilberry_SC_010 and Shannon (Upper)_SC_090 sub-catchments. The primary drainage receptor for surface water arising at Edera Bog drain is to the Bilberry River which discharges to Lough Ree a short distance (approximately 200m) downstream from Edera Bog. Surface water also discharges to the River Inny to the southeast of Edera Bog. The River Inny flows into Lough Ree to the south of the project site.

No water quality data is provided by the EPA for the Bilberry River. EPA water quality data for the Inny River, downstream of Edera Bog, at the Red Bridge monitoring station, has resulted in a finding of Good water quality status.

The most recent EPA water quality monitoring results of Lough Ree (2010 – 2015) have assigned a rating of moderate ecological status for this lake. The EPA catchment report for Lough Ree identified urban wastewater treatment plants as a significant pressure to the lake.

1.3.4.1 Edera Bog Surface Water Management

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

There are six silt ponds at Edera Bog, with three located around the eastern periphery of the site and three located in the centre (see Figure 3 for location). The silt ponds are inspected and maintained in accordance with the respective licence. Edera bog surface water outlets discharge to the Ledwithstown IE_SH_26L840850 waterbody via the Bilberry River which is a sub catchment and the main receiving waterbody of Edera Bog. This waterbody is currently unassigned with **no biological or chemistry monitoring data available**, but peat extraction is identified as pressure in the second cycle of the river basin management plan but is not indicated as remaining so in the third cycle, currently under preparation.

Other silt ponds drain to the east and south to the River Inny IE_SH_26I011400, and while this water body is listed as a peat pressure waterbody in the second cycle of the river basin management plan and is indicated as remaining so in the third cycle, currently under consideration, the section under pressure is in the upper reaches above Lough Derravarragh.

In addition to the silt pond discharge points there is one other additional discharge point that drains directly to the Bilberry River. The location of this discharge point is shown on Figure 3 above.

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

An analysis of monitoring over the past 5 years of the IPC licence environmental monitoring at discharge points from this bog indicate that results were under the ELV for suspended solids (SS) and trigger level

for total phosphorous (TP), ammonia and chemical oxygen demand (COD). See Table 3 below. The location of the surface water (SW) monitoring points listed in Table 3 are shown on Figure 3a above.

Table 3: EPA monitoring data for the previous five-years in relation to Edera Bog

Bog	SW	Monitoring	Sampled	pH	SS	TS	Ammonia	TP	COD	Colour
Edera	SW-97	Aug-20	18/08/2020	6.9	<2	189	0.473	<.05	91	416
Edera	SW-95	Sep-20	19/08/2020	7.3	2	293	0.209	<.05	78	393
Edera	SW-95	Q1 20	24/03/2020	8.1	2	371	0.064	<.05	17	50.7
Edera	SW-96	Q1 20	24/03/2020	8.3	5	284	0.075	<.05	54	202
Edera	SW-97	Q1 20	24/03/2020	7.9	2	268	0.085	<.05	20	51.3
Edera	SW-98	Q1 20	24/03/2020	7.8	2	343	0.213	<.05	41	157
Edera	SW-99	Q1 20	24/03/2020	8.2	6	376	0.067	0.1	39	119
Edera	SW-94	Q3 17	14/08/2017	8	9	399	0.1	<.05	36	77
Edera	SW-95	Q3 17	14/08/2017	7.7	8	286	0.37	0.1	41	155
Edera	SW-96	Q3 17	14/08/2017	7.9	5	318	0.17	<.05	41	108
Edera	SW-97	Q3 17	14/08/2017	7.8	5	316	0.02	0.07	28	72
Edera	SW-98	Q3 17	14/08/2017	8.1	10	354	0.09	<.05	34	66
Edera	SW-99	Q3 17	14/08/2017	8	5	380	0.02	<.05	17	32
Edera	SW-95	Q3 16	12/09/2016	7.1	5	154	0.09	<.05	97	315
Edera	SW-96	Q3 16	12/09/2016	7.5	5	216	0.03	0.09	63	121
Edera	SW-97	Q3 16	12/09/2016	7.6	5	250	0.14	0.07	64	122

It is noted that the ELV and trigger levels assigned under the IPC licence and higher than the limits assigned by the NPWS for aquatic habitats. For instance, the NPWS have assigned the following annual average concentrations for TP and ammonia in the natural eutrophic lake habitat of the Lough Ree SAC, which occurs approximately 200m downstream of Edera Bog, at <20ug/l and <0.065mg/l N. No limit has been assigned by the NPWS for SS.

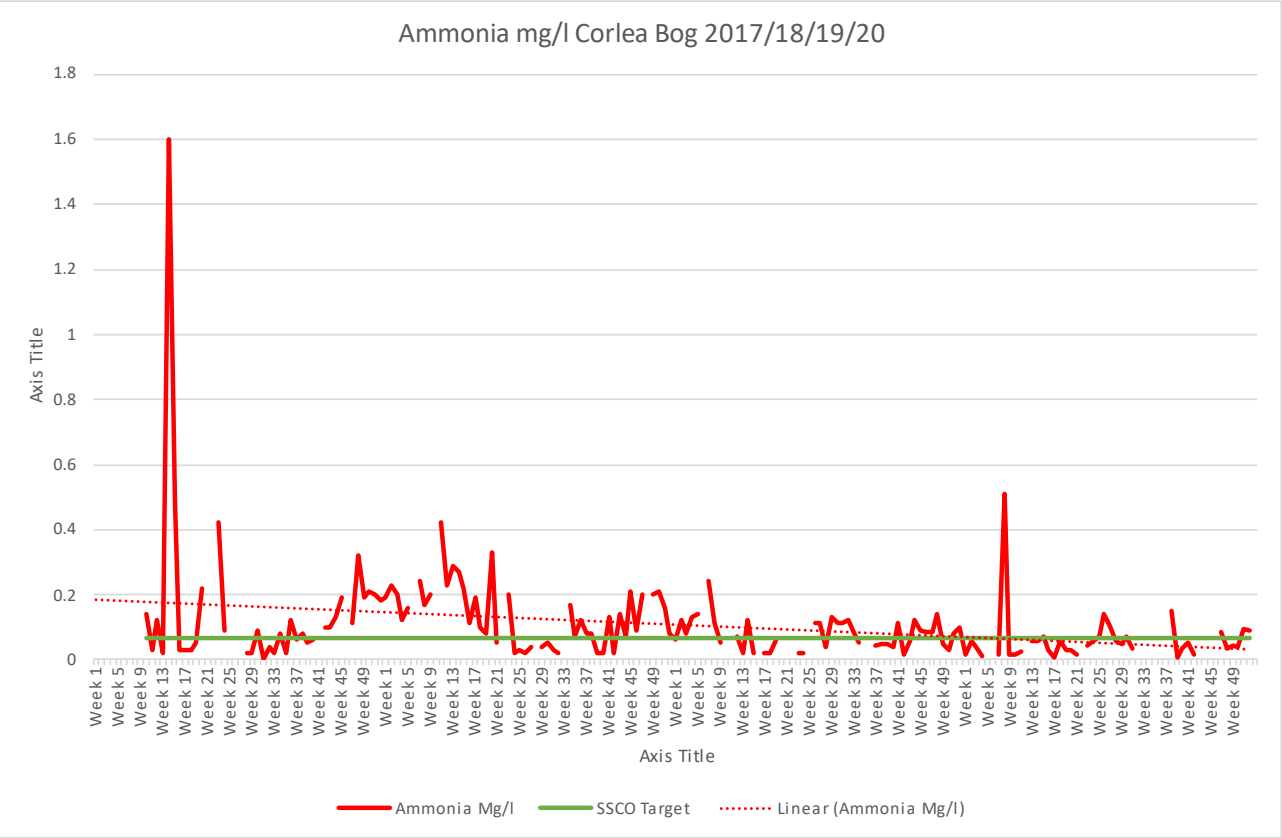
IPC water quality monitoring at Edera Bog has recorded TP and ammonia above the NPWS limits set for natural eutrophic lake habitat. However, this monitoring coincides with the recent cessation of peat production activity at Edera Bog in 2019.

It is expected that following the implementation of the PCAS at Edera 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 below the NPWS limits.

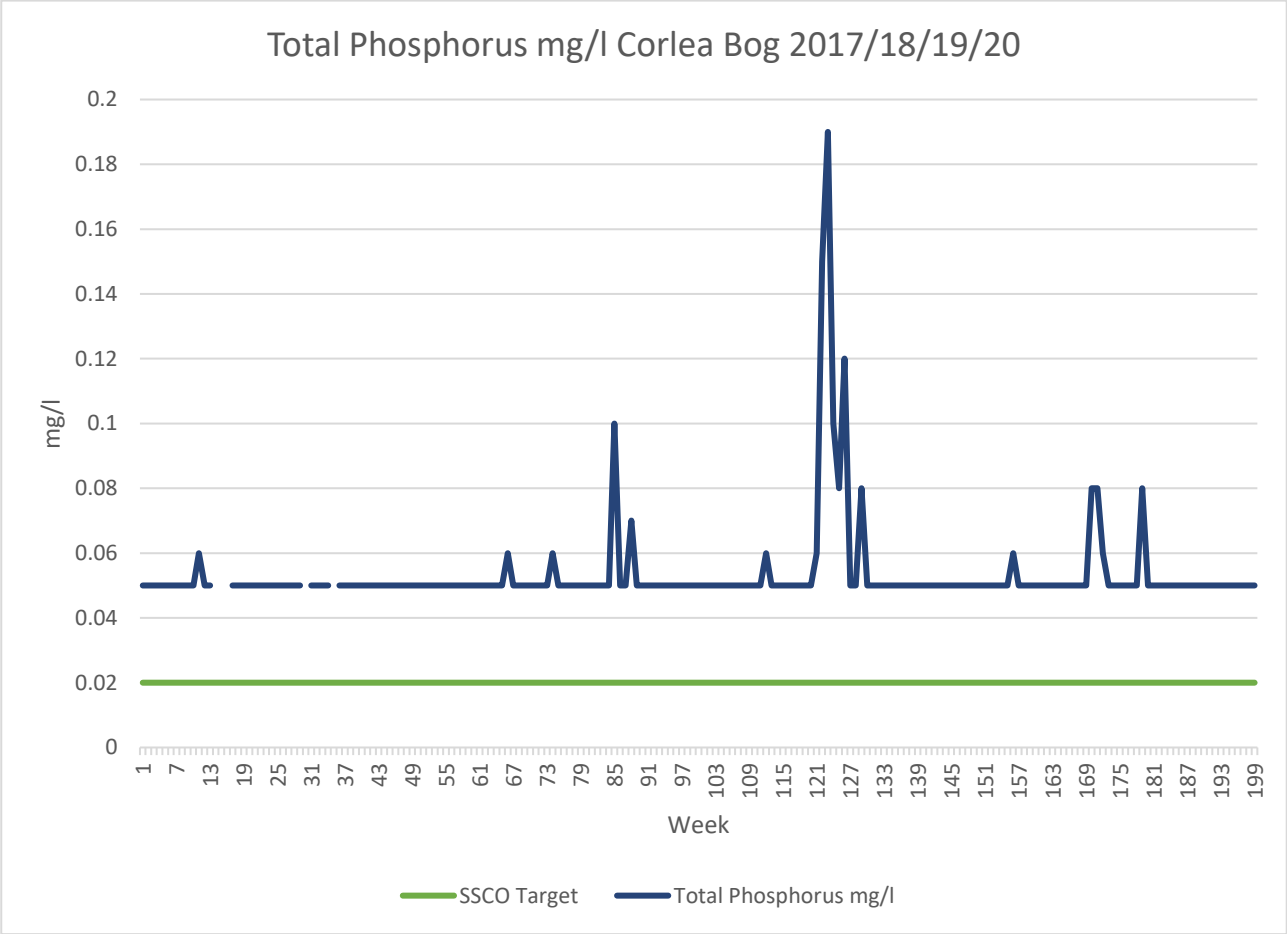
This projection is supported by water quality monitoring of 2 other similar raised bogs (Longfordpass Bog and Corlea Bog) that were previously subject to industrial peat extraction and that have since been subject to peatland rehabilitation. Graph 1 below shows the downward trend for ammonia at Corlea Bog, which is also located within Bilberry _SC_010 sub-catchment, approximately 2.5km north of Edera Bog. 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 below the NPWS 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 3 above are from onsite silt ponds. The water from the silt pond discharges to the Bilberry River and the Inny River. Water quality in the receiving Inny waters is reported to be of 'Good' status, indicating that the waters discharging from the silt pond to the River Inny is not undermining its water quality status. The waters discharging from the silt ponds are diluted within the Bilberry River and the River Inny and are further diluted and assimilated within Lough Ree.



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

1.3.5 Air Emissions Monitoring

The IPC licence for Edera Bog sets an ELV of 350mg/m2/day for dust emissions from Edera Bog. Dust monitoring results during 2019, which was the last year of industrial peat extraction at Edera Bog consistently recorded levels below the ELV. Dust is the only aerial emission that requires to be monitored under the IPC licence. Works associated with industrial peat extraction and with peatland rehabilitation do not represent a source of any other aerial emission that could result in negative environmental effects.

The works associated with the PCAS will represent a minimal level of activity on site when compared to industrial peat extraction. For instance, during production operations the bog surface is milled and harrowed a number of times. The milled and harrowed peat is then ridged and harvested into the adjoining field. Production activity in any typical year amount to 12 harvests with all activities carried out using tractors and associated attachments. Dust arises from these production operations, associated tractor traffic along fields and headlands and peat stockpiles.

During PCAS there will be a minimal number of machines in operation, the operations will not require the milling or harrowing of peat and there will be no stockpiling of peat on the bog. Given these changes and the low levels of dust generated during production, it can be assumed with a high degree of confidence that the works associated with PCAS rehabilitation prescriptions will generate negligible levels of dust and will not have the potential to result in any perceptible dust emissions to air.

No other aerial emissions are associated with the works required for the implementation of the PCAS rehabilitation prescriptions.

1.4 Certainty and Sufficiency of Data Provided

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

In addition, where required, or possible, specific data requests have been made to NPWS via the online data request facility, specifically with regards to records of sensitive species; and, to BirdWatch Ireland in respect of the results of IWeBS surveys, which are available upon request.

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

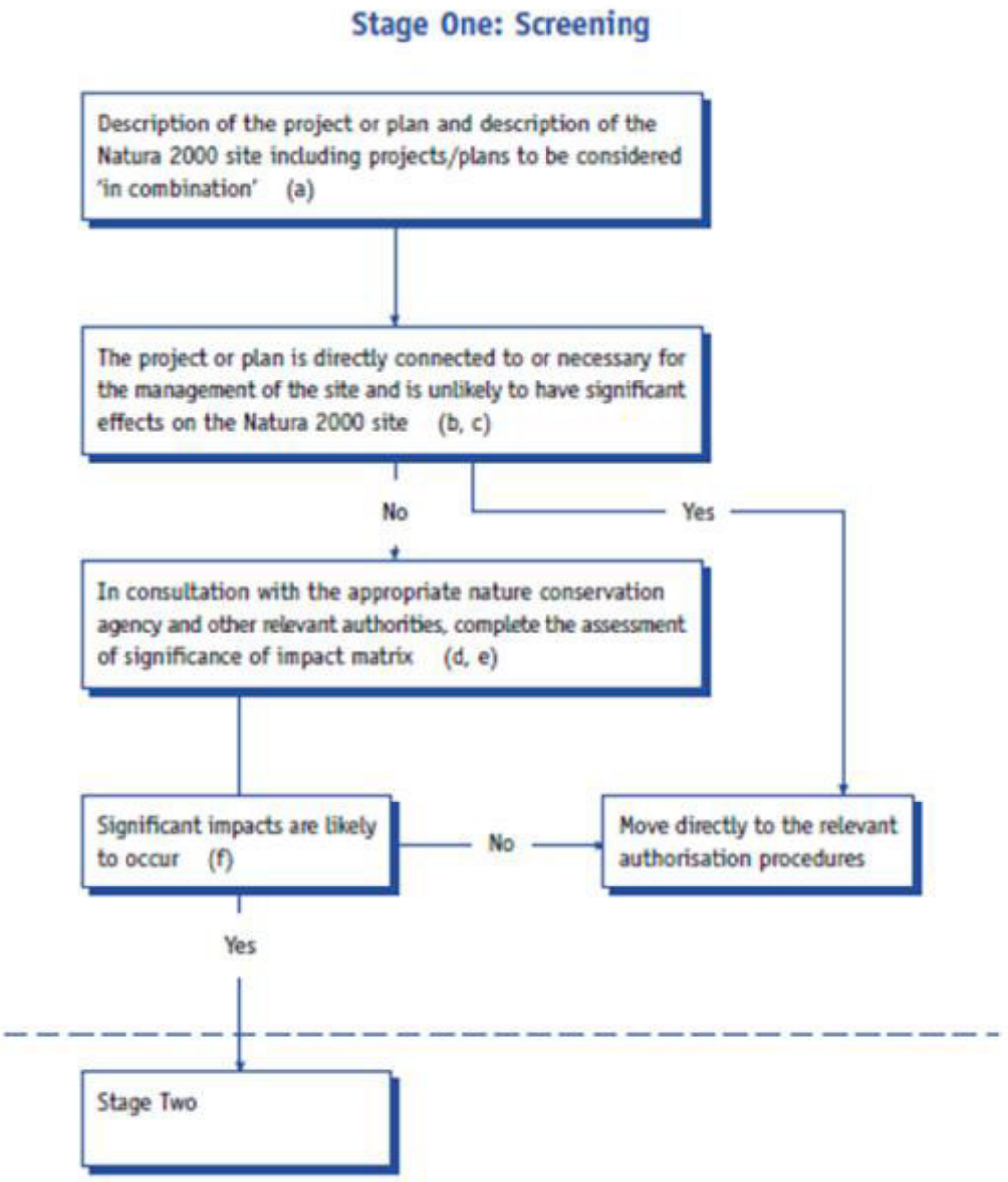
For the avoidance of doubt due regard has been given to the passage of time & any changes to the baseline environment in the interim period were considered by a suitably qualified ecologist; visits to inform the current appraisal were used as ground-truthing exercises to confirm the relevance or not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

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

2. STAGE 1: SCREENING

2.1 Screening Evaluation Process

The Screening process examines the likely effects of the described Edera 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:



2.2 Overview of Edera Bog Decommissioning and Rehabilitation

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Mount Dillon bog group (Ref. P0504-01). As part of Conditions 10.1 and 10.2 of this licence, respectively, decommissioning and rehabilitation must be undertaken to ensure the permanent rehabilitation of the cutaway bog lands within the licensed area. Edera bog is part of the Mount Dillon bog group. Edera Bog is located in Co. Longford.

A document titled '*Edera Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2021'* has been prepared specifically to describe the proposed decommissioning and rehabilitation measures at Edera 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. Note this proposal is also known colloquially as the 'Peatlands Climate Action Scheme'. The additional costs of the proposed Scheme will be supported by Government through the Climate Action Fund, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator. Bord na Móna have identified a footprint of 33,000 ha (a subset of the BnM estate that has been used for energy production) as peatlands suitable for enhanced rehabilitation. This proposed Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations 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.

Decommissioning seeks to address condition 10.1 of license Ref. P0504-01, 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. P0504-01 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. P0504-01:
"*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."*
Edera Bog has been in active peat production since 2003. Industrial peat production ceased in 2018. The primary rehabilitation goal and outcome for Edera 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 Edera 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

Edera Bog is located approximately 4.5km to the west of Ballymahon in County Longford, on the shore of Lough Ree (See Figure 3 and 5). The surrounding landscape is a mosaic primarily consisting of low-lying agricultural land (pasture) interspersed with other raised bogs, many of which have also been managed by Bord na Móna for peat production with some areas utilised for domestic turf-cutting.

Edera Bog has only been in peat production since 2003, with all commercial peat extraction ceasing on site in 2018. The peat was harvested from this site was used for fuel peat Lough Ree Power in Lanesborough. Several small peat stock-piles are still present on the site and these will be removed before rehabilitation and decommissioning is complete.

2.4.1.2 Size, Scale, Landcover

Size and Scale: Edera Bog comprises 283Ha in total.

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

- The cleaning of the bog
- the cleaning of existing silt ponds
- decommissioning and de-gassing mobile fuel tanks
- peat stockpile management via levelling
- the de-sludging of an existing septic tank

Enhanced measures may include the lifting of the existing rail line, decommissioning of existing level crossings and measures to restrict access to the bog; re-wetting of the peat areas; re-alignment of piped drainage; blocking of drains; targeted fertiliser application; water level management; and silt pond management.

The total area of Edera Bog is 283ha of which 282.1ha or 99.7% of the present Landcover (2020) has been assigned a rehabilitation prescription. The enhanced rehabilitation prescriptions to be applied at Edera Bog will included measures for deep peat cutover bog, dry cutaway bog, wetland cutaway and marginal land. Other prescriptions included comprise silt pond (3.3ha), constraints (6.7ha) and

archaeology (6.7ha). Not all measures will require land use interventions. For instance, no works will be required for the enhanced rehabilitation of marginal lands (comprising 67.4ha of the 282.1ha that will undergo rehabilitation).

Landcover

Existing:

Habitats present (in order of dominance)

The most common habitats present at this site include:

- Bare peat (PB4)
- Pioneer dry heath communities
- Silt Ponds with associated habitats such as scrub, Bracken, rank grassland, dry calcareous grassland and typical pioneer communities of disturbed areas.

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

- Birch woodland (WN2)
- Scrub (Gorse scrub and Birch scrub developing of dry high bog around margins) (WS2)
- Raised bog (PB1)
- Cutover bog (several small fragments) (PB4)
- Wet grassland along the edges of the site and along the course of the Bilberry River (GS4)

Habitats occurring within and immediately adjacent to Edera Bog comprise a significant area of scrub (WS1), raised bog (PB4) and wet grassland (GS4) in the west of the site. This area is located next to Lough Ree and has never been in industrial peat production, although some domestic peat cutting has been carried out in this area. The remnant section of the raised bog does not appear to contain any deep peat and is located in the transition zone between what was the former intact raised bog (Edera) and the wet grassland that borders Lough Ree.

A small area of the remnant raised bog and cutaway bog is located along the north-eastern boundary of the site and is used extensively for domestic turf production under licence to Bord na Móna. The Bilberry River running through the centre of the site is likely to be an important wildlife corridor and is a key link for connectivity of habitats and species.

Some small sections of the production bog at Edera appear to have been cut away with marl protruding in areas. Common Reed is becoming established on these areas and in some of the field drains.

The Bilberry river flows through the site and there are two crossing points that machinery and trains use to cross this river. The river still retains some natural features such as bends in the river and some deeper pools. The River is surrounded on both sides by relatively extensive areas of wet grassland that are subject to flooding when the River is in flood. The grassland was comprised of species such as Soft Rush, Floating Sweet-Grass, Yorkshire Fog, Reed Canary Grass, Yellow Rattle, Purple Moor Grass, Marsh Arrow Grass and Iris. Scattered trees consisting of Alder and Willow are located throughout this area. Several silt ponds are also located in this area. A small round clump of Birch and Alder are in one

area and this feature is thought to be the remains of a Crannog by archaeologists. To the south of this area lies the location of an old house that has local historical importance.

A significant area of scrub, raised bog and wet grassland is located in the western area of the site. Purple Moorgrass is dominant across much of this section of raised bog along with species such as Bog Asphodel, Sundew, Yellow Rattle, Willow, Bog Myrtle, Devil's Bit-Scabious, Gorse, Bog Cotton, Heather, *Sphagnum papillosum, S. subnitens, S. squarrosum* and *Aulacomnium palustre*. Occasional tufts of Black Bog Rush are located along the edges of this habitat. This area, immediately adjacent to Lough Ree can flood in winter, if lake water levels are high.

Other habitats along the margins of the site include Birch woodland, wet grassland, dry heath and cutover bog. Examples of degraded raised bog habitat occur along the margins of Edera Bog, including the section of the bog that is located within the Lough Ree SAC. No other Annex 1 habitats listed as qualifying habitats of this SAC occur within the boundary of Edera Bog.

Species of Conservation Concern: As detailed in Section 1.2.2.3 above

Marsh Harrier, Kestrel, Tufted Duck, Whooper Swan, Mute Swan, Little Grebe, Snipe and Coot have all been previously recorded at or in proximity to Edera Bog, and Sand Martin have been recorded nesting in peat face banks on site. Badger, Otter and Pine Marten have also been recorded on the bog. Other species of conservation concern that have been recorded in the wider area surrounding Edera Bog, but that have not been found to rely on the bog (following the results of field surveys as described in Section 1 above) include Kingfisher, Golden Plover and Lapwing.

Marsh Fritillary have been recorded just outside the Bord na Móna property to the north and south-east (NBDC data viewer) but there are no on-site records yet.

Invasive species: Invasive alien species known to occur at the subject bog (or desktop review suggests presence is likely), and for which reasonably foreseeable source impact pathways for dispersal may result from the proposed PCAS are described here. No such Third Schedule instances are known at Edera Bog. A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs, and although spatial overlap with the PCAS is expected to be limited.

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

Extent of Landcover requiring Rehabilitation: The total area of Edera Bog is 283Ha of which 282.1Ha or 99.7% of the present Landcover (2020) will be subject to **rehabilitation** prescriptions.

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

A significant part of the former production area is residual deep peat. Groundwater is unlikely to have a significant influence on the development of vegetation. If this peat can be re-wetted, and a stable water level developed close to the peat surface, it is expected to develop an embryonic *Sphagnum*-rich vegetation. The topography of this area is variable. Some of this area is modelled as wet and should be relatively straight-forward to re-wet, once drains are blocked. Some of this area is modelled as dry and more intensive deep peat measures with bunding, re-profiling and cell berms are proposed to optimise hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation.

The cutaway bog prone to winter flooding is located along the Bilbery River. This part of the former production area has shallow or no residual peat and the sub-soil is exposed. The sub-soil is limestone-based glacial deposits and lacustrine marl, and likely to have a more alkaline influence on the vegetation. This area is expected to develop wetland vegetation with fen and Reedswamp. Rehabilitation measures are proposed to block drains to manage summer water-levels and create a shallow wetland with emergent vegetation. This area will continue to be inundated with winter flooding. A berm is proposed to protect the marginal land, help maintain summer water levels and direct water flows.

Some parts of the former production area will be relatively dry. This includes headlands and high fields. Two areas of higher ground have also been identified where there is limited potential to significantly re-wet residual peat. Drain-blocking and some fertiliser application is proposed. Birch woodland and other drier habitats are expected to develop.

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

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

- Carrying out of intensive rehabilitation prescriptions (including berms, drain-blocking, field re-profiling, cell-bunding, fertiliser application, seeding of vegetation &, inoculation of *Sphagnum,* where appropriate) in addition to water level management such as modifying water levels at outfalls. This will further slow the movement of water through and out of Edera Bog.
- Water level management through blocking of outfalls, overflow management, field re-profiling, and the creation of berms to rewet cutaway.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities on deep peat, and eventually naturally functioning wetland and peatland habitats.
- Optimising hydrological conditions for the development of Reed Swamp and fen on shallow more alkaline peat and other subsoils.
- Stabilisation or reduction in water quality parameters (e.g. Suspended Solids, Ammonia and TP).
- Environmental stabilisation.
- Setting the site on an appropriate trajectory to enable the development of *Sphagnum*-rich vegetation communities on deep peat over time. It is not expected that the site has the potential to develop active raised bog (ARB) analogous to the priority EU Habitats Directive Annex I habitat

within the foreseeable future (c.50 years). Furthermore, only a proportion of the bog has potential to develop Sphagnum-rich habitats in this timeframe. Nevertheless, re-wetting across the entire bog, as part of the Scheme, will improve habitat conditions of the whole bog, making the overall bog wetter. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions. It will take some time for stable naturally functioning habitats to fully develop at Edera Bog.

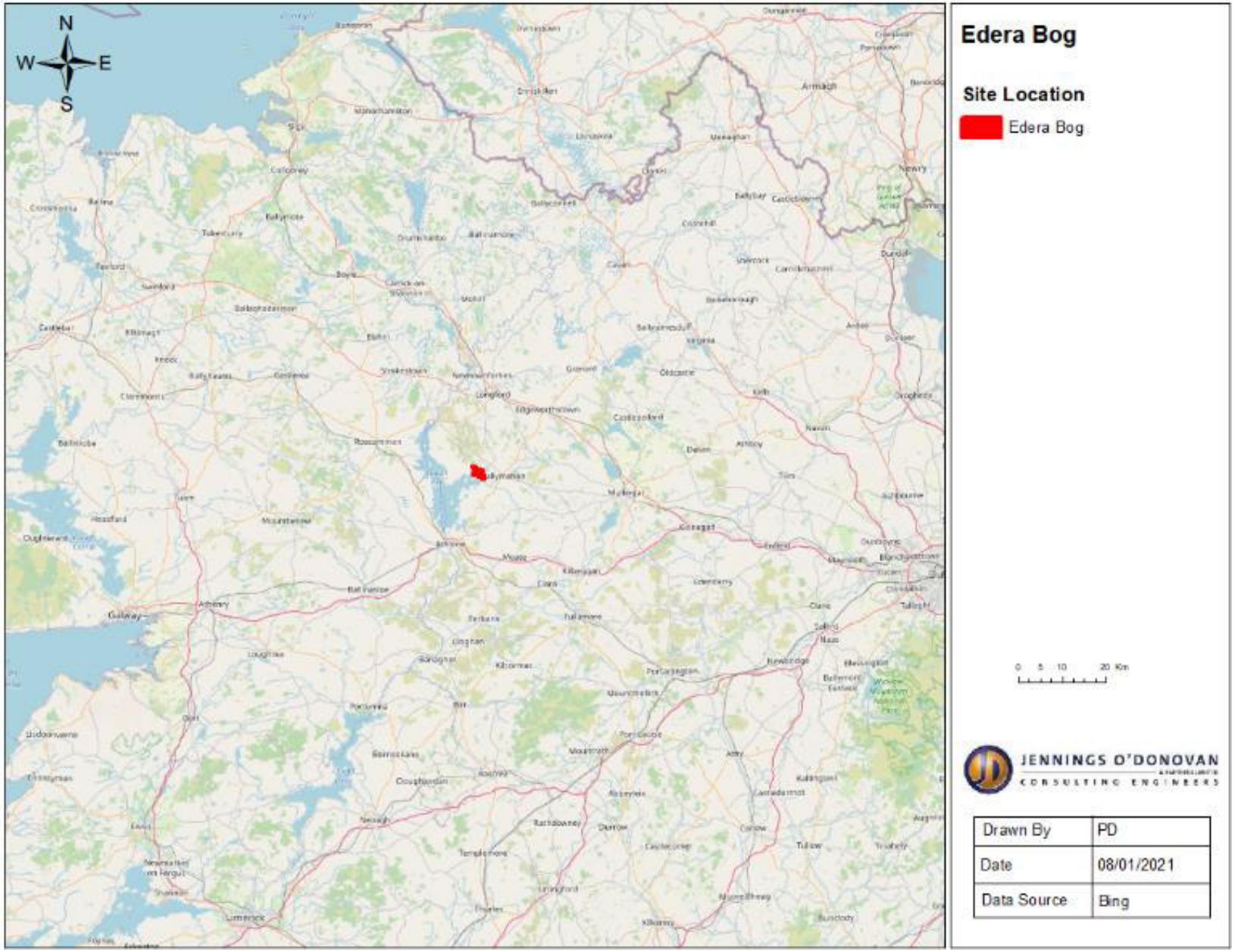


Figure 5: Edera Bog Site Location

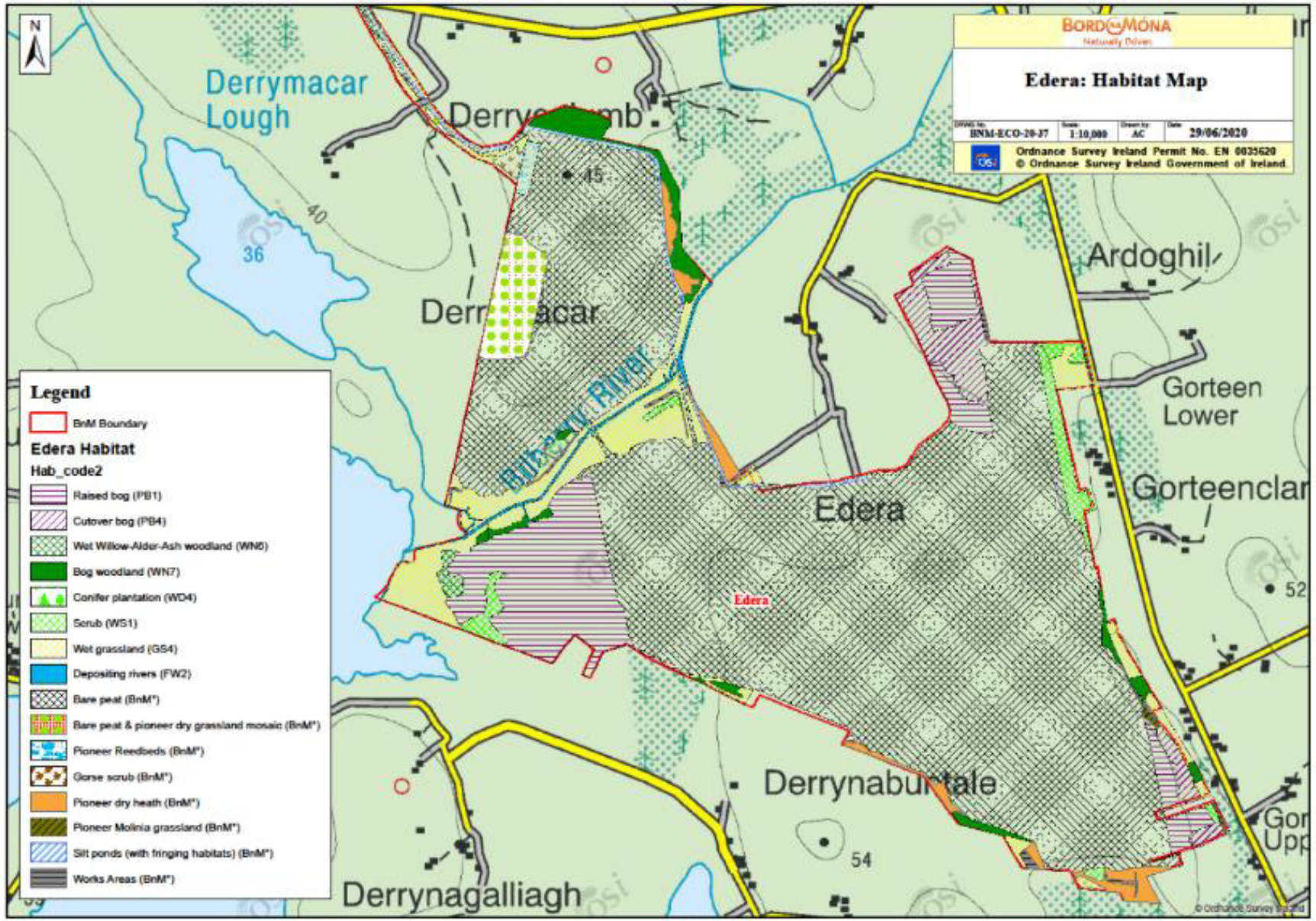


Figure 6: Current Habitat Map of Edera Bog

2.4.2 Application of Protective Measures in the Screening Evaluation

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

2.4.3 Decommissioning and Rehabilitation Stage

The proposed **decommissioning** at Edera Bog includes the cleaning of existing silt ponds, decommissioning and de-gassing mobile fuel tanks, and de-sludging septic 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.

Rail line lifting may occur concurrently or after rehabilitation activities. In some instances, outer spurs are to be left in place to facilitate rehabilitation access, meaning these lines won't be lifted until rehabilitation is complete.

The proposed Edera Bog **rehabilitation** comprises a series of interventions designed to stabilise the existing baseline and meet compliance with the requirements of the existing EPA, IPC License and the proposed PCAS. 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).

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

- Carrying out intensive rehabilitation with the application of enhanced deep peat rehabilitation measures to re-wet peat and slow water movement across the site.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities in suitable deep residual peat areas.
- Optimising hydrological conditions for the development of wetland, Reed Swamp and fen habitats on shallow cutaway peats.
- Stabilisation or improvement in water quality parameters (e.g. suspended solids).
- Environmental stabilisation.
- Rehabilitation will support the National Policies on Climate Action and GHG mitigation by maintaining and enhancing the current condition peat storage capacity of the bog (locking the carbon into the ground). In time, it is expected that the bog will develop its carbon sink function, in part, as *Sphagnum* communities develop across the bog. It will also support Ireland's commitments towards Water Framework Directive and the National River Basin Management Plan 2018-2021.

2.4.3.1 Decommissioning and Rehabilitation Access

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

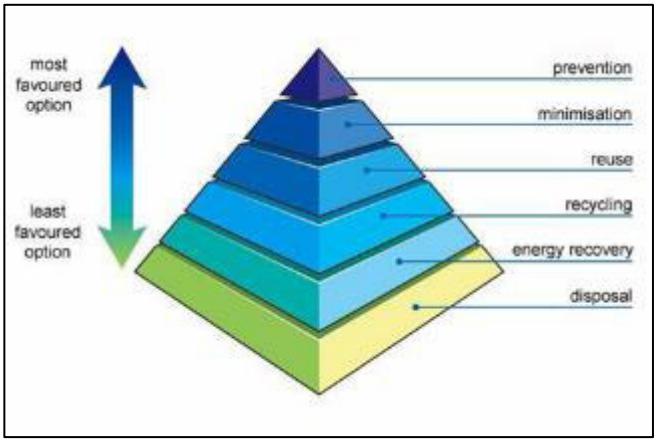
2.4.3.2 Standard Methodology for Decommissioning

Decommissioning at Edera will involve the deployment of a work crew to collect and oversee the removal of any remaining plant or potentially contaminating waste left *in situ* in line with Condition 7 of License Ref. P0502-01. This condition specifically requires that BnM's procedures for the Disposal or recovery of waste shall take place only as specified in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* of the IPC license and in accordance with the appropriate National and European legislation and protocols. No other waste shall be disposed of/recovered either on-site or off-site without prior notice to, and prior written agreement of, the EPA. Waste sent off-site for recovery or disposal shall only be conveyed to a waste contractor, as agreed by the EPA, and only transported from the site of the activity to the site of recovery/disposal in a manner which will not adversely affect the environment.

A full record, which shall be open to inspection by authorized persons of the EPA at all times, shall be kept by the licensee (BnM) on matters relating to the waste management operations and practices at Edera. 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 Edera Bog. As required by the license, these waste items will be removed for recycling or disposal, using external contractors with the required waste collection permits, with waste records maintained as required. Where possible, Bord na Móna will utilize the appropriate waste hierarchy to identify waste that can reused or recycled ahead of disposal.



The validation of the success of condition 10.1 is carried out through an Independent Closure Audit (ICA), followed by and EPA Exit Audit (EA) and the eventual partial or full surrender of the license. Decommissioning may also include measures to restrict access to the bog or silt ponds.

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

Peat stockpiles: Any existing 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 desludged by a licenced contractor. All sludge material will be transported off-site for treatment and disposal at an appropriately licenced facility. Bog area clean up: These bog areas include the parking spaces for production plant and equipment, locations for storing rail line, drainage pipes and stockpile covering. All remaining or unconsolidated old and unused polythene will be collected for recycling or disposal, depending on condition. Any remaining older and immobile plant will be brought in from bog and removed off site. Any remaining hazardous waste oils, fluids and batteries will be removed off site by qualified appropriate hazardous waste contractors. All remaining unused drainage pipes will be gathered up for reuse, recycling or disposal. All remaining, unconsolidated unused rail line sections will be collected from the bog and stored at the main access location for dismantling.

2.4.3.3 Standard Methodology for Rehabilitation Activities

The rehabilitation plan for Edera 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 **draft** guidance issued by the EPA in 2019 – **Guidance on the process of preparing and implementing a bog rehabilitation plan**.

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

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

NPWS were consulted for further information. No response has been received to date at time of writing.

- **Field Surveys**

See section 1.1.1 above for an overview of the field surveys completed at Edera Bog that are used to inform the reporting for screening the PCAS at Edera Bog.

2.4.3.4 Rehabilitation Packages

The key interventions to be applied for the restoration/rehabilitation of Edera 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 (See Table 4, which lists all rehabilitation prescriptions as well as other enhanced rehabilitation measures that are available for implementation for PCAS's):

Table 4: Rehabilitation Categories

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

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

1. Regular Drain Blocking (3/100m)
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. Infilling drains and creating cross-berms
7. Berms and field reprofiling (45m x 60m cell)
8. Drainage channels for excess water
9. Cut and fill cell bunding (30m x 30m cell)
10. Sphagnum Inoculation
11. Formation of berms to create wetlands/silt attenuation areas

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

1. Regular Drain Blocking (3/100m)

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 D provides further details on the approach to peat blockages. Figure 7 indicates the locations where drain blocks will be provided.

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

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

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

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 Outfalls

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

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

Again, the key objective is to manage water-levels at 0-10 cm above the peat surface for as much of the year as possible. Some deeper water is inevitable due to heterogenous topography of the cutaway. This measure can be particularly effective as outfall pipes generally run perpendicular to field drains to catch and transport water off the bog. The outfalls have been piped through high fields. Blocking pipes at the high fields means that the high fields can be converted to natural berms or embankments, creating a compartmented wetland.

See also Appendix D. Figure 7 indicates the locations where drain blocks will be provided.

4. Managing water levels with overflow pipes and/or cutting taps in fields

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 2: Examples of installed overflow pipes

Another technique to manage water levels is by cutting a 'tap' or transverse V-shaped drain across existing high cutaway fields. This is completed using an excavator. See also Appendix D for detailed methodology drawings.

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 D 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 D.

6. Infilling Drains and creating cross-berms

Where the peat field is located on topography sloping parallel to field drains, cross-berms will be installed across the field in order to retain water and saturated conditions within the field. Peat is taken from the centre of the field and a dozer is used to push peat in a line perpendicular to the field drains so that a cross-berm is formed. The standard specification for cross-berms will be 5m wide and 500mm high. Appendix D provides further details on the methods for installing cross-berms. The in-filling and blocking of drains will be completed in line with items 1 and 2 above.

See Methodology drawings included as Appendix D. Figure 7 indicates the locations where infilling drains and creating cross-berms will be provided.

7. Berms and field reprofiling (45m x 60m cell)

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 bulldozer 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 bulldozers 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 D. Figure 7 indicates the locations where berms will be provided.

8. Drainage channels for excess water

New drainage channels (swales) 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. Swales (shallow wide drainage channels) are a common measure used in the design and construction of constructed wetlands. They may only get occasional use during the year during periods of high rainfall.

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. This measure will allow greater management of water levels across the cutaway, the benefits of which are listed above and will help protect newly created infrastructure (cell bunds). Hydrological modelling will be key to design these new drainage channels.

9. 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 D. Figure 7 indicates the locations where bunded cells will be provided.

10. *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.

11. Formation of Berms to create wetland areas

Berms are to be created as part of wetland prescriptions to enclosed areas of shallow standing water. Methods will be similar to those applied for cross-berms to prevent sheet flow of water on reprofiled fields.

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 bulldozer tracking over the drain block. Next the bulldozer 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 500mm High Cross Berm.

See Methodology drawings included as Appendix D. Figure 7 indicates the locations where berms will be provided.

A breakdown of the extent of the rehabilitation prescriptions proposed at Edera Bog is provided in Table 5, below. See also Figure 8.

Table 5 Extent of Rehabilitation proposed at Edera Bog.

Deep Peat Cutover Bog		Extent (Ha)
DPT1	Regular drain blocking (3/100 m) & blocking outfalls & managing water levels with overflow pipes	
DPT2	More intensive drain blocking (max 7/100 m) & blocking outfalls & managing overflows	
DPT3	More intensive drain blocking (max 7/100 m) & field reprofiling & blocking outfalls and managing overflows & Sphagnum inoculation	48.9
DPT4	Berms and field re-profiling (45m x 60m cell) & blocking outfalls and managing overflows & drainage channels for excess water & Sphagnum inoculation	60.5
DPT5	Cut and Fill cell bunding (30m x 30m cell) & blocking outfalls and managing overflows & drainage channels for excess water & Sphagnum inoculation	19.7
Dry Cutaway		
DCT2	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	10.3
DCT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows + targeted fertiliser treatment	9.7
Wetland		
WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	41.9
WLT5	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	7.0
Marginal Land		
MLT1	No works required	67.4
Other		
Silt Ponds		3.3
Constraints		6.7
Archaeology Constraints		6.7
Total		282.1

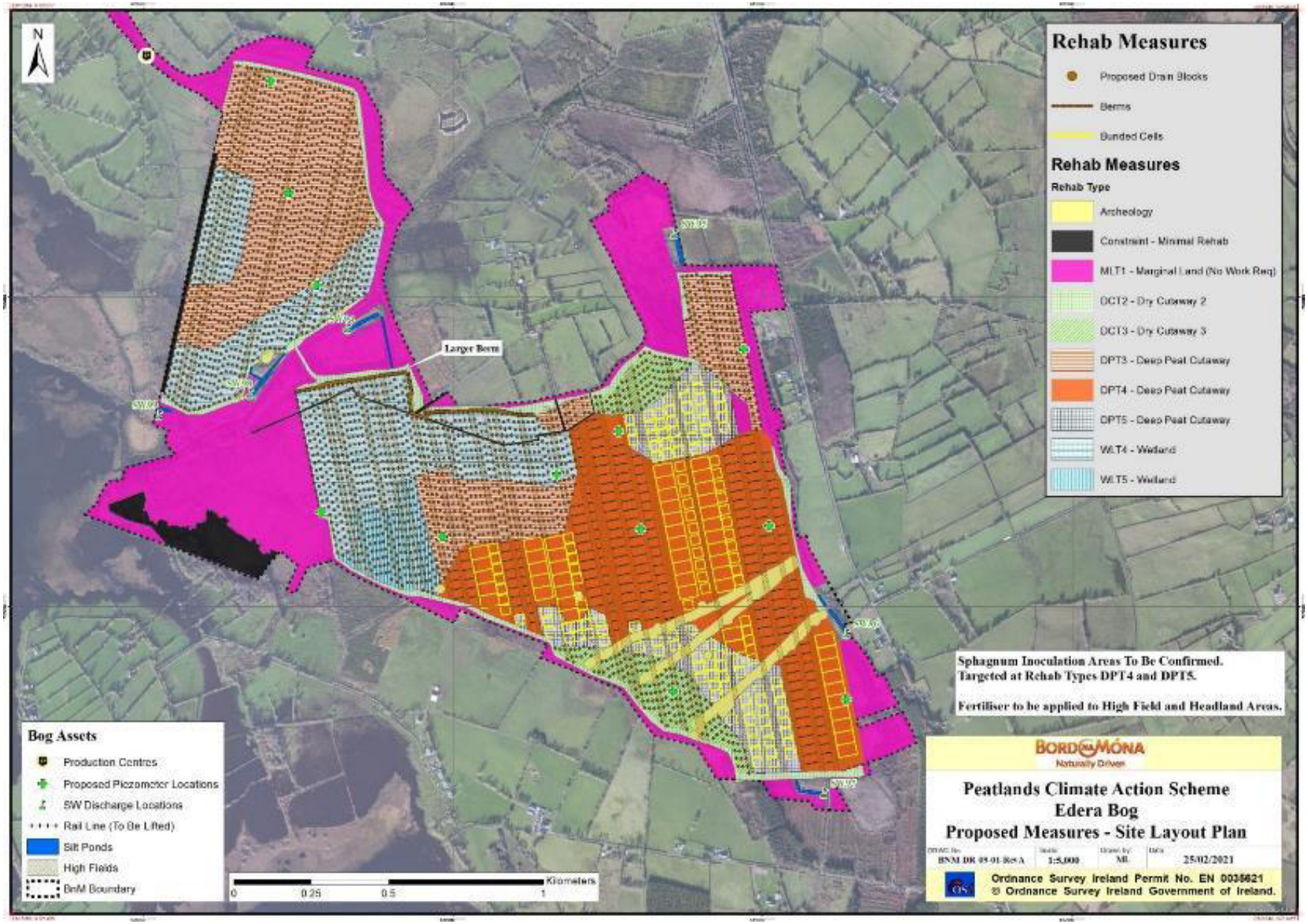


Figure 7: Proposed Rehabilitation Measures – Site Layout Plan

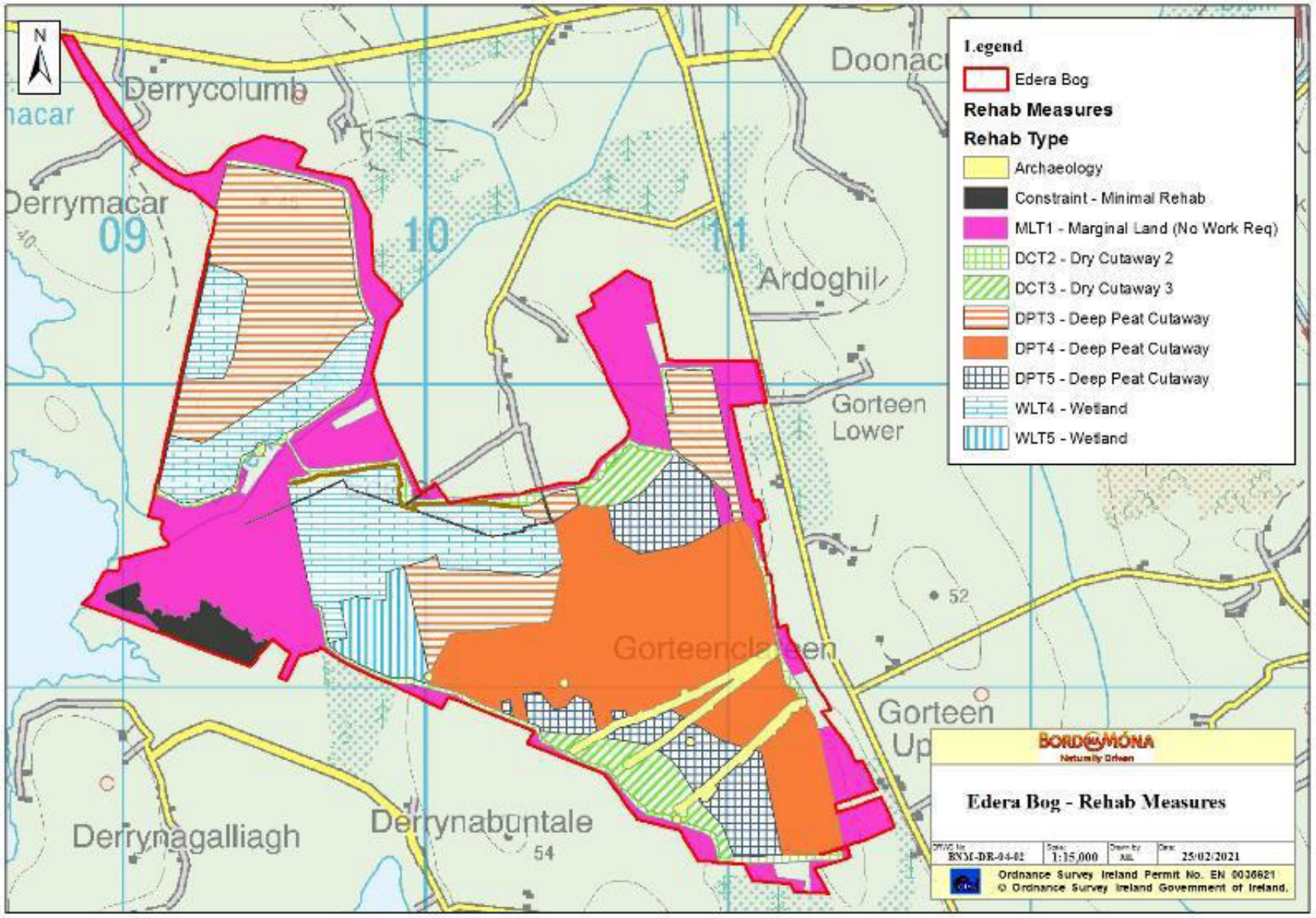


Figure 8: Proposed Enhanced (PCAS) Rehabilitation Plan (Sourced from Edera Decommissioning and Rehabilitation Plan 2021 – Appendix B)

2.4.3.5 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 within 12 months of April 2021.

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

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

2.4.3.5.1 Hours of Work

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

2.4.3.6 Use of Natural Resources

Land Requirement: There is no land requirement in respect of **decommissioning**. In total **rehabilitation** activities will take place on 282.1 hectares of land. 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'. In addition, no works are required for certain rehabilitation prescriptions (i.e. MLT1).

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. It is proposed to divert one drain to an existing silt pond in the NW part of the bog.

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.

2.4.3.7 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, However it is note that reprofiling and the creation of bunded cells will be completed by a low number of machines and will not have the potential to generate dust emissions that will be perceptible in the surrounding area. This is supported by the results of previous dust monitoring when Edera Bog was in production and much more intensive levels of machine operation was undertaken when compared to that proposed for PCAS works. Dust monitoring completed during production works was well below the IPC ELV for dust and no complaints from neighbouring properties were received during production works. In light of this and the low levels of machine activity that will be required for the Edera Bog PCAS, when compared to previous production activities, the PCAS works will have the potential to generate negligible quantities of dust that will not represent a perceptible emission in the surrounding area.

Given that a minimal number of machines and site operatives (especially when compared to previous production activities) will be working on site at any one time, there will be no potential for the PCAS works to result in a change to the baseline noise or vibration levels in the area surrounding Edera Bog.

Durations overall are expected over a 12-month period at Edera 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 Edera Bog in the form of an existing tea centre. Portaloos will be provided for site operatives during decommissioning and rehabilitation works. All wastewater generated at portaloos will be held within the portaloos tanks and will be regularly serviced by a licenced contractor. All wastewater from the portaloos will be collected from the site and treated and disposed of at a suitably licenced facility.

2.4.4 Operational Stage

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

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

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

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

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

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

Fugitive emissions to air

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

Carbon Emissions

Following rehabilitation and into the early operational stage Edera 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

With the exception of a proposed amenity walkway the location of the proposed Edera Bog decommissioning and rehabilitation does not overlap the current footprint of any other existing projects or plans.

Longford County Council are proposing an amenity walkway be located at Edera Bog comprising the construction of an amenity trackway approximately 4.65km in length through the townlands of Derrycolumb, Derrymacar, Edera, Gorteenclareen and Derrynabuntale at Edera Bog. The works will consist of a walkway, a number of activity areas at various locations and associated site works. The proposed development will require the layering on the surface of the bog to develop the final layer of the walkway. It is envisaged the majority of the area around the trackway will be allowed to re-nature back to its original wetland character.

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

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

A planning search of the National Planning Database found a number of proposed or consented developments within the vicinity of Edera Bog, including new private dwellings (Longford County Council Planning Reference No.: 1981; 19327; 18108) or amendments to private dwellings (Longford County Council Planning Reference No.: 20291) and 1 no. applications in respect of a forestry entrance (Longford County Council Planning Reference No.: 1896).

There are 3 no. local authority jurisdictions within 15km of Edera Bog (Longford County Council, Roscommon County Council and Westmeath 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 with links to Lough Ree and that could combine with the proposed PCAS at Edera Bog. Two other raised bogs that have been designated as SACs are linked to Lough Ree. These are Lough Forbes Complex SAC and Corbo Bog SAC. There are currently no bespoke restoration plans published by the NPWS for either of these two bogs and there is no known temporal overlap between any planned restoration activities at either of these SACs and the decommissioning and rehabilitation of Edera Bog.

2.4.5.1 Other BnM Bog Group Decommissioning and Rehabilitation

Other BnM bogs within the larger Mount Dillon group will also be subject to decommissioning and rehabilitation to meet the various, pertinent, IPC license conditions, however, currently, the only known temporal overlap between these proposed activities elsewhere in the Mount Dillon group is at Derrycashel Bog and Derrycolumb Bog. The construction phase of decommissioning and rehabilitation at Edera Bog may overlap with decommissioning and rehabilitation activities at the above two bogs. These two bogs are located within the River Shannon catchment and both along with Edera Bog share connectivity to the Lough Ree SPA and SAC downstream.

The Operational stage of Edera Bog Decommissioning and Rehabilitation will overlap the Rehabilitation stage of other bogs within the Mount Dillon group however the expected magnitude of any effects from Edera 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 Mount Dillon Group will be subject to Appropriate Assessment and it is assumed the requisite mitigation will be in place should the potential for any adverse effects on European site integrity be identified as part of the Appropriate Assessment process. This should also identify the potential for any sequential in-combination pathways, in particular should temporal overlap exist.

2.4.5.2 Turbary

Private turbary exists at Edera Bog where a limited area, amounting to approximately 6.3ha in total is subject to peat extraction. Licensed turbary occurs at various locations within 15km of Edera Bog, including several locations where the pathways for downstream in-combination effects on European Sites may exist, primarily via drainage to EPA blue line watercourses to facilitate turbary.

2.4.5.3 NPWS Raised Bog Restoration

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 upstream of Lough Ree that have been selected for current restoration as part of the NPWS raised bog restoration plan.

2.4.5.4 Agricultural Activity

Given the proximity of Edera Bog to the River Bilberry, 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 Edera 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:

- **Longford County Development Plan 2015 - 2021**
- **Roscommon County Development Plan 2021 – 2027**
- **County Roscommon heritage Plan 2017-2021**
- **Westmeath County Development Plan 2014 -2020**
- **Draft Westmeath County Development Plan 2021 - 2027**

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

2.4.5.6 Amenity Walkway proposed for Edera Bog

Longford County Council are proposing an amenity walkway be located at Edera Bog. There is no temporal overlap with this currently proposed development (in Part VIII process) and the proposed timeline for PCAS activities. On this basis the order of magnitude of in combination effects will be that of the proposed walkway. It is assumed that the amenity walkway, or any other plans including those currently at Part VIII status, will be subject to the requirement for Appropriate Assessment screening and if necessary Appropriate Assessment which can reasonably be assumed to provide mitigation to avoid adverse effects on European Sites, should it be required. The possibility of likely significant in-combination effects can reasonably be excluded on this basis.

2.4.5.7 Derryadd Wind Farm

Derryadd Wind Farm was granted planning permission in 2020 by An Bord Pleanála. A Natura Impact Statement (NIS) was prepared for the wind farm. The NIS examined the potential adverse impacts posed by the wind farm to European Sites and prescribed mitigation measures to avoid significant adverse effects to European Sites, their qualifying features of interest and their conservation objectives. The effectiveness of these mitigation measures to achieve this aim was also examined as part of the NIS. The NIS informed An Bord Pleanála and it was determined, that provided all mitigation measures and associated planning conditions are implemented in full, the wind farm will not, alone or in-combination with other plans or projects, result in significant adverse effects to integrity of European Sites or undermine the conservation objectives of European Sites. Given the determination made by An Bord Pleanála, there will be no potential for the PCAS at Edera Bog in combination with the Derryadd Wind Farm to result in cumulative negative effects to European Sites.

2.4.5.8 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 Edera Bog; the absence of hydrological connectivity or shared hydrological catchment with many of the other plans or projects described, the separation distance or setback buffers between the described plans or projects and European Sites, and the requirement for Appropriate Assessment for other plans or projects, 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 Edera 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 Edera 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 6 European Sites - 5 Special Areas of Conservation (SAC) and 1 Special Protection Area (SPA) - within 15km of Edera Bog. The locations of these European Sites are illustrated in Figure 9: SACs and SPAs within 15km of Edera Bog.

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

Table 6: Proximity of the proposed Edera 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 Edera Bog)
Lough Ree SPA	004064	0 – sections of bog located within SPA	Y
Ballymore Fen SAC	002313	14.2km SE	N
Carn Park Bog SAC	002336	13.8km S	N
Fortwilliam Turlough SAC	000448	8km NW	N
Lough Ree SAC	000440	0 – sections of bog located within SAC	Y
Mount Jessop Bog SAC	002202	10.8km N	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 fourteen 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.

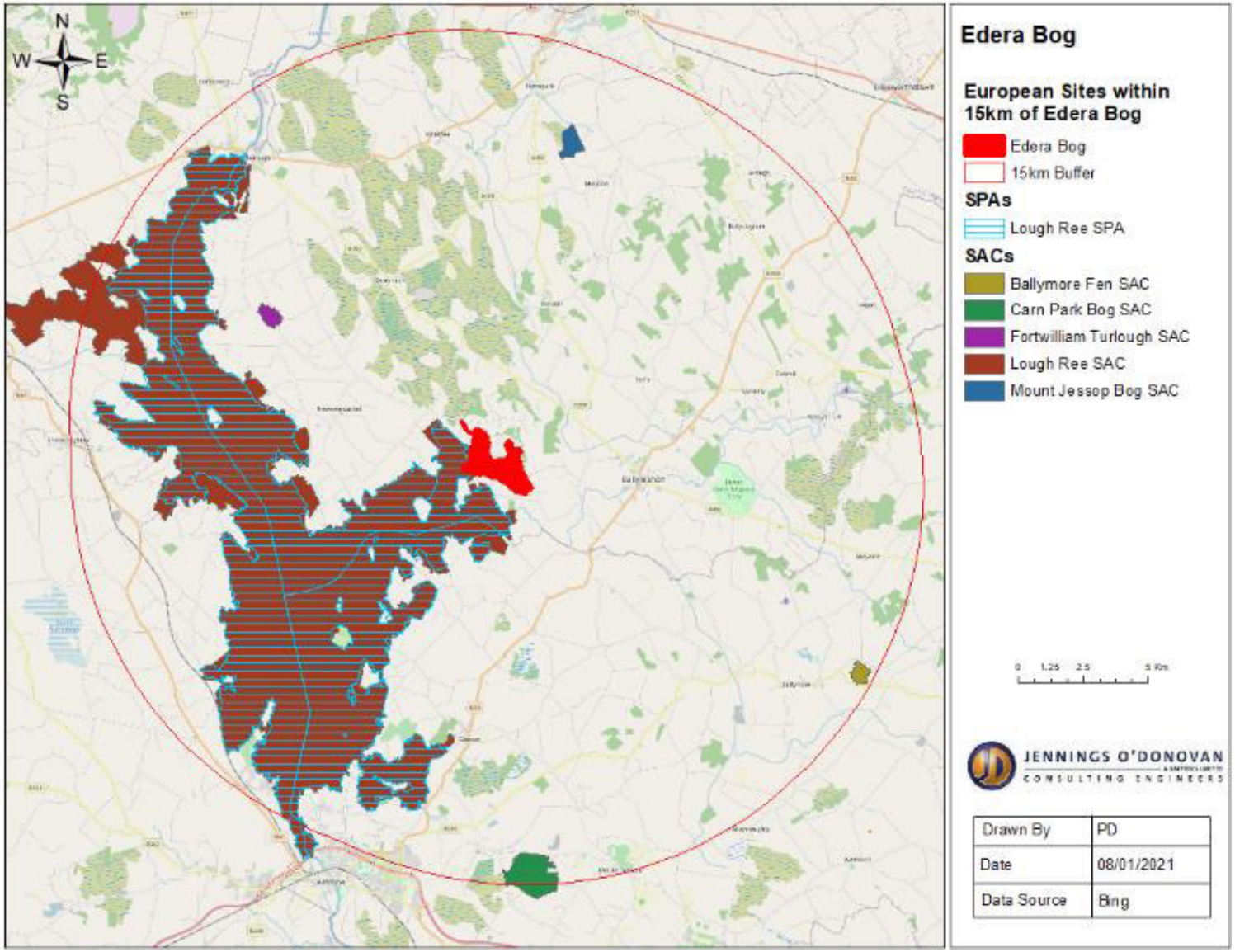


Figure 9: SACs and SPAs within 15km of Edera Bog

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

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
1	Lough Ree SPA [004064]	Little Grebe (*Tachybaptus ruficollis*) [A004] Whooper Swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Mallard (*Anas platyrhynchos*) [A053] Shoveler (*Anas clypeata*) [A056] Tufted Duck (*Aythya fuligula*) [A061] Common Scoter (*Melanitta nigra*) [A065] Goldeneye (*Bucephala clangula*) [A067] Coot (*Fulica atra*) [A125] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Common Tern (*Sterna hirundo*) [A193] Wetland and Waterbirds [A999]	Lough Ree SPA is situated on the River Shannon between Lanesborough and Athlone, lying in an ice-deepened depression in Carboniferous Limestone, and is the third largest lake in the Republic of Ireland. The main inflowing rivers are the Shannon, Inny and Hind, and the main outflowing river is the Shannon. Lough Ree is one of the most important Midland sites for wintering waterfowl, most notably nationally important populations of Common Scoter and Common Tern, as well as Whooper Swan, Golden Plover and Common Tern, as listed under Annex I of the E.U. Birds Directives.	*Lough Ree SPA | National Parks & Wildlife Service*. (n.d.). Retrieved January 22, 2021, from https://www.npws.ie/protected-sites/spa/004064
2	Carn Park Bog SAC [002336]	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120]	Carn Park Bog is situated 8km east of Athlone, in the townlands of Tullywood, Carn Park, Cappaghbrack, Warren High and Moydrum, Co. Westmeath. Due to its characteristic active raised bogs (areas of high bog that are wet and actively peat-forming with high percentage of *Sphagnum* spp. cover) and degraded bogs (areas of high bog whose hydrology has been adversely affected by peat cutting, drainage and other land use activities, with the capacity of regenerating), Carn Park Bog has the status of Special Area of Conservation. The site supports a good diversity of raised bog microhabitats, including hummock/hollow complexes, pool and *Sphagnum* lawns, as well as the rate species *Sphagnum pulchrum*.	*Carn Park Bog SAC | National Parks & Wildlife Service*. (n.d.). Retrieved January 22, 2021, from https://www.npws.ie/protected-sites/sac/002336
3	Ballymore Fen SAC [002313]	Transition mires and quaking bogs [7140]	Ballymore Fen lies approximately 17km of Mullingar adjacent to the Mullingar to Ballymore road (R390) in Co. Westmeath, with the geological profile of Carboniferous	*Ballymore Fen SAC | National Parks & Wildlife Service*. (n.d.). Retrieved January 22, 2021, from

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			Limestone. The central, wetter parts of the bog is characterised by a scraw with an abundance of Bogbean (*Menyanthes trifoliata)* and Water Horsetail (*Equisetum fluviatile*). At the edge of the wetter area, particularly east of the site, a graduation to Black Bog-rush dominated fen occurs. The Bryophyte communities in this site is of considerable interest, especially due to species richness in the relatively small area, enhanced by the presence of the Red Data Book species Round-leaved Wintergreen.	https://www.npws.ie/protected-sites/sac/002313
4	Fortwilliam Turlough SAC [000440]	Turloughs [3180]	Fortwilliam Turlough is situated close to the eastern shore of Lough Ree, 6km south of Lanesborough in Co. Longford. The surroundings are flat with a thin cover of drift. The floor of the basin is at two levels, and a higher surrounding area of till with scattered rocks, extending north-westwards into flat fields and woodland. There is a little surface flow into the basin and floodwater appears to be strongly calcareous. The central of this SAC contains Shoreweed, Various-leaved Pondweed, Broad-leaved Pondweed, and the moss *Scorpidium scorpioides*, as well as Lesser Water-plantain, sedges and Jointed Rush. Slightly drier areas support a community dominated by Common Sedge, Creeping Cinquefoil and abundant Adder's-tongue. Snipe and Mallard nest in the area. Fortwilliam is the only extant large turlough in Longford and one of the only two east of the River Shannon. Its oligotrophic status is valuable, with the disappearance of these features from agricultural activities.	*Fortwilliam Turlough SAC | National Parks & Wildlife Service*. (n.d.). Retrieved January 22, 2021, from https://www.npws.ie/protected-sites/sac/000448

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
5	Lough Ree SAC [000440]	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] 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] Alkaline fens [7230] Limestone pavements [8240] Bog woodland [91D0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, *Salicion albae*) [91E0] *Lutra lutra* (Otter) [1355]	Lough Ree is the third largest lake in Ireland and is situated in an ice-deepened depression in Carboniferous limestone on the River Shannon system between Lanesborough and Athlone. The site spans Counties Longford, Roscommon andWestmeath. Some of its features (including the islands) are based on glacial drift. Although the lake has been classified as mesotrophic in quality, the size of the system give rise to a range of nutrient statuses and pH conditions from its variety of rock types. Species present include Intermediate Bladderwort, pondweeds, Quillwort, Greater Duckweed, stoneworts, and Arrowhead. Lowland wet grasslands are found in abundance around the shores and occurs as callowland (grassland that floods in the winter; feeding grounds for winter waterfowl and breeding waders), and an unusual community on stony wet lake shore, characterised by Water Germander. Dry broadleaved semi-natural woodland occurs in several places around the lake, most notably at St. John's Wood and on Hare Island. Examples of raised bog occur, and show a natural transition through wet woodland and/or swamp to lakeshore habitats. Two small areas of woodland occur on the raised bog domes. The lake contains one of the only two populations in Ireland of the endangered fish species, Pollan. Small flocks of Greenland White-fronted Goose use several areas of callow land around the lake in winter. Some of the lake islands provide nesting sites for Common Tern, as well as breeding habitat for wildfowl. The woodland and the scrub provide a habitat for the Garden Warbler, a bird species mainly confined to the Shannon lakes in Ireland. The lake also supports a population of Otter (Protected	*Lough Ree SAC	National Parks & Wildlife Service*. (n.d.). Retrieved January 22, 2021, from https://www.npws.ie/protected-sites/sac/000440

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			under the Annex II of the E.U. Habitats Directive).	
6	Mount Jessop SAC [002202]	Degraded raised bogs still capable of natural regeneration [7120] Bog woodland [91D0]	Mount Jessop Bog SAC occurs within the larger raised bog system and is situated 5km south-west of Longford Town in the townland of Mount Jessop, Co. Longford. The site is part of a basin raised bog that includes both areas of high bog and cutover bog. Mount Jessop Bog consists of 71.91 ha of raised bogs. The vegetation is typical of Midland Raised Bog Type, consisting of Heather, Bog Asphodel, Hare's-tail Cottongrass, Ccross-leaved Heath, White Beak-sedge and bog mosses. There is also a record of one of the Western raised bog indicators, the liverwort *Pleurozia purpurea.* The unforested cutover bogs bog areas of the site are mainly overgrown with Downy Birch, Gorse, and willow scrub with occasional Lodgepole Pine from adjacent forestry. Water-levels remain high throughout the year and the bog moss *Sphagnum cuspidatum* dominates the wet hollows. The site contains good examples of the Habitats Directive Annex I habitat Degraded Raised Bog (capable of regeneration), which is reverting to the priority Annex 1 habitat Active Raised Bog and a small area of the Annex 1 priority habitat Bog Woodland which is developing on the cutover. Red Grouse, a bird which is becoming increasingly rare in Ireland, has been recorded at this site, along with the Irish Hare, a Red Data Book species, which increases its overall scientific interest.	*Mount Jessop Bog SAC	National Parks & Wildlife Service*. (n.d.). Retrieved January 22, 2021, from https://www.npws.ie/protected-sites/sac/002202

2.6 Sources of Information & Consultation

2.6.1 Consultation

A process of engagement and Informal consultation was undertaken with NPWS regarding the Appended Rehabilitation Plan and is described in Section 4 of same. Due cognisance has also been given to information available on the NPWS website at:
https://www.npws.ie/development-consultations#Public_authority_plans_and_projects_and_appropriate assessment.

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

2.6.2 Sources of Information

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

- Review of the Conservation Objectives, Site Synopsis and Site boundary information for the European Sites within with study area;
- Review of OSI Discovery Mapping for the 15km study area around Edera 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 Edera 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 2018/2019 dataset for Lough Ree; 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.

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 Criticl Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change.
- Mackin *et al*. (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al*. (2011). The Fen Management Handbook, (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised bog Special Areas of Conservation management plan 2017-2022. Department of Arts, Heritage and the Gaeltacht.
- Quinty & Rochefort (2003). Peatland Restoration Guide, second edition. Canadian Sphagnum Peat Moss Association and New Brunswick Department of Natural Resources and Energy.
- Renou-Wilson *et al*. (2011). BOGLA–D - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.
- Schouten (2002). Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies. Dúch–s - The Heritage Service of the Department of the Environment and Local Government, Ireland;
- Thom (2019). Conserving Bogs – Management Handbook.
- Wheeler & Shaw (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction.

- Wittram *et al*. (2015). A Practitioners Guide to *Sphagnum* Reintroduction. Moors for the Future Partnership.

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

2.7.1 Potential Sources, Pathways and Timing of Impacts to SACs

2.7.1.1 Direct Impact to Habitats within the SAC

Edera Bog overlaps Lough Ree SPA as shown on Figure 9 above. The habitats of Edera Bog occurring within Lough Ree SAC comprise improved agricultural grassland, scrub woodland and degraded raised bog. Of these three habitats occurring within the SAC boundary, it is only the example of degraded raised bog (7120) that corresponds to a qualifying habitat of the SAC. Approximately 0.09 Ha of degraded raised bog habitat of Edera Bog is located within the SAC. The grassland habitat is representative of improved agricultural grassland and is not representative of orchid-rich calcareous grassland (6210). The scrub woodland habitat is representative of immature birch and gorse scrub and is not an example of bog woodland (91D0) or alluvial woodland (91E0), which are the two woodland qualifying habitats of the SAC.

Given the presence of approximately 0.09 Ha of the qualifying habitat degraded raised bog (7120) within the footprint of Edera Bog and the PCAS the potential for negative effects to this habitat cannot be ruled out at the screening stage and further examination of impacts to this qualifying habitat of the Lough Ree SAC is required as part of a Natura Impact Statement of the PCAS.

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

Sources (some but not all inside SAC boundaries): Movement of soil or peat, machinery; earthworks, excavations, works in or near water, cleaning of silt ponds, unforeseen events such as the failure of drain blocks and berms resulting in the release of silt-laden water to waterbodies, temporary overburden storage, changes in local hydrological and hydrogeological conditions with downstream effects on adjacent SACs, namely the Lough Ree SAC; removal of waste and/or raw material, lifting of rail; use of fuels, chemicals or fertiliser.

Receptors: Annex 1 qualifying habitats of Lough Ree SAC.

Modelled Pathways: water runoff flow paths, watercourses, flooding/changes to hydrological regimes, air**.**

Potential Edera Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity:

There is a hydrological pathway connecting Edera Bog to Lough Ree SAC. All other SACs listed in Table 7 above are not connected via a hydrological pathway to Edera Bog. The current appraisal evaluates the possibility of any effects to Lough Ree SAC through sediment/contaminant/nutrient laden runoff, changes to hydrological regimes or morphology of supporting watercourses, or through the spread of invasive species

One Annex 1 qualifying habitat, natural eutrophic lake habitat, of the SAC occurs downstream of the rehabilitation works. Effects on this qualifying habitat occurring downstream of Edera Bog, are evaluated to determine the potential (or not) for significant effects.

As noted in section 2.4.3.6 above the extent of dust, noise and localised vibration from individual machines during rehabilitation work will be negligible and imperceptible in the surrounding area. As such no functional air , noise or vibration impact pathway will connect the PCAS to Lough Ree SAC or the other 4 SACs occurring in the wider surrounding area.

Timing of Impacts: The potential for impact sources arising from the project only relates to the Decommissioning and Rehabilitation Stage, when groundworks and use of machinery will take place for a limited duration -in this instance expected to be up to 12 months. Once decommissioning and rehabilitation are complete, the decommissioned and rehabilitated of Edera Bog will require monitoring, generally involving visual inspections of habitat succession, sometimes using drones, and ongoing scheduled maintenance of silt ponds. In addition, the Edera Bog Drainage Management Plan (RPS, 2021) has identified the potential need for the activities to retain the function of boundary drains, following the results of operation phase monitoring. The ongoing maintenance of silt ponds and the upgrading of boundary drains, where required, could combine during the operation phase to cause significant effects to European Sites.

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

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

Modelled Pathways: contact, air, noise visibility

Potential Edera Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity: The impact sources identified above may result in possible localised impacts occurring within the local context of the decommissioning and rehabilitation area during the construction phase. Any such impacts resulting in disturbance or displacement effects on Annex II species listed as Qualifying Interests of SACs (e.g. Otter) would be *ex situ* and separated from any European Site (the closest European Site designated for Otter is Lough Ree SAC, which is overlapped by the western extent of Edera Bog). There are no impact sources identified which would extend outside of the local extent of the works area which could indirectly result in disturbance or displacement of Qualifying Interests of any other SAC, aside from Lough Ree SAC.

Timing of Impacts: As outlined above, the potential for effects relates to both the construction stage of decommissioning and rehabilitation and the operation phase.

2.7.1.4 In-situ or ex-situ mortality of Qualifying Interests

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

Operation phase activities will be restricted to monitoring and maintenance of the PCAS rehabilitation prescriptions at Edera Bog.

Modelled Pathway: contact

Potential Edera Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity: Given the absence of otter resting sites, such as holts and couches at Edera Bog there will be no potential for the rehabilitation works to result in contact with otters and the accidental mortality of this species. Berms will be provided on site during the construction phase as part of the rehabilitation works. Given the absence of breeding otter from Edera Bog and the absence of holts and couches any accidental failure of beerms will not present a risk of mortality to otters. It is further noted that berms are present adjacent to all silt ponds and none are used as holt or couch sites.

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

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

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

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

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

Timing of Impacts: It is considered that during the decommissioning and rehabilitation stages at Edera, the possibility exists for any inadvertent release of silt or other degrading materials, such as ammonia, phosphorous to possibly combine with downstream effects from other projects/land uses. Although expected to be localised and limited in magnitude, disturbance effects on Otter and natural eutrophic lake habitat may combine with other localised sources such as related to Turbary to result in increased effects on the population of the Lough Ree SAC and the status of natural eutrophic lake habitat supported by the SAC. The ongoing maintenance of silt ponds combined with any required upgrades to boundary drains will also have the potential to combine with other localised sources of pollutants to result in negative effects to the otter population and natural lake habitat of the Lough Ree SAC during the operation phase.

2.7.2 Potential Sources, Pathways and Timing of Impacts to SPAs

2.7.2.1 Direct Impacts to Habitats within SPAs

Edera Bog overlaps Lough Ree SPA as shown on Figure 9 above. The habitats occurring within this area of overlap include improved agricultural grassland, scrub woodland and degraded raised bog. The degraded raised bog habitats shown on Figure 6, is representative of wetland habitat potentially utilised by some waterbird species. Wetland habitat is listed as a special conservation interest of the Lough Ree SPA. The area of the Edera bog that overlaps within the Lough Ree SPA (approximately 3.45) that is representative of degraded raised bog and wetland habitat is approximately 0.1 Ha in size.

Given the presence of the wetland habitat of the SPA within the footprint of Edera Bog and the PCAS the potential for negative effects to this habitat cannot be ruled out at the screening stage and further examination of impacts to wetland habitat of the Lough Ree SPA is required as part of a Natura Impact Statement of the PCAS.

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

Sources (some but not all inside SPA boundaries): Movement of soil or peat, machinery; earthworks, excavations, work in or near water, cleaning of silt ponds, unforeseen events such as the failure of drain blocks and berms resulting in the release of silt-laden water to waterbodies, temporary overburden storage, changes in local hydrological and hydrogeological conditions with downstream effects on adjacent SPAs, namely Lough Ree SPA; removal of waste and/or raw material, lifting of rail; use of fuels, chemicals or fertiliser.

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

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

The proposed Decommissioning and Rehabilitation at Edera bog overlaps one SPA boundary, namely the Lough Ree SPA. Effects on this SPA are evaluated to determine the potential (or not) for significant effects.

Timing of Impacts: The potential for impact sources arising from the project only relates to the Decommissioning and Rehabilitation Stage, when groundworks and use of machinery will take place for a limited duration -in this instance expected to be up to 12 months. Once decommissioning and rehabilitation are complete, the decommissioned and rehabilitated of Edera Bog will require minimal monitoring, generally involving visual inspections of habitat succession, sometimes using drones, and

any ongoing scheduled maintenance such as of silt ponds. In addition, the Edera Bog Drainage Management Plan (RPS, 2021) has identified the potential need for the upgrade of boundary drains, following the results of operation phase monitoring. The ongoing maintenance of silt ponds and the upgrading of boundary drains, where required, could combine during the operation phase to cause significant effects to European Sites.

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

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

Modelled Pathway: contact, air, noise visibility

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

Edera Bog is directly adjacent/overlapping one SPA, namely the Lough Ree SPA.

Timing of Impacts: As outlined above, the potential for effects relates to both the decommissioning and rehabilitation Stage and the operation phase. 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 special conservation interest species for which these sites are designated are likely to be present[3].

2.7.2.4 In-situ or ex-situ mortality of Special Conservation Interest Bird Species/Waterbirds

Sources (all outside SAC boundaries): Decommissioning and Rehabilitation activities associated with maintenance of silt ponds.

Modelled Pathway: contact

Potential Edera Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity: Silt ponds provide suitable breeding habitat for special conservation interest bird species/waterbirds (e.g. Little Grebe of Lough Ree SPA). In the event that maintenance of silt ponds overlaps with the bird breeding season the potential will exist for damage or destruction of nests and mortality of eggs and non-fledged chicks. It is noted that rehabilitation works during the winter season will not pose a mortality risk to birds as all birds will be mobile at this time and will be capable of evading machinery etc.

[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.

Timing of Impacts: Where maintenance works overlap with the breeding bird season.

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

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

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

Modelled Pathway: contact, air, noise, visibility

Potential Edera Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity:

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

Timing of Impacts: The potential for in combination impact sources arising from the project relates to both the works stage (i.e. Decommissioning and Rehabilitation), when groundworks and use of machinery will take place for a limited duration -in this instance expected to be up to 12 months; and during the operation phase when ongoing maintenance works at silt ponds could combine with upgrades to boundary drains (if required). In terms of Timing of Effects, this is limited to the migratory (September to November for Autumn and March to mid-May for Spring) and winter period (October to March) or breeding period, as applicable, when most of the special conservation interest species for which these sites are designated are present.

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

The Screening evaluation is based on a conceptual site model which identifies potential impact source-pathways between the described Edera 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 Edera Bog decommissioning and rehabilitation is the construction stage, no impact source-pathways are identified during the operational stage.

Section 2.7 above has identified the impact source-pathways arising from the rehabilitation plan. These impact-source pathways are summarised below[4] and the potential for these to result in significant effects to the 5 SAC sites under consideration are evaluated in Table 8 below:

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

The following impact source-pathways for the 1 SPA site are evaluated in relation to any potential for significant effects (Table 9 below):

- Direct impact to wetland habitat of SPAs
- Indirect loss, reduction or degradation of terrestrial or aquatic habitats within SPA sites, alone and in combination;
- Indirect, in-situ or ex-situ disturbance/ displacement of bird species listed as Special Conservation Interests, alone and in combination.
- In-situ or ex-situ mortality of Special Conservation Interest Bird Species/Waterbirds

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.

[4] Note that as the project does not have the potential to result in direct effects to Annex 1 habitats of the SAC or wetland habitats of the SPA (see Sections 2.7.1.1 & 2.7.2.1 above), this effect is not included in Table 8.

Table 8: Evaluation of Possibly Significant Effects to the 5 SAC sites

	European Site	Separation Distance from Edera Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Edera Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 5 SAC Sites: 1. Direct loss or degradation to terrestrial or aquatic qualifying habitats of the SAC 2.2Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site **3**. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest
1	Ballymore Fen SAC [002313]	14.2km SE	No	**1: No Direct loss or degradation to terrestrial or aquatic qualifying habitats of the SAC** Due to the remote separation distance between proposed activities and this European Site, no pathways for effects are identified. **2: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic 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 species of Qualifying Interests** Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.
2	Carn Park Bog SAC [002336]	13.8km south	No	**1: Screened Out – No Direct loss or degradation to terrestrial or aquatic qualifying habitats of the SAC** Due to the remote separation distance between proposed activities and this European Site, no pathways for effects are identified. **2: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic 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 species of Qualifying Interests**

	European Site	Separation Distance from Edera Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Edera Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 5 SAC Sites: 1. Direct loss or degradation to terrestrial or aquatic qualifying habitats of the SAC 2.2Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site **3**. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest
				Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.
3	Fortwillian Turlough SAC [000448]	8km NW	No	**1: Screened Out – No Direct loss or degradation to terrestrial or aquatic qualifying habitats of the SAC** Due to the remote separation distance between proposed activities and this European Site, no pathways for effects are identified. **2: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic 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 species of Qualifying Interests** Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.
4	Mount Jessop Bog SAC [000440]	10.8km North	No	**1: Screened Out – No Direct loss or degradation to terrestrial or aquatic qualifying habitats of the SAC** Due to the remote separation distance between proposed activities and this European Site, no pathways for effects are identified. **2: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic 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 species of Qualifying Interests**

	European Site	Separation Distance from Edera Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Edera Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 5 SAC Sites: 1. Direct loss or degradation to terrestrial or aquatic qualifying habitats of the SAC 2.2Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site **3**. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest
				Qualifying Interests only relate to habitats and plant species which are not sensitive to indirect disturbance at the distance of separation from proposed activities.
5	Lough Ree SAC [000440]	0km – sections of Edera Bog are contained in the SAC	Yes	**1: Direct loss or degradation to terrestrial or aquatic habitat within the SAC site** Examples of degraded raised bog, which is a qualifying habitat of the Lough Ree SAC occurs within the section of the SAC that overlaps Edera Bog. The potential for the PCAS to result in loss or degradation of this habitat cannot be ruled out at the screening stage and further examination of such direct effects are required as part of a Natura Impact Statement. **2: Screened Out - No likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC** There are no pathways connecting Edera Bog and the works associated with the PCAS to examples of the following qualifying habitats of the Lough Ree SAC: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210], Active raised bogs [7110], Bog woodland [91D0], Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Limestone pavements [8240] and Alkaline fens [7230]. Given the absence of pathways there will be no potential for the PCAS to result in likely significant effects to these qualifying features of interest and they are screened out. **3: Screened In - likelihood for significant indirect loss or degradation of terrestrial or aquatic habitats within the SAC.** Due to the presence of a hydrological connection between the proposed activities and this European Site, possible pathways for localised effects on Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] and *Lutra lutra* (Otter) [1355], are identified, which cannot be screened out in the absence of measures to avoid harmful effects.

	European Site	Separation Distance from Edera Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Edera Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 5 SAC Sites: 1. Direct loss or degradation to terrestrial or aquatic qualifying habitats of the SAC 2.2Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site **3**. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest
				3: Screened In – Possibility for indirect, in-situ or ex-situ disturbance or displacement of species of Qualifying Interests Due to the overlap of the Edera Bog with the Lough Ree SAC and the presence of suitable lake habitat downstream of the bog, there is potential for proposed activities to result in indirect disturbance and displacement to otters within the SAC (in the areas of the SAC overlapped by Edera Bog and outside the SAC (ex-situ) towards the east of Edera Bog).

Table 9: Evaluation of Possibly Significant Effects to Lough Ree SPA Site

	European Site	Separation Distance from Edera Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Edera Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 1 SPA Sites: 1. Direct impacts to wetland habitats of SPAs 2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site; 3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. 4. In-situ or ex-situ mortality of special conservation interest bird species /waterbirds
1	Lough Ree SPA [004064]	0km – sections of bog are contained within this SPA	Yes	**1. Screened In - Direct impacts to wetland habitats of the SPA** Due to the presence of degraded raised bog within the area of Edera Bog overlapping this SPA, the potential of negative impacts to wetland habitat of the SPA cannot be ruled out at the screening stage. **2: Screened In - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to the SPA** Due to the presence of hydrological connectivity between proposed activities and this European Site, possible pathways for localised effects on wetland habitats upon which special conservation interest bird species of the SPA and other wetland bird species of the SPA are identified, which cannot be screened out in the absence of measures to avoid harmful effects **3: Screened In/Out - Possibility for indirect, in-situ or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest** Bird species of Special Conservation Interests for this SPA include a range of special conservation interest bird species that are known to utilise a variety of wetland habitats during the non-breeding and/or breeding season. The non-breeding special conservation interest bird species of the SPA that are known to utilise wetland habitats such as raised bogs and open water habitats (the latter habitat is present at Edera Bog in the form of the Bilberry River and silt ponds) include Little Grebe, Whooper Swan, Wigeon, Teal, Mallard, Shoveler, Tufted Duck, Goldeneye, Coot, Golden plover and Lapwing. IWeBS surveys in 2018/2019 have recorded the presence of Teal, Mallard, Tufted Duck, Little Grebe, Coot, Lapwing, Golden Plover in the wider area of Lough Ree adjacent to Edera Bog. However, baseline surveys at Edera Bog have shown that Edera Bog and the open water habitats within the bog's boundary are not relied upon by the majority of these species. Wigeon, Teal, Shoveler, Goldeneye, Golden Plover nor Lapwing were not recorded on the bog during winter walkover surveys between 2013 and 2019, nor were they recorded utilising the bog during monthly surveys between January and March 2021. Given the absence of these species during baseline surveys, they do not

	European Site	Separation Distance from Edera Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Edera Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 1 SPA Sites: 1. Direct impacts to wetland habitats of SPAs 2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site; 3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. 4. In-situ or ex-situ mortality of special conservation interest bird species /waterbirds
				rely on Edera Bog and will not be subject to any disturbance as a result of the proposed PCAS. As such, the potential for likely significant effects to these six species during the **non-breeding season** are 'screened out'. Mallard, Whooper Swan, Little Grebe and Coot have been recorded on Edera Bog. Other wetland bird species recorded on Edera Bog during surveys include Water Rail, Mute Swan and Grey Heron. These seven species have been recorded in low numbers on the bog and the results of baseline surveys do not suggest that the population of these species that are associated with this SPA rely on the bog as an over-wintering non-breeding habitat. Nevertheless, given the presence of these species and the presence of suitable wetland habitat for these species within the Edera Bog, and in view of the precautionary principle, the potential for proposed activities to result in disturbance within or adjacent to the SPA to the four special conservation interest bird species and the three other wetland bird species listed above cannot be ruled out. The breeding special conservation interest bird species of the Lough Ree SPA are Common Scoter, Common Tern, Tufted Duck and Little Grebe. Recent surveys completed for Common Scoter at Lough Ree show that this species does not breed in the vicinity of Edera Bog, nor is suitable breeding habitat (i.e. Islands) available in close proximity to Edera Bog, while Common Tern is also restricted to breeding on islands of Lough Ree. In light of this, the breeding sites for these two species are located at sufficiently remote distances from Edera Bog such that they will not be subject to any significant disturbance as a result of the proposed PCAS. In addition, given the presence of a marginal land buffer (over approximately 150m) between areas where active rehabilitation works will be undertaken at the lake habitats upon which terns and scoters rely, there will be no potential for the rehabilitation works to result in significant disturbance to foraging birds of these two species at Lough Ree. As such, the potential for likely significant effects to these two species overall are 'screened out'. There is suitable habitat occurring at Edera Bog for Little Grebe and Tufted Duck. Little Grebe was recorded on the bog during surveys in the non-breeding season of 2021, while Tufted Duck was recorded in the wider area. Given the presence of these two species at Edera Bog and in the wider surrounding area and the presence of suitable wetland breeding habitat for these species within Edera Bog, the potential for proposed rehabilitation activities to result in

	European Site	Separation Distance from Edera Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Edera Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the 1 SPA Sites: 1. Direct impacts to wetland habitats of SPAs 2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site; 3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. 4. In-situ or ex-situ mortality of special conservation interest bird species /waterbirds
				disturbance to possible source populations of these two special conservation interest bird species or other wetland bird species within or adjacent to the SPA cannot be ruled out. **4: Screened In - In-situ or ex-situ mortality of Special Conservation Interest Bird Species/Waterbirds** Suitable breeding habitat for special conservation interest bird species of the SPA such as Little Grebe and Tufted Duck occurs at the silt ponds within the site. Maintenance works at silt ponds during the breeding bird season will have the potential to pose a risk of mortality to any eggs or non-fledged chicks that occupy nests at these silt ponds, and may be a source population for the SPA.

2.9 Screening for Appropriate Assessment Conclusion Statement

The Screening Evaluation provided herein has examined the potential for any effects arising via source pathway linkages with regard to connectivity to designated European Sites (SACs and SPAs) within the zone of influence of all predicted Project impacts. An extended buffer zone of 15km was further considered, in line with NPWS guidance (DoEHLG, 2009), for evaluation of effects on any European Site which may arise associated with the proposed decommissioning and rehabilitation of Edera Bog, as required. There are a total of 6 European sites located within the 15km zone of consideration:

Table 10: European Sites Located within the 15km Zone

No.	European Site	Site code
1	Lough Ree SAC	000440
2	Ballymore Fen SAC	002313
3	Fortwilliam Turlough SAC	000448
4	Mount Jessop Bog SAC	002202
5	Carn Park Bog SAC	002336
6	Lough Ree SPA	004064

Following screening it can reasonably be concluded that **there is no likelihood of significant effects to 4 of the above European Sites** because of the proposed project, either alone or in-combination with other plans or projects. **Therefore, the potential for significant effects on 4 European Sites has been excluded, and have been 'Screened Out' from the Appropriate Assessment process and no Appropriate Assessment is required for these European Sites.**

Following screening it can reasonably be concluded that **there is likelihood and/or uncertainty of significant effects to 2 of the above European Sites** as a result of the proposed project, either alone or in-combination with other plans or projects. **Therefore, the potential for significant effects on any European Sites has not been excluded, and Appropriate Assessment is required in respect of the following European Sites:**

Table 11: European Sites where Appropriate Assessment is Required

No.	European Site	Site code
1	Lough Ree SAC	000440
2	Lough Ree SPA	004064

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

3. STAGE 2: NATURA IMPACT STATEMENT

3.1 Introduction to Stage 2

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

1. Lough Ree SAC (Site Code 000440)
2. Lough Ree SPA (Site Code 004064)

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

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

3.1.1 Features of Interest at Risk of Likely Significant Effects

3.1.1.1 Lough Ree SAC

The Lough Ree SAC is designated for nine qualifying features of interest. The screening of the PCAS examined the potential for the likely significant effects to each of these features. It was concluded during the screening that the following qualifying features:

Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210];

Active raised bogs [7110];

Alkaline fens [7230];

Limestone pavements [8240];

Bog woodland [91D0]; and

Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0];

are not at risk of likely significant effects from the PCAS due to:

the absence of any examples of these qualifying features at Edera Bog

the absence of any examples of these qualifying features within the section of the Lough Ree SAC overlapping Edera Bog;

the remote distance between the PCAS and the examples of these qualifying features supported by Lough Ree SAC; and

the absence of any potential impact pathways connecting the PCAS to the examples of these qualifying features supported by the Lough Ree SAC.

During the screening the natural eutrophic lakes and otters were identified as being at risk of likely significant effects due the presence of a hydrological pathway connecting Edera Bog to natural eutrophic lake and the habitats relied upon by otters downstream of Edera Bog.
During the screening it was also found that due to the presence of degraded raised bog within the section of Edera Bog that overlaps with the Lough Ree SAC it potential for likely significant effects could not be ruled out at the screening stage and further examination was required as part of an Natura Impact Statement.

In light of the findings of the screening exercise this Natura Impact Statement provides an examination of the potential for the PCAS at Edera Bog to result in significant adverse effects to natural eutrophic lake, degraded raised bog and otter qualifying features of the Lough Ree SAC.

Given the absence of any potential for likely significant effects to the other six qualifying features of the Lough Ree SAC there is no requirement to consider further these qualifying features in the context of this Natura Impact Statement.

3.1.1.1 Lough Ree SPA

The Lough Ree SPAis designated for fourteen special conservation interests. These are listed in Table 7 above. The screening of the PCAS examined the potential for the likely significant effects to each of these special conservation interests. It was concluded during the screening that the following special conservation interests: Wigeon; Teal; Shoveler; Common Scoter; Golden Plover; Lapwing; and Common Tern are not at risk of likely significant effects from the PCAS due to the results of baselines surveys that shows that these species do not rely on Edera Bog as an ex-situ habitat and due to the presence of a sufficient buffer distance (of over 150m) between areas of active rehabilitation works associated with the PCAS and potential suitable habitat for these species.

During the screening the following special conservation interest bird species: Little Grebe; Tufted Duck; Whooper Swan; Coot; and Mallard were identified as being at risk of likely significant effects from the PCAS due to their documented presence within Edera Bog during baseline field surveys. The special conservation interest wetland habitat was also identified as being at risk of likely significant effects due to the presence of a hydrological pathway connecting the PCAS at Edera Bog with wetland habitats of the Lough Ree SPA downstream.

In light of the findings of the screening exercise this Natura Impact Statement provides an examination of the potential for the PCAS at Edera Bog to result in significant adverse effects to. Little Grebe; Tufted Duck; Whooper Swan; Coot; Mallard and wetland habitat of the Lough Ree SPA.

Given the absence of any potential for likely significant effects to the other seven special conservation interest bird species of the Lough Ree SPA there is no requirement to consider further these special conservation interests in the context of this Natura Impact Statement.

3.2 Receiving Environment

Description of site

Edera Bog is located approximately 4.5km to the west of Ballymahon in Co. Longford on the shore of Lough Ree (see Figure 10). 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. Lough Ree is immediately adjacent to the south-west corner of the site and the Bilberry River flows through the site. A relatively large section of wet grassland along with a remnant section of raised bog still exist on the site.

A rail line connects Edera bog with Derrycolumb Bog to the north, and this is the main access to the site, with a small tea centre and machinery travel path at this entrance to the bog. A machinery bridge and separate rail bridge are present in the centre of the site to cross the Bilberry River.

A habitat map is included as Figure 6, and the local context is further illustrated overleaf in Figure 10.

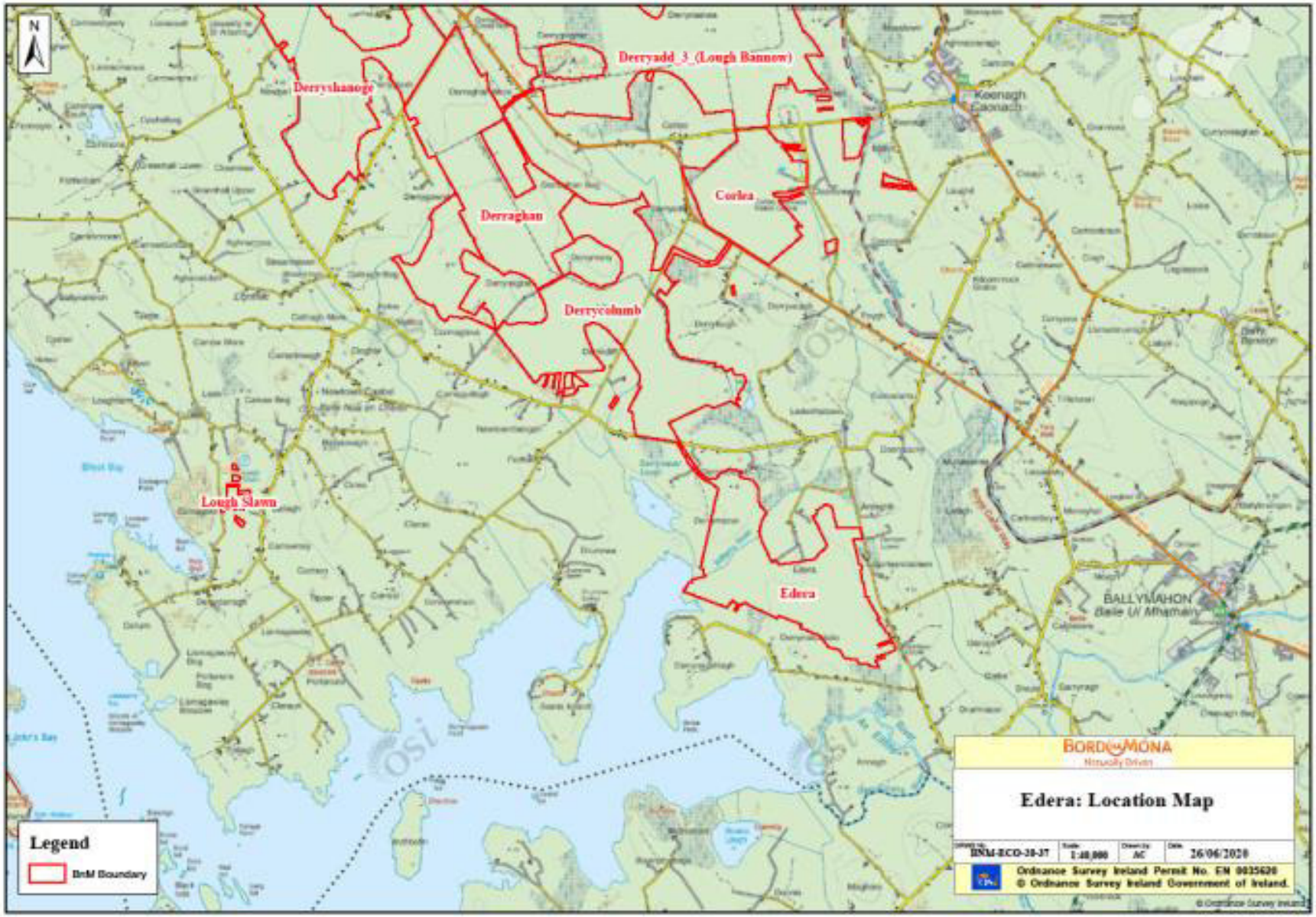


Figure 10. Edera Bog Local Context

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

3.2.1.1 Lough Ree SAC (000440)

Otter *Lutra lutra*

The Qualifying interest under consideration is Otter *Lutra lutra.* This European site holds a population of Otter, a species listed on Annex II of the E.U. Habitats Directive. Suitable habitat (foraging and breeding) exists for this species along the fringes of Lough Ree adjacent to Edera Bog and also along the Bilberry River that flows through Edera Bog and at the 6 silt ponds occurring within the bog. During baseline survey no Otter holts or couches have been recorded along the stretch of the Bilberry River flowing through Edera Bog or at any of the six silt ponds occurring within the bog. An otter spraint was recorded at the southern end of silt pond ED105 during baseline surveys. While current surveys have found that otter holts and couches are absent from the above areas, the future presence of holts or couches at these locations cannot be excluded given the presence of suitable holt habitat (mainly around the silt ponds) and couching habitat (around the silt ponds and also along the Bilberry River.

The territories of Otters can stretch for several kilometres; the total length of the home range depends on the availability of food. The smallest territories are thought to occur at coastal sites, where territories may be as small as 2km. The longest territories occur in upland streams where an individual may have to range more than 20km to find sufficient food. Territorial marking typically occurs by means of sprainting or anal secretions. These marks are left mostly at features such as bridge footings, boulders, grass tussocks and stream confluences. Within their territories an individual otter may utilise a number of resting sites within its territory; these can be hidden refuges above ground (couches), or under-ground chambers (holts). Holts tend to be natural crevices, associated with the roots of trees growing along river and lake banks. These natural recesses provide the otter with a holt that has multiple entrances from which the otter can escape if disturbed. Couches occur frequently in dense vegetation and may be associated with frequently used runs and slides into the water. The rearing of cubs occurs within 'natal holts', which are not marked by spraint. Although capable of breeding at any time of the year, a peak in breeding occurs during the summer and early autumn.

Otters that live in rivers and lakes generally crepuscular – activity peaks at dusk and dawn, which is likely to reduce overlap with rehabilitation works. However, otter activity can still occur during daytime hours (which could coincide with rehabilitation works). Otters are principally piscivorous (fish eating), relying predominantly on salmonids (salmon and trout), but also eel and small fish species such as stickleback. However, Otters are not limited to fish and feed opportunistically on a range of prey when available: frogs are frequently eaten by Otters, and the remains of invertebrates (crayfish), birds and small mammals have also been found in spraints.

Within the most recent Habitats Directive Article 17 Reporting: the conservation status of Otter is listed as 'Favourable' under *Range*, *Population*, *Habitat for the Species*, and *Future Prospects*- overall favourable. The current favourable reference range is considered to be large enough to allow the long-term survival of

the species and is greater than the estimated range of the species when the habitats directive came into force in Ireland. Regarding habitat for the species, habitat availability and quality is not considered to be or to have been a limiting factor in the species range, based on its widespread occurrence. Hence the underlying trend in habitat is evaluated as having remained 'stable'. No conservation measures are reported as being needed.

Regarding future prospects Article 17 reporting describes Otter as a species whose range is extensive and stable, having recovered from a previous decline. The broad habitat niche is occupied and is generally considered to be in good condition. No significant threats or pressures were identified. The overall trend in conservation status is improving.

Regarding Natura 2000 sites specifically, the short-term trend in population size within the Natura network is 'increasing'. This is considered to be applicable to Lough Ree SAC where otters are known to occur.

The threats and pressures to the Lough Ree SAC have been documented by the NPWS in the latest Natura 2000 Standard Data Return form for this SAC (dated September, 2019). Table 12 below lists these threats and pressures and examines their implication for the conservation status of the SAC's otter population.

Site-specific conservation objective for otters have been published for the Lough Ree SAC (NPWS, 2016). These conservation objectives are presented in Section 3.4.5 where they are used to assist the examination of potential impacts to otters as a result of the PCAS.

Table 12: Lough Ree SAC Threats & Pressures and associated examination of risk to the SAC's Otter Population

Threat Code	Threat	Threat Rank	Are Otters at Risk from Threat
K03.05	Antagonism arising from introduction of species	High	Otters are not at risk of antagonistic behaviour from other introduced species. However, it is noted that the presence of non-native invasive species, such as zebra mussel in Lough Ree has potential to result in changes to trophic dynamics within the lake, thereby negatively affecting the foraging resource provided by the lake for otters.
H02.06	Diffuse groundwater pollution due to agricultural and forestry activities	Medium	Otters are not sensitive to groundwater pollution.
A04	Grazing	Medium	Otters are not sensitive to grazing pressure. Indirect impacts of intensive grazing on water quality has the potential to result in indirect impacts for otters.
A08	Fertilisation	Medium	The potential negative impacts of fertilisation for water quality

Threat Code	Threat	Threat Rank	Are Otters at Risk from Threat
			has the potential to indirectly threaten the otter population of the Lough Ree SAC.
J02.11.02	Other siltation rate changes	High	The potential negative impacts of elevated siltation of Lough Ree has the potential to indirectly threaten the otter population of the Lough Ree SAC.
F03.01	Hunting	Medium	The otter population of Ireland are not threatened by hunting.
G01.01	Nautical sports	Medium	Otters are not sensitive to nautical sports.
E01.03	Dispersed habitation	Medium	The otter population of Lough Ree SAC are not sensitive to dispersed habitation.
H01.08	Diffuse pollution to surface waters due to household sewage and waste waters	Medium	The potential negative impacts of diffuse pollution to Lough Ree has the potential to indirectly threaten the otter population of the Lough Ree SAC.
B02	Forest and Plantation management & use	Medium	The potential negative impacts of forest and plantation management and use to the water quality of Lough Ree has the potential to indirectly threaten the otter population of the Lough Ree SAC.
F02.03	Leisure fishing	Medium	Excessive leisure fishing on Lough Ree has the potential to threaten the lakes otter population by reducing the availability of prey species.
I01	Invasive non-native species	High	The presence of non-native invasive species, such as zebra mussel in Lough Ree has potential to result in changes to trophic dynamics within the lake, thereby negatively affecting the foraging resource provided by the lake for otters.
A03.03	Abandonment / lack of mowing	Medium	The otter population of the SAC is not sensitive to abandonment/lack of mowing.

Natural Eutrophic Lakes

Little is known about the characteristics or ecology of Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation in Ireland. This lake habitat is considered likely to occur in lowland, base-rich lakes in the midlands and north-east of Ireland, where it is characterised by high abundance and diversity of pondweeds (Potamogeton spp.), such as *Potamogeton lucens, P. praelongus, P. perfoliatus, P. obtusifolius, P. berchtoldii* and *P. pectinatus.* Examples of this habitat are associated with catchments dominated by mineral soil and, hence, some of the most intensive agricultural lands in Ireland. Consequently, the habitat has been under pressure from eutrophication since the 1970s or before.

The surface area of natural eutrophic lakes in Ireland is estimated to be approximately 144km^2 to 394km^2 of which approximately 100km^2[5] have been mapped by the NPWS as occurring within the Lough Ree SAC.

The short-term is stable while the long-term trend has not been reported by the NPWS in their 2019 Article 17 Reporting. The overall assessment of this habitat conservation status is considered to be 'Unfavourable/Inadequate'. The threats and pressures to this habitat are numerous and include agricultural activities, forestry activities, discharges from urban wastewater, modifications of hydrological flow, physical alterations to waterbodies, peat extraction, and pollution arising from urban runoff.

Table 13 below lists the Natura 2000 Standard Data Return form threats and pressures and examines their implication for the conservation status of the SAC's natural eutrophic lake habitat.

Site-specific conservation objective for the natural eutrophic lake habitat have been published for the Lough Ree SAC (NPWS, 2016). These conservation objectives are presented in Section 3.4.5 where they are used to assist the examination of potential impacts to natural eutrophic lake habitat as a result of the PCAS.

Table 13: Lough Ree SAC Threats & Pressures and associated examination of risk to the SAC's Natural Eutrophic Lake Habitat

Threat Code	Threat	Threat Rank	Is natural eutrophic lake habitat at Risk from Threat
K03.05	Antagonism arising from introduction of species	High	No, this threat does not have negative implications for this habitat.
H02.06	Diffuse groundwater pollution due to agricultural and forestry activities	Medium	No, this habitat is not sensitive to groundwater pollution
A04	Grazing	Medium	Yes, indirect impacts of intensive grazing on water quality has the potential to result in negative effects for this habitat.
A08	Fertilisation	Medium	Yes, this habitat is sensitive to inappropriate application of artificial fertilisation.
J02.11.02	Other siltation rate changes	High	Yes, this habitat is sensitive to changes in siltation rates in waterbodies.
F03.01	Hunting	Medium	No, this habitat is not sensitive to this threat.
G01.01	Nautical sports	Medium	Yes, this habitat is sensitive to this threat.
E01.03	Dispersed habitation	Medium	No, this habitat is not sensitive to this threat.
H01.08	Diffuse pollution to surface waters due to household sewage and waste waters	Medium	Yes, the potential negative impacts of diffuse pollution to

[5] This area is based on the extent of this habitat occurring at Lough Ree as mapped by the NPWS in their Annex 1 Habitat digital mapping.

			Lough Ree has the potential to indirectly threaten the status of this habitat at Lough Ree SAC.
B02	Forest and Plantation management & use	Medium	Yes, the potential negative impacts of forest and plantation management and use to the water quality of Lough Ree has the potential to indirectly threaten the status of this habitat at Lough Ree SAC.
F02.03	Leisure fishing	Medium	Yes, excessive leisure fishing on Lough Ree has the potential to threaten the faunal community and in turn the structure of this habitat.
I01	Invasive non-native species	High	Yes, the presence of non-native invasive species, such as zebra mussel in Lough Ree has potential to result in changes to the ecology of this habitat.
A03.03	Abandonment / lack of mowing	Medium	No, this habitat is not sensitive to abandonment/lack of mowing.

Degraded Raised Bog

Raised bogs are accumulations of deep acid peat (3-12m) that originated in shallow lake basins or topographic depressions. Recently, the Irish Vegetation Classification assigned Degraded Raised Bog to vegetation communities under the two main bog vegetation groups*: Rhynchospora alba-Sphagnum cuspidatum* (BG1) and Erica tetralix-*Sphagnum capillifolium* (BG2) (Perrin, 2018). Degraded raised bog is characterised by the complete absence, or at best the presence of only a patchy thin cover, of an 'acrotelm' layer. The acrotelm is the living, actively growing upper layer of a raised bog. The acrotelm is vital to the maintenance and development of an active raised bog as this is the peat-forming layer and its presence strongly influences the rate of water runoff. Previously all the vegetated areas of high bog which were not delineated as Active Raised Bog were classified as degraded raised bog, on the assumption that most of it could be restored to active peat-forming condition after implementation of comprehensive restoration works. The habitat was therefore considered to encompass sub-marginal, marginal and face bank ecotopes, (Kelly, 1993; Kelly and Schouten, 2002), as well as inactive flushes and dry woodland on the high bog. Such examples of degraded raised bog habitat occur at the west of Edera Bog in the area of the bog that is overlapped by the Lough Ree SAC.

The surface area of degraded raised bog in Ireland is estimated to be approximately 25km^2 of which approximately 70Ha have been mapped by the NPWS as occurring within the Lough Ree SAC.

The short-term and long-term trends for this habitat are stable. The threats and pressures to this habitat include peat extraction, drainage, conversion to forestry and burning for agriculture.

Table 14 below lists the Natura 2000 Standard Data Return form threats and pressures and examines their implication for the conservation status of the SAC's natural eutrophic lake habitat.

Site-specific conservation objective for the degraded raised bog habitat have been published for the Lough Ree SAC (NPWS, 2016). These conservation objectives are presented in Section 3.4.5 where they are used to assist the examination of potential impacts to degraded raised bog as a result of the PCAS.

Table 14: Lough Ree SAC Threats & Pressures and associated examination of risk to the SAC's Degraded Raised Bog Habitat

Threat Code	Threat	Threat Rank	Is the example of the SAC's Degraded Raised Bog Habitat that occurs within Edera Bog at Risk from Threat
K03.05	Antagonism arising from introduction of species	High	No, this threat does not have negative implications for this habitat.
H02.06	Diffuse groundwater pollution due to agricultural and forestry activities	Medium	No, this habitat is not sensitive to groundwater pollution
A04	Grazing	Medium	No. the example of degraded raised bog occurring Edera Bog is not subject to grazing or grazing pressure.
A08	Fertilisation	Medium	Yes, this habitat is sensitive to inappropriate application of artificial fertilisation.
J02.11.02	Other siltation rate changes	High	No, this habitat is not sensitive to changes in siltation rates in waterbodies.
F03.01	Hunting	Medium	No, this habitat is not sensitive to this threat.
G01.01	Nautical sports	Medium	No, this habitat is not sensitive to this threat.
E01.03	Dispersed habitation	Medium	No, this habitat is not sensitive to this threat.
H01.08	Diffuse pollution to surface waters due to household sewage and waste waters	Medium	No, this habitat is not sensitive to this threat.

3.2.1.1 Lough Ree SPA (004064)

The Lough Ree SPA is designated in respect of the following Special Conservation Interests:

- Little Grebe (*Tachybaptus ruficollis*) [A004]
- Whooper Swan (*Cygnus cygnus*) [A038]
- Wigeon (*Anas penelope*) [A050]
- Teal (*Anas crecca*) [A052]
- Mallard (*Anas platyrhynchos*) [A053]
- Shoveler (*Anas clypeata*) [A056]
- Tufted Duck (*Aythya fuligula*) [A061]
- Common Scoter (*Melanitta nigra*) [A065]
- Goldeneye (*Bucephala clangula*) [A067]
- Coot (*Fulica atra*) [A125]
- Golden Plover (*Pluvialis apricaria*) [A140]

- Lapwing (*Vanellus vanellus*) [A142]
- Common Tern (*Sterna hirundo*) [A193
- Wetland and Waterbirds [A999]

Of these species the following were screened out:

- Wigeon (*Anas penelope*) [A050]
- Teal (*Anas crecca*) [A052]
- Shoveler (*Anas clypeata*) [A056]
- Common Scoter (*Melanitta nigra*) [A065]
- Goldeneye (*Bucephala clangula*) [A067]
- Golden Plover (*Pluvialis apricaria*) [A140]
- Lapwing (*Vanellus vanellus*) [A142]
- Common Tern (*Sterna hirundo*) [A193
- Wetland and Waterbirds [A999]

The special conservation interest that were screened in are as follows:

- Little Grebe (*Tachybaptus ruficollis*) [A004]
- Whooper Swan (*Cygnus cygnus*) [A038]
- Mallard (*Anas platyrhynchos*) [A053]
- Tufted Duck (*Aythya fuligula*) [A061]
- Coot (*Fulica atra*) [A125]
- Wetland and Waterbirds [A999]

Little Grebe (*Tachybaptus ruficollis*) [A004]

The latest Article 12 reporting data available from NPWS in respect of Little Grebe relates to the period 2011-2016. The All-Ireland wintering population size for this period, based on a five-year mean was 2,200 of which 944 were associated with the SPA network. Results of the Irish Wetland Bird Survey (IWeBS) for the 2018/2019 winter season recorded low numbers (max. count of 2 individuals during any count) of Little Grebe at the section of Lough Ree in the vicinity of Edera Bog (Table 2 above).

This species is resident on ponds and lakes throughout Ireland. Little Grebes extend their wintering habitat to include ephemeral wetlands and are often encountered on sheltered coasts, estuaries and coastal lakes and lagoons at this time of the year. Their diet consists of a range of invertebrates (particularly insect larvae), small fish and molluscs.

Little grebe were recorded at Edera on survey visits in the winter period 2020/21.

Given the presence of Little Grebe during winter surveys and the presence of suitable foraging and roosting habitat at Edera Bog there is potential for adverse impacts to the Little Grebe population of the Lough Ree SPA.

No site-specific conservation objectives for the special conservation interest bird species of the Lough Ree SPA have been published. However site-specific conservation objectives from other SPAs that support this species are presented in Section 3.4.5 and are used to assist the examination of potential impacts to this species as a result of the PCAS.

Whooper Swan (*Cygnus cygnus*) [A038]

The latest Article 12 reporting data available from NPWS in respect of Whooper Swan relates to the period 2010. The wintering population size for this period, based on a best estimate of the number of individuals wintering was 10,520. Trends, both short term (2000-2010) and long-term (1986-2010) were all positive and increasing. The main pressures and threats comprise *Utility and service lines*, *renewable abiotic energy use, modification of cultivation practices*, *other agriculture activities*, *outdoor sports and leisure activities, recreational activities*, *and other forms of pollution* (sources relating to lead poisoning referenced only). The main threats and pressures at Lough Ree SPA are detailed in Table 15 below.

Results of the Irish Wetland Bird Survey (IweBS[6]) for the winter period 2009/10 – 2015/16 report a population size (ROI) of 11,852 individuals (from Crowe *et al*., 2015), of which 4,052 were associated with the SPA network. No Whooper Swan was recorded in the vicinity of Edera Bog at Lough Ree during the 2018/2019 IWeBS surveys (see Table 2 above).

Regarding connectivity to Edera Bog and potential linkage to the Lough Ree SPA flock, Scottish Natural Heritage (SNH)[7] recommends a core range of 5km from nighttime roosts be assumed in respect of foraging Whooper Swan during the winter months when establishing connectivity between a proposed wind farm development and nearby SPA's. However, it is also accepted that the distribution of the Whooper Swan population wintering in Ireland may change over the winter months, possibly due to birds dispersing southwards (as the winter progresses) from their original arrival grounds[8].

Suitable habitat (improved grazing fields) for Whooper Swan does occur adjacent to Edera Bog (due north and east) and birds were recorded in low numbers (Max 4) at Edera in winter 2020/21. Given the overlap with the SPA, the presence of Whooper Swan at Edera Bog and the presence of potential roosting and foraging habitat within or in close proximity to Edera Bog and associated rehabilitation activities there is potential for adverse effects to the Whooper Swan population supported by Lough Ree SPA.

No site-specific conservation objectives for the special conservation interest bird species of the Lough Ree SPA have been published. However site-specific conservation objectives from other SPAs that support

[6] Lewis *et al.* (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.

[7] https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

[8] 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.

this species are presented in Section 3.4.5 and are used to assist the examination of potential impacts to this species as a result of the PCAS.

Mallard (*Anas platyrhynchos*) [A053]

The latest reporting data available from NPWS in respect of Mallard relates to the period 2011-2016. The All-Ireland wintering population size for this period, based on a five-year mean was 28,230 of which 1,278 occurred within the SPA network. Long-term trends for this species are negative and decreasing.

Results of the Irish Wetland Bird Survey (IWeBS) at the section of Lough Ree in the vicinity of Edera Bog recorded low numbers of Mallard (max. count of 17 individuals in November 2018). Mallard were recorded in low numbers (maximum 4 individuals) at Edera Bog during winter season surveys in 2021.

Suitable foraging and roosting habitat occurs adjacent to Edera Bog at Lough Ree and also along the Bilberry River, and given their presence at Edera Bog there is potential for adverse disturbance impacts to the wintering population of Mallard supported by Lough Ree SPA.

No site-specific conservation objectives for the special conservation interest bird species of the Lough Ree SPA have been published. However site-specific conservation objectives from other SPAs that support this species are presented in Section 3.4.5 and are used to assist the examination of potential impacts to this species as a result of the PCAS.

Tufted Duck (*Aythya fuligula*) [A061]

The latest reporting data available from NPWS in respect of (wintering) tufted duck relates to the period 2011-2016. The All-Ireland wintering population size for this period, based on a five-year mean was 27,470 individuals of which 16,927 occurred within the SPA network, while a peak number of 192 were recorded within Lough Ree SPA during this time. No Tufted Duck were recorded in the sections of Lough Ree adjacent to Edera Bog during 2018/2019 IweBS surveys. No Tufted Duck were recorded at Edera Bog during the 2021 winter season surveys, however they were recorded in the vicinity of Edera Bog.

Trends in the short term are considered to be decreasing. The main pressures and threats to the Tufted Duck population supported by Lough Ree SPA are nautical sports, walking, horse-riding and non-motorised vehicles, hunting, leisure fishing, grazing, fertilisation and the spread of non-native invasive species.

Tufted Duck generally inhabit lowland freshwater lakes, as well as town lakes, ponds, canals and slow-moving rivers. The silt ponds and Bilberry River at Edera Bog offer suitable habitat for Tufted Duck. They feed predominantly on mussels, and to a lesser extent on crustaceans, insect larvae (particularly caddis-fly) and bryozoans.

Given the presence of Tufted Duck in the wider area surrounding Edera Bog and the presence of suitable breeding habitat in the form of silt ponds, there is potential for rehabilitation works to result in adverse impacts to Tufted Duck that may use silt ponds as nest sites.

No site-specific conservation objectives for the special conservation interest bird species of the Lough Ree SPA have been published. However site-specific conservation objectives from other SPAs that support this species are presented in Section 3.4.5 and are used to assist the examination of potential impacts to this species as a result of the PCAS.

Coot (*Fulica atra*) [A125]

The latest reporting data available from NPWS in respect of (wintering) coot relates to the period 2011-2016. The wintering population size for this period, based on a five-year mean was 18,520 individuals of which 12,280 occurred within the SPA network. The long-term population trend for this species is negative and decreasing.

During IWeBS surveys of the section of Lough Ree in the vicinity of Edera Bog during the 2018/2019 season low numbers of coot were recorded (max. 2 coot during any one count). During 2021 winter season surveys at Edera Bog a maximum of 2 coot was recorded during each of the transect surveys.

Coot is resident in Ireland but the winter population is augmented by winter migrants from the Continent and Britain. They are found on lakes, coastal estuaries and river systems, but show a clear preference for large inland lakes. Coots are omnivorous and feed on both plants and animals, but mainly on plants. Food taken from the water surface, including emergent plants and whilst diving. Food includes plant shoots, seeds, insects, algae and fish.

No species-specific guidance is available with which to establish connectivity distances to wintering bird-based SPA's. Migratory and local movements by Coot are rarely observed and are most likely to take place at night (Wernham et al., 2002).

Given the presence of coot at Edera Bog during winter season surveys and the presence of suitable breeding habitat in the form of silt ponds, there is potential for rehabilitation works to result in adverse impacts to coots that may use Edera Bog.

No site-specific conservation objectives for the special conservation interest bird species of the Lough Ree SPA have been published. However site-specific conservation objectives from other SPAs that support this species are presented in Section 3.4.5 and are used to assist the examination of potential impacts to this species as a result of the PCAS.

Wetland and Waterbirds [A999]

The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the wetland area contained in the SPA and the waterbirds that utilize this resource are of special conservation

interest for 'Wetland & Waterbirds'. In addition to the Special Conservation Interests described above, the Site Synopsis for the Lough Ree SPA describes a wide range of species as utilizing the site, including Mute Swan, Curlew, Great-crested Grebe, Cormorant and Black-headed Gull. The lake and the fringing habitats present in the SPA provide optimum feeding grounds for these various species of waterbirds, while many of the birds also roost or rest within the SPA.

Wetland habitats occur within the Edera Bog boundary and some examples of these habitats (i.e. degraded raised bog), that provide suitable habitat for waterbirds overlap with the boundary of the Lough Ree SPA.

Based on the presence of suitable wetland and waterbird habitat of the SPA within and adjacent to the boundary of Edera, connectivity to wetland and waterbird special conservation interest of the Lough Ree SPA is assumed.

No site-specific conservation objectives for the wetland habitat of the Lough Ree SPA have been published. However site-specific conservation objectives from other SPAs that support wetland habitat are presented in Section 3.4.5 and are used to assist the examination of potential impacts to this species as a result of the PCAS.

SPA Threats & Pressures

The threats and pressures to the Lough Ree SPA have been documented by the NPWS in the latest Natura 2000 Standard Data Return form for this SAC (dated September, 2019). Table 15 below lists these threats and pressures and examines their implication for the conservation status of the SPA's wetland bird populations that are examined as part of this Natura Impact Statement.

Table 15: Lough Ree SPA Threats & Pressures and associated examination of risk to the Special Conservation Interest Bird Species Wetland Birds

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

Threat Code	Threat	Threat Rank	Are Birds at Risk from Threat
			the use of non-motorised vehicles within or adjacent to the SPA.
F03.01	Hunting	Medium	Yes, wetland bird species are at risk from excessive hunting.
F02.03	Leisure fishing	Medium	Yes, wetland bird species, and particularly aquatic species such as Little Grebe, Tufted Duck, Mallard and Coot are at risk from disturbance associated with leisure fishing.

3.2.2 Conservation Objectives for the relevant European Sites

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

3.2.2.1 Lough Ree SAC (000440)

The site-specific conservation objectives of the Lough Ree SAC aim to define favourable conservation condition for the particular habitat or species at that site. These objectives and conditions are summarised in Table 16 below in respect of the Qualifying Interests of the Lough Ree SAC which were screened in for further evaluation.

The conservation objectives of the Lough Ree SAC are available in full on the National Parks & Wildlife Service website at:

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000440.pdf

The conservation objectives reproduced in the table below were sourced from NPWS Conservation Objectives: Lough Ree SAC [000440].

As noted in Section 3.2.1 above the site-specific conservation objectives for otters, natural eutrophic lake and degraded raised bog are presented in Section 3.4.5 below and are used to inform the examination of the potential for the PCAS to result in adverse effects to the favourable conservation status of these qualifying features of interests.

Table 16: Conservation Objectives of Lough Ree (Site Code 000440)

Lough Ree SAC (000440)			
Objective:	To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:		
	Code 1355 7110 91D0 91E0 3150	**Common Name** Otter Degraded raised bogs still capable of natural regeneration Bog woodland Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* Natural Eutrophic Lakes	**Scientific Name** *Lutra lutra*

3.2.2.2 Lough Ree SPA

The site-specific conservation objectives of Lough Ree SPA aim to define favourable conservation condition for the particular habitat or species at that site. These objectives and conditions are summarised in Table 17 below in respect of the special conservation interests of the Lough Ree SPA which were screened in for further evaluation.

The conservation objectives of the Lough Ree SPA are available in full on the National Parks & Wildlife Service website at:

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004064.pdf

The conservation objectives reproduced in Table 17 below were sourced from NPWS Conservation Objectives: Lough Ree SPA [004064].

As noted in Section 3.2.1 above the site-specific conservation objectives for special conservation interest bird species and wetland habitats of the SPA that are the subject of this Natura Impact Statement have been taken from other SPAs that list these species as interest features. These are presented in Section 3.4.5 below and are used to inform the examination of the potential for the PCAS to result in adverse effects to the favourable conservation status of these special conservation interest bird species and wetland habitats

Table 17: Conservation Objectives of Lough Ree SPA

Lough Ree SPA			
Objective #1	To maintain or restore the favourable conservation condition of the wetland habitat at Lough Ree SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.		
Objective #2	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:		
	Species Code **A004** **A038** **A053** **A061** **A125**	**Common Name** Little Grebe Whooper swan Mallard Tufted duck Coot	**Scientific Name** *Tachybaptus ruficollis* *Cygnus cygnus* *Anas platyrhynchos* *Aythya fuligula* *Fulica atra*

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

The following impact pathways to Qualifying Interests/Special Conservation Interests are examined in relation to Lough Ree SAC and Lough Ree SPA, in order to evaluate the effect of Edera Bog Decommissioning and Rehabilitation, if any, on the integrity of both European Sites.

Table 18: Qualifying Interests/Special Conservation Interests and Impact Pathways examined at Stage 2

European Site	Qualifying Interest/Special Conservation Interest for evaluation at Stage 2	Impact examined at Stage 2
Lough Ree SAC	a) *Lutra lutra* (Otter) [1355] b) Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150] c) Degraded raised Bogs	a) Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SAC b) Indirect/in-situ/ex-situ disturbance or displacement of species of Qualifying Interest. c) Indirect loss, reduction or degradation of habitats within or in close proximity to the SAC
Lough Ree SPA (Site Code 004064)	Little Grebe (*Tachybaptus ruficollis*) [A004] Whooper Swan (*Cygnus cygnus*) [A038] Mallard (*Anas platyrhynchos*) [A053] Tufted Duck (*Aythya fuligula*) [A061] Coot (*Fulica atra*) [A125]	a) Indirect, In-situ or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. b) In-situ/ex-situ mortality to special conservation interest bird species/waterbirds.

European Site	Qualifying Interest/Special Conservation Interest for evaluation at Stage 2	Impact examined at Stage 2
	Wetland habitat upon which special conservation interest bird species and other waterbirds rely.	a) Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site;

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

Evaluations are generally grouped between those which impact habitats (indirect based on where secondary habitat degradation potentially occurs, i.e. within a European Site boundary or outside) and then species (disturbance/displacement or mortality). Disturbance or displacement to the key avian receptors which comprise SCI's and form part of the 'Wetland and Waterbirds' SCI is dealt with collectively. Potentially adverse impacts on wetlands as part of 'Wetlands and Waterbirds' are addressed under the treatment of indirect loss, reduction or degradation of terrestrial or aquatic habitats. Potentially adverse secondary effects on waterbirds as part of 'Wetlands and waterbirds' are evaluated under 'Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest'. Potential in-situ/ex-situ mortality of special conservation interest bird species/waterbirds is evaluated separately below.

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

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

3.4.1 Direct Loss or degradation of Degraded Raised Bog & Wetland Habitat

During the screening approximately 0.9 Ha of degraded raised bog habitat of the Lough Ree SAC was identified as occurring within Edera Bog while approximately 0.04 Ha of degraded raised bog habitat that is representative of wetland habitat was identified as occurring within the Lough Ree SPA.

Figure 3 shows the extent of degraded raised bog occurring within both the Lough Ree SAC and the Edera Bog boundaries. Figure 7 shows the rehabilitation prescriptions that will be applied during the PCAS at Edera Bog. As can be seen on Figure 7 it is intended to apply the rehabilitation prescription MLT1 in the area of Edera Bog that overlap the SAC and include examples of degraded raised bog habitat. The MLT1 rehabilitation prescription does not involve any works. A Constraint rehabilitation prescription is also shown on Figure 7 in the area that overlaps the Lough Ree SAC. This prescription also does not entail any works.

The MLT1 prescription will also be applied to the area of Edera Bog outside but immediately surrounding the Lough Ree SAC and the example of degraded raised bog. The nearest area of a PCAS rehabilitation

prescription that will require works is separated over 100m from the example of degraded raised bog within the SAC and the SAC boundary. The absence of any proposed works within the SAC boundary and the example of degraded raised bog of Edera Bog occurring within the SAC boundary will ensure that the potential for direct loss or degradation of degraded raised bog habitat will not occur as a result of the PCAS. Furthermore, it is noted the nearest area of rehabilitation works will be associated with the application of WLT4 – wetland prescription. This rehabilitation prescription, which is buffered from the SAC boundary and the example of degraded raised bog, by approximately 100, will involve the installation of drain blocks and the creation of berms. The works associated with drain blocking and berm creation will involve a tracked machine. The track machine working area will be buffered from the SAC boundary and the degraded raised bog by a minimum distance of 100m and there will be no potential for these works to result in the loss or degradation of degraded raised bog occurring within the Lough Ree SAC.

3.4.2 Indirect/in-situ/ex-situ disturbance or displacement of Otters

3.4.2.1 Alone

Otter are rated as a very high sensitivity receptor (based on International importance ratings) and do not tolerate disturbance at or near holts (breeding dens) that are in active use (breeding may occur at any time of the year, but most likely during the Summer/early Autumn period). When Otters are not breeding, records suggest that Otters are less sensitive to human disturbance (Chanin, 2013). This could include the disturbance of animals at resting places (couches) but also at natal holts.

Given the absence of holts or couches within Edera Bog, there will be no potential for disturbance to otter at their holts or couches.

However, in the absence of suitable safeguards there will be potential for negative indirect disturbance or displacement effects to the otter population of Lough Ree SAC as a result of perturbation to water quality in the lake. As outlined in Table 12 above sedimentation has been identified as an existing threat to the otter population of the SAC. The release of excess sediment laden water to the lake will have the potential to result in changes to status of the lake habitat downstream and its potential to support otter prey species. This in turn could depress the quality of lake downstream as a foraging resource for otters and result in their abandonment of this area as a foraging area.

3.4.2.2 In Combination

There is potential for cumulative effects with existing identified threats and pressures to the Lough Ree SAC and from other plans or projects which may result in similar source-impact-pathways to Otter within the Lough Ree SAC or watercourses feeding the SAC.

The decommissioning and rehabilitation of Derrycashel Bog and Derrycolumb Bog by BnM, which is within the Lough Ree catchment, may result in likely significant/ potentially adverse effects on Otter; these projects are known to temporally overlap works proposed for Edera Bog.

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

Additional sources of disturbance such as the proposed walking route to be provided through Edera Bog, baseline agricultural activities or existing turbary are considered unlikely to result in in-combination adverse effects, due to habituation, described tolerance and occurrence during primarily daylight hours.

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

3.4.2.3 Stage 2 Evaluation

In the absence of measures to avoid/reduce harmful effects, the decommissioning and rehabilitation of Edera Bog, in-combination with other projects, such as the decommissioning and rehabilitation of other bog sites will have the potential to result in adverse effects to the favourable conservation status of the Otter population of the Lough Ree SAC.

3.4.3 Indirect loss, reduction or degradation of aquatic, wetland habitats of the Lough Ree SAC & SPA in close proximity or downstream of Edera Bog

Pathways for this impact to arise occur between Edera Bog and the natural eutrophic lake qualifying habitat of the Lough Ree SAC.

This habitat is also representative of a wetland habitat of the Lough Ree SPA.

Some or all of this habitat may be utilised by SCI species and waterbirds as feeding resources and/or roost sites.

Lake habitats in particular are highly sensitive to change, containing sensitive aquatic ecological receptors including fisheries, and a diverse macroinvertebrate community which provides feeding resources for various fauna.

Decommissioning and Rehabilitation at Edera Bog will require direct excavation of the banks and bed of the existing drainage channels (peat production drains), levelling of existing stock piles, movement of peat to create various blocks/speedbumps and cell bunds, infilling of drains, peat field reprofiling and the creation of berms, and excavations to lift or remove outfall pipes. It will require the use of machinery and involve the removal of waste, including raw material and the desludging of septic tanks, potentially contaminated soils or peat, railway infrastructure, and fuel.

3.4.3.1 Water quality effects due to the release of deleterious materials

Alone

The potentially polluting parameters to surface water associated with Edera Bog that have been monitored as part of the IPC licence for the bog are SS, TP and ammonia. These three parameters represent the

potential water quality contaminants that could be discharged from Edera Bog to Lough Ree SAC and the natural eutrophic lake aquatic/wetland habitat downstream.

Surface water is currently released from silt ponds to the Bilberry River and River Inny and conveyed downstream to Lough Ree. There is also one additional outfall to Bilberry River that does not pass through a silt pond.

The deposition of sediment to lake habitats is a natural process that varies throughout the year depending on precipitation rates and flow rates in discharging watercourses. However, additional sediment contributions entering the lake habitat of Lough Ree, from the above sources during PCAS activities at Edera Bog, could have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels by sediment causing mortality impacts for fish eggs (affecting recruitment) and interfering with invertebrate life stages within substrates. Effects on these receptors may in turn affect SCI species /waterbirds of the SPA or the otter population of the SAC which utilise fish and invertebrates as food resources. In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality.

The release of large volumes of sediment (for instance in the unforeseen event of a berm failure) to lake habitats downstream of Edera Bog may reduce the quality of habitats as foraging or roosting resources for waterbirds (including special conservation interest bird species of the SPA) or otters, and/or result in effective habitat loss and/or displacement should waterbirds or otters cease to utilise degraded habitats.

Overall effects may reduce the suitability of lake habitats downstream of Edera Bog as a resource for waterbirds and otters, thus affecting Site Integrity and/or Conservation Objectives – and particularly so in light of the conservation objectives for natural eutrophic lake habitat which seeks to restore the favourable conservation condition of this habitat and also for wetland habitat of the SPA which aim to maintain or restore favourable conservation condition of wetland habitat as a resource for the regularly-occurring migratory waterbirds that utilise it.

Loss of nutrient to Lough Ree will have the potential to contribute to an increase in the trophic status of the lake and result in further eutrophication. Lough Ree is a natural eutrophic lake and limits for TP and ammonia have been set by the NPWS for this habitat. These limits are an annual average concentration limit of <20ug/l for TP, <0.065mg/l N for ammonia and an annual average 95th percentile of <0.140mg/l N for total ammonia. Excessive nutrient inputs to the lake above these thresholds will have the potential to result in adverse effects to vegetation communities and fauna supported by the lake.

As noted in Section 1.2.5 above water quality at silt ponds are monitored prior to discharge to the Bilberry River and the River Inny that drain to Lough Ree. Currently the concentrations for TP and ammonia at silt ponds are above the limits set by the NPWS for Lough Ree. It is noted that these monitoring results are from the silt ponds and are representative of TP and ammonia concentrations downstream at Lough Ree.

The concentrations of TP and ammonia draining to the above two watercourses will be diluted and attenuated and further diluted within the lake waterbody.

The PCAS includes measures for the application of fertiliser to help accelerate natural colonisation within the areas targeted by active rehabilitation prescriptions. Slow-release Phosphorous-rich fertiliser (such as Rock Phosphate) will be used to accelerate natural colonisation and the development of pioneer vegetation cover. Low application rates will be used.

In the absence of suitable safeguards the use of these fertilisers, in-combination with the exist levels of TP and ammonia discharging from silt ponds, as well as discharges from existing and unprotected outfalls to the Billberry River will have the potential to combine with other existing sources of nutrient pressure to the lake to undermine its trophic status.

In combination

There is potential for cumulative effects from other plans or projects which may result in similar source-impact-pathways to Lough Ree and watercourse feeding the lake.

The decommissioning and rehabilitation of Derrycashel bog and Derrycolumb Bog by BnM, which is within the Lough Ree catchment, may result in likely significant/ potentially adverse effects on Otter, natural eutrophic lake habitat and to a lesser extent alluvial woodland habitat; these projects are known to temporally overlap works proposed for Edera Bog.

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

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

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

Stage 2 Evaluation

In the absence of measures to avoid/reduce harmful effects, decommissioning and rehabilitation of Edera Bog, in-combination with other projects, such as the decommissioning and rehabilitation of other bog sites, will have the potential to result in adverse effects to the favourable conservation status of qualifying habitats of the Lough Ree SAC, as listed above.

3.4.3.2 Alteration of flow regimes or changes to watercourse morphology

Alone

Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. In the absence of mitigation there is potential for the decommissioning and rehabilitation at Edera Bog to result in changes to local hydrogeological and hydrological conditions, with potential for downstream effects to aquatic lake habitats (i.e. natural eutrophic lake)) of the Lough Ree SAC and SPA. Potential impacts to hydrogeology and hydrology will arise from:

a)increases in groundwater levels which may affect neighbouring lands across hydraulic gradients;

b)reductions in conveyance capacity around or through the BNM bog, or;

c)Marginal alteration of topographical catchments, also resulting in flooding as a result of increased run-off.

In combination

There is potential for cumulative effects from other plans or projects which may result in similar source-impact-pathways to local hydrogeological and hydrological conditions that influence flow rates to Lough Ree and watercourse feeding the lake.

The decommissioning and rehabilitation of Derrycashel Bog and Derrycolumb Bog by BnM, which is within the Lough Ree catchment, may result in likely significant/ potentially adverse effects on Otter, natural eutrophic lake habitat and alluvial woodland habitat; these projects are known to temporally overlap works proposed for Edera Bog.

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

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

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

Stage 2 Evaluation

In the absence of measures to avoid/reduce harmful effects, decommissioning and rehabilitation of Edera Bog, in-combination with other projects, such as the decommissioning and rehabilitation of other bog sites, will have the potential to result in adverse effects to the favourable conservation status of qualifying habitats of the Lough Ree SAC, particularly natural eutrophic lake habitat and alluvial forest habitat, and wetland habitats of the Lough Ree SPA.

3.4.3.3 Spread of invasive species

Alone

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

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

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

It is noted that no non-native invasive species were identified at Edera Bog during baseline surveys.

Were the impacts described above to occur during works at Edera Bog within, in close proximity to, or upstream of Lough Ree SAC/Lough Ree SPA, it may result in adverse effects on qualifying interests and special conservation interests and Conservation objectives such as the resource status and favourable condition of habitat and species, by virtue of effects to structure and composition of SCI habitat, an altered hydrological regime and through secondary effects on prey item species, affecting the supporting habitat quality for waterbirds (including special conservation interest bird species of the Lough Ree SPA) and the otter population of the Lough Ree SAC.

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

In combination

There is potential for cumulative effects from other plans or projects which may result in similar source-impact-pathways to the Lough Ree SAC and the Lough Ree SPA.

The decommissioning and rehabilitation of Derrycashel Bog and Derrycolumb Bog by BnM, which is within the Lough Ree catchment, may result in likely significant/ potentially adverse effects to natural eutrophic

lake habitat of Lough Ree and the Otter population that rely on this habitat; these projects are known to temporally overlap works proposed for Edera Bog.

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

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

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

Stage 2 Evaluation

In the absence of measures to avoid/reduce harmful effects, decommissioning and rehabilitation of Edera Bog, in-combination with other projects, such as the decommissioning and rehabilitation of other bog sites, will have the potential to result in adverse effects to the favourable conservation status of qualifying habitats of the Lough Ree SAC, particularly natural eutrophic lake habitat and alluvial forest habitat, and wetland habitats of the Lough Ree SPA.

3.4.4 Indirect, In-situ or Ex Situ disturbance or displacement of bird species of Special Conservation Interest of the lough Ree SPA

3.4.4.1 Alone

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

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

As the construction phase of decommissioning and rehabilitation will involve the use of heavy machinery, disturbance/displacement effects on waterbirds listed as Special Conservation Interests for the Lough Ree SPA has been identified as a potential source impact pathway for likely significant effects, and in the

absence of protective measures potentially adverse effects on the SPA's Integrity/Conservation Objectives.

Seeing as the construction phase is expected to be of a temporary to short-term duration, the disturbance effects are considered similarly temporary to short-term in duration. It is also noted that the PCAS works will not differ significantly from baseline peat harvesting activities on site. Due however to the proximity of suitable SCI habitat to the proposed works, and the possibility of works taking place during the winter/migration season, the potential for adverse effects through the disturbance/displacement of wintering or passage wildfowl is considered and examined herein. In addition, due to the potential for Lough Ree SPA to support breeding Little Grebe and Tufted Duck as well as other waterbirds the potential for adverse effects through the disturbance/displacement to these species during the breeding season is considered and examined herein.

To determine if disturbance effects are likely, a literature review looked at the tolerances of bird species to disturbance. Although these distances, often referred to as the Minimum Approach Distance (MAD; a function of observed Flight Initiation Distances (FID)) are not considered to be the best determinant of whether disturbance will affect birds, they nevertheless remain the most effective approach for establishing set-back distances (or buffers) to limit disturbance effects around areas where birds occur. Livezey et al. (2016) reviewed a substantial number of such studies between 2009 and 2015 where FIDs had been calculated for the species groups which are pertinent for the current appraisal, including non-breeding Anseriformes (wildfowl, including Whooper Swan, Wigeon, Goldeneye, Tufted Duck, Teal, Shoveler and Mallard), Charadriiformes (waders including Golden Plover, Lapwing, Common Tern and gulls such as Black-headed Gull), Podicepidiformes (e.g. Little Grebe) and Gruiformes (e.g. Coot). As it offers the most comprehensive review currently available, the MADs presented in Livezey et al., (2016) in respect of motorized vehicles and/or pedestrians (with the highest MAD from either selected) were considered an appropriate basis for use in the current appraisal; these were 123.2m for Anseriformes, 42.2m for Charadriiformes, 46.4m for Podicepidiformes, and 42.8m for Gruiformes.

An evaluation of the significant effects due to noise and disturbance resulting from the decommissioning and rehabilitation on SCI species potentially occurring at or in proximity to Edera Bog is presented in Table 19.

Table 19 SCI Disturbance Evaluation

SCI	MAD (m)	Sensitivity	Notes
Little Grebe	46.4	Resident Foraging/ Roosting	Recorded in baseline surveys. Suitable habitat along the Bilberry River within 25m of the nearest rehabilitation prescription (i.e. WLT1). The silt ponds within the Edera bog site also provide suitable breeding habitat for Little Grebe. Usage of these areas cannot be precluded; significant disturbance effect.
Whooper Swan	123.2	Wintering Foraging/ Roosting	Recorded in baseline surveys. Suitable habitat in the form of grassland habitats, within 123.2m of works and usage cannot be precluded; significant disturbance effect.
Mallard	123.2	Wintering Foraging/ Roosting	Recorded in baseline surveys. Suitable habitat along the Bilberry River within 25m of the nearest rehabilitation prescription (i.e. WLT1). The silt ponds within the Edera bog site also provide suitable breeding habitat for Mallard. Usage of these areas cannot be precluded; significant disturbance effect.
Tufted Duck	123.2	Resident Foraging/ Roosting	Recorded in baseline surveys. Suitable habitat along the Bilberry River within 25m of the nearest rehabilitation prescription (i.e. WLT1). Usage of the Bilberry River cannot be precluded; significant disturbance effect.
Coot	42.8	Resident Foraging/ Roosting	Recorded in baseline surveys. Suitable habitat along the Bilberry River within 25m of the nearest rehabilitation prescription. The silt ponds within the Edera bog site also provide suitable breeding habitat for Coot and usage cannot be precluded; significant disturbance effect.
Wetland and waterbirds	123.2*		Suitable habitat present and usage cannot be precluded; significant disturbance effect.

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

3.4.4.2 In combination

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

The decommissioning and rehabilitation of Derrycashel Bog and Derrycolumb bog by BnM, which is within the Lough Ree catchment, may result in likely significant/ potentially adverse effects on special conservation interest bird species of Lough Ree SPA; these projects are known to temporally overlap works proposed for Edera Bog.

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

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

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

3.4.4.3 Stage 2 Evaluation

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

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

3.4.5 Indirect/in-situ/ex-situ mortality to Special Conservation Interest Bird Species

3.4.5.1 Alone

Silt ponds on site and the Bilberry River provides suitable breeding habitat for Little Grebe and Tufted Duck. The establishment of nests of these species in silt ponds cannot be precluded. In the event that nests of these species are established at silt ponds, the potential will exist for accidental destruction of a nest. Where the presence of an active nest overlaps with maintenance works, machinery will have the potential to result in the destruction of eggs or the mortality of non-fledged chicks that may occupy the nest.

3.4.5.2 In combination

The potential for nest destruction and mortality of Mallard, Coot or Little Grebe chicks will have the potential to combine with other known pressures, such as those listed in Table 9 above to the bird populations supported by Lough Ree SPA.

3.4.5.3 Stage 2 Evaluation

In the absence of measures to avoid/reduce harmful effects, the decommissioning and rehabilitation of Edera Bog, in-combination with other existing threats and pressures will have the potential to result in adverse effects to the favourable conservation status of the special conservation interest bird species population of the Lough Ree SPA.

3.4.6 Examination of Potential Impact to Conservation Objectives

Table 20 below lists the site-specific conservation objectives published by the NPWS for Lough Ree SAC otter and degraded raised bog. Site-specific conservation objectives for special conservation interest bird species and wetland habitats are also listed in Table 17. As there are no site-specific conservation objectives published for Lough Ree SPA, the site-specific conservation objectives for little grebe are taken from Cork Harbour SPA (); for whooper swan and coot are taken from Lough Swilly SPA; for Mallard and wetland habitat are taken from Castlemaine Harbour SPA. There are no published site-specific conservation objectives for Tufted Duck, as such the site-specific conservation objective attributes of population trend and distribution are also used for this species

The attributes that are used to measure the favourable conservation status of these features of interest and the targets that are required to be achieved to ensure favourable conservation status are listed in Table 17 and an examination of the potential for the PCAS to undermine the achievement of these targets is outlined.

Table 20: Examination of Potential Impacts to Conservation Objectives

Attribute No.	Attribute	Target	Consideration of likely significant effects
Lough Ree SAC			
Otter			
1	Distribution	No significant decline	Negative effects to water quality as a result of project activities will have the potential to affect the otter foraging resource of the Bilberry River and result in local impacts within Lough Ree downstream of Edera Bog.
2	Extent of terrestrial habitat	No significant decline	The project will not result in the loss of any terrestrial habitat used by otters. Upon establishment the re-wetting of the bog and the provision of wetland habitat within the bog will increase the availability of terrestrial habitat within Edera Bog for otters.
3	Extent of freshwater habitat (river)	No significant decline	As per attribute no. 1 above negative impacts to the water quality of Bilberry River and the River Inny will have the potential to undermine its potential to support otters.
4	Extent of freshwater habitat (lakes)	No significant decline	As per attribute no. 1 above negative impacts to the water quality of Bilberry River and the River Inny will have the potential to contribute negatively to the status of Lough Ree to function as a foraging resource for otters.
5	Couching sites and holts	No significant decline	No couching sites or holts are present at Edera Bog and the PCAS will not have the potential to result in the decline of these features.
6	Fish biomass	No significant decline	As per attribute no. 1 above the project will have the potential to undermine water quality downstream and within waterbodies likely to be used by the SAC's otter population. Any adverse impacts to these waterbodies could result in a decrease in fish biomass and undermine the target for this attribute.
7	Barriers to connectivity	No significant increase	Activities associated with the construction and operation phase of the PCAS will not have the potential to undermine this attribute.
Natural Eutrophic Lake			
8	Habitat Area	Area stable or increasing, subject to natural processes	The PCAS at Edera Bog will not result in the loss of an natural eutrophic lake habitat. The lake is buffered from the nearest area of active works associated with rehabilitation prescriptions by approximately 150m which will ensure no change to the area of this habitat within the SAC.
9	Habitat Distribution	No decline, subject to natural processes.	For the reason outlined for attribute no. 8 above the project will not have the potential to result in changes to the distribution of this habitat.

10	Typical Species	Typical species present, in good condition, and demonstrating typical abundances and distribution	In the absence of suitable safeguards the works associated with the PCAS could result in the introduction of non-native invasive species to Edera Bog that could in turn spread to this lake habitat. It is noted that no non-native invasive species were identified at Edera Bog during baseline surveys and none are known to occur at Edera Bog. The potential for the spread of such species will be via their introduction during the transport of machinery on to the bog and the movement of site operatives at the bog. Its further noted that the likely of such introductions occurring are low, especially when the scale of PCAS works are compared to former industrial peat extraction works (See Section 1.2.6 above) during which no non-native invasive species were introduced to the bog.
11	Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition	In the event that the project results in the release of polluted surface water with elevated concentrations of SS, TP or ammonia to the Bilberry River, the River Inny and Lough Ree downstream, it could combine with other sources of such contaminant in the Lough Ree catchment and result in an increase in sediment and nutrient deposition within Lough Ree. Increases in sedimentation and/or nutrient could in turn change lake depths with consequent effects on the zonation of vegetation communities.
12	Vegetation distribution: maximum depth	Maintain maximum depth of vegetation, subject to natural processes	For reasons outlined for attribute no 11 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to lake depth.
13	Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat	The PCAS will not result in any increases to discharge volumes or flows to Lough Ree and the natural eutrophic lake habitat. The aim of the PCAS rehabilitation prescriptions is to restore a natural drainage regime in the existing bog that will contribute to a more stable hydrological regime that will not alter the existing sub-catchments or the natural eutrophic lake habitat downstream.
14	Lake substratum quality	Maintain appropriate substratum type, extent and chemistry to support the vegetation	For reasons outlined for attribute no. 11 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to composition of the lake substrate.
15	Water quality: transparency	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	For reasons outlined for attribute no. 11 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to transparency in the water column.
16	Water quality: nutrients	Maintain the concentration of nutrients in the water column at sufficiently low levels to support the habitat and its typical species	An annual average TP concentration limit of <20ug/l has been assigned for TP, <0.065mg/l N has been assigned for ammonia and an annual average 95th percentile of <0.140mg/l N has been assigned for total ammonia.

			As outlined in Section 1.2.4 above the concentration of nutrients discharging from Edera Bog are following a downward trend and this trajectory is predicted to be continue as a result of the PCAS, which will lower runoff and flow volumes from the bog. The PCAS includes measures for the application of fertiliser to help accelerate natural colonisation within the areas targeted by active rehabilitation prescriptions. Slow-release Phosphorous-rich fertiliser (such as Rock Phosphate) will be used to accelerate natural colonisation and the development of pioneer vegetation cover. Low application rates will be used. In the absence of suitable safeguards the use of these fertilisers, in-combination with the exist levels of TP and ammonia discharging from silt ponds, as well as discharges from existing and unprotected outfalls to the Billberry River will have the potential to combine with other existing sources of nutrient pressure to the lake to undermine its trophic status.
17	Water quality: phytoplankton biomass	Maintain appropriate water quality to support the habitat, including good chlorophyll a status	For reasons outlined for attribute no. 16 above the PCAS will have the potential to combine with other sources of nutrient inputs to result in excessive growth of phytoplankton biomass within the natural eutrophic lake habitat of Lough Ree SAC.
18	Water quality: phytoplankton composition	Maintain appropriate water quality to support the habitat, including good phytoplankton composition status	For reasons outlined for attribute no. 16 above the PCAS will have the potential to undermine the achievement of this conservation objective.
19	Water quality: attached algal biomass	Maintain trace/absent attached algal biomass (<5% cover) and good phytobenthos status	For reasons outlined for attribute no. 17 above the PCAS will have the potential to undermine the achievement of this conservation objective.
20	Water quality: macrophyte status	Maintain good macrophyte status	The principal parameter influencing macrophyte status in the lake is nutrient status. For reasons outlined for attribute no. 17 above the PCAS have the potential to undermine the achievement of this conservation objective.
21	Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	A limit of a pH of <9 has been assigned by the NPWS for this attribute. Any release of excess peat-derived silts to the natural eutrophic lake of the Lough Ree SAC could combine with other sources of peat-derived siltation in the Lough Ree catchment to result in an increase in the discharge of low pH silt material to the lake.
22	Water colour	Maintain appropriate water colour to support the habitat	For reasons outlined for attribute no. 11 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation

			within the lake with the potential for resultant changes to transparency in the water column.
23	Dissolved organic carbon (DOC)	Maintain appropriate organic carbon levels to support the habitat	The release of excess peat-derived silts to the Lough Ree catchment during could combine with other sources of peat-derived siltation in the catchment to result in an increase in DOC within the catchment and downstream within the lake.
24	Turbidity	Maintain appropriate turbidity to support the habitat	In the event that the project results in the release of polluted surface water to watercourses, the project could combine with other sources of silt in the Lough Ree catchment and result in an increase in sedimentation deposition within Lough Ree. Increases in sedimentation could in turn increase turbidity within the lake.
25	Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of the lake habitat	Any changes to pH levels within the lake habitat as outlined for attribute no 21 above could result in a change to the structure of fringing habitats.
Degraded Raised Bog			
26	Habitat area	Restore area of active raised bog to 70.1ha, subject to natural processes	The PCAS at Edera Bog will not result in a reduction of habitat area or the achievement of the restoration target for degraded raised bog occurring within Lough Ree SAC. An example of degraded raised bog occurs within both the SAC and Edera Bog boundaries. The rehabilitation prescriptions MLT1 and "constraint" is to be applied to the area of Edera Bog that supports this example of degraded raised bog (as shown on Figure 2). No active works are associated with MLT1 or "constraint" and the area of degraded raised bog supported by the Lough Ree SAC will not be subject to any loss or degradation as a result of the PCAS. The PCAS will contribute to an increase in the overall extent of raised bog habitat at a national level.
27	Habitat distribution	Restore the distribution and variability of active raised bog across the SAC.	The PCAS at Edera Bog will not result undermine the targets for this attribute. The PCAS will contribute to an increase in the overall distribution of raised bog habitat adjacent to the SAC.
28	High bog area	No decline in extent of high bog necessary to support the development and maintenance of active raised bog.	The PCAS will not result in an decline in remaining high bog areas within Lough Ree SAC.

29	Hydrological regime: water levels	Restore appropriate water levels throughout the site	The PCAS aims to restore water levels and the hydrological regime at Edera Bog to natural conditions. This aim will contribute to achieving this conservation objective for the example of degraded raised bog at Edera Bog that are located within Lough Ree SAC.
30	Hydrological regime: flow patterns	Restore, where possible, appropriate high bog topography, flow directions and slopes.	The PCAS aims to restore flow directions and slopes to more natural conditions, that will contribute to achieving the target of this conservation objective.
31	Transitional areas between high bog and adjacent mineral soils (including cutover areas)	Restore adequate transitional areas to support/protect active raised bog and the services it provides	The PCAS will have the potential to contribute positively to achieving the target of this conservation objective through its aim for restoring peatland habitat at Edera Bog.
32	Vegetation quality: central ecotope, active flush, soaks, bog woodland	Restore 35.1ha of central ecotope/active flush/soaks/bog woodland as appropriate.	No examples of these ecotopes occur at Edera Bog and the PCAS will not have the potential to undermine the target for this conservation objective. The PCAS will have the potential to contribute to this conservation objective by restoring peatland and these ecotopes within Edera Bog.
33	Vegetation quality: microtopographical features	Restore adequate cover of high quality microtopographical features	The aim of the PCAS to restore peatland at Edera Bog will have the potential to contribute positively towards achieving this target through the restoration of peatland habitat and the microtopographical features that will develop at Edera Bog under restored peatland conditions.
34	Vegetation quality: bog moss (Sphagnum) species	Restore adequate cover of bog moss (Sphagnum) species to ensure peat forming capacity	The aim of the PCAS to restore peatland at Edera Bog will have the potential to contribute positively towards achieving this target through the restoration of peatland habitat and the increase in sphagnum cover that will develop at Edera Bog under restored peatland conditions.
35	Typical ARB species: flora	Restore, where appropriate, typical active raised bog flora	The aim of the PCAS to restore peatland at Edera Bog will have the potential to contribute positively towards achieving this target through the restoration of peatland habitat and the increase in typical raised bog flora cover that will develop at Edera Bog under restored peatland conditions.
36	Typical ARB species: fauna	Restore, where appropriate, typical active raised bog fauna	The aim of the PCAS to restore peatland at Edera Bog will have the potential to contribute positively towards achieving this target through the restoration of peatland habitat and the increase in typical raised bog fauna that will colonise Edera Bog under restored peatland conditions.
37	Elements of local distinctiveness	Maintain features of local distinctiveness, subject to natural processes	The PCAS aims to restore peatland habitats and will not result in any decline in the features of local distinctiveness that are supported by examples of degraded raised bog occurring within the Lough Ree SAC.
38	Negative physical indicators	Negative physical features absent or insignificant	The PCAS aims to remove negative physical features from Edera Bog that will have the potential to contribute positively to the status of degraded raised bog at Edera Bog that is located within the SAC boundary.

39	Vegetation composition: native negative indicator species	Native negative indicator species at insignificant levels	See examination provided for attribute no 10 above.
40	Vegetation composition: non-native invasive species	Non-native invasive species at insignificant levels and not more than 1% cover	See examination provided for attribute no 10 above.
41	Air quality: nitrogen deposition	Air quality surrounding bog close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr	The PCAS rehabilitation prescriptions will not result in any nutrient emissions to air and will not have the potential to result in nitrogen deposition on examples of degraded raised bog habitat.
42	Water quality	Water quality on the high bog and in transitional areas close to natural reference conditions	The aim of the PCAS is to stabilise conditions at Edera Bog which in turn will contribute to a natural hydrological regime that includes water quality trending towards natural conditions on peatland habitats.
Lough Ree SPA			
Little Grebe; Mallard, Tufted Duck, Coot, Whooper Swan & Waterbirds			
43	Population trend	Long term population trend stable or increasing	The works at Edera Bog will not have the potential to result in a decline in the long-term population trend of the special conservation interest bird species or wetland birds supported by the SPA. The works associated with the PCAS are short term and following their completion there will be minimal activity on site with potential to disturb bird populations. Furthermore, once the rehabilitation prescriptions have been implemented and Edera Bog begins to stabilise it is predicted that Edera Bog will provide suitable additional wetland habitat for waterbirds and will have the potential to contribute to an increase in the long-term population of special conservation interest bird species and other waterbirds.
44	Distribution	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	In the absence of appropriate mitigation measures the potential exists for localised and short-term impacts to the distribution of mallard, coot, tufted duck and little grebe that use existing silt ponds at Edera Bog and for ex-situ disturbance to the small numbers of whooper swan that use Edera Bog.
Wetland Habitat			
45	Habitat Area	The permanent area occupied by the wetland habitat should be stable and not decreasing.	The PCAS at Edera Bog will not result in a reduction of wetland habitat area occurring within Lough Ree SPA. An example of degraded raised bog, that is representative of a wetland habitat occurs within both the SPA and Edera Bog boundaries. The rehabilitation prescriptions MLT1 and "constraint" is to be applied to the area of Edera Bog that supports this example of wetland habitat (as shown on Figure 2). No active works are associated with MLT1 or "constraint" and the area of wetland

			habitat supported by the Lough Ree SPA will not be subject to any loss or degradation as a result of the PCAS. The PCAS will contribute to an increase in the overall extent of wetland habitat at a national level and surrounding Lough Ree SPA and will have the potential to contribute positively to the integrity of the SPA by providing a significant natural wetland buffer to the east of the SPA boundary.

3.5 Mitigation Measures

A range of mitigation measures are outlined in the following sub-sections that aim to avoid, or minimise to an insignificant level, the potential impacts to the conservation objectives of the Lough Ree SAC and Lough Ree SPA that have been identified in Section 3.4 above. The mitigation measures prescribed below rely on established best practice environmental control measures as well as the provision of design measures at Edera Bog. Existing measures are in place at Edera Bog to control the emission of surface water from the bog downstream to the Bilberry River and the River Inny and on to Lough Ree. While these measures are utilised to provide effective treatment of surface waters draining from Edera Bog to the required standards under the Edera Bog IPC licence, further bespoke design mitigation measures will be implemented as part of the PCAS so that all surface water draining from the bog is controlled and treated to a high standard that will ensure no loss of suspended solids or nutrient to the Bilberry River, River Inny and Lough Ree.

The following sub-sections describe the range of mitigation measures that will be implemented during the PCAS and form part of the PCAS design.

3.5.1 Description of the Measure

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

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

- Bog restoration/rehabilitation works will be restricted to within the footprint of the proposed rehabilitation works area.
- The proposed rehabilitation works will have due regard to noise limits and hours of operation (i.e. dusk and dawn) to minimise any potential disturbance on resident and local fauna that utilise the site and immediate environs.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- The proposed works will be restricted to daylight hours and there will be no requirement for artificial lighting.
- Silt ponds will be inspected and maintained as per the IPC Licence.
- During periods of heavy precipitation and run-off, works will be halted.
- Works will be carried out using a suitably sized machine and in all circumstances, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.
- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
- Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.

- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- All waste will be sorted by the works crews, managed within the site in designated waste disposal facilities, and removed to a licenced waste facility, in line with BnM Standard operating practice.
- Vehicles will never be left unattended during refuelling.
- No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
- All plant refuelling will take place using mobile fuel bowsers. Only dedicated trained and competent personnel will carry out refuelling operations.
- All fuels required for machinery and equipment will be stored in a designated location, away from main traffic activity, at the nearest BnM Compound. All fuel will be stored in bunded, locked storage containers. Diesel or petrol fuel and mechanical oils will also be used by site vehicles.
- Mobile storage such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked. All pumps using fuel or containing oil will be locally and securely bunded where there is the possibility of discharge to waters.
- Potential impacts caused by spillages etc. during rehabilitation works will be reduced by keeping spill kits and other appropriate equipment on-site.
- Site works will be carried out in accordance with 'best practice'. In order to ensure compliance and implementation of 'best practice', these measures will be communicated to relevant Bord na Móna staff and updated as required.
- All waste water will be removed by a licenced waste contractor to a licenced waste water treatment facility.
- Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
    1. The land is waterlogged
    2. The land is flooded, or it is likely to flood
    3. The land is frozen, or covered with snow
    4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann)
    5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- No fertiliser will be spread on land within 2 metres of a surface watercourse.
- Buffer zones in respect of waterbodies, as specified on https://www.epa.ie/about/faq/name,57156,en.html, will be adhered to at all times with regard to fertiliser application.

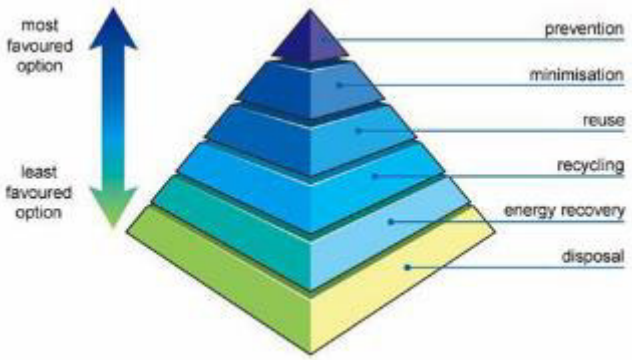
3.5.1.2 Best Practice Measures around the treatment of Waste

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

- Disposal or recovery of waste shall take place only as specified in Schedule 2(i) Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery of this licence and in

accordance with the appropriate National and European legislation and protocols. No other waste shall be disposed of/recovered either on-site or off-site without prior notice to, and prior written agreement of, the Agency.

- Waste sent off-site for recovery or disposal shall only be conveyed to a waste contractor, as agreed by the Agency, and only transported from the site of the activity to the site of recovery/disposal in a manner which will not adversely affect the environment.
- A full record, which shall be open to inspection by authorized persons of the Agency at all times, shall be kept by the licensee on matters relating to the waste management operations and practices at this site. This record shall as a minimum contain details of the following:
    - The names of the agent and transporter of the waste.
    - The name of the persons responsible for the ultimate disposal/recovery of the
    - waste.
    - The ultimate destination of the waste.
    - Written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site.
    - The tonnages and EWC Code for the waste materials listed in Schedule 2(i) Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery sent off-site for disposal/recovery.
    - Details of any rejected consignments.
- A copy of this Waste Management record shall be submitted to the Agency as part of the AER for the site.
- As required by the licence, these waste items will be removed for recycling or disposal, using external contractors with the required waste collection permits, as agreed by the EPA, with waste records maintained as required for inspection by authorized persons of the EPA at all times.
- Where possible, Bord na Móna will utilize the appropriate waste hierarchy to identify waste that can reused or recycled ahead of disposal.



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

3.5.1.3 Best Practice & Biosecurity

While it is noted that no non-native invasive species have been recorded at Edera Bog during baseline surveys the following measures will be implemented as standard best practice approach to rehab works. The potential for importation or introduction of non-native plant species (such as Japanese Knotweed, Himalayan Balsam, etc.) has been identified. Section 49 of the European Communities (Birds and Natural Habitats) Regulations 2011 prohibits the introduction and dispersal of invasive alien species (particularly plant species) listed on Part 1 (third column) of the 'Third Schedule'.

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

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

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

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

- All water quality monitoring equipment which has been used in water will be treated with a disinfectant or a strong saline solution and then thoroughly dried (ideally over 24 hours) BEFORE being used in water again.
- Check, Clean, Dry protocol will be adhered with before and after visiting a river or lake for monitoring, in line with Best Practice[9] or for activities such as Sphagnum inoculation.
- Virkon Aquatic will be available as required.

3.5.1.4 Silt Ponds

Silt Ponds – 6 no. Silt ponds with a total volume of 9.1m^3 are in place at Edera Bog and connected to the existing drainage network. These silt ponds, already stipulated and in use as mitigation measures in respect of Peat Extraction under IPC license, will continue to function as the primary intervention in terms of sediment release to receiving waterbodies. Regular cleaning and reporting on same, already forms part

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

of annual (AER) reporting submitted to EPA. All Silt Ponds at Edera Bog are currently compliant with EPA requirements. Table 21 below and Figure 11 overleaf summarise and illustrate the onsite Silt Pond locations, the latter also illustrates the current flow regime within the main drainage network (into which any other drains also feed). Continued maintenance and reporting on same will be reported on annually, until IPC license Surrender.

Table 21 Silt Ponds in use at Edera Bog

Bog Name	IPC License Reference	Pond No.	Area (m^2)	Volume (m^3)
Edera Bog	504	ED105	1525	2287.0
Edera Bog	504	ED109	1343	2013.7
Edera Bog	504	ED110	387	580.2
Edera Bog	504	ED106	1068	1601.3
Edera Bog	504	ED107	962	1441.6
Edera Bog	504	ED108	811	1216.6
		Total	**6096**	**9,140.4**

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

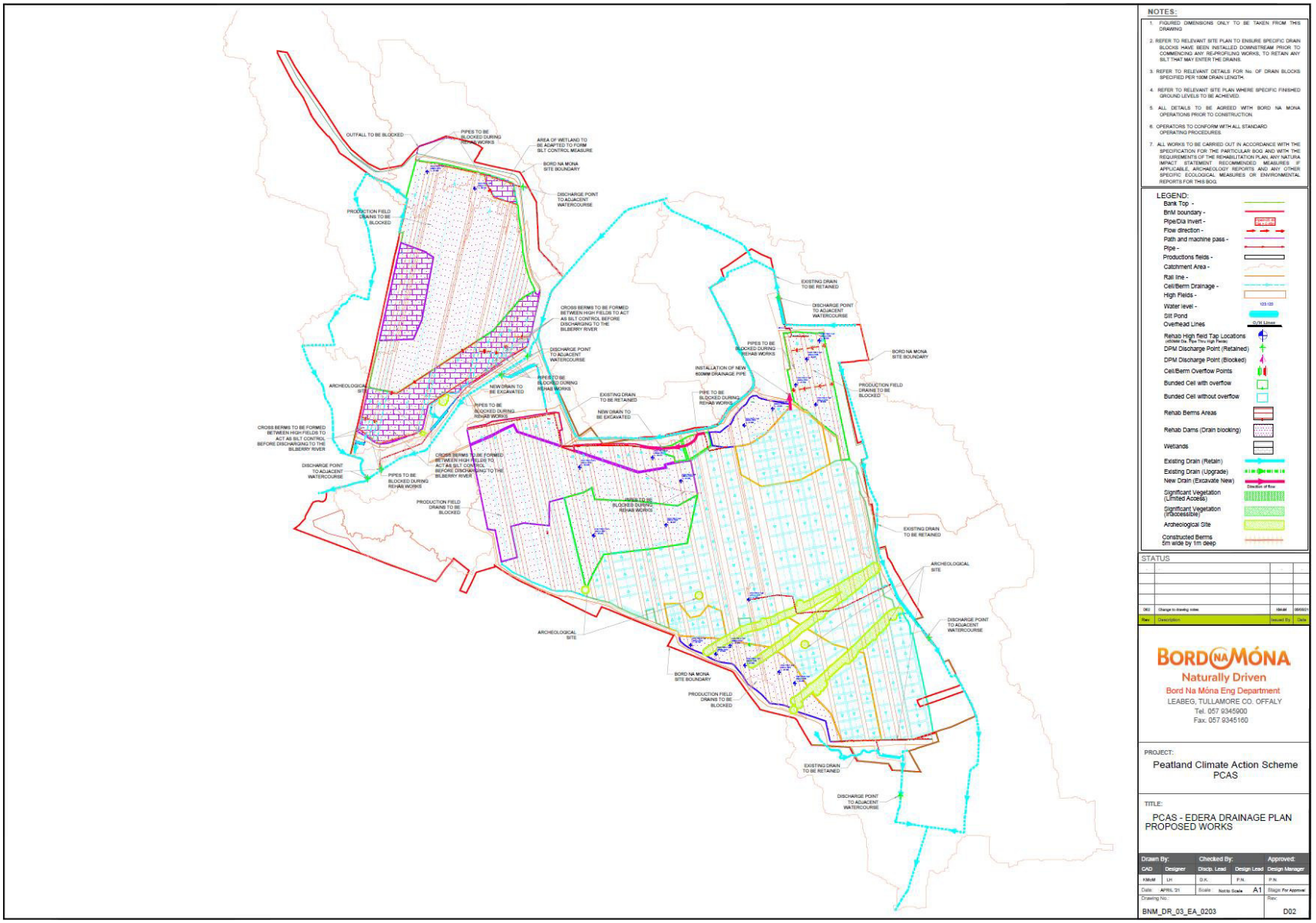


Figure 11: EDERA Existing and Proposed Surface Water Management & Treatment

3.5.1.5 Measures to avoid runoff when carrying out rewetting of peat

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

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

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

3.5.1.6 Bespoke Measures to Further Manage and Treat Surface Water

In addition to the utilisation of the existing silt ponds and surface water management infrastructure at Edera Bog, further bespoke surface water management and treatment will be provided as part of the PCAS design through the provision of wetland areas and the removal of an outfall to the Bilberry River.

The provision of the wetland areas will act as a silt control measure and thus will perform the same functional requirement as the original silt ponds, thereby introducing an additional treatment and settlement stage for surface water generated at the bog. The wetlands upstream of the outfalls will also act as a large silt sinks between high fields and thus increased sediment/silt control will be introduced to the bog by default as part of the rehabilitation measures.

The wetland areas will be inoculated with reeds (*Phragmites australis*) and other rhizomes of hydrophilous vegetation. The growth of wetland vegetation within the wetland area will function as a reedbed treatment pond that will treat surface water by removing nutrients such as ammonia and TP.

The existing outfall to the Bilberry River that does not currently flow through a silt pond will be removed and water from the existing drain feeding this outfall will be directed to the silt pond.

3.5.1.7 Measures to avoid changes to hydrological regime

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

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

- Where existing drains require upgrading, barriers to control the flow of sediment downstream along the drain will be installed prior to the commencement of upgrade works.
- The barrier will comprise in the installation of at minimum 2 in series standard blocks at the downstream end of the stretch of drainage channel to be upgraded. The 2 standard blocks will be installed upstream of the receiving drainage network downstream of the channel that is to be upgraded.
- The two standard blocks will be installed during low, ebb flows in the drain prior to the commencement of upgrade works.
- The 2 drain blocks may need to be installed well in advance of the drainage channel upgrade works during ebb flows.
- The build-up of silt material upstream of the 2 standard blocks will be monitored during upgrade works and the silt material will be removed from the drainage channel during works as it builds up. The material will be compacted into the adjacent field, a minimum of 10m from the nearest drain.
- Blocks will be inspected during periods of dry weather to ensure no 'cracking' of peat has occurred which might allow for discharge.
- Upon completion of the upgrade works all silt will be removed from the drainage channel immediately upstream of the 2 standard drain blocks prior their removal. The 2 standard drain blocks will only be removed once all upgrade works are completed.
- Where a new drain is required, it will be formed and established prior to connecting the drainage channel to wider drainage network. Only once it has formed and become established, with the bed and banks stabilised will it be connected to the wider drainage network. This approach will minimise to a negligible level the potential for suspended solids to be generated in waters within the new drainage channel and conveyed downstream to the Lough Ree SAC and SPA.
- An Emergency Response Plan will be available in the event of any inadvertent release of a large volume of sediment.
- The above will be overseen by a suitably qualified Ecologist

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

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

3.5.1.9 Measures to Avoid Berm Failure

The possible failure of berms and drain blocks has been identified as a risk to waterbodies within and downstream of Edera Bog such as the Bilberry River and Lough Ree. An engineering specification for berms and drain blocks has been prepared for the Edera Rehabilitation Plan is provided as Appendix E to this Natura Impact Statement.

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

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

- It is recognized that consistency of peat and or sub-soil and its compaction in layers is important, resulting in a robust trench and berm mitigating water seepage. It should be firm enough to be shaped and compacted. Adequate compaction of the peat will be ensured.
- Prior to infilling, any loose or dried out peat in the base or sides of the drain should be removed to ensure a tight seal mitigating water seepage.
- Peat Berms are constructed circa 1000mm higher than the adjacent ground level to protect marginal lands. They are not designed to hold significant volumes of deep water and water levels will be managed at an appropriate level using pipes. They are designed to a width of 5m to be robust strong structures.
- The berm installation process includes a key formation in the drains. A 500mm deep key is formed by taking a strip of peat from the field and pushing it in to the drain where it is compacted by the bulldozer ensuring a tight seal. The excavator trims and shapes the completed berm avoiding presence of loose material exposed to wind erosion.
- Provision will be made for additional silt protection at terminal dams if deemed necessary.
- Operators assigned to this work element are familiar with the technique and process and provide effective robust berms. The operators are experienced and capable of adapting to the particular conditions encountered within the bog.

- Qualified, experienced Engineers overseeing the works during the installation phase ensure that quality procedures of the various elements are implemented and effectively meet the standards for quality service and performance.

The following measures will be implemented through maintenance and avoidance:

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

3.5.1.10 Emergency Response Plan

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

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

3.5.1.11 Mortality or disturbance to Otter

As noted above no otter resting places such as holts or couches occur within Edera Bog,therefore no specific mitigation is required in respect of Mortality or Disturbance based on the information presented herein. While no risk of otter mortality has been identified in this Natura Impact Statement the following measures will still be put in place during rehabilitation works.

- Confirmatory surveys for active Otter holts and breeding activity will be carried out along the section of the Bilberry River and at each of the six silt ponds and surrounding habitats occurring within Edera Bog.
- Should it be confirmed all works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer and outside of 1 hours after sunrise or before sunset during winter.
- No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work will not take place within 15m of such holts, except under license.
- The prohibited area associated with otter holts, should they be located in confirmatory surveys, will, where appropriate, be protected from any inadvertent disturbance from any works or

personnel occurring nearby such as at a silt pond and declared as 'Ecology Restriction Zone' with no mention of otters to any onsite staff.

- Appropriate awareness of the purpose of the excluded area will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each possible access point. All contractors or operators on site will be made fully aware of the procedures pertaining to Ecology Restriction Zones and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
- All construction works will be carried out during daylight hours.

In addition to these measures all measures detailed in the SOP for otters, as outlined in Appendix G to this Natura Impact Statement will be implemented in full.

3.5.1.12 Measures to avoid disturbance or displacement to SCI bird species

Birds

- Breeding surveys of silt ponds suitable to support breeding Little Grebe and Tufted Duck will be completed in advance of any maintenance works of silt ponds that are scheduled to overlap with the breeding bird season. Where nests are identified maintenance works will be postponed until the nest becomes inactive and there is no risk of disturbance to a breeding pair or mortality of eggs or non-fledged chicks.
- A 150m Ecological Restriction Zone (ERZ) will be in place surrounding the locations where wintering special conservation interest bird species of the Lough Ree SPA were identified during baseline surveys in 2021. Following the 2021 winter bird surveys at Edera Bog the area along the Bilberry River as shown on Figure 12 below was identified as the principal area of the bog being relied upon by waterbirds. The area identified as "Winter Waterbird Habitat" on Figure 12 is based on the results of the winter bird surveys, which are shown on Figure 4 above. A 150m ERZ has been applied to this area that supports waterbirds during the winter season. The application of the 150m ERZ will also ensure that sufficient undisturbed habitat is available at the bog for roosting whooper swans and mute swans that were also recorded in the vicinity of this winter waterbird area.
- The location and extent of these ERZs are shown on Figure 12 below.
- No works will take place within these ERZs during the period:

Mid-September – mid-May inclusive

- Conformance will be audited through compliance checks by the Project Ecologist (with 'stop-works' authority).

Should no suitable habitat be present on confirmatory survey of the previously identified suitable habitat, further surveys will take place on a twice per month basis prior to the commencement of the next successive seasonal period, and on a weekly basis for any bogs where birds are likely to be present during migration only.

Once an Ecologial Restriction Zone is operational, no PCAS scheme activities will take place within the prescribed zone. General usage will be restricted to use of existing rail and travel passes. All will be overseen by the Project Ecologist.

Figure 12: Ecological Restriction Zone in respect of Birds

3.5.2 Summary of Mitigation measures Targeting Potential Impacts to Conservation Objectives

The conservation objective attributes that have been identified as being at risk from the PCAS in Table 17 above are listed in Table 21 below and the mitigation measures described above that will target these potential impacts to ensure adverse effects to these conservation objective attributes do not arise are summarised.

Table 21: Examination of Potential Impacts to Conservation Objectives

Attribute No.	Attribute	Summary of Adverse Effects	Targeted Mitigation Measures
Otter			
1	Distribution	Negative effects to water quality as a result of project activities will have the potential to affect the otter foraging resource of the Bilberry River and result in local impacts within Lough Ree downstream of Edera Bog.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above). Implementation of measures detailed in Section 3.5.1.10. Implementation of Otter SOP as provided in Appendix G
3	Extent of freshwater habitat (river)	As per attribute no. 1 above negative impacts to the water quality of Bilberry River and the River Inny will have the potential to undermine its potential to support otters.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
4	Extent of freshwater habitat (lakes)	As per attribute no. 1 above negative impacts to the water quality of Bilberry River and the River Inny will have the potential to contribute negatively to the status of Lough Ree to function as a foraging resource for otters.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).

6	Fish biomass	As per attribute no. 1 above the project will have the potential to undermine water quality downstream and within waterbodies likely to be used by the SAC's otter population. Any adverse impacts to these waterbodies could result in a decrease in fish biomass and undermine the target for this attribute.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
Natural eutrophic lake			
10	Typical Species	In the absence of suitable safeguards the works associated with the PCAS could result in the introduction of non-native invasive species to Edera Bog that could in turn spread to this lake habitat. It is noted that no non-native invasive species were identified at Edera Bog during baseline surveys and none are known to occur at Edera Bog. The potential for the spread of such species will be via their introduction during the transport of machinery on to the bog and the movement of site operatives at the bog. Its further noted that the likely of such introductions occurring are low, especially when the scale of PCAS works are compared to former industrial peat extraction works (See Section 1.2.6 above) during which no non-native invasive species were introduced to the bog.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
11	Vegetation composition: characteristic zonation	In the event that the project results in the release of polluted surface water with elevated concentrations of SS, TP or ammonia to the Bilberry River, the River Inny and Lough Ree downstream, it could combine with other sources of such contaminant in the Lough Ree catchment and result in an increase in sediment and nutrient deposition within Lough Ree. Increases in sedimentation and/or nutrient could in turn change	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).

		lake depths with consequent effects on the zonation of vegetation communities.	
12	Vegetation distribution: maximum depth	For reasons outlined for attribute no 11 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to lake depth.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
14	Lake substratum quality	For reasons outlined for attribute no. 11 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to composition of the lake substrate.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
15	Water quality: transparency	For reasons outlined for attribute no. 11 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to transparency in the water column.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
16	Water quality: nutrients	An annual average TP concentration limit of <20ug/l has been assigned for TP, <0.065mg/l N has been assigned for ammonia and an annual average 95th percentile of <0.140mg/l N has been assigned for total ammonia.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River.

		As outlined in Section 1.2.4 above the concentration of nutrients discharging from Edera Bog are following a downward trend and this trajectory is predicted to be continue as a result of the PCAS, which will lower runoff and flow volumes from the bog. The PCAS includes measures for the application of fertiliser to help accelerate natural colonisation within the areas targeted by active rehabilitation prescriptions. Slow-release Phosphorous-rich fertiliser (such as Rock Phosphate) will be used to accelerate natural colonisation and the development of pioneer vegetation cover. Low application rates will be used. In the absence of suitable safeguards the use of these fertilisers, in-combination with the exist levels of TP and ammonia discharging from silt ponds, as well as discharges from existing and unprotected outfalls to the Billberry River will have the potential to combine with other existing sources of nutrient pressure to the lake to undermine its trophic status.	Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above). Reference is also made to the baseline information detailed in Section 1.3.4 of this document, which indicates a downward trend for parameters in form industrial peat bogs that have been subject to rehabilitation (e.g. the downward trajectory of ammonia at Corlea Bog, which has decreased to below the 0.065mg/l N target for this attributes target.
17	Water quality: phytoplankton biomass	For reasons outlined for attribute no. 16 above the PCAS will have the potential to combine with other sources of nutrient inputs to result in excessive growth of phytoplankton biomass within the natural eutrophic lake habitat of Lough Ree SAC.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
18	Water quality: phytoplankton composition	For reasons outlined for attribute no. 16 above the PCAS will have the potential to undermine the achievement of this conservation objective.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River.

			Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
19	Water quality: attached algal biomass	For reasons outlined for attribute no. 17 above the PCAS will have the potential to undermine the achievement of this conservation objective.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
20	Water quality: macrophyte status	The principal parameter influencing macrophyte status in the lake is nutrient status. For reasons outlined for attribute no. 17 above the PCAS have the potential to undermine the achievement of this conservation objective.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
21	Acidification status	A limit of a pH of <9 has been assigned by the NPWS for this attribute. Any release of excess peat-derived silts to the natural eutrophic lake of the Lough Ree SAC could combine with other sources of peat-derived siltation in the Lough Ree catchment to result in an increase in the discharge of low pH silt material to the lake.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
22	Water colour	For reasons outlined for attribute no. 11 above the project could combine with other sources of silt in the catchment and lead to an increase in	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds.

		sedimentation within the lake with the potential for resultant changes to transparency in the water column.	Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
23	Dissolved organic carbon (DOC)	The release of excess peat-derived silts to the Lough Ree catchment during could combine with other sources of peat-derived siltation in the catchment to result in an increase in DOC within the catchment and downstream within the lake.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
24	Turbidity	In the event that the project results in the release of polluted surface water to watercourses, the project could combine with other sources of silt in the Lough Ree catchment and result in an increase in sedimentation deposition within Lough Ree. Increases in sedimentation could in turn increase turbidity within the lake.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).
25	Fringing habitat: area and condition	Any changes to pH levels within the lake habitat as outlined for attribute no 21 above could result in a change to the structure of fringing habitats.	Retention of existing surface water management and treatment infrastructure in the form of settlement ponds. Provision of additional bespoke wetland areas to provide for additional surface water management and water quality control. Removal of outfall to the Bilberry River. Implementation of fertiliser application measures (see Section 3.5.1.1) Implementation of measures to avoid berm failure 3.5.1.9 above).

Degraded raised bog			
39	Vegetation composition: native negative indicator species	See examination provided for attribute no 10 above.	Implement mitigation measures detailed in Section 325.1.3 above.
40	Vegetation composition: non-native invasive species	See examination provided for attribute no 10 above.	Implement mitigation measures detailed in Section 3.5.1.3 above.
Lough Ree SPA			
Special conservation interest bird species & Waterbirds			
44	Distribution	In the absence of appropriate mitigation measures the potential exists for localised and short-term impacts to the distribution of mallard, coot, tufted duck and little grebe that use existing silt ponds at Edera Bog and for ex-situ disturbance to the small numbers of whooper swan that use Edera Bog.	Implement mitigation measures detailed in Section 3.5.1.10 above.

3.5.3 Effectiveness of these Measures

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

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

3.5.3.1 Watercourse crossing works and aquatic habitat protection guidance

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

3.5.3.2 Pollution Prevention Guidance Notes (PPGs) & Guidance for Pollution Prevention (GPP)[10]

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

[10]https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/

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

3.5.3.3 Construction Industry Research and Information Association (CIRIA) [11]

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

3.5.3.4 Invasive Species Guidance

- Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)[12];
- NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2010)[13];
- Managing Invasive Non-native Plants in or near Freshwater, Environment Agency (2010)[14];
- Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*, Invasive Species Ireland (2015);
- IFI Biosecurity Protocol for Field Survey Work, Inland Fisheries Ireland (2010[15]).

3.5.3.5 Guidance relating to Bird Disturbance

- Livesey et al., (2016) Database of bird flight initiation distances to assist in estimating effects from human disturbance and delineating buffer areas. Journal of Fish and Wildlife Management 7: 181–191.
- Scottish National Heritage (2009) Monitoring the impact of onshore wind farms on birds - January 2009. Guidance Note.
- Scottish National Heritage (2016) Dealing with Construction and birds. Guidance Version 3.
- Scottish National Heritage (2017) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities. Version 2. https://www.nature.scot/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms

[11] Available from https://www.ciria.org/

[12] http://cfinns.scrt.co.uk/wp-content/uploads/2014/06/2013-code-of-practice.pdf

[13]https://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf

[14] https://www.midsussex.gov.uk/media/1725/managing-invasive-non-native-plants.pdf

[15] https://www.fisheriesireland.ie/Biosecurity/biosecurity-protocol-for-field-survey-work.html

3.5.3.6 Guidance relating to Mammal Disturbance

- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts[16].
- Brew, T. & Gillagan, N. (2019). Environmental Guidance: Drainage Maintenance and Construction
- National Roads Authority. Guidelines for the treatment of Otters prior to the construction of National Road Schemes. https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf

3.5.4 Implementation of Mitigation Measures

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

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

3.5.5 Degree of confidence in the likely success of the mitigation measure

All protection measures have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. The measures that are to be implemented are similar to those that have been implemented for other industrial peat bogs that have been subject to rehabilitation (i.e. Corlea Bog). Furthermore the bespoke mitigation measures to be implemented at Edera Bog, such as the creation of specific wetland areas, will exceed those implemented for Corlea Bog. As noted in Section 1.3.4 above following the implementation of rehabilitation measures at Corlea Bog a downward trajectory in water quality parameters such ammonia to below site-specific conservation objective limits has been recorded. In light of this and the aforementioned best practice and BAT, it is considered that with the implementation of all mitigation measures detailed in this Natura Impact Statement there is a very high degree of confidence in their likely success to ensure that significant adverse effects to the conservation objectives of the Lough Ree SAC and the Lough Ree SPA are avoided.

3.5.6 Monitoring of the Implementation and Effectiveness of the Mitigation Measures

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

[16]https://www.gov.ie/en/publication/957aa7-consent-requirements-constructionalteration-of-watercourse-infrastru/

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

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

3.5.7 How any mitigation failure will be addressed

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

An Emergency Response Plan has been prepared (Appendix H) so that an effective response to unforeseen events such as a berm failure can be put in place. The implementation of emergence response measures will ensure that such events are contained and do not result in significant adverse effects to Lough Ree SAC or SPA.

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

Nonetheless contingency measures will be in place for unforeseen events such as oil/fuel spillages, water pollution or any inadvertent release of sediment. This will ensure any unforeseen potentially adverse effects are identified in a timely manner and appropriate remedial action taken immediately. The Project Ecologists, Engineers and Environmental Compliance Officers will have a 'stop-works' authority to temporarily stop works over part of the site to avoid an infringement of the Environmental Commitments or an unforeseen environmental event. Works will not be allowed to re-commence until the issue is resolved.

3.6 Evaluation of the impact of Edera Bog Decommissioning and Rehabilitation on the Integrity of the European Sites under consideration

Using the checklist in Table 22 below, the proposed Edera Bog Decommissioning and Rehabilitation Plan, as described in Appendix B, both alone and in-combination with other projects, for adverse impacts on the integrity of the European Sites under consideration is examined, following the implementation of the measures described herein.

Table 22: Integrity of European Site checklist

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

Does the project or plan have the potential to: Yes/No	Lough Ree SAC	Lough Ree SPA
- reduce diversity of the site?	No	No
- result in disturbance that could affect population size or density or the balance between key species?	No	No

3.7 Conclusion

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

Appropriate Assessment Stage One Screening of all European sites identified within a 15km radius of the proposed development evaluated that the potential for significant effects on the Special Conservation Interests or Qualifying Interests of 2 no. European Sites could not be excluded. In particular, the potential for indirect effects via a deterioration in water quality, and from disturbance to /displacement to fauna. Thus, the respective elements were brought forward for further critical examination in the Natura Impact Statement Report to inform the Appropriate Assessment process.

Following examination and analysis, and taking account of the protective measures proposed, the potential for:

- disturbance and displacement of Whooper Swan, Little Grebe, Tufted Duck, Mallard, Coot and SCI waterbird species; and for mortality to Little Grebe and Tufted Duck for which Lough Ree SPA is designated
- degradation of natural lake habitat of Lough Ree SAC;
- degradation of the degraded raised bog through the spread of negative indicator species or non-native invasive species; and
- disturbance and/or displacement of the otter population of Lough Ree SAC

were found not to result in adverse effects due to the protective measures detailed in this Natura Impact Statement.

The protective measures detailed in this Natura Impact Statement comprise standard best practice environmental control measures, measures to avoid berm failure, the utilisation of existing surface water management infrastructure and the provision of further bespoke surface water management and mitigation measures in the form of wetland areas and the removal of an outfall to the Bilberry River.

With the implementation of these mitigation measures there are no significant effects identified which would adversely affect the special conservation interests or conservation objectives of the Lough Ree SPA with regard to the densities, range or conservation status of the waterbird species and their supporting wetland habitats.

With the implementation of these mitigation measures there are no significant effects identified which would adversely affect the natural eutrophic lake habitat or otter population of the Lower River Shannon SAC under consideration with regard to the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which this SAC has been selected.

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

4. 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

Hunt, J., Heffernan, M.L., McLoughlin, D., Benson, C. & Huxley, C. (2013) The breeding status of Common Scoter, Melanitta nigra in Ireland, 2012. Irish Wildlife Manuals, No. 66. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland.

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, Fernandez-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.

Mackin, F., Flynn, R., Barr, A. and Fernandez-Valverde, F. (2017b). Use of geographical information system-based hydrological modelling for development of a raised bog conservation and restoration programme. Ecological Engineering 106 (2017) 242–252.

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).pdfmiddle

NPWS. (2017). 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 (2014) Ballynamóna 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) Lough Croan Turlough SPA 004139. Version dated 22.04.2010. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 30.07.2020

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 (2019) Site Synopsis: Lough Ree SAC 000440. Version dated 23.08.2019. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 21.01.2021

NPWS (2016) Conservation Objectives: Lough Ree SAC 000440. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2020) Conservation objectives for Lough Ree SPA [004064]. Generic Version dated 07.04.2020. Department of Culture, Heritage and the Gaeltacht. Department of Culture, Heritage and the Gaeltacht. Accessed online 21.01.2020

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/

Perrow, M. R., Skeate, E. R., & Gilroy, J. J. (2011). Visual tracking from a rigid-hulled inflatable boat to determine foraging movements of breeding terns. Journal of Field Ornithology, 82(1), 68-79.

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: Finding of No Significant Effects (FONSE) Report

Finding of No Significant Effects Report (FONSE)

In accordance with the EC (2001) guidance document, *Assessment of plans and projects significantly affecting Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*, A Finding of No Significant Effects Report has been completed for the proposed Decommissioning and Rehabilitation Plan for Edera. 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.

Finding of No Significance Effects Report	
Name and location of the Natura 2000 sites	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 Edera Bog, as required. There are a total of 6 European sites located within the 15km zone of consideration: No. European Site Site Code 1 Lough Ree SAC 000440 2 Ballymore Fen SAC 002313 3 Fortwilliam Turlough SAC 000448 4 Mount Jessop Bog SAC 002202 5 Carn Park Bog SAC 002336 6 Lough Ree SPA 004064
Description of the project or plan	**Overview:** Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the EDERA bog group (Ref. P0-504-01). As part of Conditions 10.1 and 10.2 of this licence, respectively, decommissioning and rehabilitation must be undertaken to ensure the permanent rehabilitation of the bog lands within the licensed area. Edera bog is part of the Blackwater bog group. Edera Bog is located in Co. Galway. A document titled 'Edera Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2021' has been prepared specifically to describe the proposed decommissioning and rehabilitation measures at **Edera Bog** as appended to this document as Appendix B. **Purpose:** The decommissioning and Rehabilitation of **Edera 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** 5 **Planning Applications in the area surrounding Edera Bog** 6 **Longford County Council Part VIII planning application for a walking route**

Finding of No Significance Effects Report	
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 **there is no *potential* for the Decommissioning and Rehabilitation plan to cause any effects to the following 4 no. European Sites:** No. European Site Site Code 1 Ballymore Fen SAC 002313 2 Fortwilliam Turlough SAC 000448 3 Mount Jessop Bog SAC 002202 4 Carn Park Bog SAC 002336 *T*herefore, these EU sites have been 'Screened Out' at Stage One of the Appropriate Assessment process.
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 4 of these 6 European sites as a result of the proposed decommissioning and rehabilitation, as described in Appendix B. With regard to the following listed EU Sites: Lough Ree SAC and Lough Ree SPA, significant effects, in the absence of mitigation (which is not considered at Screening Stage) are considered possible or likely via identified source-pathway linkages: As a result, there is an obligation on the Competent Authority to carry out an Appropriate Assessment (i.e. Stage Two of the AA process) under Article 6 (3) of the Habitats Directive for this project, and in this context a Stage 2 Appropriate Assessment Report has been completed.	Bord na Móna, Leabeg, Blueball, Tullamore, Co. Offaly, R35 P304.

Appendix B: Edera Bog: Cutaway Bog Decommissioning and Rehabilitation Plan 2021

Edera Bog

Cutaway Bog Decommissioning and Rehabilitation Plan 2021

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0504-01:

> "*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 Edera 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 Edera Bog.

In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. P0504-01, 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 Edera 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 Edera Bog as environmental stabilisation, re-wetting and setting the bog on a trajectory towards development of naturally functioning peatland and wetland habitats.

Any consideration of any other future after-uses for Edera 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:	Edera Bog Decommissioning and Rehabilitation Plan 2021					
Document File Path:						
Document Status:	Draft					
This document comprises:	DCS	TOC	Text (Body)	References	Maps	No. of Appendices

Rev. 5.0	Author(s):	Checked By:	Approved By:
Name(s):	AC	CC	MMC
Date:	21/09/2020	28/01/2021	29/01/2021

Table of Contents

SUMMARY

Name of bog: Edera **Area:** 282 ha

Site description:

- Edera Bog is located approximately 4.5km to the west of Ballymahon in Co. Longford.
- Edera Bog was drained and developed for industrial peat production in the 1990s and has been in active peat production since the 2003. Industrial peat production ceased in 2018.
- The majority of the former peat production footprint is bare peat (~75%) and contains active drainage channels.
- Remnant peat depths are in excess of 4m in large parts of Edera Bog. Where peat has largely been removed, wetlands have developed.
- Edera Bog is located adjacent to Lough Ree and several designated conservation sites. In winter, Edera can be partly inundated with water corresponding to water levels in Lough Ree.

Rehabilitation goals and outcomes

Bord na Móna is committed to discharging the obligations arising from Condition 10 of the IPC licence. The primary goals and outcomes of this plan are:

- Meeting conditions of the IPC Licence.
- Stabilisation or improvement in water quality parameters (e.g. suspended solids).
- Optimising hydrological conditions for **climate action benefits as part of PCAS**. This will be achieved via **wetland creation and deep peat re-wetting**.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities in suitable deep residual peat areas.
- Optimising hydrological conditions for the development of wetland, Reed Swamp and fen habitats on shallow cutaway peats.
- Rehabilitation will support the National Policies on Climate Action and GHG mitigation by maintaining and enhancing the current condition peat storage capacity of the bog (locking the carbon into the ground). In time, it is expected that the bog will develop its carbon sink function, in part, as *Sphagnum* communities develop across the bog. It will also support Ireland's commitments towards Water Framework Directive and the National River Basin Management Plan 2018-2021 and future National River Basin Management Plans.
- Note that will take some time for stable naturally functioning peatland and wetland habitats to fully develop at Edera Bog.

Scope of rehabilitation

The principal scope of this rehabilitation plan is defined by:

- The area of Edera Bog.
- EPA IPC Licence - Ref. P0-504-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The key objective of 'rehabilitation', as required by this licence, is achieved by the **environmental stabilisation** of the bog.
- **The proposed Scheme (PCAS)** includes enhanced measures which are designed to exceed/meet the standard stabilisation requirements as defined by the IPC Licence and to enhance the ecosystem services of the bog, in particular, optimising **climate action benefits**.
- The local environmental conditions of this bog. Edera Bog has variable environmental characteristics with a range of residual peat depths, hydrology and topography. Part of the bog has large remnants of deep peats and is suited to deep peat re-wetting.

- The key goals and outcomes of rehabilitation at this bog outlined above.
- To minimise potential impacts on neighbouring land, some boundary drains around Edera Bog will be left unblocked, as blocking boundary drains could affect adjacent land.
- Other constraints including archaeology and rights of way.
- Bord na Móna have identified the main land-use at this bog as **biodiversity and ecosystem services**.

Criteria for successful rehabilitation:

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

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

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

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

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

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

Summary of measures:

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

- Planning actions, including developing a detailed site plan and carrying out a drainage and hydrology assessment.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation.
- Carry out proposed measures, which will be a combination of wetland measures, drain blocking, peat field re-profiling, cell-bunding and fertiliser applications targeting headlands, high fields and other areas (where required).
- Phase 2 measures may include seeding of targeted vegetation and inoculation of *Sphagnum* in suitable areas.

- Silt ponds will continue to be maintained during the rehabilitation and decommissioning phase.
- Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.
- Decommissioning of silt-ponds will be assessed and carried out, where required.

Timeframe:

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

Budget and Costing

- The rehabilitation plan outlined in this document is predicated on the understanding that it is the Minister's intention to support, via the Climate Action Fund, Bord na Móna in developing a package of measures, 'the proposed Scheme', for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme'. However, only the additional costs associated with the additional and enhanced rehabilitation, i.e., measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support.
- In relation to the pre-existing Condition 10 IPC Licence requirement to carry out what can be termed the 'standard' decommissioning and rehabilitation, Bord na Móna maintains a Provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. This is updated every year. For more information see the Bord na Móna Annual Report (Bord na Móna 2020). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.
- For the avoidance of doubt, should the proposed Scheme and the associated statutory obligation on Bord na Móna not materialise, Bord na Móna will not carry out the enhanced decommissioning, rehabilitation and restoration measures described in this plan. Bord na Móna will instead plan to complete only the 'standard' decommissioning and rehabilitation required under Condition 10, see Appendix I, and for which financial provisions have been made, to comply with that element of the Licence.

Monitoring, after-care and maintenance

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

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

Additional Monitoring:

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

Validation and IPC Licence surrender

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

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

1. INTRODUCTION

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Mount Dillon bog group (Ref. P0504-01). 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. Edera bog is part of the Mount Dillon bog group (see Appendix II for details of the bog areas within the Mount Dillon Bog Group). Edera Bog is located in Co. Longford.

This document seeks to address the requirements of Condition 10.2 of IPC License Ref. P0504-01:

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

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

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

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme (PCAS) on peatlands previously used for energy production. Note this proposal is also known colloquially as the 'Peatlands Climate Action Scheme'. The additional costs of the proposed Scheme will be supported by Government through the Climate Action Fund, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator. Bord na Móna have identified a footprint of 33,000 ha (a subset of the Bord na Móna estate that has been used for energy production) as peatlands suitable for enhanced rehabilitation. This proposed Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations (Appendix VII & IX) under existing EPA IPC licence conditions. Improvements supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. However, it is important for all stakeholders to understand that only the costs associated with the additional, enhanced and accelerated rehabilitation, i.e. those measures which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10, will be eligible for support under the proposed Scheme.

It is expected that the proposed Scheme (PCAS) will have benefits accruing from biodiversity provision, water quality and storage attenuation as well as increased carbon storage, reduced carbon emissions and acceleration towards carbon sequestration. The Scheme will also facilitate monitoring of carbon fluxes (Greenhouse Gases

and fluvial carbon) in selected areas (in addition to other established research programmes), to monitor changes in where the interventions will accelerate the trajectory towards a naturally functioning peatland ecosystem.

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

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

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

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

1.1 Constraints and Limitations

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

The future use of Edera Bog has not been defined by Bord na Móna but biodiversity and ecosystem services have been identified as the current primary land-use. Bord na Móna will continue to review the future after-use of its land-bank. Any consideration of any other future after-uses for Edera Bog, will be conducted in adherence to the relevant planning legislation and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.

Peat production activities have the potential to impact the habitats and environment of a bog. The ecological processes involved in the creation and maintenance of functioning, active bog systems are complex, happen over very long time periods (>1,000 years) and not all are fully understood. Nevertheless, the basis for the proposed approaches and implementation outlined in the document is the experience gained in 40 years of research and implementation of the after-use development, rehabilitation and restoration of the Bord na Móna cutaway bogs as well as best practise internationally (see reference documents).

Industrial peat extraction at Edera Bog permanently ceased in 2018. Currently the former peat production area is bare peat. The combination of active enhanced rehabilitation measures and natural colonisation will quickly

establish pioneer vegetation and will be planned to accelerate environmental stabilisation. Nevertheless, it will take some time (30-50 years) for naturally functioning peatland ecosystems to fully re-establish.

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

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

2. METHODOLOGY

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

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

- Experience of 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (Clarke, 2010; Bord na Móna, 2016);
- Significant international engagement during this period with other counties in relation to best-practise regarding peatland rehabilitation and after-use through the International Peat Society and the Society for Ecological Restoration (Joosten & Clarke, 2002; Clarke & Rieley, 2010; Gann *et al*., 2019);
- Consultation and engagement with internal and external stakeholders;
- GIS Mapping;
- BNM drainage surveys;
- Bog topography and LIDAR data:
- Hydrological modelling; and
- The development of a **Methodology Paper (draft) outlining the proposed Scheme (PCAS)**. This rehabilitation includes enhanced measures defined in the Methodology Paper which are designed to exceed the standard stabilisation requirements as defined by the IPC Licence and to enhance the ecosystem services of Edera Bog, in particular, optimising **climate action benefits**.

2.1 Desk Study

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

- Anderson *et al*. (2017). An overview of the progress and challenges of peatland restoration in Western Europe.
- Barry, T.A. et al (1973). A survey of cutover peats and underlying mineral soils. Soil Survey Bulletin No. 30. Dublin, Bord na Móna and An Foras Taluntais.
- Bonn *et al*. (2017). Peatland restoration and ecosystem services- science, policy and practice.
- Carroll *et al*. (2009). *Sphagnum* in the Peak District. Current Status and Potential for Restoration. Moors for the Future Report No 16.
- Clark & Rieley (2010). Strategy for responsible peatland management.
- Eades *et al*. (2003). The Wetland Restoration Manual.
- Farrell & Doyle (2003). Rehabilitation of Industrial Cutaway Atlantic Blanket Bog, NW Mayo, Ireland.
- Gann *et al*. (2019). International Principles and Standards for the practice of Ecological Restoration.
- Hinde *et al*. (2010). *Sphagnum* re-introduction project: A report on research into the re-introduction of *Sphagnum* mosses to degraded moorland. Moors for the Future Research Report 18.

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

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

- 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.

2.2 Consultation

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

2.3 Field Surveys

Bord na Móna carried out a baseline ecological survey of all of its properties in 2009-2012 and developed habitat maps. As part of this exercise, Edera Bog was surveyed in July 2012 and surveyed again during 2018. Additional ecological walk-over surveys and visits have taken place at Edera Bog between 2012-2020 to inform rehabilitation planning and habitat maps have been updated, where required. This rehabilitation plan is informed by the original baseline survey as well as subsequent site walk-over surveys and visits, and updates to baseline data.

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

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

3. SITE DESCRIPTION

Edera Bog is located approximately 4.5km to the west of Ballymahon in Co. Longford on the shore of Lough Ree (see Figure 3.1). The surrounding landscape is a mosaic primarily consist of low-lying agricultural land (pasture) interspersed with other raised bogs, many of which have also been managed by Bord na Móna for peat production with some areas utilised for domestic turf-cutting. Lough Ree is immediately adjacent to the south-west corner of the site and the Bilberry River flows through the site (see Figure 3.2). A relatively large section of wet grassland along with a remnant section of raised bog still exist on the site.

A rail line connects Edera bog with Derrycolumb Bog to the north, and this is the main access to the site, with a small tea centre and machinery travel path at this entrance to the bog. A machinery bridge and separate rail bridge are present in the centre of the site to cross the Bilberry River.

3.1 Status and Situation

3.1.1 Site history

Edera Bog has only been in peat production since 2003, with all commercial peat extraction ceasing on site in 2018. The peat was harvested from this site was used for fuel peat Lough Ree Power in Lanesborough. Several small peat stock-piles are still present on the site and these will be removed before rehabilitation and decommissioning is complete. (Appendix VII & IX).

3.1.2 Current land-use

Industrial peat production has now permanently ceased at Edera Bog. Future land-use has not been defined by Bord na Móna but biodiversity and ecosystem services has currently the primary land-use.

The entire bog is not within the ownership of Bord na Móna and domestic turf cutting (private turbary) is having a significant impact on the bog, both within and outside the BnM boundary.

There is a right of way in the southern part of the site. This will be considered and incorporated into the rehabilitation plan.

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.

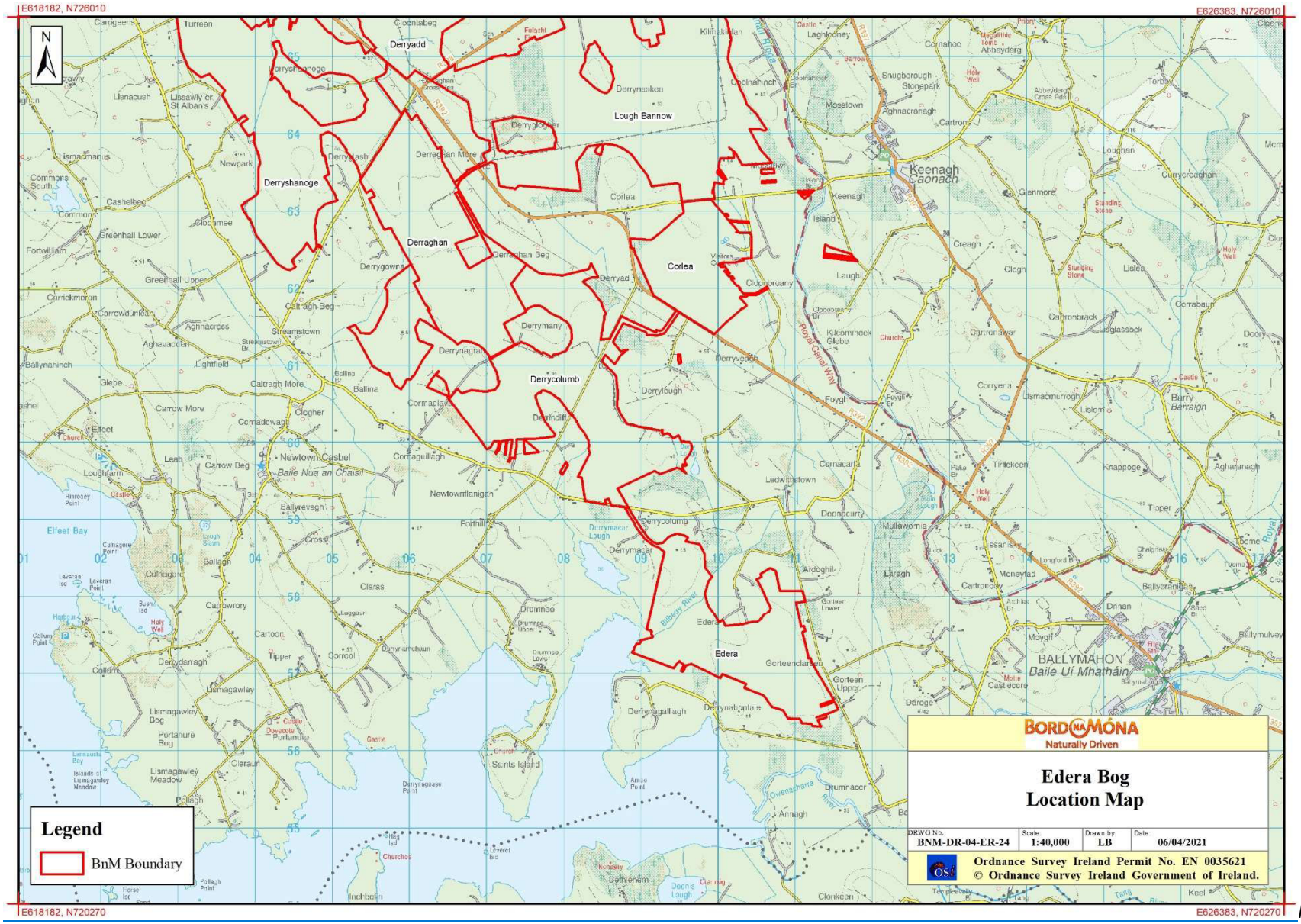


Figure 3.1 Location of Edera in context to other Bord na Móna bogs and surrounding area

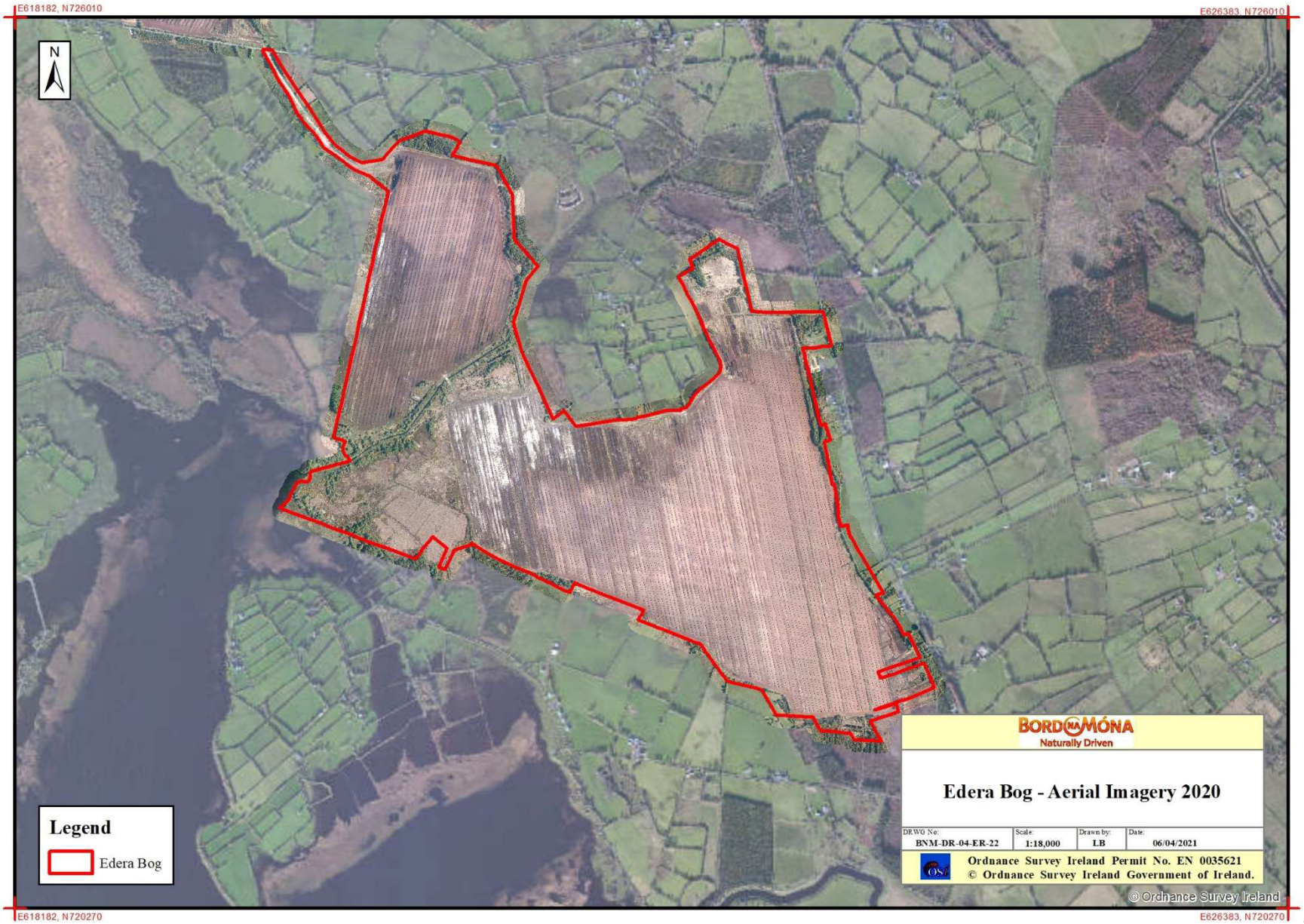


Figure 3.2 Aerial photo of Edera Bog (2020).

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

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

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

3.2 Geology and Peat Depths

3.2.1 Sub-soil geology

The majority of the underlying geology at Edera Bog is limestone and shale bedrock, with a small extrusion on the eastern site of lime-mudstone[1]. The underlying soils and sub-soils are classed as 'Raised Bog Cutover Peat'.

3.2.2 Peat type and depths

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

3.3 Key Biodiversity Features of Interest

The majority of Edera Bog within the Bord na Móna boundary is bare peat as this site was in production until 2018. A significant area of scrub (WS1), raised bog (PB4) and wet grassland (GS4) is located in the west of the site. This area is located next to Lough Ree and has never been in industrial peat production; however, some domestic turf cutting has been carried out in this area. The remnant section of raised bog does not appear to contain deep peat and is located in the transition zone between what was the former intact raised bog (Edera) and the wet grassland that borders Lough Ree.

A small area of remnant raised bog and cutaway bog is located along the north-eastern boundary of the site. This area is used extensively for domestic turf production under licence to Bord na Móna. The Bilberry River running through the centre of the site is likely to be an important wildlife corridor and is a key link for connectivity of habitats and species

3.3.1 Current habitats

Some small sections of the production bog at Edera appear to have been cut away with marl protruding in areas. Common Reed is becoming established on these areas and in some of the field drains.

The Bilberry river flows through the site and there are two crossing points that machinery and trains use to cross this river (see Figure 3.3). The river still retains some natural features such as bends in the river and some deeper pools. The River is surrounded on both sides by relatively extensive areas of wet grassland that are subject to

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

flooding when the River is in flood. The grassland was comprised of species such as Soft Rush, Floating Sweet-Grass, Yorkshire Fog, Reed Canary Grass, Yellow Rattle, Purple Moor Grass, Marsh Arrow Grass and Iris. Scattered trees consisting of Alder and Willow are located throughout this area. Several silt ponds are also located in this area. A small round clump of Birch and Alder are in one area and this feature is thought to be the remains of a Crannog by archaeologists. To the south of this area lies the location of an old house that has local historical importance.

A significant area of scrub, raised bog and wet grassland is located in the west of the site. Purple Moorgrass is dominant across much of this section of raised bog along with species such as Bog Asphodel, Sundew, Yellow Rattle, Willow, Bog Myrtle, Devil's Bit-Scabious, Gorse, Bog Cotton, Heather, *Sphagnum papillosum, S. subnitens, S. squarrosum* and *Aulacomnium palustre*. Occasional tufts of Black Bog Rush are located along the edges of this habitat. This area, immediately adjacent to Lough Ree, can flood in winter of lake water levels are high (See Figure 3.4).

Other habitats along the margins of the site include Birch woodland, wet grassland, dry heath and cutover bog.

Figure 3.3 View of the Bilberry River that runs through the centre of the site (July 2012)

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

Figure 3.4 View of the flooded habitats in south-western part of the site (January 2015)

3.3.2 Species of conservation interest

Marsh Harrier, Kestrel and Water Rail have all been recorded at Edera Bog, and Sand Martin have been recorded nesting in peat face banks on site. Badger, Otter and Pine Marten have also been recorded on the bog.

Marsh Fritillary have been recorded just outside the Bord na Móna property to the north and south-east (NBDC data viewer) but there are no on-site records yet.

3.3.3 Invasive species

Invasive alien species known to occur at the subject bog (or desktop review suggests presence is likely), and for which reasonably foreseeable source impact pathways for dispersal may result from the proposed PCAS are described here. No such instances are known at Edera Bog. A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs, and although spatial overlap with the PCAS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during PCAS activities (Appendix V).

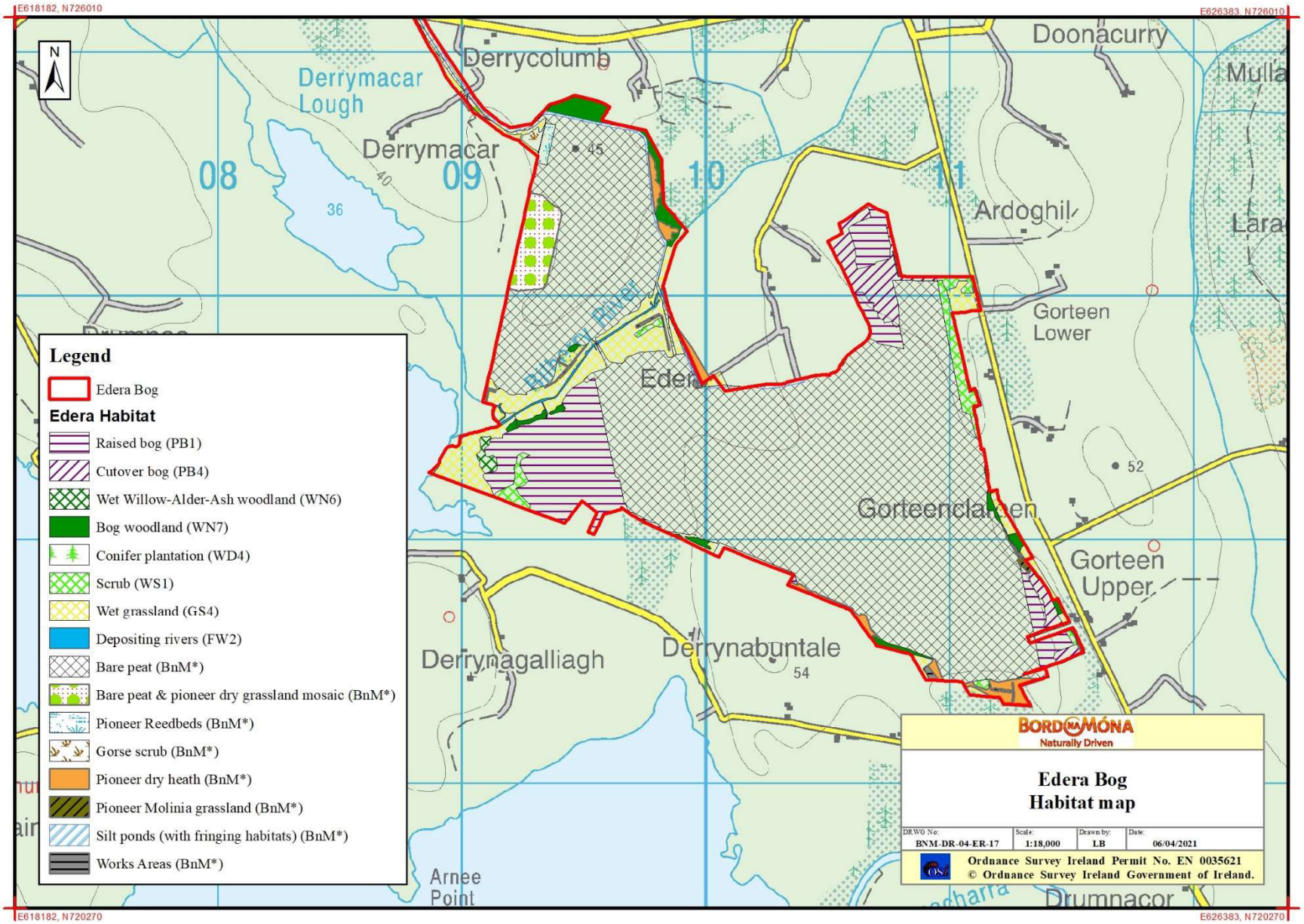


Figure 3.5 Habitat map of Edera Bog showing Bord na Móna habitat categorisation

3.4 Statutory Nature Conservation Designations

Edera Bog partially overlaps with Lough Ree SAC and pNHA (NPWS Site Code: 000440) and Lough Ree SPA (NPWS Site Code: 004064) on the western corner of the site (see Figure 3.6). Lough Ree SAC (and pNHA) is designated for the natural eutrophic lake as well as active raised bogs, degraded raised bogs capable of natural regeneration, bog woodland and Otter. Lough Ree SPA is designated for the assemblage of wintering wildfowl, many species of which occur in nationally important numbers as well, in addition to breeding Common Tern and Common Scoter. No rehabilitation measures are proposed for the area of the site that overlaps with this designation.

Derry Lough pNHA is situated within 1km of the northern boundary of Edera Bog and the Royal Canal pNHA lies within 2km of the eastern boundary of the site.

3.5 Hydrology and Hydrogeology

Edera Bog has a gravity drainage regime. The majority of the bog has active functioning drains. Part of the site is prone to seasonal winter inundation via the Bilberry River and this reflects seasonal water fluctuations in Lough Ree. Initial hydrological modelling indicates the bog has topographical basins that are expected to develop a mosaic of wetland habitats when rehabilitation is carried out and drains are blocked, in particular to either side of the Bilberry River corridor. Some of the bog on the south-eastern side is also modelled as being relatively dry due to more elevated topography and slopes (Figure 8.3).

Edera Bog is located in the Upper River Shannon catchment. The majority of the bog is drained by the Bilberry River which flows through the centre of the site and into Lough Ree. The south-east corner drains into the River Inny just upstream of the point where it meets Lough Ree, and the eastern side of the site drains into a small, un-named watercourse that also drains into the River Inny.

Silt ponds are present within the centre of the site to manage discharges into the Bilberry River, with further silt ponds to the eastern and south-eastern edges of the site (which discharge into the River Inny). The bog to the north-east of the Bilberry River has field drains running in a north-northeast to south-southwest orientation; to the south-west of the Bilberry River the field drains run in a north-northwest to south-southeast orientation.

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

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

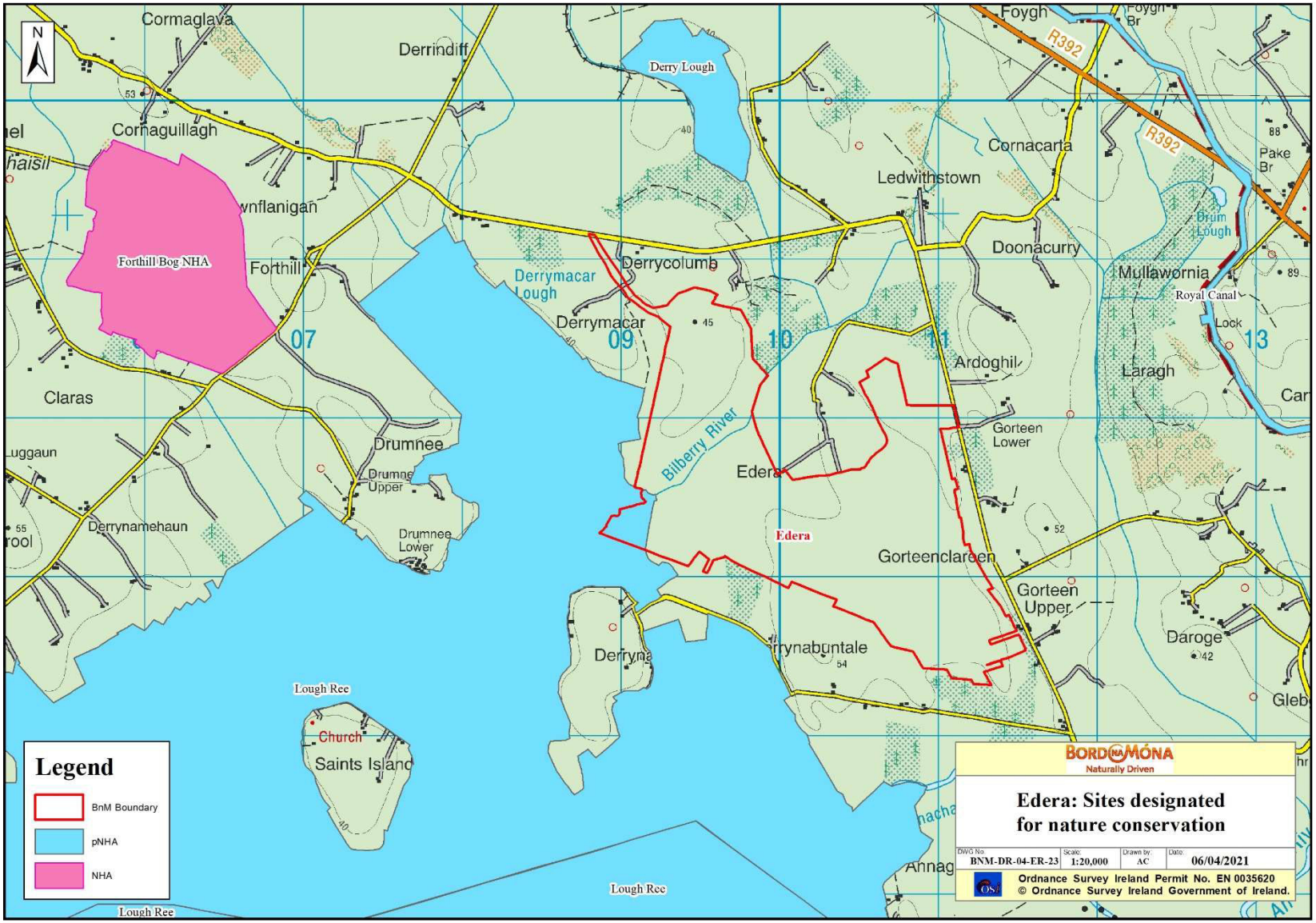


Figure 3.6: Sites designated for nature conservation in the vicinity of Edera Bog

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

3.6 Emissions to surface-water and water-courses

Drainage is an important feature of industrial peat production and there were extensive field drains maintained throughout bog areas to facilitate industrial peat production annually, each of which eventually drains into a terminal silt pond that allows for settlement of suspended solids before entering the main river systems (see Figure 3.8).

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

Edera bog surface water outlets discharge to the Ledwithstown IE_SH_26L840850 water body via the Bilberry River which is a sub catchment and main receiving water of Edera Bog. This water body is currently unassigned with no biological or chemistry monitoring data available, but peat extraction is identified as pressure in the second cycle of the river basin management plan but is not indicated as remaining so in the third cycle, currently under preparation.

Other silt ponds drain to the east and south to the River Inny IE_SH_26I011400, and while this water body is listed as a peat pressure WB in the second cycle of the river basin management plan and is indicated as remaining so in the third cycle, currently under consideration, the section under pressure is in the upper reaches above Lough Derravarragh.

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

Initial monthly ammonia concentrations from August to January 2021 have a range of 0.044 to .473mg/l with an average of .161mg/l.

From an analysis of any monitoring over the past 5 yrs. of the IPC licence environmental monitoring of some of the discharges from this bog indicate that results were under the ELV for SS and trigger level for ammonia and COD. See Table 3.1 below.

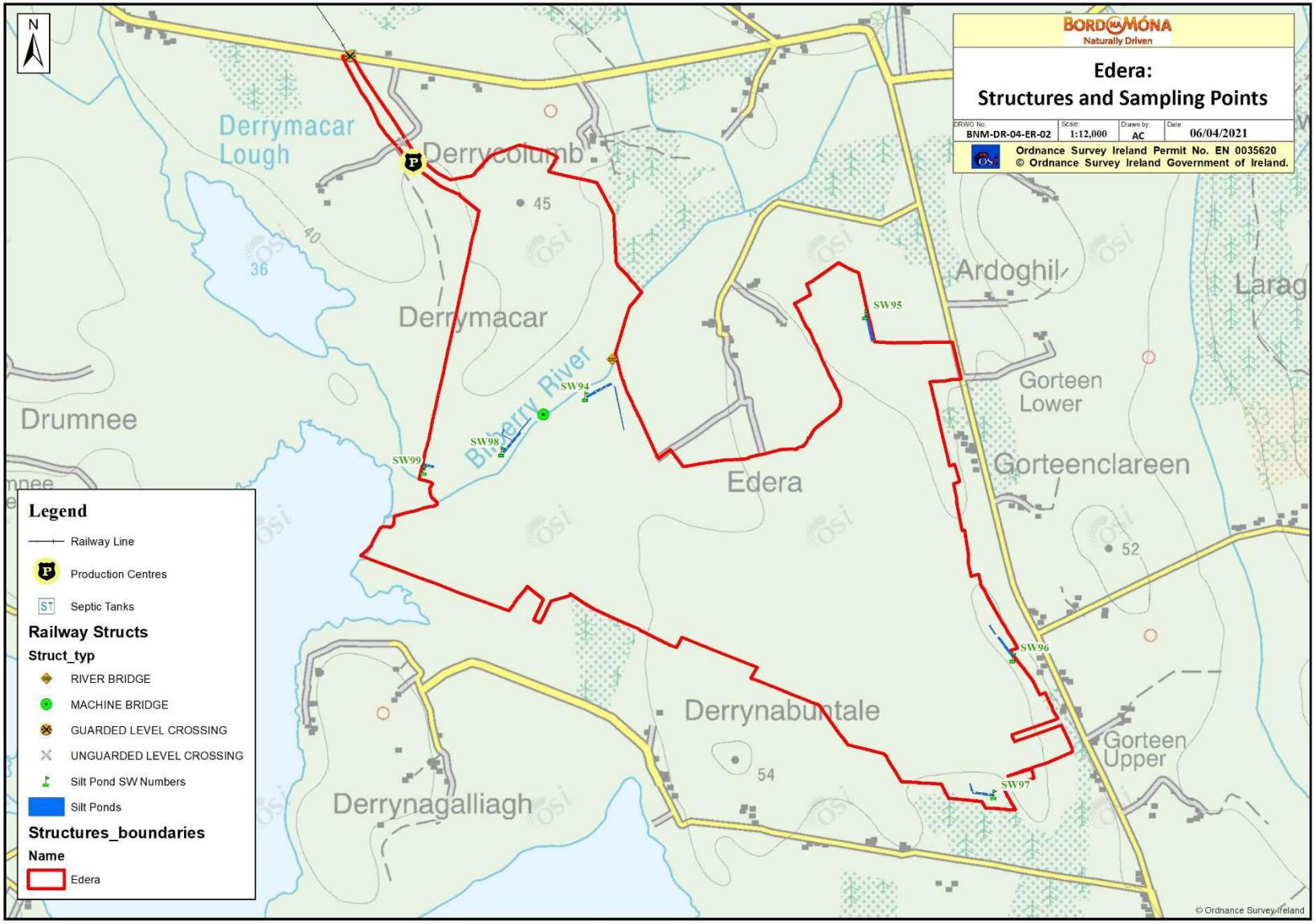


Figure 3.7. Map of Edera Bog showing structures and designated emission points

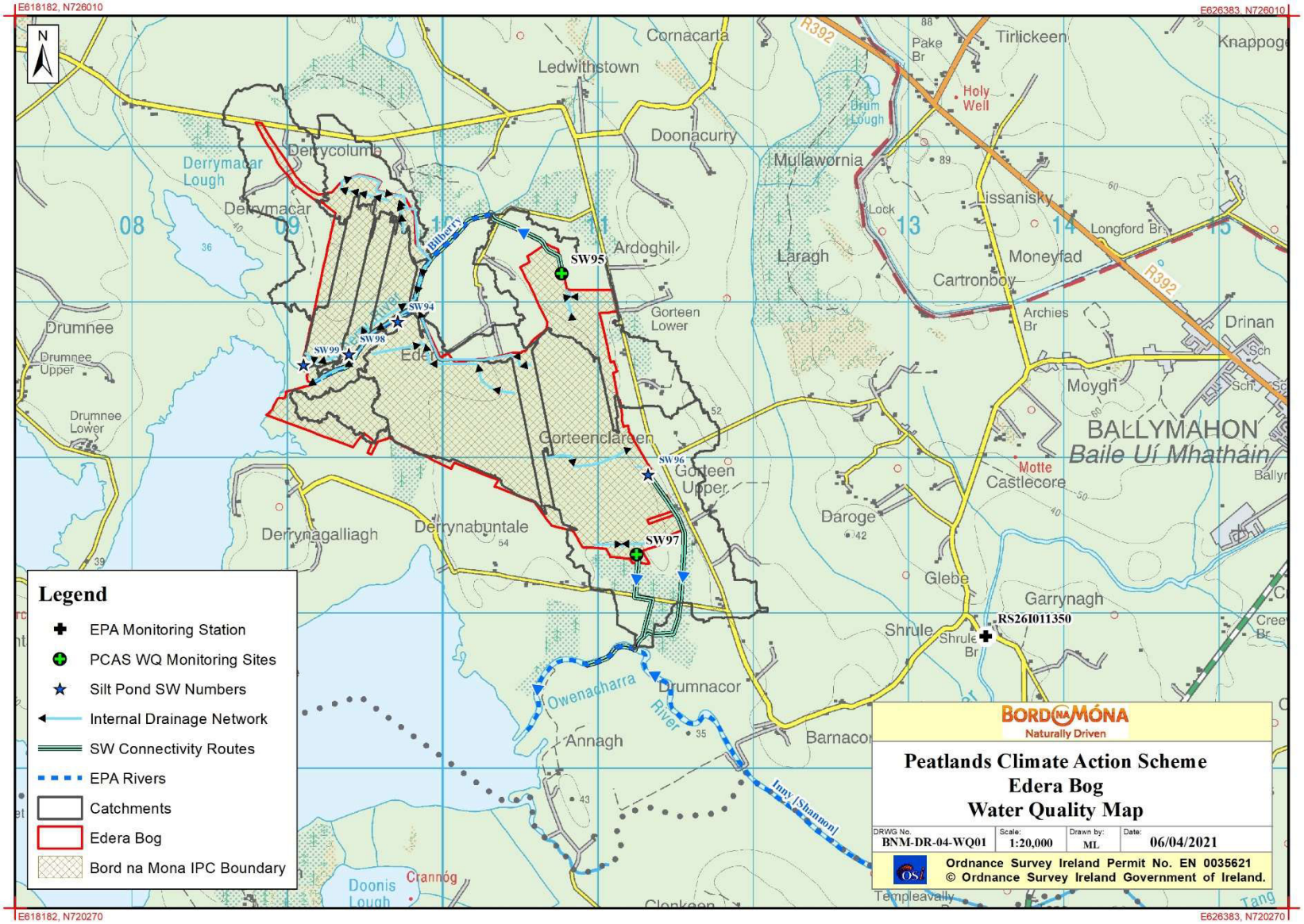


Figure 3.8. Map of Edera Bog showing water management features and water quality monitoring points.

Table 3.1. EPA Monitoring data (EPA) for the previous five years in relation to Edera Bog

Bog	SW	Monitoring	Sampled	pH	SS	TS	Ammonia	TP	COD	Colour
Edera	SW-97	Aug-20	18/08/2020	6.9	<2	189	0.473	<.05	91	416
Edera	SW-95	Sep-20	19/08/2020	7.3	2	293	0.209	<.05	78	393
Edera	SW-95	Q1 20	24/03/2020	8.1	2	371	0.064	<.05	17	50.7
Edera	SW-96	Q1 20	24/03/2020	8.3	5	284	0.075	<.05	54	202
Edera	SW-97	Q1 20	24/03/2020	7.9	2	268	0.085	<.05	20	51.3
Edera	SW-98	Q1 20	24/03/2020	7.8	2	343	0.213	<.05	41	157
Edera	SW-99	Q1 20	24/03/2020	8.2	6	376	0.067	0.1	39	119
Edera	SW-94	Q3 17	14/08/2017	8	9	399	0.1	<.05	36	77
Edera	SW-95	Q3 17	14/08/2017	7.7	8	286	0.37	0.1	41	155
Edera	SW-96	Q3 17	14/08/2017	7.9	5	318	0.17	<.05	41	108
Edera	SW-97	Q3 17	14/08/2017	7.8	5	316	0.02	0.07	28	72
Edera	SW-98	Q3 17	14/08/2017	8.1	10	354	0.09	<.05	34	66
Edera	SW-99	Q3 17	14/08/2017	8	5	380	0.02	<.05	17	32
Edera	SW-95	Q3 16	12/09/2016	7.1	5	154	0.09	<.05	97	315
Edera	SW-96	Q3 16	12/09/2016	7.5	5	216	0.03	0.09	63	121
Edera	SW-97	Q3 16	12/09/2016	7.6	5	250	0.14	0.07	64	122

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

Water quality of water discharges from restored peatlands normally improves as a result of bog restoration measures and the restoration of natural peatland processes (Bonn *et al*., 20017). Bog restoration is also expected to improve water attenuation of the site as the drains are blocked, slowing water movement and water release from the site. Restored peatlands help slow the release of water and aid the natural regulation of floods downstream (Minayeva *et al*., 2017). The National River Basin Management Plan (NRBMP) 2018-2021 (DHPCLG, 2017) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD). The NRBMP outlines how key actions such as the Bord na Móna 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 Edera has been completed. This discharge will have improving water quality and there will be increased wetland attenuation, meaning slower release of water. This is expected to have a positive impact on status of the key water body receptor, Lough Ree, and is expected to support the retention of the current and future status of the Lough Ree as being of Good Status.

The key water quality success criteria associated with this enhanced rehabilitation are as follow:

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

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 3.8). 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 (Figure 3.9).

As the monthly monitoring program at Edera Bog 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.

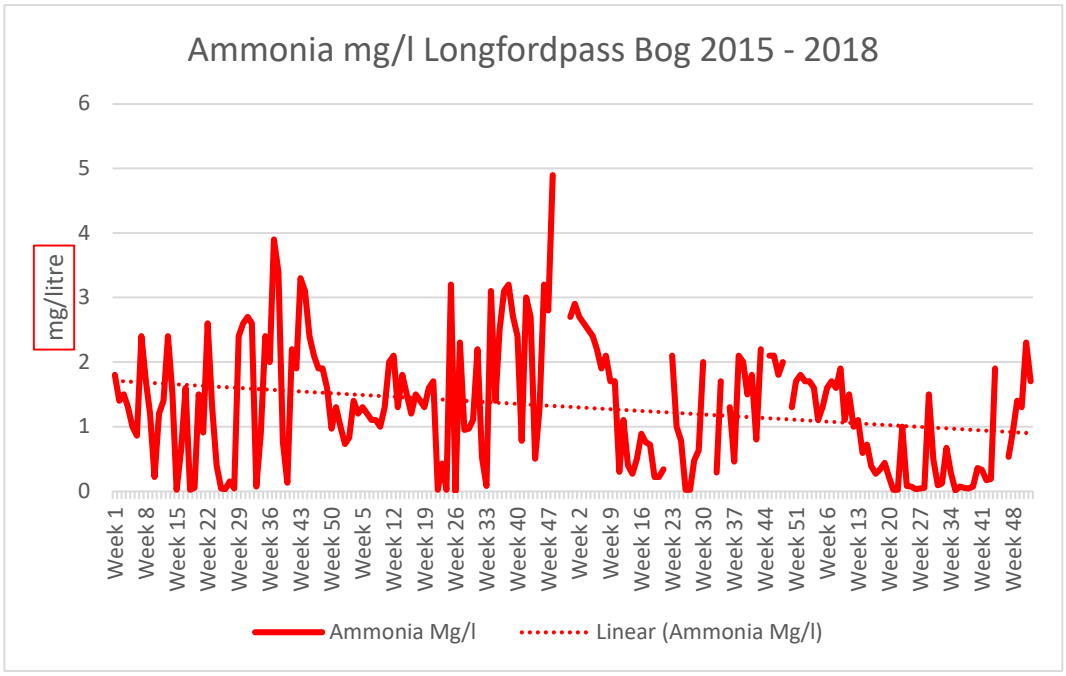


Figure 3.8 Ammonia monitoring results from Longfordpass Bog, 2015-2018

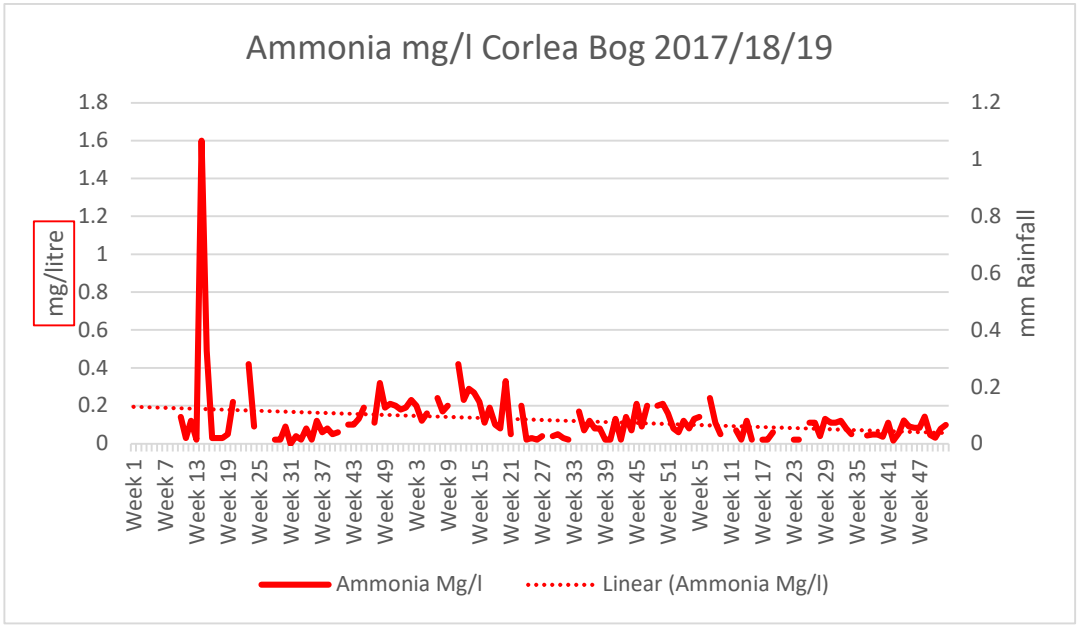


Figure 3.9 Ammonia monitoring results from Corlea Bog, 2017-2019

3.7 Fugitive Emissions to air

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

3.8 Carbon emissions

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

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

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

3.9 Current ecological rating

(Following NRA (2009) Evaluation Criteria)

Current ecological rating ranges from **International** to **Local Importance (lower value).** The site partially overlaps with Lough Ree SAC (NPWS Site Code: 000440) and Lough Ree SPA (NPWS Site Code: 004064) on the western section of the site and this area is deemed to be of **International Importance**.

The area of remnant high bog in the western section of Edera Bog is rated as being of **county importance**, due to this habitat undergoing a decline in quality and extent at the national level (NRA, 2009). The Bilberry River and associated wet grassland habitats are likely to be of **Local Importance (higher value)** as they will be used as a wildlife corridor, linking habitats. The majority of this site is deemed to be of **Local Importance (lower value)** due to the dominance of bare peat formerly managed for industrial peat production.

It is expected that the overall ecological value of this site will increase in the future as the site re-vegetates, matures and forms semi-natural habitats, such as more extensive areas of active raised bog.

3.10 Edera Bog Characterisation Summary

Edera Bog is located approximately 4.5km to the west of Ballymahon in Co. Longford on the shore of Lough Ree. Edera Bog only commenced peat production in 2003, with all commercial peat extraction ceasing in 2018. The majority of the bog is therefore classed as deep peat cutover, as it has deep residual peat (>2 m) Edera is located close to Lough Ree and a portion of the bog along the Bilbery River is prone to seasonal flooding. The margin of Edera partially overlaps two European protected sites which occur where Lough Ree adjoins the western boundary.

The bog can be broadly divided into four categories: (1) bog remnants, (2) deep residual peat, (3) shallow cutaway bog prone to winter flooding, (4) marginal and other dry areas of the former production area. (The bog is developed into these four areas to assist rehab planning. In reality, there are natural transitions between these areas where there are ecological and environmental gradients in relation to residual peat, etc.). These are summarised further as follows.

(1) The western bog remnant is the only bog remnant with raised bog restoration potential. Other bog remnants are quite small, narrow and subject to ongoing turf cutting via turbary.
(2) A significant part of the former production area is residual deep peat. Ground-water is unlikely to have a significant influence on the development of vegetation. If this peat can be re-wetted, and a stable water level developed close to the peat surface, it is expected to develop an embryonic *Sphagnum*-rich vegetation. The topography of this area is variable. Some of this area is modelled as wet and should be relatively straight-forward to re-wet once drains are blocked. Some of this area is modelled as dry and more intensive deep peat measures with bunding, re-profiling and cell berms are proposed to optimise hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation.
(3) The cutaway bog prone to winter flooding is located along the Bilbery River. This part of the former production area has shallow or no residual peat and the sub-soil is exposed. The sub-soil is limestone-based glacial deposits and lacustrine marl, and likely to have a more alkaline influence on the vegetation. This area is expected to develop wetland vegetation with fen and Reedswamp. Rehabilitation measures are proposed to block drains to manage summer water-levels and create a shallow wetland with emergent vegetation. This area will continue to be inundated with winter flooding. A berm is proposed to protect the marginal land, help maintain summer water levels and direct water flows.
(4) Some parts of the former production area will be relatively dry. This includes headlands and high fields. Two areas of higher ground have also been identified where there is limited potential to significantly re-wet residual peat. Drain-blocking and some fertiliser application is proposed. Birch woodland and other drier habitats are expected to develop.

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

Longford Council are proposing the construction of a walkway along the former railway at Edera. These proposed project is compatible with the proposed rehabilitation.

4. CONSULTATION

4.1 Consultation to date

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

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

- Longford Wetland Wilderness (general proposal led by Longford County Council and other stakeholders. This has had several iterations. See Lough Ree and Mid Shannon, Spirit Level 2017. A feasibility study for Longford County Council).
- Feehan, J. (2004) A Long-Lived Wilderness; the future of the north midlands peatland network UCD/NWWPC.
- Lauder, A. & O'Toole L. (2017). Concept development for a landscape-scale Wetland Wilderness Park in the Mid Shannon Region. A report funded by the Heritage Council's Heritage Grant Scheme.
- Foss, P.J., Crushell, P. & Gallagher, M.C. (2017). Counties Longford & Roscommon Wetland Study. Report prepared for Longford and Roscommon County Councils.
- 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).
- Proposed greenway development (Longford County Council).

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

Consultation was carried out in 2019 on an earlier draft of this plan and additional consultation was carried out in 2020/2021.

Consultation in 2019 included:

- May 2019: Separate meetings with neighbour and representative from Longford County Council's Planning Section.
- May 2019: Written response received from IPCC in relation to consultation invitation on Edera Bog.
- June 2019: Meeting (on site) with regional NPWS representative.

In addition, provision for consultation with local residents and landowners in general (including any with turbary rights) has been facilitated by the distribution of letters to all houses within 1km of the boundary of Edera Bog. These letters included information about PCAS as well as contact details for further information. An

advertisement about PCAS was also printed in the Longford Leader (January 2021) (a local newspaper that covers the Edera Bog area).

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

4.2 Issues raised by Consultees

To date, a number of issues have been raised by consultees during the consultation process for both the current and previous drafts of the rehabilitation plan for Edera Bog – these are summarised below.

4.2.1 Assessments of rehabilitation

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

4.2.2 Sphagnum inoculation

NPWS raised the idea of inoculating some of the rehabilitated deep peat areas with *Sphagnum* if the site did not naturally see *Sphagnum* re-colonisation after 2-3 years. A potential donor site of Fisherstown Bog was indicated during discussions.

4.2.3 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.

4.2.4 Monitoring

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

4.2.5 Flooding

The IFA, ICMSA and two neighbours of Edera Bog 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.

4.2.6 Conservation grazing

A neighbouring farmer suggested it may be of value to explore conservation grazing with ponies on part of the site. Trialling this management option was supported in discussions with NPWS regional staff.

4.2.7 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).

Longford County Council proposes to undertake a project comprising the construction of amenity trackway through part of Edera Bog.

A technical issue relating to a Bord na Móna railway bridge on the site was raised.

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

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

4.3 Bord na Móna response to issues raised during consultation

4.3.1 Assessments of rehabilitation

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

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

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

4.3.2 Sphagnum inoculation

Sphagnum inoculation has been proposed at Edera Bog as part of PCAS measures

4.3.3 Restoration scope

As part of the PCAS, all restoration/rehabilitation options have been developed to support climate action and biodiversity objectives.

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 Edera 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 Edera Bog. The re-colonisation of species such as Large Heath is likely to take a longer timeframe.

4.3.5 Flooding

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

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

The rehabilitation measures proposed at Edera 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.

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

4.3.6 Conservation grazing

The primary aim of the rehabilitation of Edera is the re-wetting of habitats to restore Carbon-sink function and improve these habitats for biodiversity. Conservation grazing can be a valuable tool in supporting biodiversity-rich habitats in agricultural landscapes, but would be less common in wetland and peatland habitats (although there are examples of using conservation graziers in fen habitats). From an animal welfare perspective, it would be important to ensure that the habitats post-re-wetting are suitable to support animals, and that appropriate types and breeds are available, along with animal husbandry resources. As a result, conservation grazing is not being proposed in the short-term rehabilitation options for Edera Bog, but may be considered in the medium-

term if suitable habitats for conservation graziers are present, and an appropriate mechanism for the management and supervision of such stock can be identified and secured.

4.3.7 Other issues (including 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.

Amenity such as the greenway proposed by Longford County Council can be positively aligned and integrated to after-use plans following the completion of the proposed rehabilitation at Edera Bog. Rehabilitation measures proposed for Edera 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.

Given the proximity of our peatlands to the Shannon basin, Bord na Móna are positioned to make significant contributions to future amenity and associated green infrastructure initiatives, not least the proposed Mid-Shannon Wilderness Park and proposed Biosphere Reserve. Bord na Móna are currently working with Longford County Council to develop c.10km of greenway trails through our peatlands at Corlea, Knappogue and Derryarogue.

Other issues, including after-use and management issues outside the boundary of Edera Bog, are acknowledged but are specifically outside the scope of this rehabilitation plan. This includes the technical issue relating to a Bord na Móna railway bridge on the site, which is currently being investigated and a response will be issued to the query as soon as this has been resolved internally. However, this issue does not directly relate to the proposed rehabilitation measures in PCAS.

4.3.8 Concluding statement.

- 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.
- Several marginal drains will not be blocked to avoid impacts on adjacent lands, rights of way, or turf-banks.
- No changes were required to the rehabilitation plan to enable future potential amenity (greenway).

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**. Optimising hydrology for the development of embryonic *Sphagnum*-rich vegetation communities on deep peat, and eventually naturally functioning and peatland habitats.
- Optimising hydrological conditions for the development of Reed Swamp and fen on shallow more alkaline peat and other subsoils.
- Optimising hydrological conditions for the protection of 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 at Edera 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, making the overall bog wetter. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.
- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as such the development of new habitat to support biodiversity and local attenuation of water flows from the bog.
- 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).

- Re-wetting 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 Edera Bog (Figure 3.1).
- EPA IPC Licence - Ref. P0504-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area.
- The proposed rehabilitation is designed to exceed the requirements as defined by the IPC Licence. PCAS is designed to enhance the ecosystem services of Edera Bog, in particular, optimising **climate action benefits**. The proposed improvements will mean that environmental stabilization is achieved (meaning IPC obligations are met) and, in addition, significant other ecosystem service benefits will be accrued.
- The local environmental conditions of Edera Bog identify wetland creation and deep peat re-wetting as the most suitable rehabilitation approach for this site.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog. Bord na Móna have defined the key goal and outcome of rehabilitation at Edera Bog **environmental stabilisation** and **optimising deep peat re-wetting, and setting the site on a trajectory towards the development of embryonic peat-forming (*Sphagnum*-rich) vegetation communities on deep peat, and the development of Reed Swamp and fen on shallow more alkaline peat and other subsoils.**
- Rehabilitation of Edera Bog will support multiple national strategies of climate action, biodiversity action and other key environmental strategies such was the Water Framework Directive.
- **Time frame.** Rehabilitation measures will be carried out during the period of PCAS (2020-2025). The surrender of the licence is likely to extend beyond the PCAS timeframe.
- No direct rehabilitation measures will be carried out in the small proportion of the margin of Edera Bog that overlaps with the protected European sites (no measures proposed as there are no drains to target).

6.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, much of the peat mass has been removed at many sites, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status, etc.) and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland). At Edera Bog, only a certain proportion of peat has been removed leaving a largely un-vegetated surface over deep peat deposits. There are local factors that will influence the future trajectory of this site, which need to be considered as part of the wider rehabilitation.
- **Surrounding landscape and neighbours.** Another key constraint is the interaction between the Bord na Móna sites and the surrounding landscape. Care will be taken that no active rehabilitation management is carried out that could negatively and knowingly impact on surrounding land. This includes the hydrology of neighbouring farmland, neighbouring turbary, as well as potential changes to the hydrology of surrounding designed sites. It is anticipated that the work proposed here (blocking drains and re-wetting cutaway peatlands) will not have any flooding impacts on adjacent land. In general, marginal drains will **not be blocked**.
- **Public Rights of Way**. Where a public right of way or similar burden exists on Bord na Móna property, consideration will be given to ensuring that this remain intact, where possible. In some instances,

depending upon previous land uses and management, alternative solutions may be required. These will be explored in consultation with local communities and statutory bodies.

- **Archaeology**. The discovery of monuments or archaeological objects during peatland rehabilitation may potentially constrain the rehabilitation measures proposed for a particular area. If this occurs, rehabilitation measures will be reviewed and adapted. An archaeological impact assessment of the proposed rehabilitation at Edera is being carried out. Rehabilitation around archaeology will be avoided, minimised or amended (peat barriers located to avoid damage to any archaeological features) in response to the AIA (Figure 8.5, Appendix XII).

6.2 Key Assumptions

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

6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- The longer-term development of stable naturally functioning habitats to fully develop at Edera Bog. The plan covers the short-term rehabilitation **actions** and **an additional monitoring and after-care programme** to monitor the rehabilitation and to respond to any needs.
- This plan is not intended to be an after-use or future land-use plan for Edera Bog.
- The longer-term management of this site, potentially as a nature conservation site, or for amenity, or for other uses in the future.

7. CRITERIA FOR SUCCESSFUL REHABILITATION

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

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

Rehabilitation is generally defined by Bord na Móna as

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

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

In general, the key objective will be to optimise the area of suitable hydrological conditions for climate action benefits (re-wetting peat and keeping water levels close to the peat surface) across this heterogeneous cutaway landscape to accelerate the trajectory of establishment of embryonic *Sphagnum*-rich habitats on suitable deep peat areas and optimise water levels in the shallow cutaway areas for the development of Reed swamp and fen habitats.

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

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

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

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

- Optimising the extent of suitable hydrological conditions to optimise climate action and other ecosystem service benefits (optimising and maximising deep peat re-wetting). This will be measured by an aerial survey after rehabilitation has been completed.

- Accelerating the trajectory of the site towards becoming a reduced carbon source/carbon sink and eventually naturally functioning peatland habitats (heath, scrub, poor fen and embryonic *Sphagnum*-rich raised bog peatland communities, where conditions are suitable). These habitats will generally establish initially as pioneer vegetation. This will be measured through habitat mapping and the development of cutaway bog condition assessment. This cutaway bog condition assessment will include assessment of environmental and ecological indicators such as vegetation cover, vegetation communities, presence of key species, *Sphagnum* cover, bare peat cover and water levels. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Reduction in carbon emissions. This will be 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.
- Improvement in biodiversity and ecosystem services. This will be demonstrated by metrics outlined in Section 9.1 that can be used to measure changes in ecosystem services (e.g. water quality parameters, development of pioneer habitats, breeding bird monitoring). This will be measured by collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.

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

Criteria type	**Criteria**	**Target**	**Measured by**	**Expected Time-frame**
IPC validation	Rewetting of the drained high bog area	Delivery of planned rehabilitation measures. This will be a combination of drain blocking, bunding and re-profiling	Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking)	2021-2024
IPC validation	Key water quality parameters Ammonia, Phosphorous, Suspended solids, pH and conductivity	Stabilization Improvement of key water quality parameters	Monthly Water quality monitoring. Started in advance of the proposed rehabilitation.	2021-2023
IPC validation	Reducing pressure from	At Risk classification will see improvements in the	EPA WFD monitoring programme	WFD schedule

	peat production on the local water body catchment (WFD)	associated pressures from this peatland or if remaining At Risk, that there is an improving trajectory in the pressure from this peatland	Additional BnM water quality monitoring	
Climate action verification	Optimising the extent of suitable hydrological conditions to optimise climate action and setting the site on a trajectory towards establishment of a mosaic of compatible peatland habitats	Optimal extent of suitable hydrological conditions Indicators of establishment of compatible cutaway habitats	Aerial photography, Cutaway bog condition map 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	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 Presence of key species – Sphagnum – Walkover survey Breeding birds – Breeding bird survey Pollinators – Pollinator walk 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.	2021-2024

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 8.1-8.4) will be important in planning the future peatland landscapes and planning the use of the most appropriate rehabilitation methodologies to maximise climate action benefits. Hydrological modelling (Figure 8.4) indicates those areas that are likely to re-wet when drains are blocked, based on the current topography, and areas where water levels may have to be modified, where needed. Enhanced rehabilitation measures will look to optimise hydrological conditions for re-wetting peat in other areas. This planning is also essential for matching the most sustainable rehabilitation methodology to the most suitable cutaway environment to maximise the benefits of the resource outlay (maximising cost/benefit).

The rehabilitation actions will be a combination of PCAS measures to re-wet peat. The distribution of these measures is provisionally outlined in Figure 8.5. (Note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and future refinement of the enhanced rehabilitation measures.)

These enhanced measures for Edera bog will include (see Figure 8.5):

- Re-wetting the deep peat areas of the bog using berms, drain blocking and field re-profiling. This enhanced measure seeks to create large (c. 45m x 60m) flat areas or cells of shallow (< 10 cm) water conditions on bare peat, across multiple fields that are enclosed by shallow berms to retain shallow surface water;
- In some areas, a cut-and-fill cell bunding technique is proposed. The cut and fill cell bunding approach aims to create 'saucers' or flat bunded areas (cells) on peat with berms to hold shallow water at appropriate levels;
- Re-wetting some deep peat areas of the bog through regular more intensive drain blocking using an excavator to create up to a max of 7 no. peat blockages every 100 m along each field drain, along with field re-profiling and drain infilling if required;
- Re-alignment of piped drainage;
- Blocking drains in targeted marginal (degraded) high bog/cutaway areas and re-wetting, where possible, using an excavator to install peat blockages, up to a max of 7/100m. Some bog remnants are too small to benefit from this approach;
- Targeted fertiliser applications on bare peat areas to accelerate vegetation establishment on headlands and high fields.
- Seeding of vegetation and inoculation of *Sphagnum* in suitable deep residual peat; and
- Modifying water levels at outfalls. This will further slow the movement of water through and out of Edera Bog.
- Water level management through blocking of outfalls, overflow management, field re-profiling, and the creation of berms to rewet cutaway.
- Silt ponds will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase silt ponds will be continually inspected and maintained, where appropriate. When it is deemed that silt ponds are not required, as the bog has been successfully stabilised and there is no silt run-off, the condition of the silt ponds will be reviewed. Silt ponds will either be de-watered (water levels lowered to a level where the silt pond will naturally develop as a small wetland feature), left in situ, or infilled (where discharges do not require silt control).

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

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

- Seek formal approval of the enhanced plan from the EPA;
- Agree an *ex ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator;
- Develop a detailed site plan with detailed site drawings outlining how the various rehabilitation methodologies (the proposed PCAS) will be applied to Edera Bog. This will take account of peat depths, topography, drainage and hydrological modelling. (See map for an indicative view of the application of different rehabilitation methodologies);
- Carry out a hydrology and drainage management assessment of the proposed enhanced rehabilitation measures;
- Carry out a review of known archaeology and an archaeological impact assessment of the proposed rehabilitation. Incorporate the results of this assessment into the rehabilitation plan to minimise known archaeological disturbance, where possible;
- Carry out a review of remaining milled peat stocks;
- Carry out a review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements. A known right of way exists along across one of the Bord na Móna margins.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation, if needed, such as the presence of sensitive ground-nesting bird breeding species (e.g. Curlew) or larval webs of Marsh Fritillary butterfly, etc. The scheduling of rehabilitation operations will be adapted, as mitigation; and
- Ensure all activities comply with the environmental protection requirements of the IPC Licence.

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

- Carry out proposed measures as per the detailed site plan. This will include a combination of drain blocking, peat field re-profiling, cell-bunding and fertiliser applications targeting headlands, high fields and other areas (where required). All rehabilitation will be carried out with regard to environmental control measures (Appendix IV);
- Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions;
- Carry out the proposed monitoring, as outlined.
- While natural colonisation is expected to commence almost immediately once peat production ceases, Phase 2 actions will be carried out in targeted areas to accelerate re-vegetation and colonisation of target species. Phase 2 actions may include seeding of targeted vegetation and inoculation of *Sphagnum*;
- Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent silt run-off from the site during the rehabilitation phase; and

- Submit an *ex post* report to the Scheme regulator to verify the eligible works to be carried out in year 1 of the Scheme, and an *ex ante* estimate for year 2 of the Scheme; and so on for each year of the proposed Scheme.

8.3 Long-term (>3 years)

- Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary;
- Evaluate opportunity for conservation grazing option post re-wetting including available resources for management and husbandry;
- Delivery of a monitoring, aftercare and maintenance programme (See section 10.2 below);
- Decommissioning of silt-ponds will be assessed and carried out, where required; and
- Reporting to the EPA will continue until the IPC License is surrendered.

8.4 Timeframe

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

8.5 Budget and costing

Bord na Móna (BnM) appreciates the Minister's intention to support, via the Climate Action Fund, Bord na Móna in developing a package of measures, 'the proposed Scheme', for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme'. *However, only the additional costs associated with the additional and enhanced rehabilitation, i.e, measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support.*

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

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

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

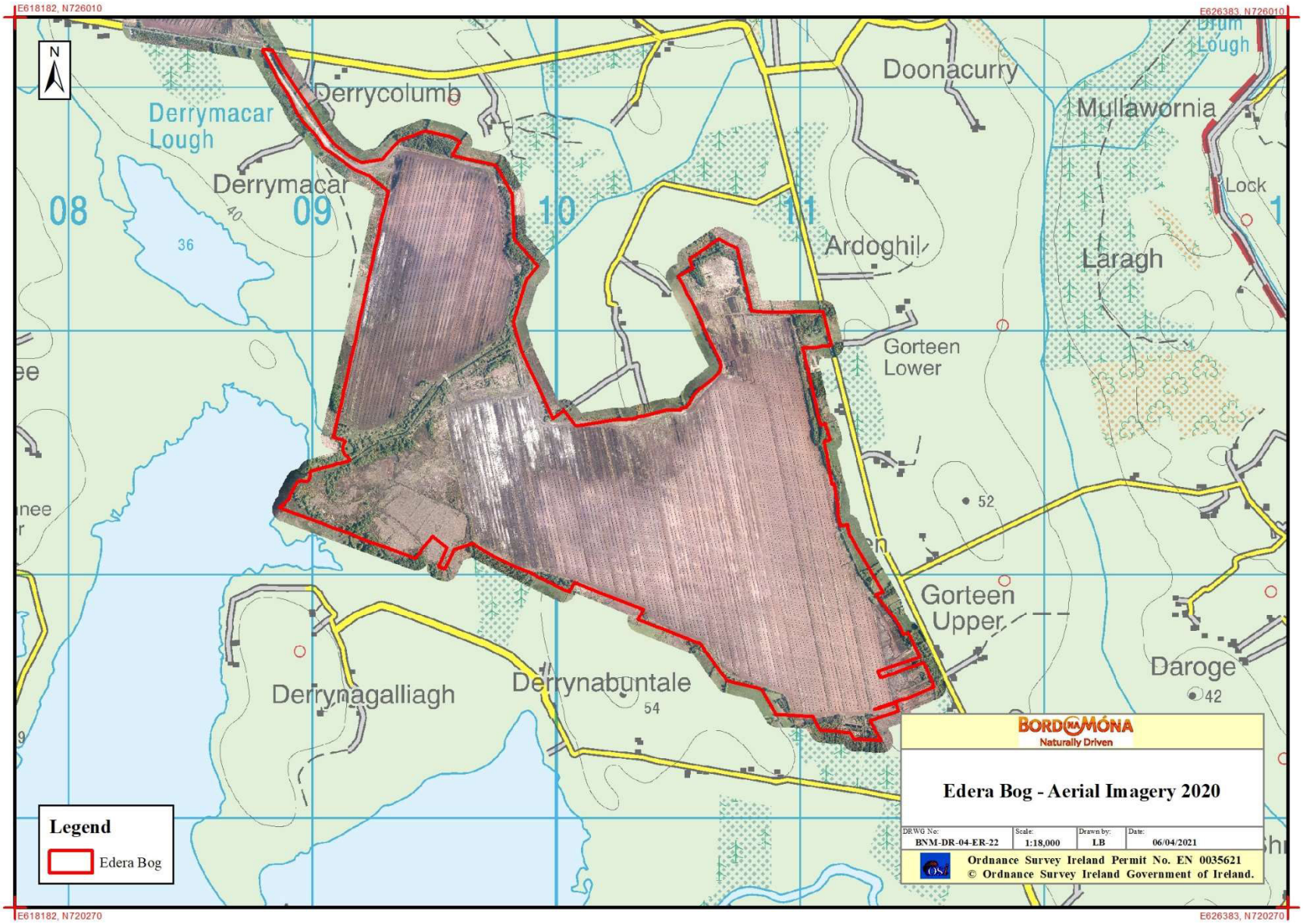


Figure 8.1. Aerial photo of Edera Bog. The production bog is bare peat. The cutaway area is visible as exposed whitish sub-soil.

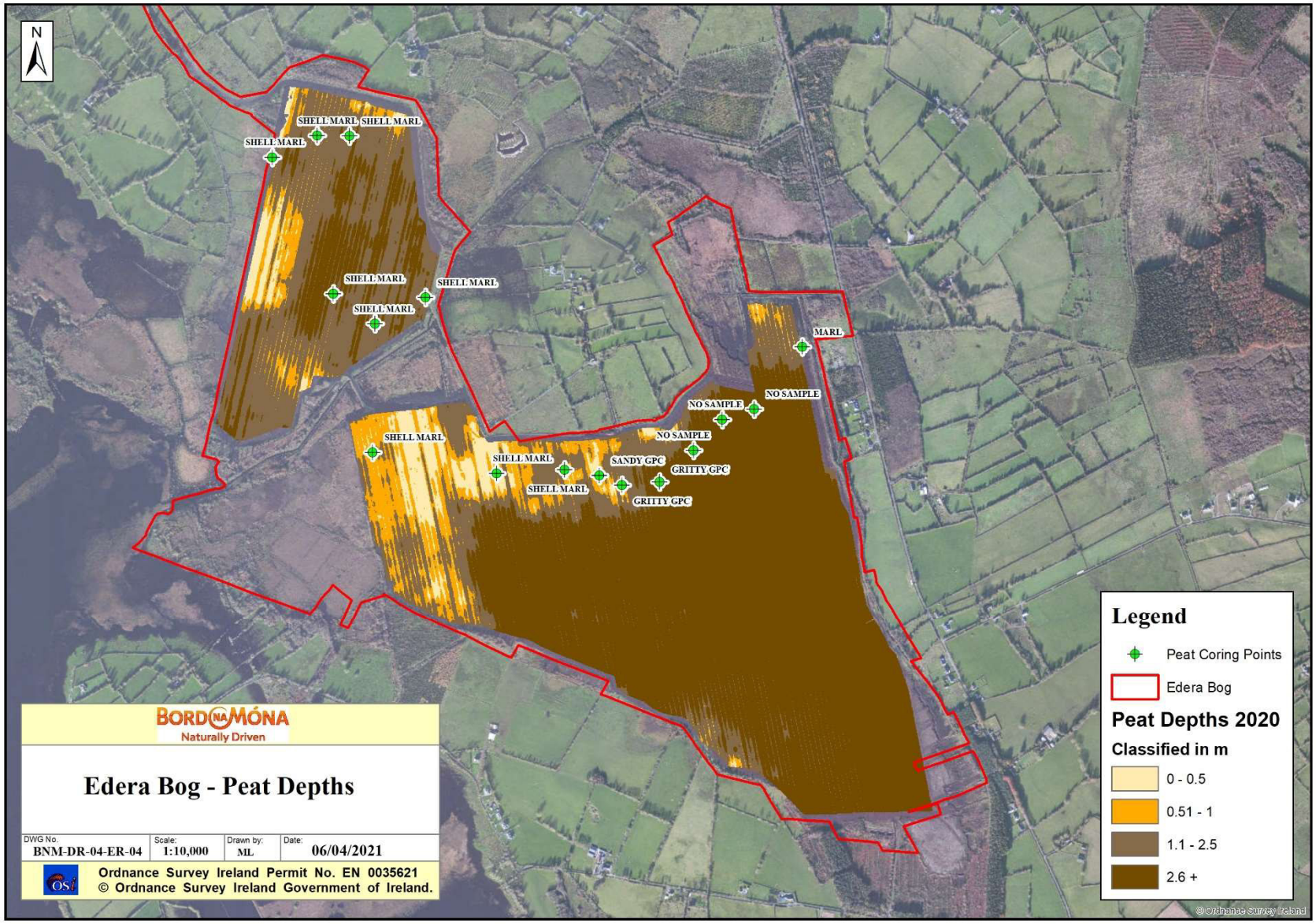


Figure 8.2. Peat depth map for Edera Bog. The majority of the bog is characterised as deep peat cutover bog.

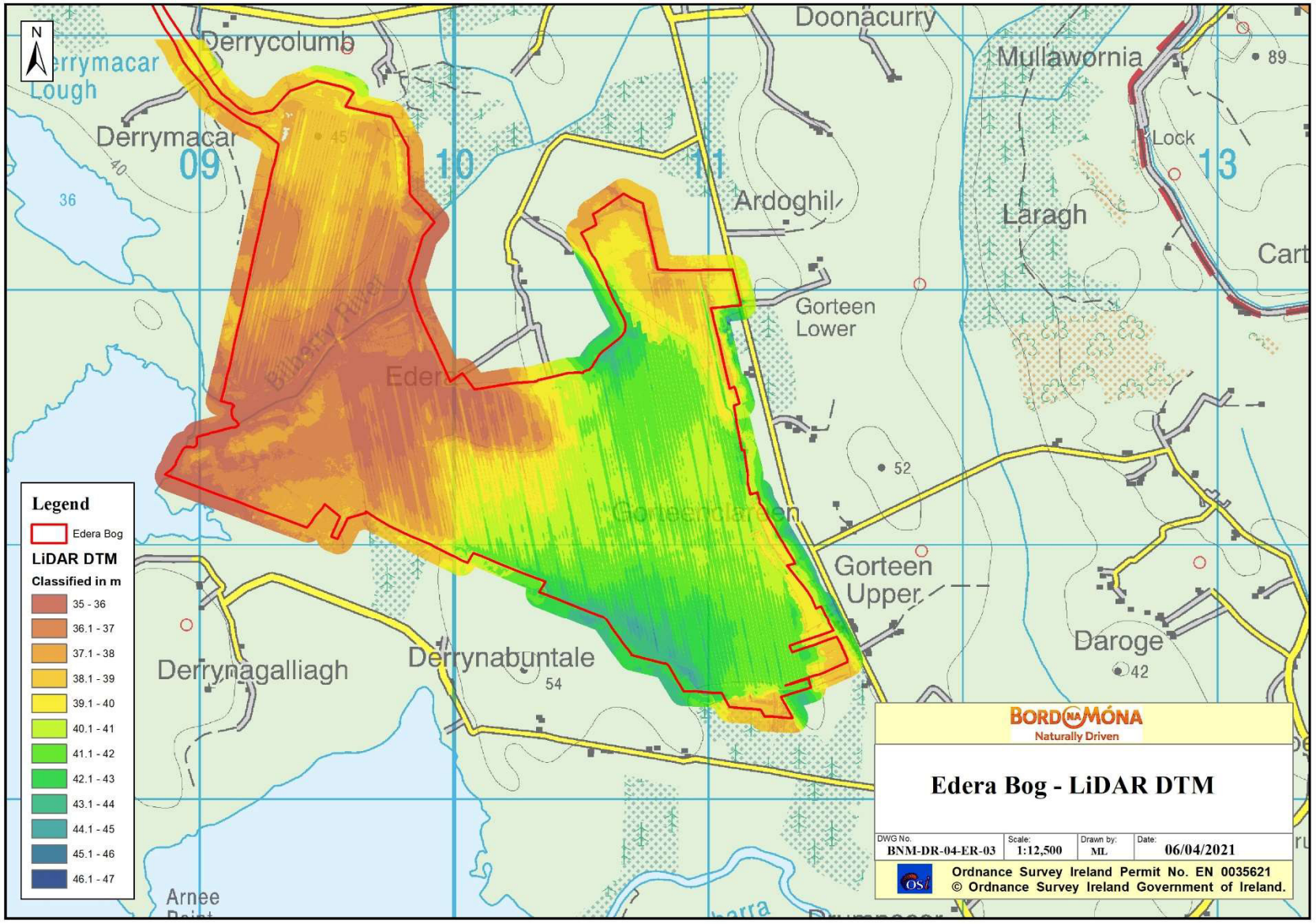


Figure 8.3. LIDAR topography map of Esker Bog. Low areas and basins are orange-yellow, more elevated areas are blue-green.

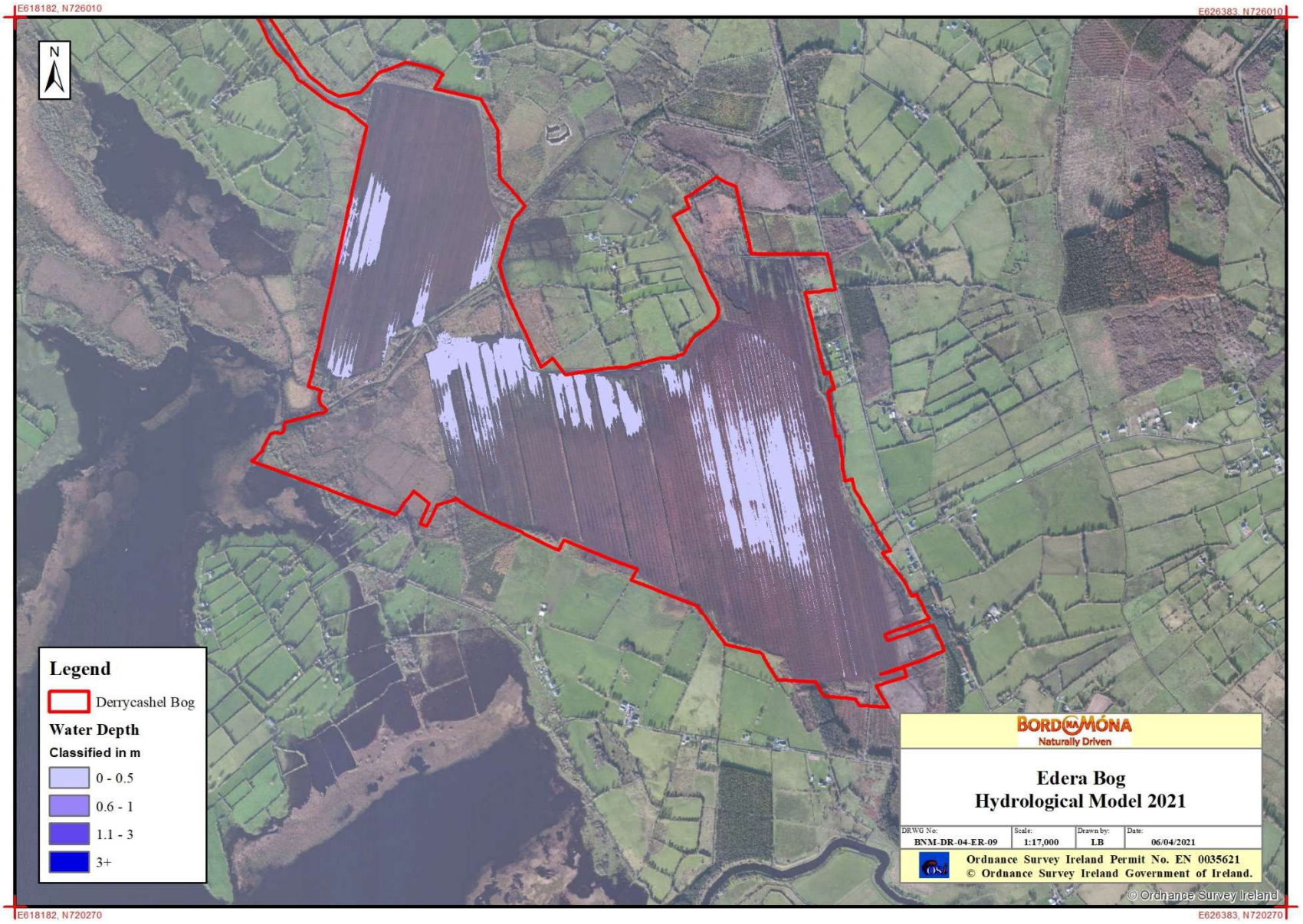


Figure 8.4. Hydrological modelling for Edera Bog showing range of expected water depths based on current topography.

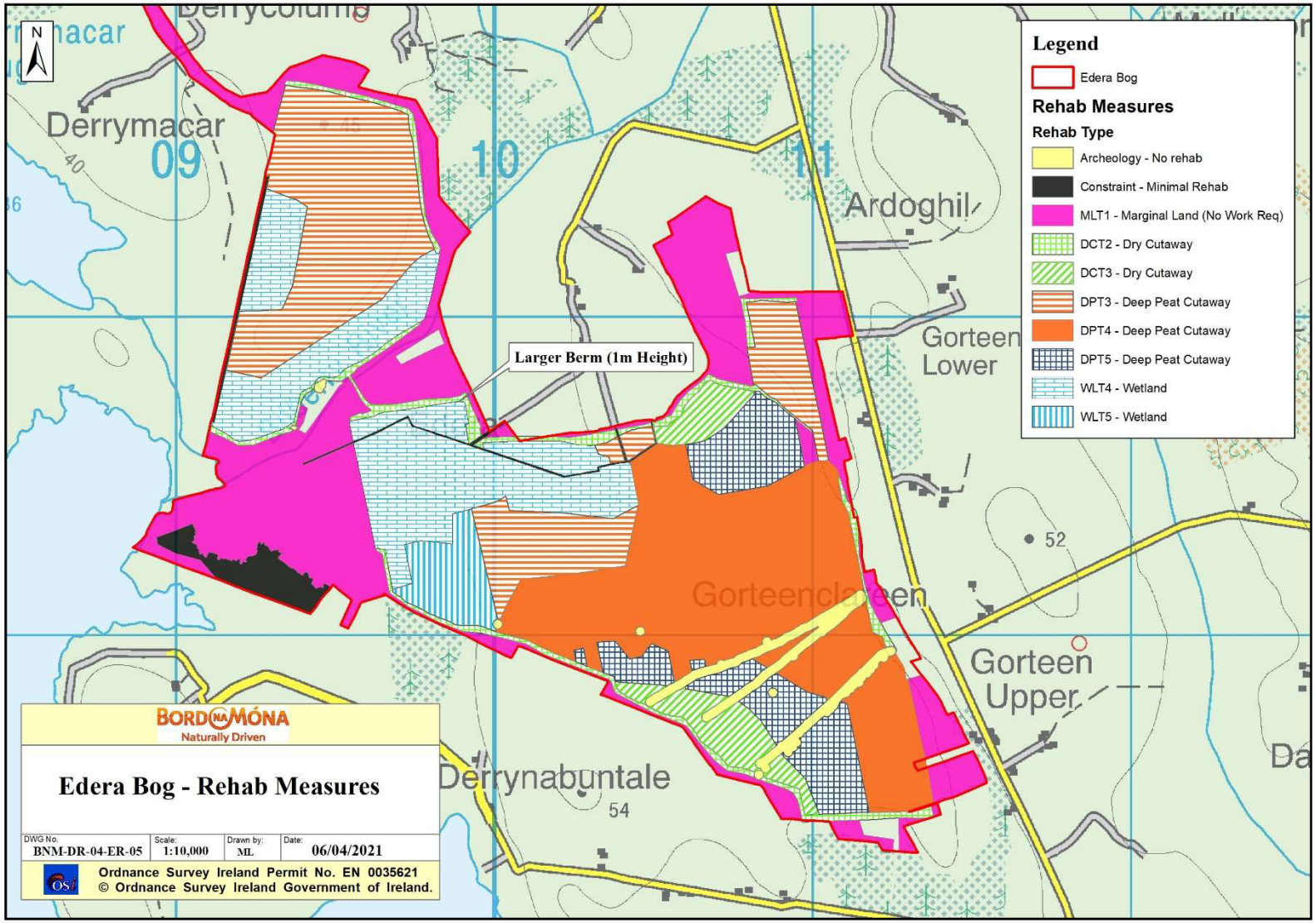


Figure 8.5. Indicative Enhanced Rehabilitation Plan for Edera Bog. Note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.

Table 8.1 Enhanced rehabilitation measures and target area at Edera 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 (max 3/100 m) + blocking outfalls and managing water levels with overflow pipes	
	DPT2	More intensive drain blocking (max7/100 m) + blocking outfalls and managing overflows (follows best practise raised bog restoration for drained high bog)	
	DPT3	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows	48.9
	DPT4	Berms and field re-profiling (45m x 60m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	60.5
	DPT5	Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	19.7
Dry cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	
	DCT2	Regular drain blocking (max 3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	10.3
	DCT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows + targeted fertiliser treatment	9.7
Wetland cutaway	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	
	WLT2	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site	
	WLT3	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site + constructing larger berms to re-wet cutaway + transplanting Reeds and other rhizomes	
	WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	41.9
	WLT5	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	7.0
Marginal land	MLT1	No work required	67.4
	MLT2	More intensive drain blocking (max 7/100 m)	
	MLT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows with + boundary berm	
Other		Silt-ponds	3.3
		Constraints	6.7
		Archaeology constraints	6.7
Total			282.1

9. AFTERCARE AND MAINTENANCE

9.1 Programme for monitoring, aftercare and maintenance

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

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

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

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

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

- Vegetation and habitat monitoring after rehabilitation is completed using a cutaway bog condition assessment (Similar to ecotope mapping). This assessment will include assessment of on environmental and ecological indicators such as vegetation cover, vegetation communities, presence of key species, *Sphagnum* cover, bare peat cover and water levels.
- The condition of the bog can be assessed using the condition assessment and suitable Greenhouse Gas (GHG) emission factors can be assigned to different habitats. GHG emission factors have been determined for various peatland habitats in Ireland (Wilson *et al.*, 2015) and are constantly being refined with more and more research. BnM is actively supporting research into GHG fluxes in different rehabilitated peatland habitats. This means that potential GHG emissions can be estimated from the site, as the site continues along its trajectory towards a naturally functioning peatland ecosystem.
- It is proposed to monitor the improvement of some biodiversity ecosystem services. A breeding bird and Pollinator monitoring programme will be established. Specific pollinator indicators will be monitored (Bee and Butterfly). To be defined in relation to monitoring of the overall proposed Scheme and after consultation with stakeholders.

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

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

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

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

10. REFERENCES

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.

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.

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

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

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.

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.

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.

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., 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.

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

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 Edera Bog (Figure 3.1).
- EPA IPC Licence - Ref. P0-504-01. 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. Edera bog is part of the Mount Dillon Bog group.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog.
- To minimise potential impacts on neighbouring land. Some boundary drains around Edera Bog will be left unblocked as blocking boundary drains could affect adjacent land.

Rehabilitation goals and outcomes

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

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

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

Criteria for successful rehabilitation:

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

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

Rehabilitation targets

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

Rehabilitation measures: (see Figure Ap-1)

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

Timeframe:

- 2021. 1st phase of rehabilitation. Field drain blocking.
- 2021. 2nd phase. Further realignment of piped drainage and other re-wetting measures dependent on success of 1st phase re-wetting, as determined by ongoing monitoring of water levels and re-vegetation.
- Other enhancement measures such as fertiliser treatment will be carried out, if needed. These will be determined by ongoing monitoring.
- 2023-2024. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- 2023-2024. Decommission silt-ponds, if necessary.

Budget and Costing

- Bord na Móna maintains a Provision on its balance sheet to pay for the future costs of rehabilitation and decommissioning when industrial peat extraction ceases. This is updated every year. For more information see the Bord na Móna Annual Report (Bord na Móna 2020). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.
- At this time, a basic rehabilitation provision has been allocated to the site based on the area degraded raised bog across the site.

Table AP-1. Rehabilitation measures and target area.

Type	Code	Description	Area (Ha)
Deep peat	DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes	138.7
Dry cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	13.1
Wetland	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	53.6
Silt Pond			4.4
	MLT1	No work required (Marginal land including Silt Ponds)	70.9
Archaeology			0.6
Constraint			0.9
Total			**282.1**

Monitoring, after-care and maintenance

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

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

Validation and IPC Licence surrender

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

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

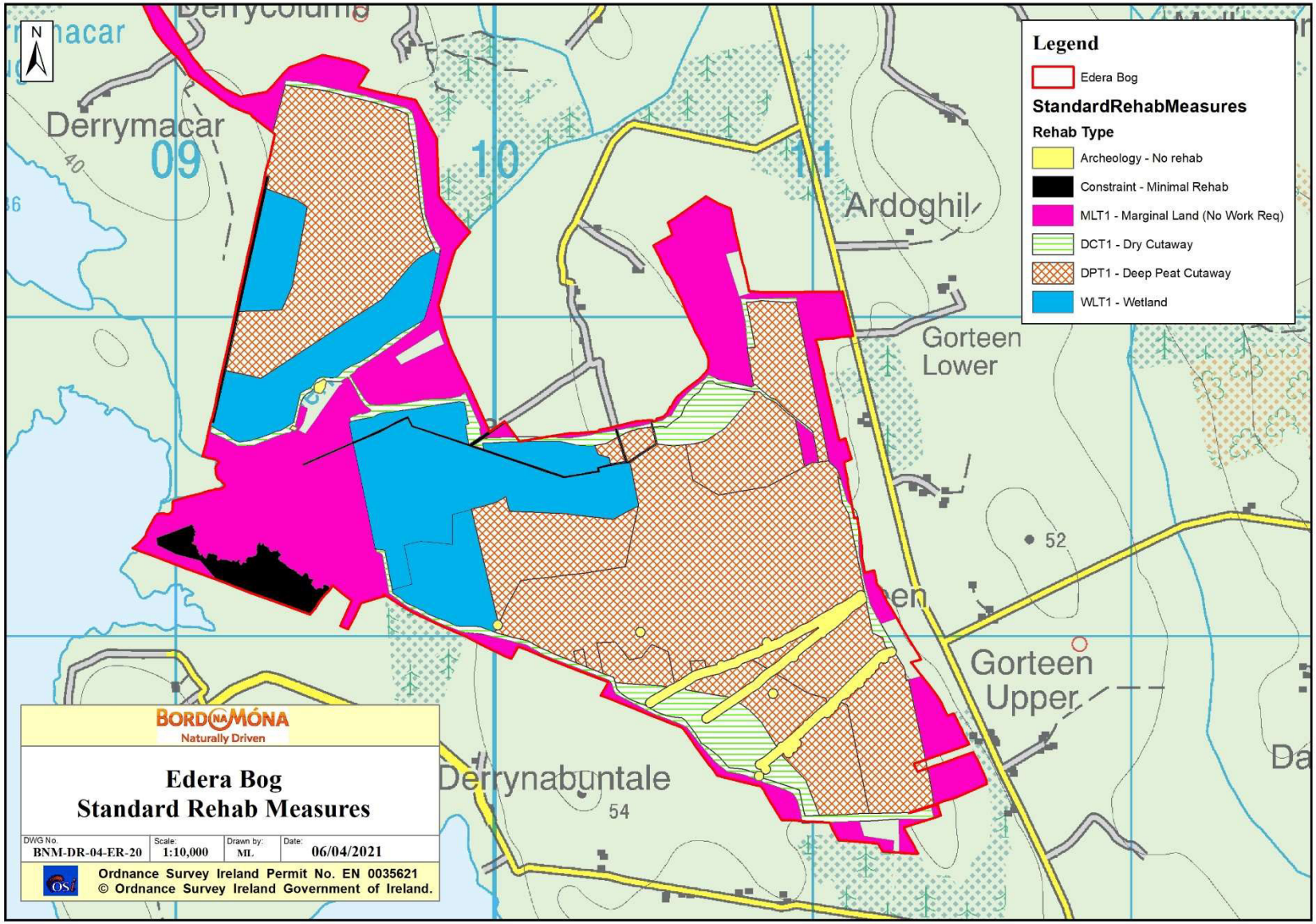


Figure Ap-1. Indicative standard rehabilitation plan for Edera Bog.

APPENDIX II: BOG GROUP CONTEXT

The Mount Dillon Bog Group IPC Licensed area is made up of two sub-groups Mount Dillion and Mostrim) and have been in industrial peat production for several decades. There are 28 defined sites covering a total area of 11,138 ha. Of the 28 sites, 23 mainly straddle the River Shannon within counties Roscommon and Longford, with five sites partially in County Westmeath to the east. Each bog area further comprises a range of habitats from bare milled peat production areas to re-colonising cutaway to workshops areas and transport infrastructure. Industrial peat extraction from these sites mainly supplied ESB power stations at Lanesborough (LRP) or for horticultural peat products.

Industrial peat extraction in the Mount Dillon Bog Group ceased in 2019. It is planned to supply remaining milled peat stocks to Lanesborough (LRP) during 2020. Both power stations will cease using peat by the end of 2020. All remaining peat stocks will also be removed. Intensive decommissioning and rehabilitation for the Mount Dillon Bog Group is expected to start in 2020/2021.

One bog site, Cloonmore, was never used for industrial peat production and several bogs in the Mostrim group have been drained but never fully developed and still retain typical high bog characteristics. These include Clonwhelan, Glenlough and a section of Mostrim. These sites have been zoned for biodiversity and a high bog drain blocking will be used to re-wet the high bog and encourage restoration of the raised bog habitat. Several sites (Glenlough, Mostrim, Clonwhelan and Clynan) were assessed by consultants for NPWS as part of the review of the raised bog Natural Heritage Area network (NPWS 2014).

A breakdown of the component bog areas for the Mount Dillon Bog Group IPC License Ref. PO504-01 is outlined in Table Ap-2. These areas are also outlined on Figure Ap-2 (Map of the Mount Dillon Bog Group).

Industrial peat production history varies across the Mount Dillon bog group, so there is a wide range of peat depths at present. Bogs close to Lanesborough tend to have shallower peat depths or have been cutaway, while some bogs on the periphery of the group tend to have deeper peat reserves. Several sites such as Mount Dillion and Garryduff have been mostly cutaway to the fen peat layers or in some cases to expose the underlying gravel/sub-soil. Several bogs in the Mostrim group have only been partially developed or have had no industrial peat production, and have relatively deep peat depths.

Table Ap-2a: Mount Dillon Bog Group names, area and indicative status (Mount Dillon Energy Peat sub-group).

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Begnagh	265	Cutover Bog Industrial peat production commenced at Begnagh Bog in 1977. Deep peat reserves remain on much of the former production area. Pumped bog drainage.	Begnagh Bog formerly supplied fuel peat for Lough Ree Power Some areas of cutaway on site are developing pioneer cutaway vegetation communities. LCC are proposing an amenity walkway for this bog	2020	Draft 2017
Clooneeny	358	Cutover Bog Industrial peat production commenced at Clooneeny Bog in 1985 and ceased in 2020. Deep peat reserves remain on much of the former production area. Clooneeny is considered a deep peat cutover bog. Pumped bog drainage.	Clooneeny Bog formerly supplied including; horticultural peat and fuel peat for Lough Ree Power Most of the former production area on site is bare peat. Some areas of cutaway on site are developing pioneer cutaway vegetation communities. Bog restoration has been carried out in a bog remnant that was damaged by turf cutting trespass.	2020	Draft 2017

			LCC are proposing an amenity walkway for this bog		
Cloonmore	102	N/A	Never developed for industrial peat production; scattered plots.	N/A	N/A
Cloonshannagh	494	Cutover Bog Industrial peat production commenced at Cloonshannagh Bog in 1985. Deep peat reserves remain across the former production area. Cloonshannagh is considered a deep peat cutover bog.	Cloonshannagh Bog formerly supplied horticultural peat, and fuel peat for Lough Ree Power Restoration work has been carried out on a 38ha section of high bog within Cloonshannagh Bog. Some of the former production area on site is developing pioneer cutaway vegetation communities, the remainder of the site is bare peat	2020	Draft 2017
Cloonshannagh Rail Link	28	Cloonshannagh rail link is a link between sites.	N/A	N/A	N/A
Corlea	163	Cutaway Bog Industrial peat production commenced at Corlea Bog in 1960. Long-term peat extraction has created shallow cutaway. Corlea was a pumped bog. Pumped bog drainage – pumping has ceased.	The former production area at Corlea has already extensively colonised. Pioneer wetland and scrub development has occurred over much of the site. Large wetlands have developed with the cessation of pumping. Some wetland and rehabilitation management was undertaken between 2016-2019. Part of site leased to local community development group to develop amenity walkway in association with Longford County Council. LCC are proposing an amenity walkway for this bog	2018	Finalised 2019
Derraghan	289	Cutover Bog Industrial peat production commenced at Derraghan Bog in the 1940's. Most of the former production area has shallow peat reserves. Some pockets of deep peat remain. Derraghan is considered a shallow peat cutover bog. Pumped bog drainage.	Derraghan Bog formerly supplied fuel peat for Lough Ree Power. Part of the site developed into a licenced ash facility for Lough Ree Power. Much of the former production area at Derraghan has been out of production for some time. These areas have already extensively colonised with pioneer wetland and scrub vegetation communities. A small area has been used for a BirchWater trail as part of the BnM Herbs Project.	2020	Draft 2017
Derryadd	653	Cutover Bog Industrial peat production commenced at Derryadd Bog in 1960. Long-term peat extraction has left shallow cutaway. Some pockets of deep peat remain. Pumped bog drainage.	Much of the former production area has been out of production for some time. These areas have already extensively colonised with pioneer wetland and scrub vegetation communities Derryadd Bog is part of the footprint of Derryadd Windfarm for which planning permissions were granted in 2020. An amenity walkway is proposed.	2020	Draft 2019
Derryadd2	328	Cutover Bog Industrial peat production commenced at Derryadd 2 Bog in 1960. Long-term peat extraction has left shallow cutaway. Some pockets of deep peat remain. Pumped bog drainage.	Much of the former production area has been out of peat production for some time. These areas have already extensively colonised with pioneer wetland and scrub vegetation communities Derryadd 2 Bog is part of the footprint of Derryadd Windfarm for which planning permissions were granted in 2020. An amenity walkway is proposed.	2020	Draft 2019
Derryarogue	895	Cutaway Bog Industrial peat production commenced at Derryarogue Bog in 1941. Long-term peat extraction has left shallow cutaway. Some pockets of deep peat remain. Pumped bog drainage – pumping has been reduced.	Much of the former production area has been out of production for some time. These areas have already extensively colonised with pioneer wetland, cutaway and scrub vegetation communities. Derryarogue Bog is part of the footprint of Derryadd Windfarm for which planning permissions were granted in 2020. An amenity walkway is proposed.	2020	Draft 2019

Derrycashel	388	Cutaway Bog Industrial peat production commenced at Derrycashel Bog in 1951. Long-term peat extraction has left shallow cutaway. Some pockets of deep peat remain. Pumped bog drainage – pumping has been reduced.	Derrycashel Bog formerly supplied fuel peat for Lough Ree Power Much of the former production area at Derryarogue has been out of production for some time. These areas have already extensively colonised with pioneer wetland and scrub vegetation communities. Some wetland and rehabilitation management was undertaken (c.60ha) between 2014-2015.	2018	Draft 2021
Derrycolumb	454	Cutaway & Cutover Bog Industrial peat production commenced at Derrycolumb Bog in the 1980's. Most of the former production area still has deep peat reserves. Pumped bog drainage.	Derrycolumb Bog formerly supplied fuel peat for Lough Ree Power Much of the former production area at Derrycolumb has been out of production for some time. These areas have already extensively colonised with pioneer wetland and scrub vegetation communities. LCC are proposing an amenity walkway for this bog	2019	Draft 2021
Derrymoylin	356	Cutover Bog Industrial peat production commenced at Derrymoylin Bog in 1985 and ceased in 2020. This site still has residual deep peat.	Derrymoylin Bog formerly supplied fuel peat for Lough Ree Power. Most of the former production area on site is bare peat.	2020	Draft 2017
Derryshannoge	452	Cutover Bog Industrial peat production commenced at Derryshannoge Bog in 1985 and ceased in 2020. This site still has residual deep peat. Pumped bog drainage.	Derryshannoge Bog formerly supplied fuel peat for Lough Ree Power. Much of the former production area at Derryshannoge has been out of production for some time. These areas have already extensively colonised with pioneer cutaway and scrub vegetation communities.	2020	Draft 2017
Edera	281	Cutover Bog Development for industrial peat production commenced at Edera Bog in 1990's. Active extraction from Edera began in 2003 and ceased in 2018. This site still has residual deep peat.	Edera Bog formerly supplied fuel peat for Lough Ree Power. The majority of the former production area is bare peat. LCC are proposing an amenity walkway for this bog	2020	Draft 2021
Erenagh	93	Cutover Bog Development for industrial peat production commenced at Erenagh Bog in 1970's. This site still has residual deep peat. Pumped bog drainage.	Erenagh Bog formerly supplied; fuel peat for Lough Ree Power. Much of the former production area has been out of production for some time. These areas have already extensively colonised with pioneer cutaway and scrub vegetation communities.	2020	Draft 2017
Granaghan	212	Cutover Bog Development for industrial peat production commenced at Granaghan Bog in 1980's. This site still has residual deep peat. Pumped bog drainage.	Granaghan Bog formerly supplied horticultural peat, and fuel peat for Lough Ree Power. The majority of Granaghan Bog former production area is bare peat.	2020	Draft 2017
Killashee	110	Cutover Bog Development for industrial peat production commenced at Killashee Bog in 1985. This site still has residual deep peat.	Killashee Bog formerly supplied horticultural peat, and fuel peat for Lough Ree Power. The majority of Killashee Bog former production area is bare peat. Some areas have colonised with pioneer cutaway and scrub vegetation communities.	2020	Draft 2017
Knappoge	313	Cutaway Bog Peat Production at Knappoge bog commenced in 1963. Peat depths on the former production area are generally shallow. Pumped bog – pumping has now been stopped	Knappoge Bog formerly supplied fuel peat for Lough Ree Power. The majority of Knappoge Bog former production area is bare peat. Some areas have colonised with pioneer cutaway and scrub vegetation communities. Ceasing pumping has created large wetlands. An amenity trackway is under construction.	2018	Draft 2021
Lough Bannow	739	Cutaway Bog Peat Production at Lough Bannow bog commenced in the 1960's,. Peat depths on the former production area are generally shallow.	Much of the former production area at Lough Bannow has been out of production for some time. These areas have already extensively colonised with pioneer cutaway and scrub vegetation communities.	2020	Draft 2019

		Pumped bog	A small (35ha) conifer plantation was established in 1980's by Coillte. Lough Bannow is part of the footprint of Derryadd Windfarm for which planning permissions were granted in 2020. An amenity walkway is proposed.		
Moher	483	Cutover Bog Peat Production at Moher bog commenced in the 1960'S.. Peat depths on the former production area remain relatively deep. Pumped bog drainage.	Moher Bog formerly supplied fuel peat for Lough Ree Power. Much of the former production area is bare peat	2020	Draft 2017
Mount Dillon	592	Cutaway Bog Peat Production at Mount Dillon bog commenced in the 1940'S. Peat depths on the former production largely shallow. Pumped bog	Mount Dillon Bog formerly supplied fuel peat for Lough Ree Power. Much of the former production area at Mount Dillon has been out of production for some time. These areas have already extensively colonised with pioneer cutaway, wetland and scrub vegetation communities.	2020	Draft 2017

Table Ap-2b: Mount Dillon Bog Group names, area and indicative status (Mostrim sub-group).

Bog Name	**Area (ha)**	**Stage of development**	**Land-Use and History**	**Peat Production Cessation**	**Rehab Plan Status**
Clonwhelan	212	Development Bog. Clonwhelan Bog was drained in the 1980's but never brought into commercial peat production. Clonwhelan is a deep peat development bog.	Rehabilitation complete Raised bog restoration completed 2019	N/A	Finalised 2018
Clynan	402	Development Bog. Clynan Bog was drained in the 1980's. Sod peat production occurred around the margins and over a portion of the site.	Clynan Bog formerly supplied horticultural peat (sod moss) & fuel turf. Some rehabilitation work has been carried out on Clynan bog East already to buffer an undrained bog remnant. Raised bog restoration potential.	2020	Draft 2017
Coolcraff	412	Cutover Bog Industrial peat production commenced at Coolcraff Bog in the 1980's. The site was developed for milled peat production 2015-2018. Deep peat reserves remain over the majority of the former production area.	Coolcraff Bog formerly supplied a range of commercial functions including; horticultural peat. Much of the former production area at Coolcraff is bare peat. One section of high bog to the north or site was excluded from production and so never developed on the basis of high conservation value raised bog habitat.	2020	Draft 2017
Coolnagun	668	Cutaway Bog Industrial peat production commenced at Coolnagun Bog in 1941. Coolnagun is considered a deep peat cutover bog with areas of shallow cutaway.	Coolnagun Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat for Lough Ree Power. Much of the former production area at Coolnagun is bare peat. Some small patches of pioneer cutaway vegetation communities are developing. Some bog restoration work was undertaken already along the eastern margin.	2020	Draft 2017

Glenlough	328	Development bog Glenlough Bog was first developed in the 1980's. It was re-ditched in 2003-2005. Only a small part of the bog was fully brought into peat production for sod peat. Deep peat reserves remain over the majority of the former production area. Some of the bog has never been subject to commercial peat extraction.	Glenlough Bog formerly supplied a range of commercial functions including; horticultural pea. Degraded high bog vegetation remains over the majority of the bog. The former production area is a mosaic of vegetation. This site has raised bog restoration potential.	2020	Draft 2020
Milkernagh	627	Cutover Bog Industrial peat production commenced at Milkernagh Bog in 1950. Long-term peat extraction has created shallow cutaway in places. Deep peat reserves remain in parts on the former production area. Milkernagh is considered cutover bog with variable peat depths. Milkernagh has a pumped drainage regime.	Milkernagh Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat for Lough Ree Power. Much of the former production area at Milkernagh is bare peat. Pioneer cutaway vegetation communities are developing in places.	2020	Draft 2017
Mostrim	442	Development Bog/Cutover Bog The majority of Mostrim was drained but never developed. Industrial peat production commenced in parts of Mostrim Bog in the 1980's. Peat extraction has significantly affected parts of this bog but deep peat reserves remain on the former production area.	Mostrim Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat for Lough Ree Power. Raised bog restoration at Mostrim is ongoing with > 50% completed in Jan 2021.	2020	Finalised 2020

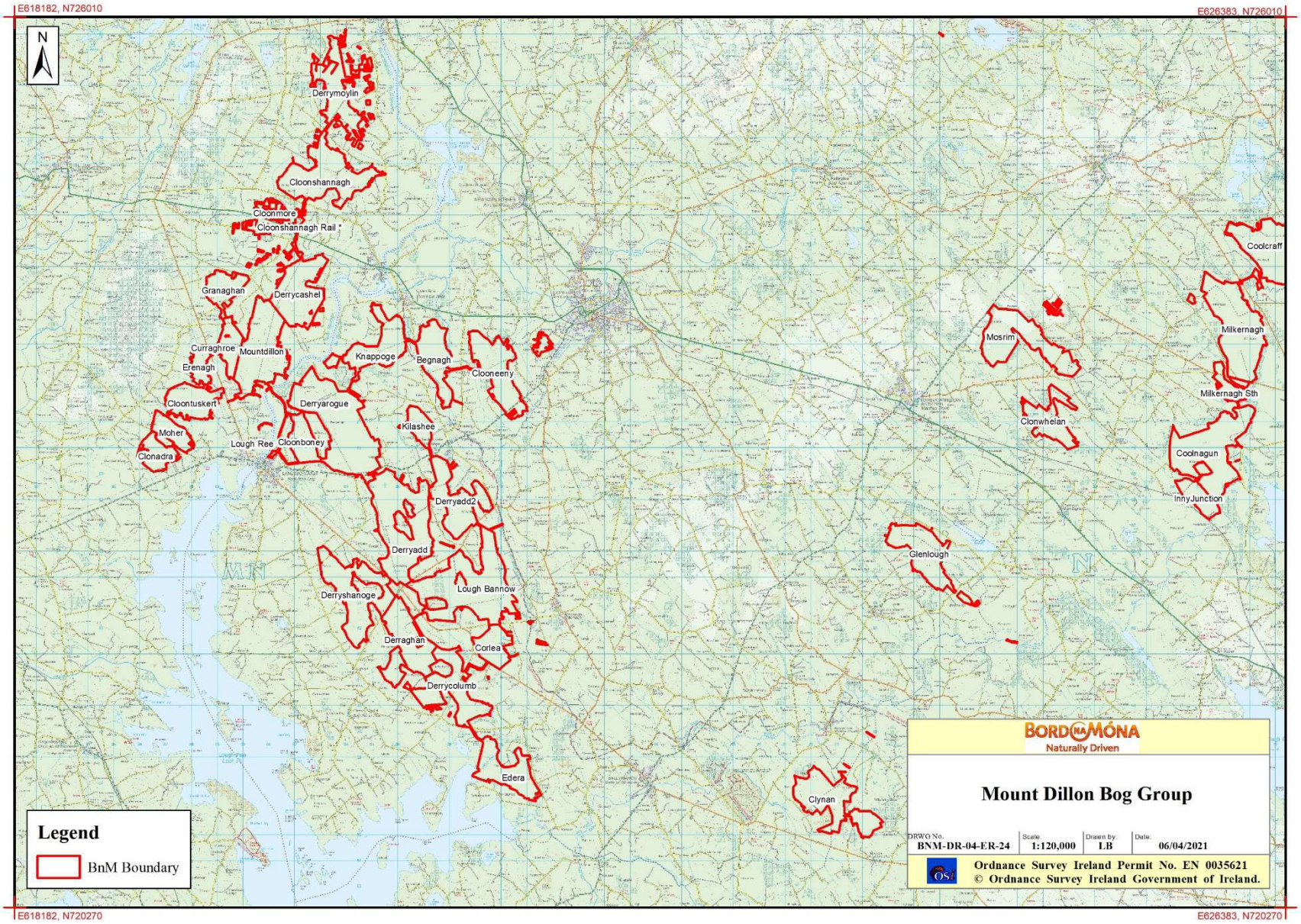


Figure Ap-2: Mount Dillon Bog Group

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:	**Edera**	**Area (ha):**	283ha
Works Name:	Mount Dillon	**County:**	Longford
Recorder(s):	BnM Ecology Section	**Survey/ monitoring Date(s):**	13th July 2012 December 2013 March 2015 January 2019

Habitats present (in order of dominance)

The most common habitats present at this site include:

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

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

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

Description of site

Edera Bog is located approximately 9km to the west of Ballymahon in County Longford. This site is located on the shore of Lough Ree. Industrial peat production ceased on site in 2018. The peat was used as fuel peat in Lough Ree Power in Lanesborough. The Bilberry River flows through the site and a relatively large section of wet grassland and remnant section of raised bog still exist on the site. A rail line connects Edera bog with Derrycolumb Bog to the north. Edera bog is underlain with both marl and gravel.

The main section of production bog to the south of the Bilberry River has only been in production for <20 years and slopes towards the Bilberry River.

The Bilberry river flows through the site and there are two crossing points that machinery and trains use to cross this river. The River has been canalised to an extent but it still retains some natural features such as bends in the river and some deeper pools. The River is surrounded on both sides by relatively extensive areas of wet grassland that are subject to flooding when the River is in flood. The grassland was comprised of species such as Soft Rush, Floating Sweet-Grass, Yorkshire Fog, Reed Canary Grass, Yellow Rattle, Purple Moor Grass, Marsh Arrow Grass and Iris. Scattered trees consisting of Alder and Willow are located throughout this area. There was no evidence

of grazing in the area and it is likely to be too wet for any significant amounts of grazing to be carried out. A number of silt ponds are also located in this area. A small round clump of Birch and Alder are located in one area and this feature is thought to be the remains of a Crannog by archaeologists. To the south of this area lies the location of an old house that has local historical importance.

To the north of the Bilberry river an area of production bog is located. This area contains between 1-2.5 m of peat; however some small sections appear to have been cut away with marl protruding in areas. Common Reed is becoming established on these areas and in some of the field drains.

A significant area of scrub, raised bog and wet grassland is located in the west of the site. This area is located next to Lough Ree and has never been in industrial peat production; however, some domestic turf cutting has been carried out in this area. The remnant section of raised bog does not appear to contain deep peat and is located in the transition zone between what was the former intact raised bog (Edera) and the wet grassland that borders the Lake. Purple Moorgrass was dominant across much of this section of raised bog along with species such as Bog Asphodel, Sundew, Yellow Rattle, Willow, Bog Myrtle, Devil's Bit-Scabious, Gorse, Bog Cotton, Heather, *Sphagnum papillosum*, *S. subnitens*, *S. squarrosum* and *Aulacomnium palustre*. Occasional tufts of Black Bog Rush were located along the edges of this habitat. This area still retained a quaking feel in most parts. This area had been burned in the past two years. The area of wet grassland that occurs between the remnant section of raised bog and Lough Ree was flooded at the time of the ecological survey and could not be accessed.

A small area of remnant raised bog and cutaway bog is located along the north-eastern boundary of the site. This area is used extensively for domestic turf production. This is licensed by Bord na Móna. Sand Martins are nesting in some sections of face bank in this area.

Other habitats along the margins of the site include Birch woodland, wet grassland, dry heath and cutover bog. Overall this bog is young in terms of industrial peat production and still retains a dome towards the centre of the site. The bog is gravity drained and does not have any pumps.

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

The Lough Ree SPA and the Lough Ree SAC (site codes 004064 and 000440 respectively) overlap with a section of the western edge of the site.

Adjacent habitats and land-use

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

Watercourses (major water features on/off site)

- The Bilberry River flows through the site. This River flows into Lough Ree.
- The Owenacharra River flows within 0.5km of the southern boundary of the site.
- The western edge of the site is adjacent to Lough Ree.

Peat type and sub-soils

The majority of the site contains "red" or "*Sphagnum*" peat, especially in the main area of production bog. The peat is underlain with marl and gravel.

Fauna biodiversity

Birds

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

- Marsh Harrier (Bilberry River)
- Water Rail
- Kestrel
- Sand Martin
- Raven
- Other more common species include Grey Heron, Gold Finch, Wood Pigeon, Grey Crow, Robin, Blackbird and Swallow.

Mammals

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

- Fox.
- Badger.
- Mink.
- Pine Marten.
- Otter.

Other species

Large Heath, Green Veined and Meadow Brown butterfly.

References

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).

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

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

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

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

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

APPENDIX V. BIOSECURITY

No invasive flora species have been recorded at Edera Bog.

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

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

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

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

In addition to the above, Best Practise measures around the prevention and spread of Crayfish plague[2] will be adhered with throughout all rehabilitation measures and activities.

[2] 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 Mount Dillon bog group (Ref. PO504-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The bog is part of the Mount Dillon Bog group. This regulatory requirement is the main driver of the development of this rehabilitation plan.

2 The Peatlands Climate Action Scheme (PCAS)

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

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

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

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

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

3 National Climate Policy

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

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

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

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

4 National Peatlands Strategy

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

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

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

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

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

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

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

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

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

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

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

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

6 National Biodiversity Action Plan 2016-2021

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

7 National conservation designations

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

Edera Bog partially overlaps with Lough Ree SAC and pNHA (NPWS Site Code: 000440) and Lough Ree SPA (NPWS Site Code: 004064) on the western corner of the site. Lough Ree SAC (and pNHA) is designated for the natural eutrophic lake as well as active raised bogs, degraded raised bogs capable of natural regeneration, bog woodland and Otter. Lough Ree SPA is designated for the assemblage of wintering wildfowl, many species of which occur in nationally important numbers as well, in addition to breeding Common Tern and Common Scoter.

Derry Lough pNHA lies within 1km of the northern boundary of Edera Bog and the Royal Canal pNHA lies within 2km of the western boundary of the site.

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.

Edera Bog is located in an area zoned by Longford County Council as open countryside[3].

11 National Archaeology Code of Practise

Bord na Móna operates under an agreed Code of Practice regarding archaeology with the Department of Arts, Heritage and the Gaeltacht and the National Museum of Ireland which provides a framework to enable the Company to progress peat extraction whilst carrying out archaeological mitigation. The Code replaced a set of Principles agreed with the Department of Arts, Heritage and the Gaeltacht in the 1990s. Under the Code Bord na

[3] http://www.longfordcoco.ie/services/planning/development-plan-2015-2021/longford-cdp-2015-2021-written-statement.pdf

Móna, the Minister and Director work together to ensure that appropriate archaeological mitigation is carried out in advance of peat extraction.

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

12 Bord na Móna Biodiversity Action Plan 2016-2021

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

One example of a key CBD target is:

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

The EUs headline target for progress by 2020 is to:

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

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

13 Bord na Móna commitments

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

The company announced that peat production would be cut by over 50 percent in 2019 and would entirely cease over most of its lands by the mid-2020s. Bord na Móna have now announced the complete cessation of industrial peat production across its estate (January 2021). Rehabilitation measures will continue to be carried out with the focus on re-wetting and rehabilitation of cutover and cutaway areas in line with national policies (such as the National Peatland Strategy, the National Biodiversity Action Plan, the Climate Action Plan 2019, the Water

Framework Directive, etc.) and rehabilitation guidelines set down by the Environmental Protection Agency. To date, 15,000 hectares of cutaway and cutover bog have been rehabilitated using this approach with 5,000 hectares in active rehabilitation.

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

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

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

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

Any consideration of other future after-uses for Bord na Móna land such as development or other mixed uses will be conducted following the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this peatland rehabilition 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	Edera 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	Not 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.

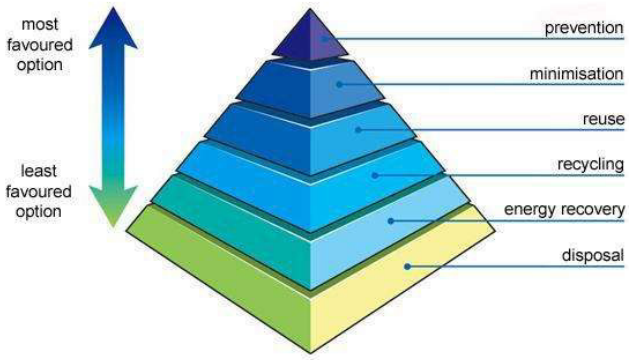
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

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

APPENDIX VIII. GLOSSARY

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

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

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

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

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

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

Environmental stabilisation is defined as:

- Carrying out planned peatland rehabilitation.

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

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

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

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

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

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

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

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

APPENDIX IX. EXTRACTIVE WASTE MANAGEMENT PLAN

(Minimisation, treatment, recovery and disposal)

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

Scope:
This plan covers IPPC Licence's P0504-01, Mountdillon Group of Bogs in Counties Roscommon, Longford 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 Mountdillon 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 P0504-01 IPPC Licence Extractive Waste Conditions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7.0 Extractive Waste Management Plan

5 (2a)(i)
The vast majority of peat extraction bogs were all designed and drained for production prior to the 1960's and as such the production fields layout cannot' be altered. Under our Cleaner Reduction Procedures, various design changes have been implemented to the production machines and process to reduce lost peat which eventually is captured in the silt ponds and requires removal as waste peat silt. This along with training and ongoing research and development will continuously reduce waste peat and subsequently waste silt pond cleanings. Bog timbers are present naturally in various volumes and quantities in different bogs and as peat production involves stripping peat in layers, the exposure, generation and removal of these timbers is unavoidable. Work has been undertaken recently into project looking at grinding of these bog timbers in situ using a timber miller, and if this project becomes viable it will contribute to the reduction of bog timbers.

5 (2a)(ii)
Given the nature and expanse of peat bogs, the stockpiling and storage of these waste materials do not present a visual, storage or stability problem. As required under Condition 10 of the IPPC Licence, the silt pond excavations and screenings will be utilised to backfill the silt pond voids once the bogs have finished and stabilised in accordance with out Bog Rehabilitation Plan. Storage of these wastes in the interim, open to the elements does not present a change on the nature of these wastes that will threaten the environment or prevent their reuse during the bog rehabilitation process.

5 (2a)(iii)
Under Condition 10 of the IPPC Licence, all silt ponds will be decommissioned once the bog surface has stabilised, in agreement with the Agency. This will involve the removal of weirs and flow controls, returning the silt pond back to its original drain or removing the silt pond from the drainage system. Both of these activities will involve placing the silt pond extraction and cleaning material back into the excavation void.

5 (2a)(iv)
The peat bogs do not contain any topsoil, so this is not required.

5 (2a)(v)
Peat mineral resources do not undergo any treatment.

5 (2b)
These three extractive waste are all being reused and recovered back to their original extraction points and have not undergone any physical, chemical, or biological change.

5 (2c)(i, ii & iii)
These three extractive wastes, stored on the bog for reuse or recovery during the bog rehabilitation phase, do not require any management or monitoring during the operation of these bogs. Silt pond excavations and cleanings are stored adjacent to the silt pond and quickly revegetated and stabilise, the screenings are graded back into the bog at the agreed locations upon disposal and the bog timbers do not prevent any water or airborne danger to the environment.

5 (3)
The three extractive wastes arising from peat extraction operations at this site are classified wastes from mineral non-metalliferous excavation, with an EWC code of 0101 02. The materials are not classified as hazardous under Directive 91/689/EEC20, and do not contain substances or preparations classified as dangerous under Directives 67/548/EEC5 or 1999/45/EC6 above a certain threshold.
The peat excavations and cleanings are stored in locations and in a manner that they could not collapse, and are remote in their nature. The stockpiles are located adjacent to silt ponds that are cleaned regularly and as such these stockpiles are managed and levelled to facilitate further cleanings.
Therefore the material stored at these waste facilities would not be considered to be a Category A waste facility.

Classification in accordance Annex II.

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

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

Closure plan. (Bog Rehabilitation Plan).
Condition 10.1 – 10.3 of the IPPC Licence requires the following:

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

10.2 Cutaway Bog Rehabilitation Plan:

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

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

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

10.4 A final validation report to include a certificate of completion for the Rehabilitation Plan, for all or part of the site as necessary, shall be submitted to the Agency within six months of execution of the plan. The licensee shall carry out such tests, investigations or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment. This plan including maps and ecological classifications are available on file at the Mountdillon IPPC Licence Coordinators office.
The location in relation to the silt pond excavations and cleanings are adjacent to the silt ponds, which are considered under the Shannon River Basin Management Plan in accordance with the requirements of Directive 2000/60/EC.
Screenings and bog timbers are all naturally occurring elements of peatland and there placement back to the bog in smaller concentrated designated waste facilities does not constitute a risk to the prevention of water compliance.
The lands under where these materials are deposited are peatlands and are un-effected by the placing of this material.

Review.
This plan will be reviewed every five years, the first review to take place in September 2017. This review will entail an inspection of these waste facilities to ensure their placing, management, maintenance and stability comply with the requirements of the Extractive Waste Management requirements and condition 7.5, 7.6 and 7.7 of the Mountdillon IPPC Licence P0504-01.

APPENDIX X. MITIGATION MEASURES FOR THE APPLICATION OF FERTILISER

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

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

APPENDIX XI. CONSULTATION SUMMARIES

Table APXI -1 Consultees contacted

Bog Name	Contact Organisation	Contact Name	Date of Issue	Communication Format	Date Response Received	Response format
Edera	Longford County Council - Director of Services (Strategic Infrastructure and Climate Change)	General e-mail contact	01/12/2020	E-mail		
Edera	Longford County Council	General e-mail contact	01/12/2020	E-mail	01/12/2020, 22/12/2020	E-mail
Edera	Longford County Council - Heritage Officer	General e-mail contact	01/12/2020	E-mail		
Edera	Eastern and Midland Regional Assembly	General e-mail contact	04/12/2020	E-mail		
Edera	Chairperson of Longford County Council	General e-mail contact	04/12/2020	E-mail		
Edera	Longford County Councillors - Ballymahon District	Cllr. Colm Murray	04/12/2020	E-mail		
Edera	Longford County Councillors - Ballymahon District	Cllr. Mick Cahill	04/12/2020	E-mail		
Edera	Longford County Councillors - Ballymahon District	Cllr. Mark Casey	04/12/2020	E-mail		
Edera	Longford County Councillors - Ballymahon District	Cllr. Gerard Farrell	04/12/2020	E-mail		
Edera	Longford County Councillors - Ballymahon District	Cllr. Pat O'Toole	04/12/2020	E-mail		
Edera	TD Roscommon - Longford Westmeath	Peter Burke	04/12/2020	E-mail		
Edera	TD Roscommon - Longford Westmeath	Sorca Clarke	04/12/2020	E-mail		
Edera	TD Roscommon - Longford Westmeath	Joe Flaherty	04/12/2020	E-mail		
Edera	TD Roscommon - Longford Westmeath	Robert Troy	04/12/2020	E-mail		
Edera	National Parks and Wildlife Service	General e-mail contact	01/12/2020	E-mail	02,03,07,09/12/2020	E-mail
Edera	NPWS Regional Network	District Conservation Officer	01/12/2020	E-mail		
Edera	NPWS Regional Network	General e-mail contact	01/12/2020	E-mail		
Edera	Dept of the Housing Local Government and Heritage	Malcom Noonan (Minister of State for Heritage and Electoral Reform)	04/12/2020	E-mail		
Edera	National Monuments Service	General e-mail contact	04/12/2020	E-mail		

Edera	National Museum of Ireland (Irish Antiquities Division)	General e-mail contact	04/12/2020	E-mail	28/12/2020	E-mail
Edera	Dept of Environment Climate and Communications	Minister - Eamon Ryan	04/12/2020	E-mail		
Edera	Dept of Environment Climate and Communications	General e-mail contact	01/12/2020	E-mail		
Edera	Inland Fisheries Ireland	General e-mail contact	01/12/2020	E-mail		
Edera	Waterways Ireland	General e-mail contact	04/12/2020	E-mail		
Edera	The Heritage Council	General e-mail contact	04/12/2020	E-mail		
Edera	Longford Wilderness Park (Clandillon Civil Consulting)	General e-mail contact	01/12/2020	E-mail		
Edera	Longford Wilderness Park (Longford County Council)	General e-mail contact	01/12/2020	E-mail		
Edera	An Forum Uisce (The Water Forum)	General e-mail contact	04/12/2020	E-mail		
Edera	North West Regional Assembly	General e-mail contact	04/12/2020	E-mail	07/12/2020	E-mail
Edera	An Taisce	General e-mail contact	01/12/2020	E-mail		
Edera	Friends of the Irish Environment	General e-mail contact	04/12/2020	E-mail		
Edera	Friends of the Earth	General e-mail contact	04/12/2020	E-mail		
Edera	Birdwatch Ireland	General e-mail contact	01/12/2020	E-mail		
Edera	Irish Peatlands Conservation Council	General e-mail contact	01/12/2020	E-mail	07/12/2020	E-mail
Edera	Irish Wildlife Trust	General e-mail contact	01/12/2020	E-mail		
Edera	Bat Conservation Ireland	General e-mail contact	04/12/2020	E-mail		
Edera	Woodlands of Ireland	General e-mail contact	04/12/2020	E-mail		
Edera	Butterfly Conservation Ireland	General e-mail contact	01/12/2020	E-mail	11/12/2020	E-mail
Edera	Community Wetlands Forum (part of Irish Rurallink)	General e-mail contact	04/12/2020	E-mail		
Edera	Turf Cutters and Contractors Association	General e-mail contact	04/12/2020	E-mail		
Edera	Longford Public Participation Network (PPN)	General e-mail contact	04/12/2020	E-mail		
Edera	Sustainable Water Action Network (SWAN)	General e-mail contact	04/12/2020	E-mail		
Edera	Irish Farmers Association (Roscommon/ Sligo/ Leitrim/Longford)	General e-mail contact	04/12/2020	E-mail		
Edera	Irish Farmers Association (Head Office)	General e-mail contact	04/12/2020	E-mail	08/12/2020	E-mail
Edera	National Association of Regional Game Councils	General e-mail contact	04/12/2020	E-mail		

Edera	Midlands & East Regional WFD Operational Committee	Co-ordinator Local Authority Water Programme	01/12/2020	E-mail		
Edera	Shannon Flood Risk State Agency Co-ordination Working Group	General e-mail contact	01/12/2020	E-mail		
Edera	ICMSA (Irish Creamery Milk Suppliers Association)	General e-mail contact	04/12/2020 25/01/2021	E-mail	07/12/2020 25/01/2021	E-mail

Table APXI -2 Response summary from Consultees contacted

Organisation	Summary of Response by Stakeholder	BnM Response
Longford County Council	1) Longford County Council - Supports proposed rehabilitation measures and any actions that seek to enhance the biodiversity of the region. Acknowledges the role BnM play in the rehabilitation of post industrialised lands in the just transition of agenda within the state. State that a AA screening and EIA screening is desirable. Suggest tree planting programme be integrated into rehabilitation measures. Describes the potentially positive impact the PCAS scheme can have on the application for biosphere reserve designation of the surrounding lands. 2) Correspondence on 01/12/2021 to provide new plans for an amenity walkway for Edera bog.	BnM acknowledged via e-mail on 01/12/2020 to assure BnM will give due cognisance to all points raised in submission by Longford County Council, when developing the rehabilitation plan for Edera Bog.
National Parks and Wildlife Service	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 throughout discussions 02-12/12/2020; Also, a phone conversation with local NPWS Conservation Ranger on 12/01/2021.
National Museum of Ireland (Irish Antiquities Division)	Responded through e-mail 28/12/2020, 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 via e-mail on 28/12/2020 to assure BnM will give due cognisance to all points raised raised in submission by NMI, when developing the rehabilitation plan for Edera Bog. A virtual meeting on PCAS between BnM and NMI was held on 18/01/2021
Irish Peatlands Conservation Council	Responded to consultation through e-mail on 07/12/2020. Issues raised were; 1. A list of the 80 sites involved in the enhanced rehabilitation programme. 2. The carbon store in each site which we understand totals 109m tonnes. 3. The GHG quantity expected to be sequestered in each site which we understand totals 3.2m tonnes. 4. Details of the logistics of the 350 employees benefitting from this scheme and the roles which they will play. 5. Could you give us a breakdown of the budget for each rehabilitation site.	BnM acknowledged via e-mail on 09/12/2020 to assure BnM will give due cognisance to all points raised in submission by IPCC when developing the rehabilitation plan for Edera Bog.
Butterfly Conservation Ireland	Responded to consultation via e-mail on 11/12/2020 with submission on Edera. Concerns raised were; 1) Alterations to the text of the rehab plan. 2) Request for all turf cutting on BnM land to end. 3) Suggest monitoring for Large Heath Butterfly or food plant Hare's-tail Cottongrass. 4) Suggested alterations to habitat design in rehab plan to further connect regional high bog habitats. 5) Raised concerns over future land use.	BnM acknowledged via e-mail to assure BnM will give due cognisance to all points raised in submission by BCI when developing the rehabilitation plan for Edera Bog. A phone conversation between a BnM ecologist and BCI took place on to discuss PCAS and 19/01/2021.
The Heritage Council	Responded to consultation via e-mail on 04/01/2021 asking for more information on PCAS and looking to be involved in any seminar or information events.	BnM responded via phone conversation on 11/01/2021. Dialogue is ongoing.
Irish Farmers Association	Responded to consultation via email on 29/01/2021 with submission on Edera. Concerns raised were: 1) Flooding 2) Health and Safety 3) Perceived potentially detrimental impact of PCAS on property value	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.
Irish Creamery Milk Suppliers Association	Responded through email 07/12/2020 to request meeting on the potential impacts of PCAS on neighbouring farmlands.	BnM acknowledged via e-mail on 08/12/2020 to assure BnM will give due cognisance to all points raised in submission by ICMSA when developing the rehabilitation plan for Edera Bog. Dialogue is ongoing.
Irish Raptor Study Group	Responded to consultation via email on 09/01/2021 asking for more information on PCAS.	BnM acknowledged and responded to queries via email on 11/01/2021; Phone conversation 21/01/2021.

Local Resident A	On the 18/01/2021 Phone conversation between BnM Community Liaison Officer and Local Resident A. Issues discussed include; 1) Maintenance of boundary drains into the future. 2) The level of the water table once rehabilitation work has been finished.	Phone conversation 29/01/2021
Local Resident B	BnM received two letters from Local Resident B in relation to issues at Edera Bog.	A response will be provided as soon as possible pending the results of an internal investigation on this matter.

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 Edera Bog, Co. Galway. Dr. Charles Mount. Nov 2020.

Archaeological Impact Assessment of Proposed Bog Decommissioning and Rehabilitation at Edera Bog, Co. Longford

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 on c.275 hectares at Edera, Co. Longford 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 Edera bog will include:

- Re-wetting the deep peat areas of the bog using berms and field re-profiling. This enhanced measure seeks to create large (c. 45m x 60m) flat areas or cells of shallow (< 10 cm) water conditions on bare peat, across multiple fields that are enclosed by shallow berms to retain shallow surface water;
- In some areas, a cut-and-fill cell bunding technique is proposed. The cut and fill cell bunding approach aims to create 'saucers' or flat bunded areas (cells) on peat with berms to hold shallow water at appropriate levels;
- Re-wetting some deep peat areas of the bog through regular field drain blocking using a dozer to create three peat blockages every 100 m along each field drain;
- Re-alignment of piped drainage;
- Blocking drains in targeted marginal (degraded) high bog area and re-wetting, where possible, using an excavator to install peat blockages. Some bog remnants are too small to benefit from this approach;
- Targeted fertiliser applications to accelerate vegetation establishment on headlands and high fields;
- Seeding of vegetation and inoculation of Sphagnum; and
- Modifying water levels at outfalls, as it may be desirable to change and control water levels at the site over time, e.g. to increase water levels as the site becomes increasingly vegetated. This will further slow the movement of water through and out of Edera Bog.

Edera Bog is located 3.5km west of Ballymahon, Co. Longford and 0.4km east of Lough Ree and to the west of the L1128 road. The bog occupies the townlands of Ardboghill, Derrycolumb, Derrymacar, Derrynabuntale, Derrynagalliagh, Drumree, Edera, Gorteenclareen, and Ledwithstown on OS 6 inch sheets Longford 22 and 26.

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

- The Bord na Móna Peatland Survey
- The Bord na Móna excavation programme
- The Sites and Monuments Record that is maintained by the Dept of Housing, Local Government and Heritage
- 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. Longford which was established under Section 12 of the National Monuments (Amendment) Act, 1994 was examined as part of the assessment (DAHGI 1996). This record was published by the Minister in 1996 and includes sites and monuments that were known in Edera Bog before that date. This review established that there are no RMPs situated in the proposed rehabilitation area or vicinity (see Fig. 1). The closest RMP to the rehabilitation area, LF022-042----, a Ringfort – rath in Derrycolumb townland, is located more than c.0.12km north of the rehabilitation area.

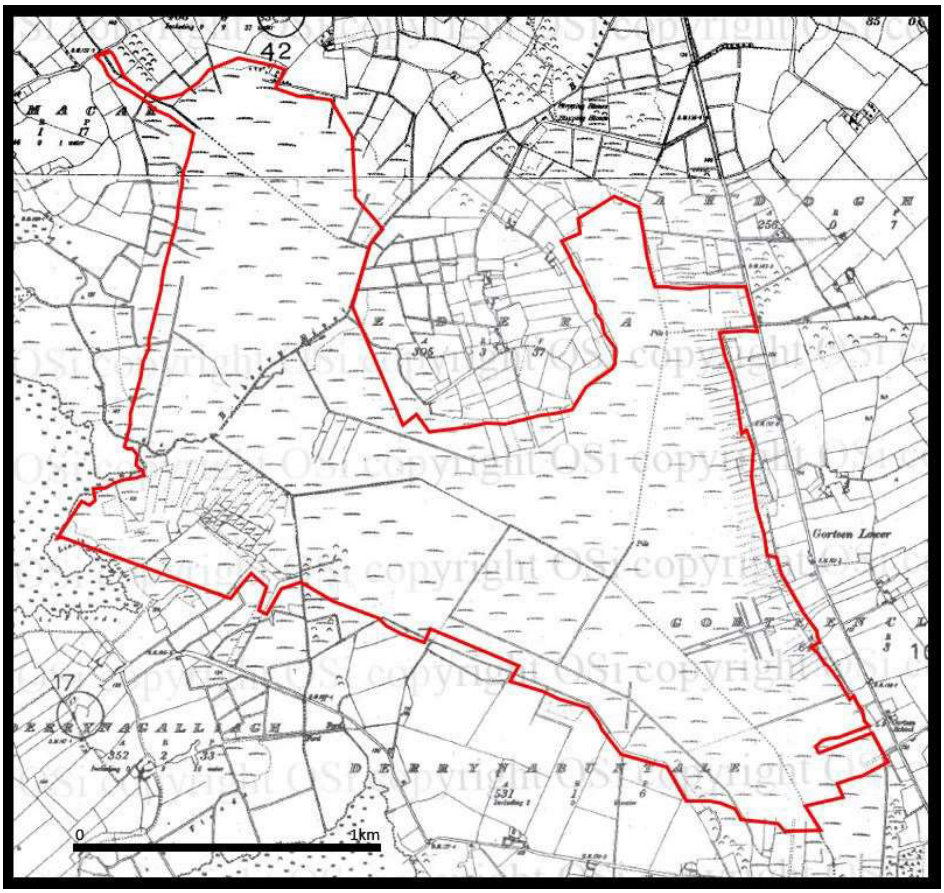


Fig. 1. Edera Bog, Co. Longford, detail of the Record of Monuments and Places map sheets Nos. 22 and 26. The proposed rehabilitation area is outlined with the redline. There are no Recorded Monuments in the area.

Peatland survey

Edera Bog was the subject of the Peatland Survey 2007 & 2008 which was commissioned by the Department of the Environment, Heritage and Local Government to assess the archaeological potential of the Bord na Móna production bogs and was carried out by Archaeological Development Services in August-September 2007 (Rohan 2009). The survey methodology involved the walked visual inspection of every second production field horizontal surface, and the visible vertical face of every second drain above the water level. In total, five toghers (LF-EDR001a-aq, LF-EDR002a-y, LF-EDR003a-ae, LF-EDR004a-u and LF-EDR005a-b) consisting of 122 individual sightings were recorded confined to the southern part of Edera Bog, in Derrynabuntale and Gorteenclareen townlands (Fig. 2). These toghers date to the period AD 542-880 and run almost in parallel crossing the bog in an east-north-east to west-south-west direction linking the dryland of Derrynabuntale to Gorteenclareen. These archaeological sightings were all notified to the Archaeological Survey of Ireland.

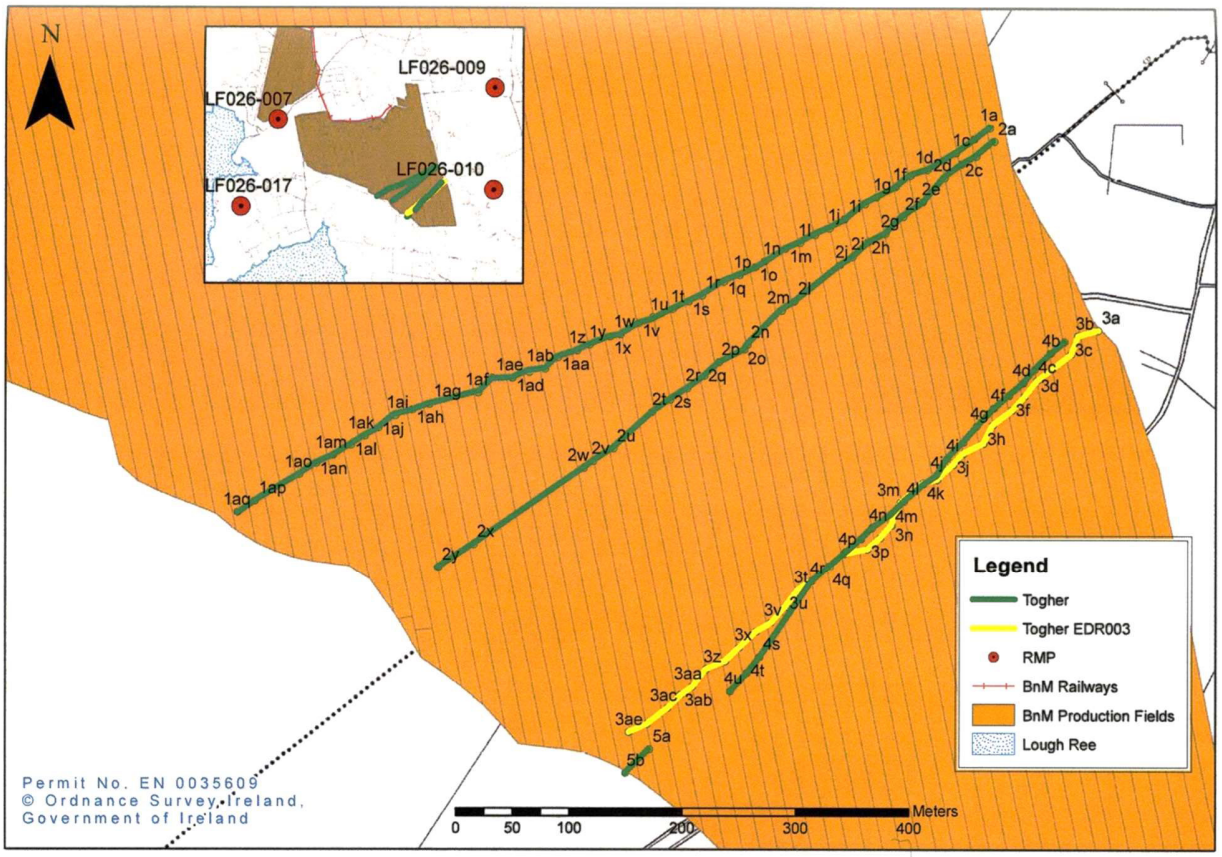


Fig. 2. Edera Bog, Co. Longford, archaeological sightings identified during the Peatland Survey 2007 & 2008 (From Rohan 2009).

Edera Bog commenced commercial peat production in 1999, finished production in 2018, and had production every year after the Peatland Survey 2007 & 2008. Estimates of the peat removed from the bog based on the results of a 2020 drone survey of the bog carried out by Bord na Móna allow the depth of bog at each sighting to be calculated for 2008 and 2020 and also the depth of bog removed calculated for each sighting (see Table 1). This data indicates that 60 sightings have been removed, 31 sightings survive on the surface, and 29 sightings survive below the surface.

Site	Site Type	Depth BS (m)	Depth of archelogy	2008 Depth	2020 Depth	Peat depth Removed	Current depth of archaeo BS	Depth of surviving archaeo	Status
LF-EDR001a	Togher	0.37	0.4	4.36	4.08	0.28	0.09		Survives below surface
LF-EDR001b	Togher	0.91	0.37	5.64	5.10	0.55	0.36		Survives below surface
LF-EDR001c	Togher	0.77	0.37	5.80	4.76	1.04	-0.27	0.10	Survives on Surface
LF-EDR001d	Togher	0.59	0.52	6.06	5.28	0.77	-0.18	0.34	Survives on Surface
LF-EDR001e	Togher	0.8	0.6	5.78	5.30	0.48	0.32		Survives below surface
LF-EDR001f	Togher	0.63	0.5	6.18	5.49	0.69	-0.06	0.44	Survives on Surface
LF-EDR001g	Togher	0.8	0.27	5.78	5.30	0.48	0.32		Survives below surface
LF-EDR001h	Togher	0.45	0.29	6.09	5.31	0.77	-0.32	-0.03	Removed
LF-EDR001i	Togher	0.7	0.18	6.05	5.21	0.84	-0.14	0.04	Survives on Surface
LF-EDR001j	Togher	0.8	0.19	3.84	2.83	1.00	-0.20	-0.01	Removed
LF-EDR001k	Togher	0.54	0.34	5.66	5.28	0.38	0.16		Survives below surface
LF-EDR001l	Togher	0.47	0.3	5.95	5.49	0.46	0.01		Survives below surface
LF-EDR001m	Togher	0.75	0.57	6.27	5.56	0.70	0.05		Survives on Surface
LF-EDR001n	Togher	1.07	0.27	4.47	4.08	0.39	0.68		Survives on Surface
LF-EDR001o	Togher	0.9	0.4	6.19	5.52	0.67	0.23		Survives below surface
LF-EDR001p	Togher	0.8	0.51	5.95	5.43	0.52	0.28		Survives below surface
LF-EDR001q	Togher	0.74	0.1	5.75	5.50	0.25	0.49		Survives on Surface
LF-EDR001r	Togher	0.95	0.3	5.25	4.41	0.84	0.11		Survives on Surface
LF-EDR001s	Togher	0.4	0.6	5.23	4.56	0.67	-0.27	0.33	Survives on Surface
LF-EDR001t	Togher	0.45	0.32	5.06	4.58	0.48	-0.03	0.29	Survives on Surface
LF-EDR001u	Togher	0.4	0.35	5.20	4.51	0.69	-0.29	0.06	Survives on Surface
LF-EDR001v	Togher	0	0.47	4.71	4.40	0.31	-0.31	0.16	Survives on Surface
LF-EDR001w	Togher	0.22	1.03	5.29	4.55	0.74	-0.52	0.51	Survives on Surface
LF-EDR001x	Togher	0.42	0.8	5.49	4.86	0.63	-0.21	0.59	Survives on Surface
LF-EDR001y	Togher	0.95	0.23	4.83	4.28	0.54	0.41		Survives below surface
LF-EDR001z	Togher	1.05	0.2	5.55	4.80	0.75	0.30		Survives below surface
LF-EDR001aa	Togher	0.62	0.43	4.71	4.71	0.00	0.62		Survives on Surface
LF-EDR001ab	Togher	0.64	0.6	5.02	4.44	0.59	0.05		Survives on Surface
LF-EDR001ac	Togher	0.43	0.34	4.95	4.33	0.62	-0.19	0.15	Survives on Surface
LF-EDR001ad	Togher	0.8	0.46	4.91	4.54	0.37	0.43		Survives on Surface
LF-EDR001ae	Togher	0.33	0.53	4.25	3.89	0.36	-0.03	0.50	Survives on Surface
LF-EDR001af	Togher	0.7	0.5	4.24	3.92	0.31	0.39		Survives below surface
LF-EDR001ag	Togher	0.6	0.75	4.98	4.37	0.60	0.00		Survives below surface
LF-EDR001ah	Togher	0.58	0.73	5.12	4.73	0.39	0.19		Survives below surface
LF-EDR001ai	Togher	0.62	0.63	4.73	4.20	0.53	0.09		Survives below surface
LF-EDR001aj	Togher	0.49	0.58	4.50	3.99	0.51	-0.02	0.56	Survives on Surface

LF-EDR001ak	Togher	0.84	0.5	4.54	4.03	0.51	0.33		Survives below surface
LF-EDR001al	Togher	0.95	0.36	4.57	3.94	0.63	0.32		Survives below surface
LF-EDR001am	Togher	0.98	0.3	4.63	4.03	0.60	0.38		Survives below surface
LF-EDR001an	Togher	0.83	0.36	4.51	4.00	0.51	0.32		Survives below surface
LF-EDR001ao	Togher	0.64	0.31	4.88	4.22	0.66	-0.02	0.29	Survives on Surface
LF-EDR001ap	Togher	1.05	0.22	4.39	3.96	0.43	0.62		Survives below surface
LF-EDR001aq	Togher	0.94	0.36	4.46	4.00	0.45	0.49		Survives below surface
LF-EDR002a	Togher	0	0.31	4.53	4.17	0.36	-0.36	-0.05	Removed
LF-EDR002b	Togher	0.18	0.08	5.24	4.97	0.27	-0.09	-0.01	Removed
LF-EDR002c	Togher	0	0.1	5.88	5.25	0.63	-0.63	-0.53	Removed
LF-EDR002d	Togher	0.03	0.68	5.58	5.11	0.48	-0.45	0.23	Survives on Surface
LF-EDR002e	Togher	0.17	0.63	6.02	5.32	0.70	-0.53	0.10	Survives on Surface
LF-EDR002f	Togher	0	0.35	6.11	5.41	0.70	-0.70	-0.35	Removed
LF-EDR002g	Togher	0.13	0.2	5.72	5.07	0.65	-0.52	-0.32	Removed
LF-EDR002h	Togher	0	0.06	5.06	4.74	0.32	-0.32	-0.26	Removed
LF-EDR002i	Togher	0.05	0.5	6.02	5.29	0.73	-0.68	-0.18	Removed
LF-EDR002j	Togher	0	0.1	5.60	5.27	0.33	-0.33	-0.23	Removed
LF-EDR002l	Togher	0.12	0.76	5.25	4.80	0.46	-0.34	0.42	Survives on Surface
LF-EDR002m	Togher	0.2	0.22	5.26	4.68	0.58	-0.38	-0.16	Removed
LF-EDR002n	Togher	0.2	0.51	4.59	4.46	0.13	0.07		Survives below surface
LF-EDR002o	Togher	0.13	0.06	5.32	5.01	0.30	-0.17	-0.11	Removed
LF-EDR002p	Togher	0.55	0.11	5.08	4.55	0.54	0.01		Survives below surface
LF-EDR002q	Togher	0.2	0.065	4.48	3.94	0.54	-0.34	-0.28	Removed
LF-EDR002r	Togher	0.14	0.27	3.77	3.78	0.00	0.14		Survives below surface
LF-EDR002s	Togher	0.22	0.3	4.54	4.03	0.51	-0.29	0.01	Survives on Surface
LF-EDR002t	Togher	0.29	0.14	4.18	3.96	0.23	0.06		Survives below surface
LF-EDR002u	Togher	0.43	0.1	3.64	3.05	0.59	-0.16	-0.06	Removed
LF-EDR002v	Togher	0	0.05	3.59	3.42	0.17	-0.17	-0.12	Removed
LF-EDR002w	Togher	0	0.09	3.93	3.65	0.27	-0.27	-0.18	Removed
LF-EDR002x	Togher	0	0.47	3.42	2.84	0.58	-0.58	-0.11	Removed
LF-EDR002y	Togher	0	0.12	2.50	1.80	0.71	-0.71	-0.59	Removed
LF-EDR003a	Togher	0.07	0.4	4.02	3.98	0.03	0.04		Survives below surface
LF-EDR003b	Togher	0	0.11	4.91	4.14	0.77	-0.77	-0.66	Removed
LF-EDR003c	Togher	0.06	0.14	5.44	4.85	0.59	-0.53	-0.39	Removed
LF-EDR003d	Togher	0.12	0.23	5.26	5.09	0.17	-0.05	0.18	Survives on Surface
LF-EDR003e	Togher	0.1	0.09	5.72	5.15	0.57	-0.47	-0.38	Removed
LF-EDR003f	Togher	0.2	0.16	5.96	5.40	0.56	-0.36	-0.20	Removed
LF-EDR003g	Togher	0	0.12	5.06	5.13	0.00	0.00		Survives below surface
LF-EDR003h	Togher	0.08	0.11	6.00	5.42	0.58	-0.50	-0.39	Removed
LF-EDR003i	Togher	0	0.06	5.40	5.00	0.40	-0.40	-0.34	Removed

LF-EDR003j	Togher	0.15	0.15	5.70	5.11	0.58	-0.43	-0.28	Removed
LF-EDR003k	Togher	0.2	0.24	5.55	5.22	0.33	-0.13	0.11	Survives on Surface
LF-EDR003l	Togher	0.16	0.05	5.20	4.67	0.53	-0.37	-0.32	Removed
LF-EDR003m	Togher	0.07	0.2	4.41	3.53	0.88	-0.81	-0.61	Removed
LF-EDR003n	Togher	0.15	0.13	4.56	4.17	0.39	-0.24	-0.11	Removed
LF-EDR003o	Togher	0.25	0.3	4.94	4.66	0.29	-0.04	0.26	Survives on Surface
LF-EDR003p	Togher	0.02	0.16	4.76	4.10	0.66	-0.64	-0.48	Removed
LF-EDR003q	Togher	0.07	0.19	3.81	3.41	0.41	-0.34	-0.15	Removed
LF-EDR003r	Togher	0	0.04	4.19	3.70	0.49	-0.49	-0.45	Removed
LF-EDR003s	Togher	0.09	0.3	3.83	3.05	0.78	-0.69	-0.39	Removed
LF-EDR003t	Togher	0.08	0.09	3.38	3.20	0.18	-0.10	-0.01	Removed
LF-EDR003u	Togher	0.37	0.15	3.57	3.25	0.33	0.04		Survives below surface
LF-EDR003v	Togher	0.08	0.16	3.83	3.23	0.60	-0.52	-0.36	Removed
LF-EDR003w	Togher	0	0.05	3.52	2.97	0.55	-0.55	-0.50	Removed
LF-EDR003x	Togher	0	0.13	2.96	3.01	0.00	0.00	0.13	Survives on Surface
LF-EDR003y	Togher	0	0.12	3.52	2.89	0.63	-0.63	-0.51	Removed
LF-EDR003z	Togher	0	0.06	3.10	2.44	0.66	-0.66	-0.60	Removed
LF-EDR003aa	Togher	0.05	0.29	2.72	2.68	0.04	0.01		Survives below surface
LF-EDR003ab	Togher	0	0.1	3.74	3.01	0.73	-0.73	-0.63	Removed
LF-EDR003ac	Togher	0	0.05	3.94	3.20	0.74	-0.74	-0.69	Removed
LF-EDR003ad	Togher	0	0.1	2.46	2.63	0.00	0.00		Survives below surface
LF-EDR003ae	Togher	0	0.06	2.74	2.08	0.66	-0.66	-0.60	Removed
LF-EDR004a	Togher	0.06	0.15	4.93	4.44	0.49	-0.43	-0.28	Removed
LF-EDR004b	Togher	0	0.05	5.77	5.14	0.63	-0.63	-0.58	Removed
LF-EDR004c	Togher	0	0.09	5.33	5.23	0.10	-0.10	-0.01	Removed
LF-EDR004d	Togher	0.05	0.15	5.71	5.09	0.63	-0.58	-0.43	Removed
LF-EDR004e	Togher	0.35	0.24	5.84	5.30	0.53	-0.18	0.06	Survives on Surface
LF-EDR004f	Togher	0.16	0.17	6.04	5.70	0.34	-0.18	-0.01	Removed
LF-EDR004g	Togher	0.2	0.07	5.47	5.03	0.44	-0.24	-0.17	Removed
LF-EDR004h	Togher	0.2	0.15	5.80	5.18	0.61	-0.41	-0.26	Removed
LF-EDR004i	Togher	0.19	0.15	5.45	5.10	0.35	-0.16	-0.01	Removed
LF-EDR004j	Togher	0.2	0.13	5.58	5.20	0.38	-0.18	-0.05	Removed
LF-EDR004k	Togher	0.16	0.1	5.18	4.65	0.53	-0.37	-0.27	Removed
LF-EDR004l	Togher	0.32	0.12	4.46	3.88	0.58	-0.26	-0.14	Removed
LF-EDR004m	Togher	0.07	0.07	4.49	3.94	0.55	-0.48	-0.41	Removed
LF-EDR004n	Togher	0.23	0.12	3.75	3.52	0.23	0.00	0.12	Survives on Surface
LF-EDR004o	Togher	0.12	0.07	4.56	3.95	0.61	-0.49	-0.42	Removed
LF-EDR004p	Togher	0.25	0.16	4.35	3.78	0.57	-0.32	-0.16	Removed
LF-EDR004q	Togher	0.02	0.1	4.00	3.50	0.50	-0.48	-0.38	Removed
LF-EDR004r	Togher	0.02	0.1	3.83	3.05	0.78	-0.76	-0.66	Removed

LF-EDR004s	Togher	0	0.08	3.52	2.93	0.59	-0.59	-0.51	Removed
LF-EDR004t	Togher	0	0.12	3.65	3.30	0.35	-0.35	-0.23	Removed
LF-EDR004u	Togher	0	0.1	3.26	2.80	0.46	-0.46	-0.36	Removed
LF-EDR005a	Togher	0	0.065	2.87	2.77	0.10	-0.10	-0.04	Removed
LF-EDR005b	Togher	0	0.05	NA	NA		0.00	?	?

Table 1. Sightings identified in the Peatland Survey 2007 & 2008 in Edera Bog indicating which sightings have been removed, which survive on the surface and which below.

Archaeological investigations

Five of the monuments identified in the Peatland Survey 2007 & 2008 (LF-EDR001a-aq, LF-EDR002a-y, LF-EDR003a-ae, LF-EDR004a-u and LF-EDR005a-b) were selected for investigation in 2012 as part of the 2010-2013 Bord na Móna excavation programme (Whitaker 2020). These monuments are noted below (Table 2). Site EDR005a-b / 12E0215 was not re-located during the excavation season.

SMR No.	License No.	Survey No.	Classification
LF026-034	12E0212	EDR002a-y	Road – Class 1 togher
LF026-036	12E0214	EDR004a-u	Road – Class 1 togher
LF026-035	12E0213	EDR003a-ae	Road – Class 1 togher
LF026-033	12E0211	EDR001a-aq	Road – gravel/stone trackway - peatland
LF026-037	12E0215	EDR005a-b	Road – Class 1 togher

Table 2. List of monuments in Edera Bog excavated in 2012.

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 12th of November 2020. The SMR consists of records included in the RMP and sites and monuments notified to the Dept. since the

publication of the RMP. This review established that there are six monuments entered in the SMR in the proposed rehabilitation area. The monuments are indicated in Table 2 and Fig. 3 below.

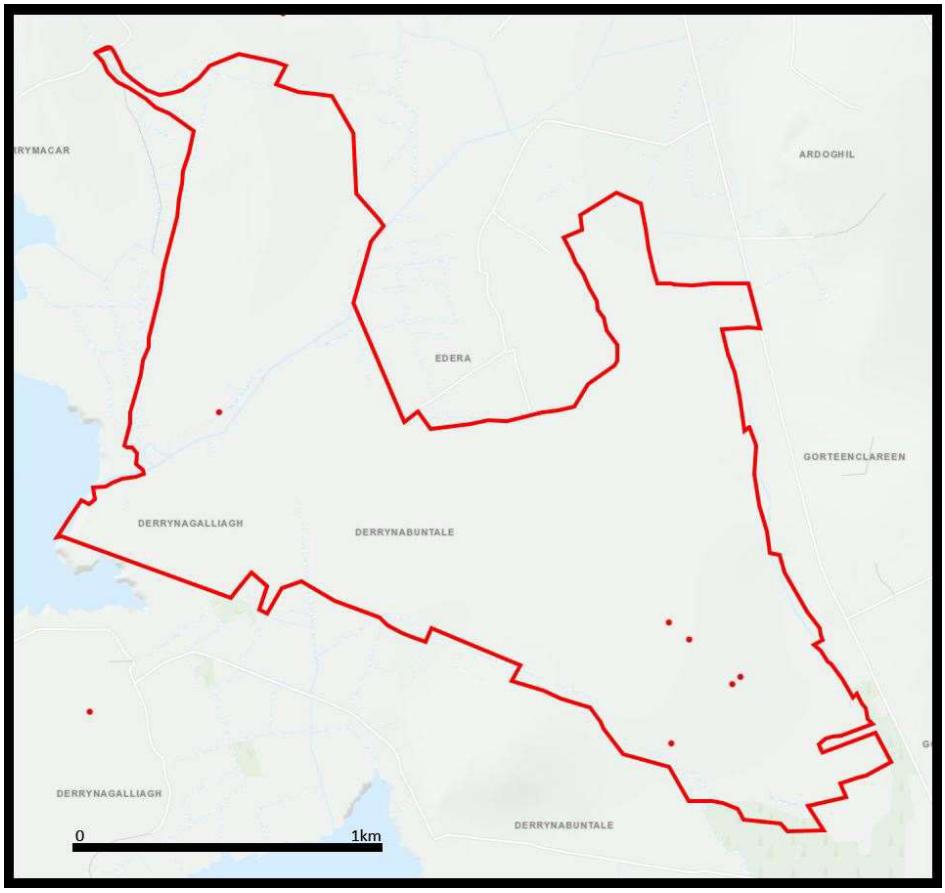


Fig. 3. Edera Bog, Co. Longford, detail of the Sites and Monuments Record. The proposed rehabilitation area is outlined with the redline. There are a six SMRs in the area.

Apart from LF026-007---- which is a Redundant Record (it is a natural feature), these are all monuments identified by the Peatland Survey 2007 & 2008 (Rohan 2009) that were notified to the Archaeological Survey of Ireland and subsequently archaeologically investigated in 2012.

SMR No.	Survey No.	License No.	Townland	Classification
LF026-007----	-	-	Derrymacar	Redundant record
LF026-033----	EDR001a-aq	12E0211	Derrynabuntale/Gorteenclaren	Road - gravel/stone trackway - peatland
LF026-034----	EDR002a-y	12E0212	Derrynabuntale/Gorteenclaren	Road - class 1 togher
LF026-035----	EDR003a-ae	12E0213	Derrynabuntale/Gorteenclaren	Road - class 1 togher
LF026-036----	EDR004a-u	12E0214	Derrynabuntale/Gorteenclaren	Road - class 1 togher

LF026-037----	EDR005a-b	12E0215	Derrynabuntale/Gorteenclaren	Road - class 3 togher

Table 3. List of sites and monuments included in the SMR in Edera Bog.

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 are no additional reports of any archaeological investigations carried out in the rehabilitation area.

Reported finds

No reports of archaeological finds from Edera Bog are recorded in the topographical files of the National Museum of Ireland.

Previous assessments

Edera 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 monuments identified in the Peatland Survey 2007 & 2008 and noted that there was a high potential for archaeological features to be uncovered during the course of any future development works in Edera Bog.

Impact assessment

There are 122 known sightings of archaeology belonging to five toghers in the rehabilitation area. Of these 60 sightings have been removed, at least 31 sightings survive on the surface, and 29 sightings survive below the surface. Table 4 lists the sightings that survive in the rehabilitation area.

Site	Site Type	East	Right	Depth BS (m)	Depth archaeo	2008 Depth	2020 Depth	Peat depth Removed	Current depth archaeo BS	Depth of surviving archaeo	Status
LF-EDR001a	Togher	211151	257128	0.37	0.4	4.36	4.08	0.28	0.09		Survives below surface
LF-EDR001b	Togher	211137	257118	0.91	0.37	5.64	5.10	0.55	0.36		Survives below surface
LF-EDR001c	Togher	211121	257106	0.77	0.37	5.80	4.76	1.04	-0.27	0.10	Survives on Surface
LF-EDR001d	Togher	211096	257091	0.59	0.52	6.06	5.28	0.77	-0.18	0.34	Survives on Surface
LF-EDR001e	Togher	211081	257086	0.8	0.6	5.78	5.30	0.48	0.32		Survives below surface
LF-EDR001f	Togher	211068	257076	0.63	0.5	6.18	5.49	0.69	-0.06	0.44	Survives on Surface
LF-EDR001g	Togher	211081	257086	0.8	0.27	5.78	5.30	0.48	0.32		Survives below surface
LF-EDR001i	Togher	211024	257040	0.7	0.18	6.05	5.21	0.84	-0.14	0.04	Survives on Surface
LF-EDR001k	Togher	210997	257034	0.54	0.34	5.66	5.28	0.38	0.16		Survives below surface
LF-EDR001l	Togher	210984	257027	0.47	0.3	5.95	5.49	0.46	0.01		Survives below surface

LF-EDR001m	Togher	210971	257022	0.75	0.57	6.27	5.56	0.70	0.05		Survives on Surface
LF-EDR001n	Togher	210458	257013	1.07	0.27	4.47	4.08	0.39	0.68		Survives on Surface
LF-EDR001o	Togher	210945	257006	0.9	0.4	6.19	5.52	0.67	0.23		Survives below surface
LF-EDR001p	Togher	210931	256999	0.8	0.51	5.95	5.43	0.52	0.28		Survives below surface
LF-EDR001q	Togher	210917	256993	0.74	0.1	5.75	5.50	0.25	0.49		Survives on Surface
LF-EDR001r	Togher	210898	256981	0.95	0.3	5.25	4.41	0.84	0.11		Survives on Surface
LF-EDR001s	Togher	210886	256976	0.4	0.6	5.23	4.56	0.67	-0.27	0.33	Survives on Surface
LF-EDR001t	Togher	210872	256969	0.45	0.32	5.06	4.58	0.48	-0.03	0.29	Survives on Surface
LF-EDR001u	Togher	210856	256981	0.4	0.35	5.20	4.51	0.69	-0.29	0.06	Survives on Surface
LF-EDR001v	Togher	210842	256957	0	0.47	4.71	4.40	0.31	-0.31	0.16	Survives on Surface
LF-EDR001w	Togher	210826	256947	0.22	1.03	5.29	4.55	0.74	-0.52	0.51	Survives on Surface
LF-EDR001x	Togher	210817	256945	0.42	0.8	5.49	4.86	0.63	-0.21	0.59	Survives on Surface
LF-EDR001y	Togher	210799	256938	0.95	0.23	4.83	4.28	0.54	0.41		Survives below surface
LF-EDR001z	Togher	210788	256933	1.05	0.2	5.55	4.80	0.75	0.30		Survives below surface
LF-EDR001aa	Togher	210771	256927	0.62	0.43	4.71	4.71	0.00	0.62		Survives on Surface
LF-EDR001ab	Togher	210760	256917	0.64	0.6	5.02	4.44	0.59	0.05		Survives on Surface
LF-EDR001ac	Togher	210746	256914	0.43	0.34	4.95	4.33	0.62	-0.19	0.15	Survives on Surface
LF-EDR001ad	Togher	210731	256909	0.8	0.46	4.91	4.54	0.37	0.43		Survives on Surface
LF-EDR001ae	Togher	210713	256909	0.33	0.53	4.25	3.89	0.36	-0.03	0.50	Survives on Surface
LF-EDR001af	Togher	210701	256896	0.7	0.5	4.24	3.92	0.31	0.39		Survives below surface
LF-EDR001ag	Togher	210658	256886	0.6	0.75	4.98	4.37	0.60	0.00		Survives below surface
LF-EDR001ah	Togher	210643	256881	0.58	0.73	5.12	4.73	0.39	0.19		Survives below surface
LF-EDR001ai	Togher	210628	256876	0.62	0.63	4.73	4.20	0.53	0.09		Survives below surface
LF-EDR001aj	Togher	210613	256865	0.49	0.58	4.50	3.99	0.51	-0.02	0.56	Survives on Surface
LF-EDR001ak	Togher	210601	256858	0.84	0.5	4.54	4.03	0.51	0.33		Survives below surface
LF-EDR001al	Togher	210589	256850	0.95	0.36	4.57	3.94	0.63	0.32		Survives below surface

LF-EDR001am	Togher	210573	256841	0.98	0.3	4.63	4.03	0.60	0.38		Survives below surface
LF-EDR001an	Togher	210558	256834	0.83	0.36	4.51	4.00	0.51	0.32		Survives below surface
LF-EDR001ao	Togher	210543	256824	0.64	0.31	4.88	4.22	0.66	-0.02	0.29	Survives on Surface
LF-EDR001ap	Togher	210504	256801	1.05	0.22	4.39	3.96	0.43	0.62		Survives below surface
LF-EDR001aq	Togher	210489	256791	0.94	0.36	4.46	4.00	0.45	0.49		Survives below surface
LF-EDR002d	Togher	211111	257084	0.03	0.68	5.58	5.11	0.48	-0.45	0.23	Survives on Surface
LF-EDR002e	Togher	211092	257063	0.17	0.63	6.02	5.32	0.70	-0.53	0.10	Survives on Surface
LF-EDR002l	Togher	210979	256976	0.12	0.76	5.25	4.80	0.46	-0.34	0.42	Survives on Surface
LF-EDR002n	Togher	210940	256935	0.2	0.51	4.59	4.46	0.13	0.07		Survives below surface
LF-EDR002p	Togher	210913	256923	0.55	0.11	5.08	4.55	0.54	0.01		Survives below surface
LF-EDR002r	Togher	210885	256900	0.14	0.27	3.77	3.78	0.00	0.14		Survives below surface
LF-EDR002s	Togher	210875	256820	0.22	0.3	4.54	4.03	0.51	-0.29	0.01	Survives on Surface
LF-EDR002t	Togher	210854	256879	0.29	0.14	4.18	3.96	0.23	0.06		Survives below surface
LF-EDR003a	Togher	211247	256951	0.07	0.4	4.02	3.98	0.03	0.04		Survives below surface
LF-EDR003d	Togher	211193	256907	0.12	0.23	5.26	5.09	0.17	-0.05	0.18	Survives on Surface
LF-EDR003g	Togher	211154	256868	0	0.12	5.06	5.13	0.00	0.00		Survives below surface
LF-EDR003k	Togher	211105	256820	0.2	0.24	5.55	5.22	0.33	-0.13	0.11	Survives on Surface
LF-EDR003o	Togher	211055	256769	0.25	0.3	4.94	4.66	0.29	-0.04	0.26	Survives on Surface
LF-EDR003u	Togher	210972	256708	0.37	0.15	3.57	3.25	0.33	0.04		Survives below surface
LF-EDR003x	Togher	210931	256672	0	0.13	2.96	3.01	0.00	0.00	0.13	Survives on Surface
LF-EDR003aa	Togher	210890	256638	0.05	0.29	2.72	2.68	0.04	0.01		Survives below surface
LF-EDR003ad	Togher	210850	256605	0	0.1	2.46	2.63	0.00	0.00		Survives below surface
LF-EDR004e	Togher	211168	256894	0.35	0.24	5.84	5.30	0.53	-0.18	0.06	Survives on Surface
LF-EDR004n	Togher	211048	256778	0.23	0.12	3.75	3.52	0.23	0.00	0.12	Survives on Surface
LF-EDR005b	Togher	210831	256562	0	0.05	NA	NA		0.00	?	?

Table 4. List of surviving monument sightings in Edera Bog with grid references.

Recommendations

All the 60 surviving sightings of archaeology identified in Table 4 should be preserved *in situ* and be avoided by the rehabilitation works. 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. There are 122 known known sightings of archaeological heritage in the rehabilitation area and at least 60 of these survive *in situ*. All the 60 surviving sightings of archaeology identified in Table 4 should be preserved *in situ* and be avoided by the rehabilitation works. 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 1996. Recorded Monuments Protected under Section 12 of the National Monuments (Amendment) Act, 1994. County Longford.

EPA 2020. Guidance on the process of preparing and implementing a bog rehabilitation plan.

Mackin *et al.* 2017. Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service.

Rohan 2009. Peatland Survey 2007 & 2008 Blackwater, Derryfadda, Coolnagun Mountdillon Group of Bogs. Unpublished report for the department of the Environment, Heritage and Local Government and Bord na Móna

Whitaker, J. 2020. Final excavation report for Edera Bog, Co. Longford. Irish Archaeological Consultancy ltd., 2020 licence ref.: 12e0211–12e0215. Unpublished report for Bord na Móna.

Dr. Charles Mount
16 December 2020

Appendix C: Site Synopses

SITE SYNOPSIS

Site Name: Lough Ree SAC

Site Code: 000440

Lough Ree is the third largest lake in Ireland and is situated in an ice-deepened depression in Carboniferous limestone on the River Shannon system between Lanesborough and Athlone. The site spans Counties Longford, Roscommon and Westmeath. Some of its features (including the islands) are based on glacial drift. It has a very long, indented shoreline and hence has many sheltered bays. Although the main habitat, by area, is the lake itself, interesting shoreline, terrestrial and semi-aquatic habitats also occur.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[3150] Natural Eutrophic Lakes
[6210] Orchid-rich Calcareous Grassland*
[7110] Active Raised Bog*
[7120] Degraded Raised Bog
[7230] Alkaline Fens
[8240] Limestone Pavement*
[91D0] Bog Woodland*
[91E0] Alluvial Forests*
[1355] Otter (*Lutra lutra*)

The greater part of Lough Ree is less than 10 m in depth, but there are six deep troughs running from north to south, reaching a maximum depth of about 36 m just west of Inchmore. The lake has been classified as mesotrophic in quality, but the size of the system means that a range of conditions prevail depending upon, for example, rock type. This gives rise to local variations in nutrient status and pH, which in turn results in variations in the phytoplankton and macrophyte flora. Therefore species indicative of oligotrophic, mesotrophic, eutrophic and base-rich situations occur. The water of Lough Ree tends to be strongly peat-stained, restricting macrophytes to depths of less than 2 m, and as a consequence, macrophytes are restricted to sheltered bays, where a typical Shannon flora occurs. Species present include Intermediate Bladderwort (*Utricularia intermedia*), pondweeds (*Potamogeton* spp.), Quillwort (*Isoetes lacustris*), Greater Duckweed (*Spirodela polyrhiza*), stoneworts (*Chara* spp., including *C. pedunculata*) and Arrowhead (*Sagittaria sagittifolia*). The latter is a scarce species which is almost confined in its occurrence to the Shannon Basin.

Reedbeds of Common Reed (*Phragmites australis*) are an extensive habitat in a number of more sheltered places around the lake, but single-species 'swamps' consisting of such species as Common Club-rush (*Scirpus lacustris*), Slender Sedge (*Carex lasiocarpa*), Great Fen-sedge (*Cladium mariscus*) and two scarce species of sedge (*Carex appropinquata* and *C. elata*) also occur in suitable places. Some of these grade up into species-rich alkaline fen with Black Bog-rush (*Schoenus nigricans*) and Whorl-grass (*Catabrosa aquatica*), or freshwater marsh with abundant Water Dock (*Rumex hydrolapathum*) and Hemp-agrimony (*Eupatorium cannabinum*).

Lowland wet grassland is found in abundance around the shore and occurs in two types. One is 'callowland', grassland which floods in winter. This provides feeding for winter waterfowl and breeding waders. The other is an unusual community on stony wet lake shore which is found in many places around the lake, and is characterized by Water Germander (*Teucrium scordium*), a scarce plant species almost confined to this lake and Lough Derg.

Dry calcareous grassland occurs scattered around the lake shore. This supports typical species such as Yellow-wort (*Blackstonia perfoliata*), Carline Thistle (*Carlina vulgaris*) and Quaking-grass (*Briza media*). Orchids also feature in this habitat e.g. Bee Orchid (*Ophrys apifera*) and Common Spotted-orchid (*Dactylorhiza fuchsii*).

Limestone pavement occurs occasionally around the lake shore. The most substantial area is at Rathcline in the extreme north-east. While this has been planted with commercial forestry since the 1950s, it still displays a diverse representation of pavement types, from the typical clint-gryke system to large blocky pavements and scattered boulders. In all cases the pavement is covered by a bryophyte-rich flora, with abundant Ivy (*Hedera helix*), and a scrub layer dominated by Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*) and some Spindle (*Euonymus europaeus*). The ground flora is variable, though in places it is species-rich.

Dry broadleaved semi-natural woodland occurs in several places around the lake, most notably at St John's Wood and on Hare Island. St John's Wood is recognised as the largest and most natural woodland in the Midlands. Its canopy is dominated by Hazel, Pedunculate Oak (*Quercus robur*), Holly (*Ilex aquifolium*) and Ash, but a range of other trees and shrubs occur, including Wych Elm (*Ulmus glabra*), Yew (*Taxus baccata*), Wild Cherry (*Prunus avium*) and Irish Whitebeam (*Sorbus hibernica*). The ground flora of St John's Wood is species-rich, and is remarkable for the presence of two species, Toothwort (*Lathraea squamaria*) and Bird's-nest Orchid (*Neottia nidus-avis*), which tend to occur in sites with a long history of uninterrupted woodland cover. The tree species composition on Hare Island is similar to that in St John's Wood, with additional non-native species such as Sycamore (*Acer pseudoplatanus*) and Beech (*Fagus sylvatica*). This wood also has an exceptionally rich ground flora. Some of the smaller areas of woodland around Lough Ree are mixed woodland with a high percentage of exotics such as Beech. Some areas of well-developed Hazel scrub also occur.

At St John's Wood, patches of wet alluvial woodland are present along the lakeshore. They are dominated by Ash, Grey Willow (*Salix cinerea*), Alder (*Alnus glutinosa*) and, in places, Downy Birch (*Betula pubescens*). The ground flora includes Creeping Bent (*Agrostis stolonifera*), Wild Angelica (*Angelica sylvestris*), Meadowsweet (*Filipendula ulmaria*), Common Marsh-bedstraw (*Galium palustre*), Yellow Iris (*Iris pseudacorus*), Gipsywort (*Lycopus europaeus*), Water Mint (*Mentha aquatica*), Reed Canary-grass (*Phalaris arundinacea*), Creeping Buttercup (Ranunculus repens) and Wood Dock (*Rumex sanguineus*). Pockets of wet woodland occur elsewhere around the lake. Most of these are dominated by willows (*Salix* spp.), Alder and Downy Birch. In one such wood, at Ross Lough, the terrestrial alga, *Trentopohlia* sp., has a specialised niche on the willow trunks. The ground layer has a rich bryophyte flora (*Calliergon* spp. and *Sphagnum* spp.), scattered clumps of Greater Tussock-sedge (*Carex paniculata*) and a good diversity of herb species, including Water Dock and Fen Bedstraw (*Galium uliginosum*).

Small examples of raised bog occur, which are of interest in that they show a natural transition through wet woodland and/or swamp to lakeshore habitats. Active Raised Bog (ARB) habitat comprises areas of high bog that are wet and actively peat-forming, where the percentage cover of bog mosses (*Sphagnum* spp.) is high, and where some or all of the following features occur: hummocks, pools, wet flats, *Sphagnum* lawns, flushes and soaks. Results from surveys of the raised bog habitat in 2003 indicate the presence of 5.9 ha of Active Raised Bog (ARB). Also present are examples of Degraded Raised Bog (DRB) capable of regeneration. In general the vegetation of these degraded areas is dominated by typical raised bog species such as Cross-leaved Heath (*Erica tetralix*), Heather (*Calluna vulgaris*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Bog Asphodel (*Narthecium ossifragum*) and Deergrass (*Scirpus cespitosus*). Typically the degraded bog areas have a low cover of peat-forming bog mosses (*Sphagnum* spp.). The current extent of DRB as estimated using a recently developed hydrological modelling technique, based largely on Light Detection And Ranging (LiDAR) data, is 44.7 ha.

Associated with the extensive raised bog system at Clooncraff/Clonlarge are areas of bog woodland. At least two small areas of woodland occur on the raised bog domes. However it would appear that this habitat is in the early stages of development. The largest area is dominated by low trees of Downy Birch and Lodgepole Pine (*Pinus contorta*). Occasional trees of Scots Pine (*Pinus sylvestris*) also occur. The ground layer is wet and quaking with a lush carpet of mosses present, including various species of *Sphagnum*, *Pleurozium schreberi* and *Aulacomium palustre*. The main vascular plant species in the ground flora are Bog-rosemary (*Andromeda polifolia*), Cranberry (*Vaccinium oxycoccos*), Bog-myrtle (*Vaccinium myrtillus*), Hare's-tail Cottongrass and Deergrass. Bog Woodland is of particular conservation importance and is listed with priority status on the E.U. Habitats Directive.

At St John's Wood, there is an interesting area of woodland that grows on cut-away peat. This is dominated by Downy Birch and Alder Buckthorn (*Frangula alnus*). The occurrence of the latter species in such abundance is unusual in Ireland.

Smaller lakes occur around the lake shore, especially on the east side, and these often have the full range of wetland habitats contained within and around them. A number of small rivers also pass through the site.

The site supports a number of rare plant species which are listed in the Irish Red Data Book. Alder Buckthorn and Bird Cherry (*Prunus padus*) are woodland components at St John's Wood and elsewhere. Narrow-leaved Helleborine (*Cephalanthera longifolia*) and Betony (*Stachys officinalis*), both of which are also legally protected under the Flora (Protection) Order, 1999, occur among the ground flora of Hare Island (where the former occurs in notable abundance). They also occur in a number of other woods. The stonewort *Chara tomentosa* is present in shallow water around the lake. The rare, though not legally protected, Marsh Pea (*Lathyrus palustris*) occurs on some of the callowland and in alluvial woodland at St John's Wood. The rare Myxomycete fungus, *Echinostelium colliculosum,* has been recorded from St John's Wood.

The lake itself contains one of only two populations in Ireland of the endangered fish species, Pollan (*Coregonus autumnalis*), which is genetically different from Continental European stock. The shrimp *Mysis relicta* (Class Crustacea) occurs in this lake and is a relict of the glacial period in Ireland.

Small flocks of Greenland White-fronted Goose, an Annex I species on the E.U. Birds Directive, use several areas of callowland around the lake in winter. An average spring count of 92 individuals was obtained for this species over the six seasons 1988/89 to 1993/94, indicating that Lough Ree is a nationally important site for the species. The following bird counts are derived from 6 counts during the period 1984/85 to 1986/87: nationally important populations of Golden Plover (1,350), an Annex I species; Wigeon (1,306); Teal (584); Tufted Duck (1,317) and Coot (798). Other winter visitors are Whooper Swan (32), an Annex I species, Mute Swan (91), Little Grebe (48), Cormorant (91), Mallard (362), Shoveler (40), Pochard (179), Goldeneye (97), Curlew (178), Lapwing (1,751) and Dunlin (48). The callowland is also used by Black-tailed Godwit and other species on migration.

Some of the lake islands provide nesting sites for Common Tern, a species listed on Annex I of the E.U. Birds Directive. The Lough Ree colony, 86 pairs in 1995, is estimated as one of the largest of this species on midland lakes. The lake also provides excellent breeding habitat for wildfowl, including Common Scoter (30-40 pairs), a rare breeding species listed as "Endangered" in the Red Data Book, and Tufted Duck (>200 pairs). The woodlands and scrub around the lake and on the islands are a stronghold of the Garden Warbler (74 territories in 1997), a bird species mainly confined to the Shannon lakes in Ireland.

There is a population of Otter around the lake. This species is listed in the Red Data Book as being threatened in Europe and is protected under Annex II of the E.U. Habitats Directive.

Land uses within the site include recreation in the form of cruiser hire, angling, camping, picnicking and shooting. Chalet accommodation occurs at a few locations around the lake. Low-intensity grazing occurs on dry and wet grassland around the shore, and some hay is made within the site. Some of these activities are damaging, but in a very localised way, and require careful planning. The main threat to the aquatic life in the lake comes from artificial enrichment of the waters by agricultural and domestic waste, and also by peat silt in suspension which is increasingly limiting the light penetration, and thus restricting aquatic flora to shallower waters. At present Lough Ree is less affected by eutrophication than Lough Derg.

Lough Ree and its adjacent habitats are of major ecological significance. Some of the woodlands around the lake are of excellent. St John's Wood is particularly important; it is one of the very few remaining ancient woodlands in Ireland. The lake itself is an excellent example of a mesotrophic to moderate-eutrophic system, supporting a rare fish species and a good diversity of breeding and wintering birds.

SITE SYNOPSIS

SITE NAME: LOUGH REE SPA

SITE CODE: 004064

Situated on the River Shannon between Lanesborough and Athlone, Lough Ree is the third largest lake in the Republic of Ireland. It lies in an ice-deepened depression in Carboniferous Limestone. Some of its features (including the islands) are based on glacial drift. The main inflowing rivers are the Shannon, Inny and Hind, and the main outflowing river is the Shannon. The greater part of Lough Ree is less than 10 m in depth, but there are six deep troughs running from north to south, reaching a maximum depth of about 36 m just west of Inchmore. The lake has a very long, indented shoreline and hence has many sheltered bays. It also has a good scattering of islands, most of which are included in the site.

Beds of Common Reed (*Phragmites australis*) are an extensive habitat in a number of the more sheltered places around the lake; monodominant stands of Common Club-rush (*Scirpus lacustris*), Slender Sedge (*Carex lasiocarpa*) and Saw Sedge (*Cladium mariscus*) also occur as swamps in suitable places. Some of these grade into species-rich calcareous fen or freshwater marsh. Lowland wet grassland, some of which floods in winter, occurs frequently around the shore.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Teal, Mallard, Shoveler, Tufted Duck, Common Scoter, Goldeneye, Little Grebe, Coot, Golden Plover, Lapwing and Common Tern. 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.

Lough Ree is one of the most important Midland sites for wintering waterfowl, with nationally important populations of Little Grebe (52), Whooper Swan (139), Wigeon (2,070), Teal (1,474), Mallard (1,087), Shoveler (54), Tufted Duck (1,012), Goldeneye (205), Coot (338), Golden Plover (3,058) and Lapwing (5,793) – all figures are three year mean peaks for the period 1997/98 to 1999/2000. Other species which occur in winter include Great Crested Grebe (29), Cormorant (99), Curlew (254) and Black-headed Gull (307) as well as the resident Mute Swan (85). Greenland White-fronted Goose has been recorded on occasion on the flooded margins of the site.

The site supports a nationally important population of Common Tern (90 pairs in 1995). It is a traditional breeding site for Black-headed Gull and whilst a full survey has not been carried out in recent years, substantial numbers of nesting birds were present on at least one island in 2003. Lesser Black-backed Gull and Common Gull have bred in the past and may still breed. Lough Ree is a noted site for breeding duck and grebes: Tufted Duck (202 pairs) and Great Crested Grebe (32 pairs) – records from 1995. Of particular note is that Lough Ree is one of the two main sites in the

country for breeding Common Scoter, a Red Data Book species. Surveys have recorded 39 pairs and 32 pairs in 1995 and 1999 respectively. Cormorant also breeds on some of the islands within the site – 86 nests were recorded in 2010. The woodland around the lake is a stronghold for Garden Warbler and this scarce species probably occurs on some of the islands within the site.

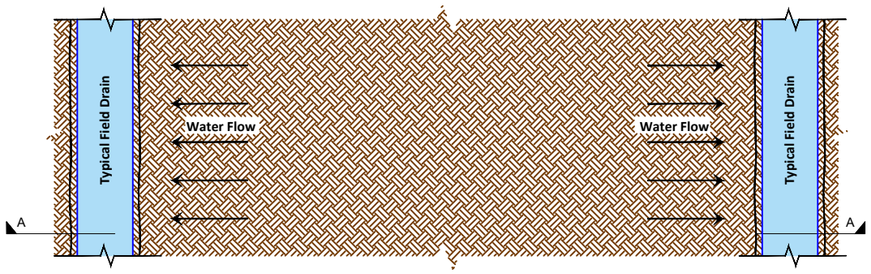
Lough Ree SPA is of high ornithological importance for both wintering and breeding birds. It supports nationally important populations of eleven wintering waterfowl species. The site has a range of breeding waterfowl species, notably nationally important populations of Common Scoter and Common Tern. Of particular note is the regular presence of three species, Whooper Swan, Golden Plover and Common Tern, which are listed on Annex I of the E.U. Birds Directive. Parts of Lough Ree SPA are Wildfowl Sanctuaries.

Appendix D: Methodology Drawings

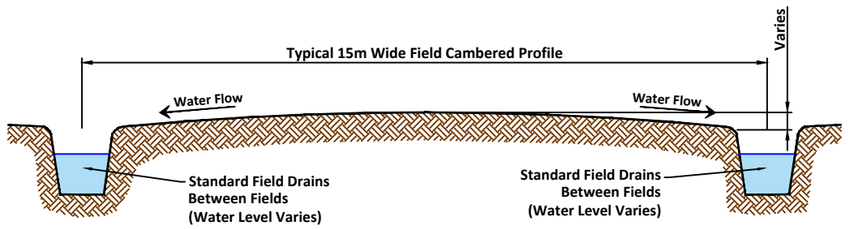
DPT 1: 'Speed Bump' Peat Dams to Re-Wet Measure

Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.
The concept of drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement through the bog.



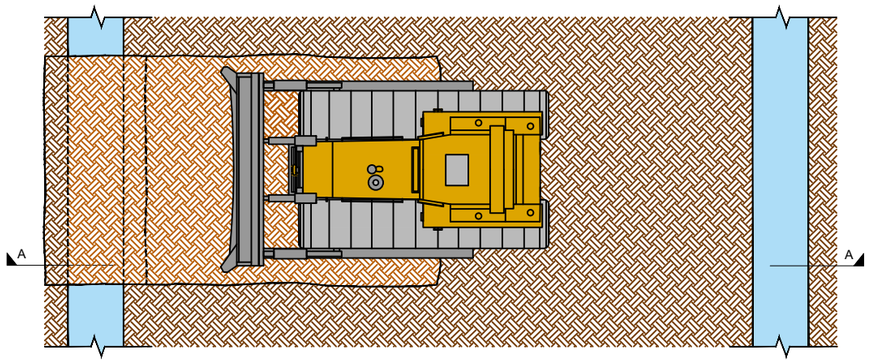
Plan View
(N.T.S.)



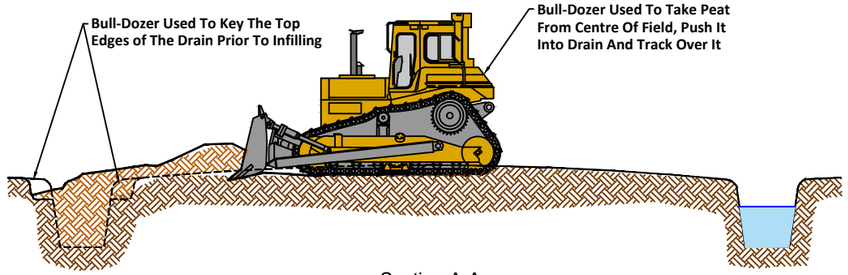
Section A-A
(N.T.S.)

Phase 1
Forming 'Speed Bump'

The Bull-dozer is used to create a 5m Length key along both edges of the drain, approximately 500mm Wide x 500mm Deep.
Next a strip of peat is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block, to form an approximately 5m Wide 'Speed Bump'.



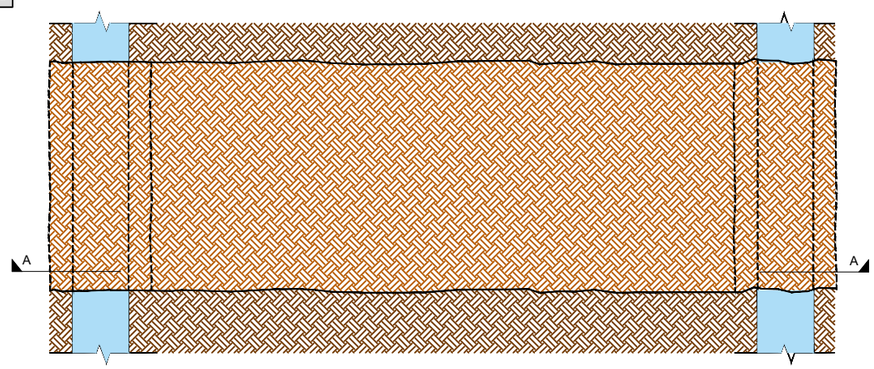
Plan View
(N.T.S.)



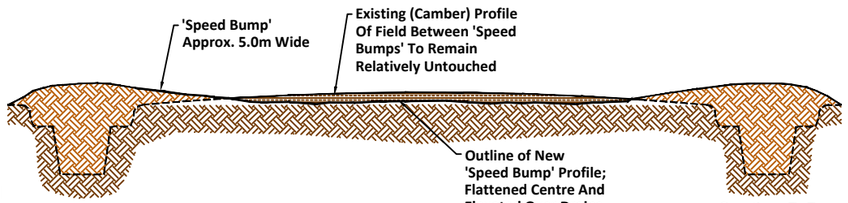
Section A-A
(N.T.S.)

Complete Fields With Speed Bump (3 Per 100m)

'Speed Bumps' are created to allow for peat subsidence and to prevent water from flowing over the drain block and eroding it before it becomes stabilised.



Plan View
(N.T.S.)



Section A-A
(N.T.S.)

Section B-B
(N.T.S.)

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

DRAFT 09/02/21

STATUS

Rev	Description	Issued By	Date
.		.	.
.		.	.
c	'Key' Added To Top Edges Of Drain At Drain Block Locations	P.K.	09/02/21
b	Intensive Drain Block Phase Removed	P.K.	28/01/21
a	Issued For Information	P.K.	18/12/20

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

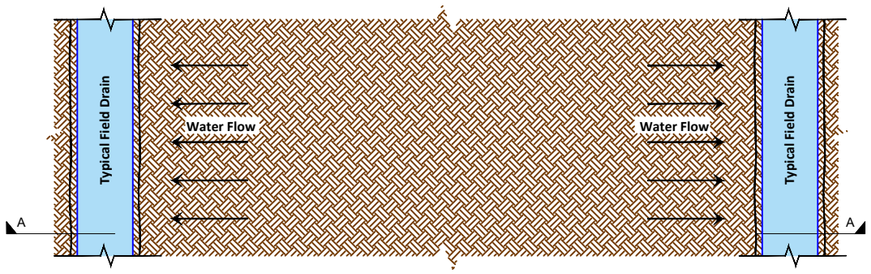
TITLE:
Rehabilitation Method DPT 1
'Speed Bump' Peat Dam

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.
Date: 18/12/20		Scale : Not to Scale	A3	Stage: Information
Drawing No.: PCAS-0100-001				Rev: c

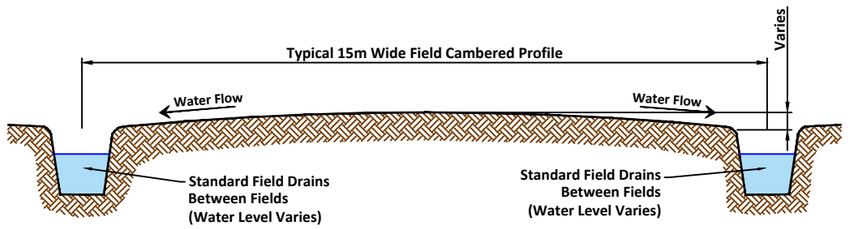
C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-001c_DPT_1_SpeedBumps.dwg

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 drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement through the bog.



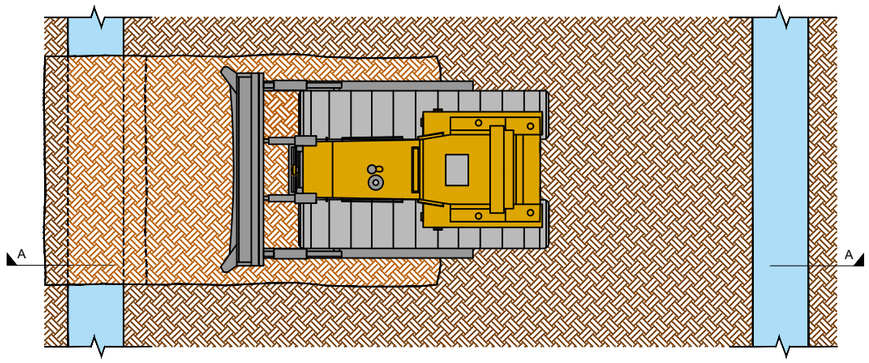
Plan View
(N.T.S.)



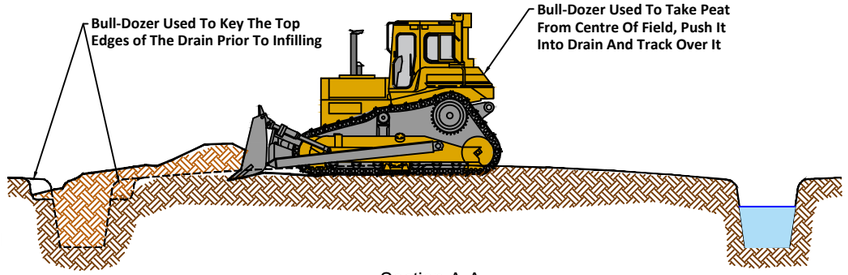
Section A-A
(N.T.S.)

Phase 1
Forming 'Speed Bump'

The Bull-dozer is used to create a 5m Length key along both edges of the drain, approximately 500mm Wide x 500mm Deep.
Next a strip of peat is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block, to form an approximately 5m Wide 'Speed Bump'.



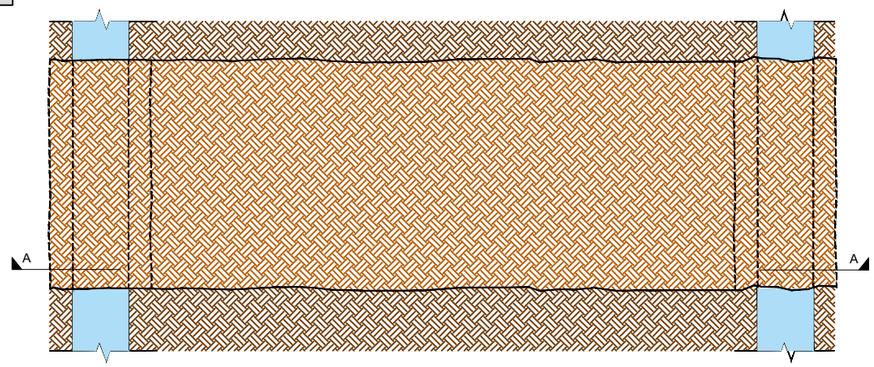
Plan View
(N.T.S.)



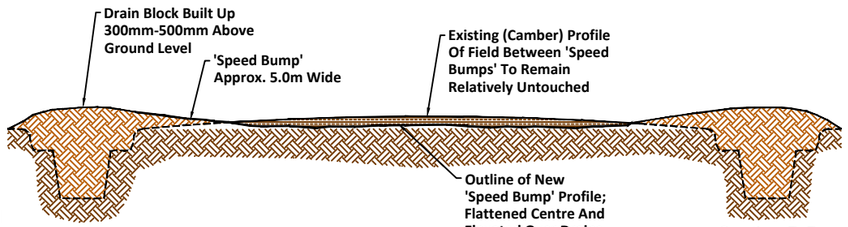
Section A-A
(N.T.S.)

Complete Fields With Speed Bump (3 Per 100m)

Drain Blocks are built up at least 300mm-500mm above the existing ground level to allow for peat subsidence and to prevent water from flowing over the drain block and eroding it before it becomes stabilised.



Plan View
(N.T.S.)



Section A-A
(N.T.S.)

Section B-B
(N.T.S.)

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
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
d	For Approval	P.K.	03/03/21
c	'Key' Added To Top Edges Of Drain At Drain Block Locations	P.K.	09/02/21
b	Intensive Drain Block Phase Removed	P.K.	28/01/21
a	Issued For Information	P.K.	18/12/20

BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

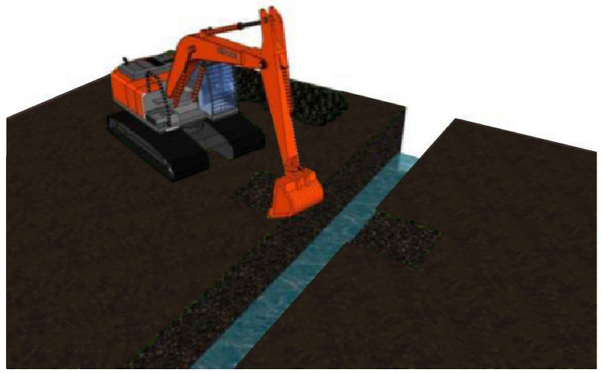
PROJECT:
Peatland Climate Action Scheme
PCAS

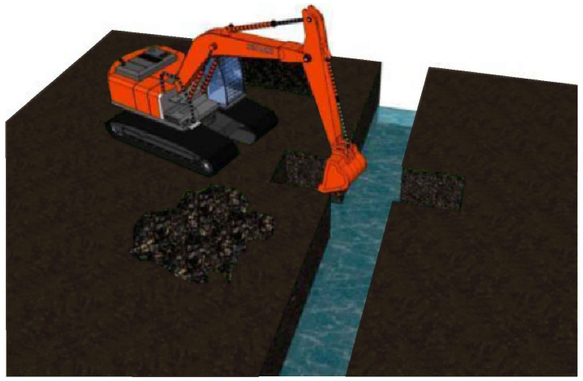
TITLE:
Rehabilitation Method DPT 1
'Speed Bump' Peat Drain Block

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.
Date: 18/12/20		Scale : Not to Scale	A3	Stage: For Approval
Drawing No.: PCAS-0100-001				Rev: d

C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-001d_DPT_1_SpeedBumps.dwg

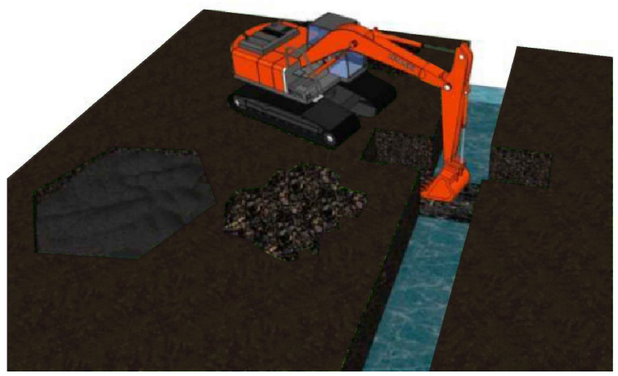
1. Before building drain block, the sides and bottom of the ditch is cleaned using the excavator to remove dry degraded peat, to ensure a good peat-to-peat contact.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

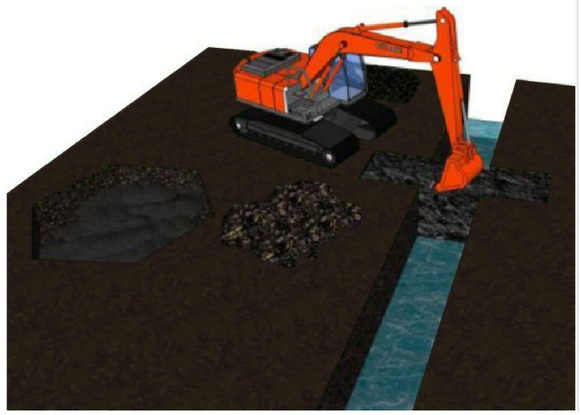




2. Cut key in either side of the drain approximately 500mm deep, and ensure that it is wider than the actual drain.
Remove 500mm of peat from bottom of the drain also and place behind the machine for replacement later.

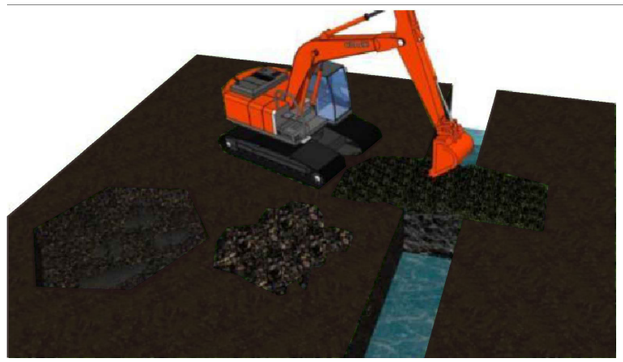
3. Open an area behind machine to be used as a borrow pit. Avoid using the surface layer of peat (top 100-200mm) which is likely to be very permeable. Only use the deeper, more compacted peat to build the drain block.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

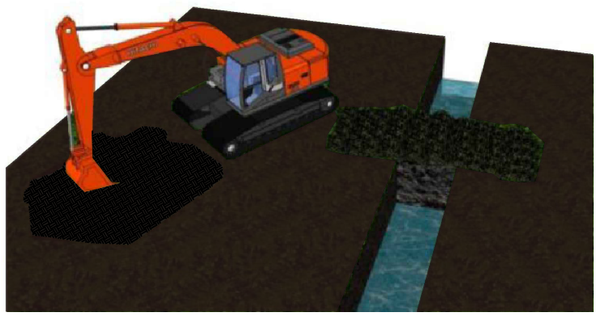




4. Dig out peat from the borrow pit and place into the drain compacting in 300mm layers. Compact the peat firmly using the excavator bucket before laying more peat from the borrow pit.

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.

BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

STATUS

Rev	Description	Issued By	Date
b	For Approval	P.K.	03/03/21
a	Issued for Information	P.K.	18/12/20

PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DPT 2
Peat Drain Blocking

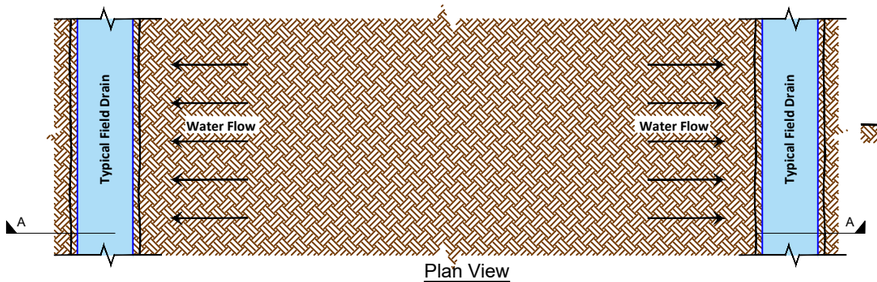
Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.		D.K.	P.N.	P.N.

Date: 18/12/20 | Scale : N.T.S. A3 | Stage: For Approval

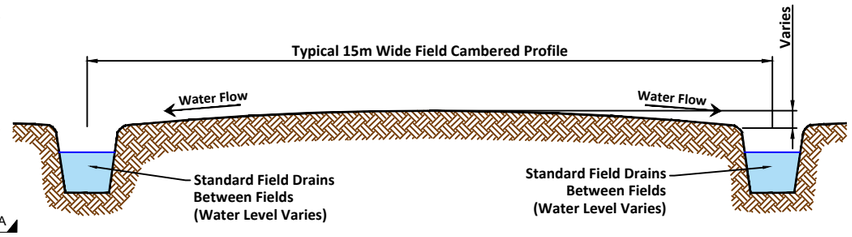
Drawing No.: PCAS-0100-002 | Rev: b

Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth.



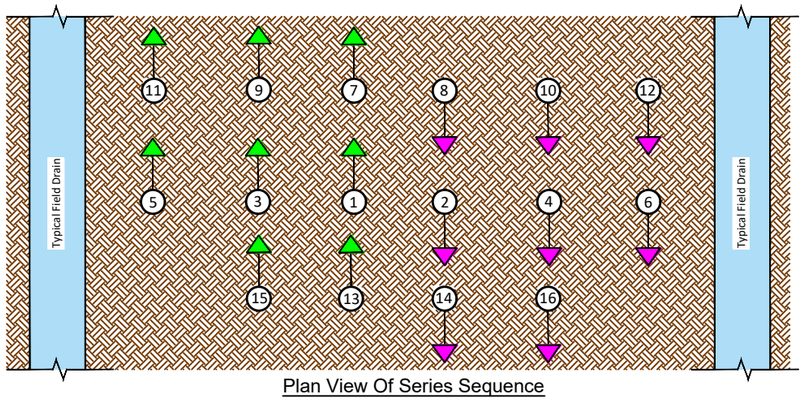
Plan View
(N.T.S.)



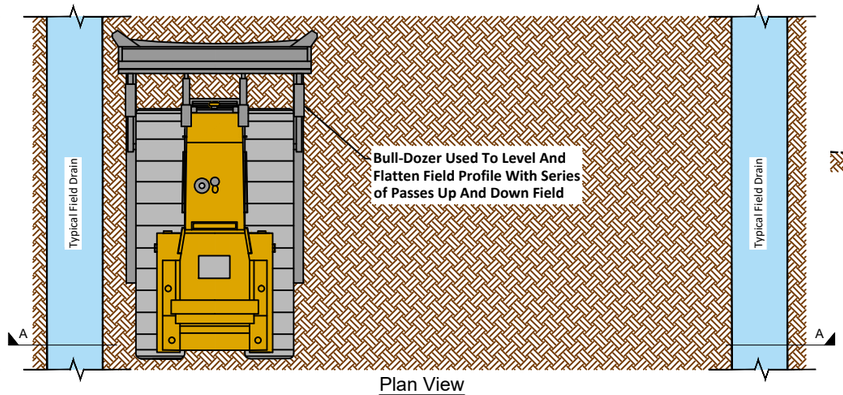
Section A-A
(N.T.S.)

Phase 1
Re-Profiling of Field Surface

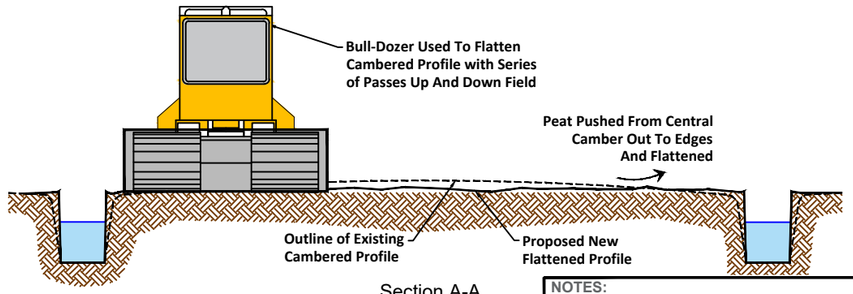
Field to be re-profiled using bull-dozer making a total of 16 passes, 8 passes up and 8 passes down, flattening the camber on the production field. (Sequence of runs shown below)



Plan View Of Series Sequence
(N.T.S.)



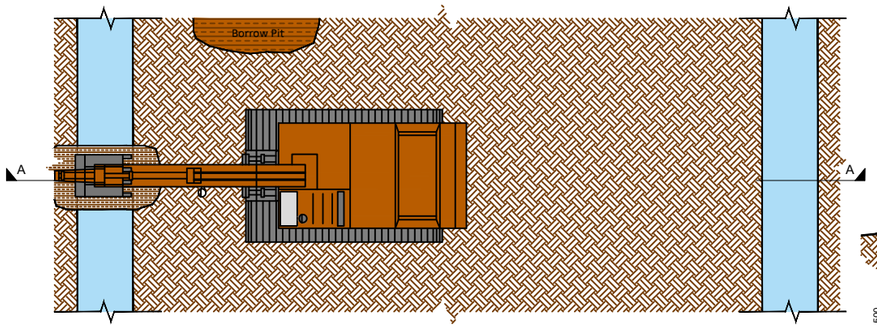
Plan View
(N.T.S.)



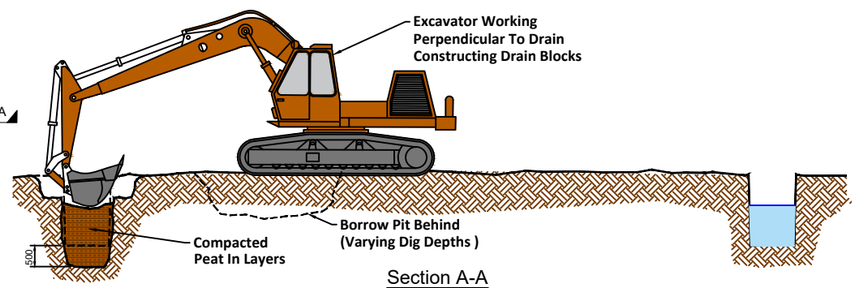
Section A-A
(N.T.S.)

Phase 2
Peat Drain Blocking

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.
Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket.
The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.
The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.
(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.)



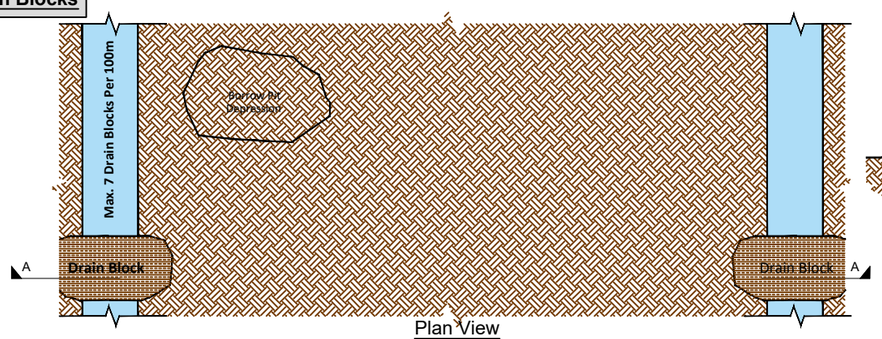
Plan View
(N.T.S.)



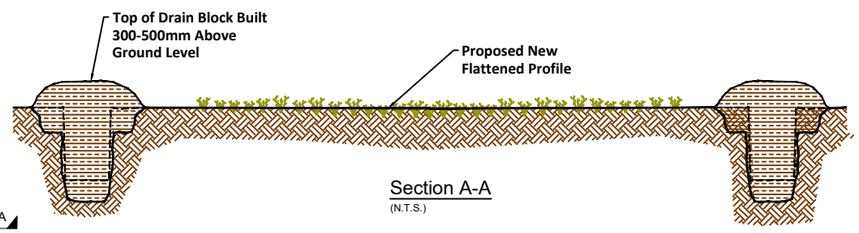
Section A-A
(N.T.S.)

Complete Shallow Field Profile with Regular Drain Blocks

Field re-profiling is developed as a technique to slow the surface water loss from the bog and to retain as much water as possible on the bog, at the required depth.



Plan View
(N.T.S.)



Section A-A
(N.T.S.)

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

STATUS

Rev	Description	Issued By	Date
.		.	.
.		.	.
.		.	.
b	Issued For Approval	P.K.	25/02/21
a	Issued For Information	P.K.	29/01/21

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 DPT 3A
Field Re-profiling

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.

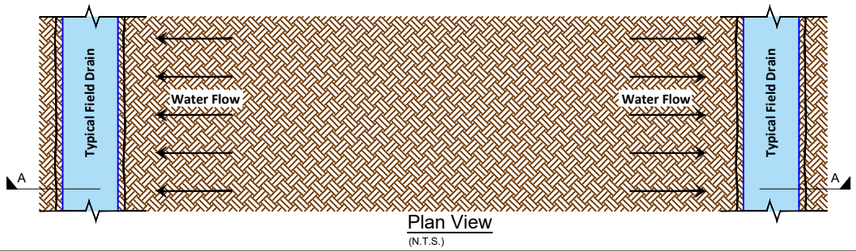
Date: 18/12/20 | Scale: Not to Scale A3 | Stage: For Approval

Drawing No.: PCAS-0100-003 | Rev: b

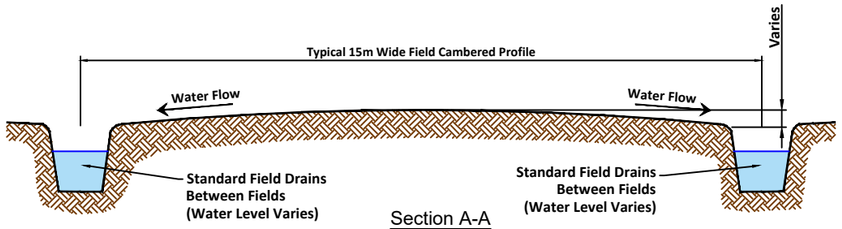
C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-003b_DPT_3A_DozerOnlyFieldProfiling.dwg

Existing Typical Field Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.
The concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth.



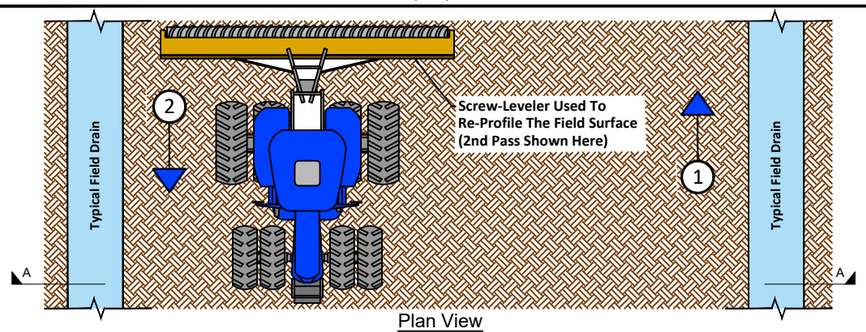
Plan View
(N.T.S.)



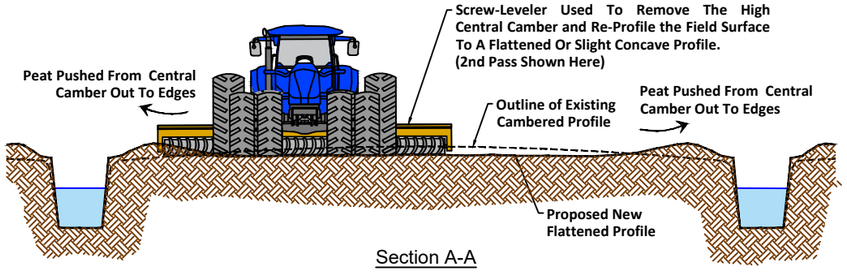
Section A-A
(N.T.S.)

Phase 1
Re-Profiling of Field Surface

The production field is re-profiled using a screw-leveler to remove the high central camber from individual production fields and deposit the peat on the lower-lying edges of the same production field.
The Screw-Leveler is towed using a tractor, with a level axis, will run up one side ① of the production field and down the other side ②, sufficiently offset from drain to ensure the peat does not enter the drain but forms a mound beside the drain.



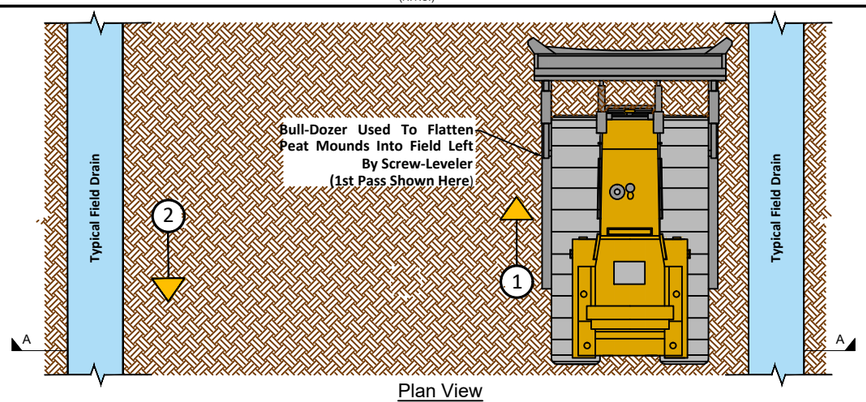
Plan View
(N.T.S.)



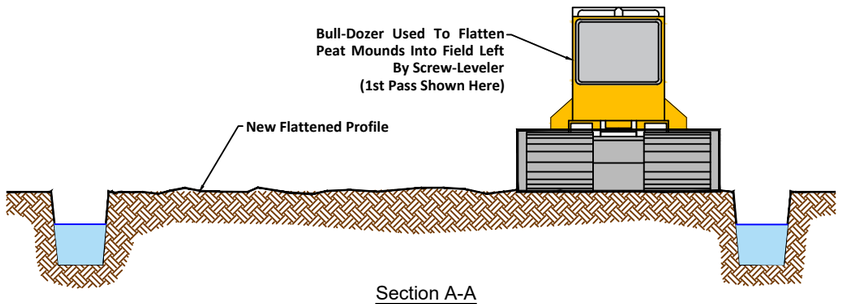
Section A-A
(N.T.S.)

Phase 2
Leveling of Loose Peat

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



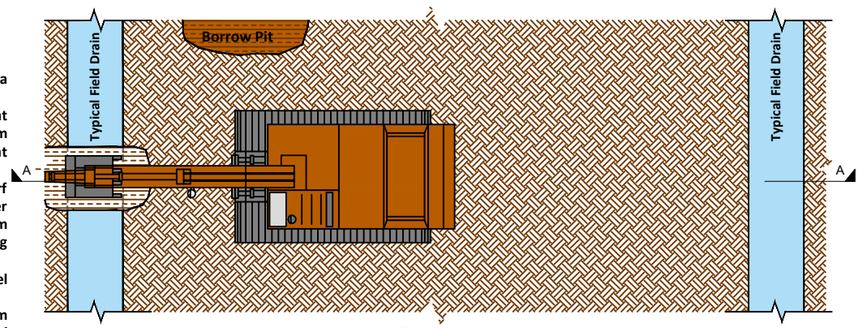
Plan View
(N.T.S.)



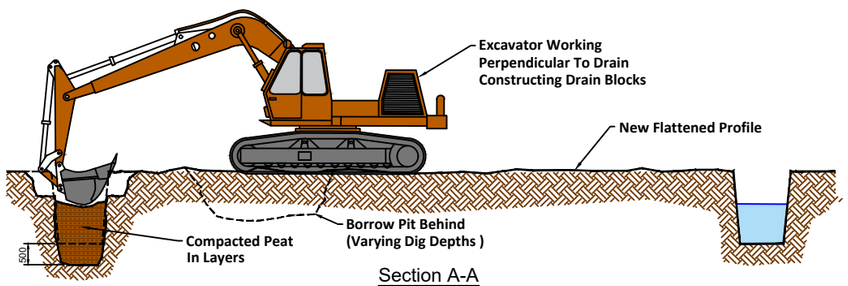
Section A-A
(N.T.S.)

Phase 3
Peat Drain Blocking

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.
Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.
The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.
(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.)



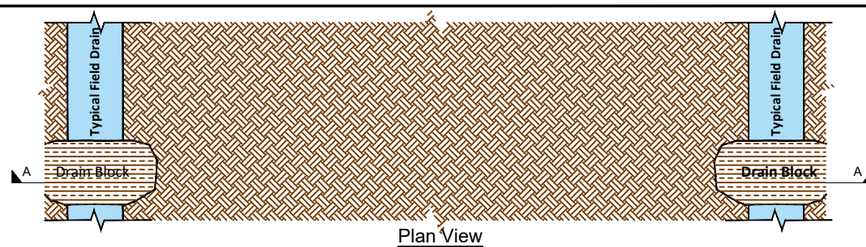
Plan View
(N.T.S.)



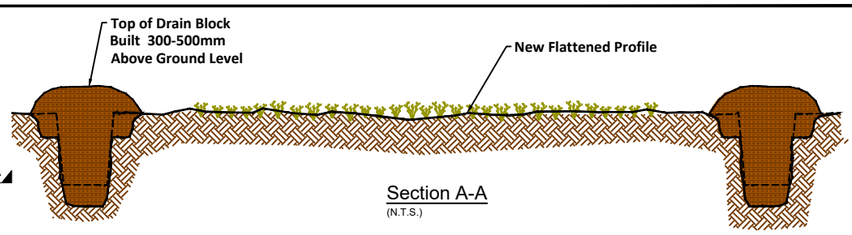
Section A-A
(N.T.S.)

Complete Flattened Field Profile

Field re-profiling is developed as a technique to slow the surface water loss from the bog and to retain as much water as possible on the site. Each re-profiled field will hold a shallow layer of water. In time, these shallows have been shown to quickly infill with peatland vegetation.



Plan View
(N.T.S.)



Section A-A
(N.T.S.)

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

STATUS

Rev	Description	Issued By	Date
.	.	.	.
.	.	.	.
.	.	.	.
b	For Approval	P.K.	03/03/21
a	Issued For Information	P.K.	07/01/21

BORD NA MÓNA
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 DPT 3B
Field Re-profiling

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.

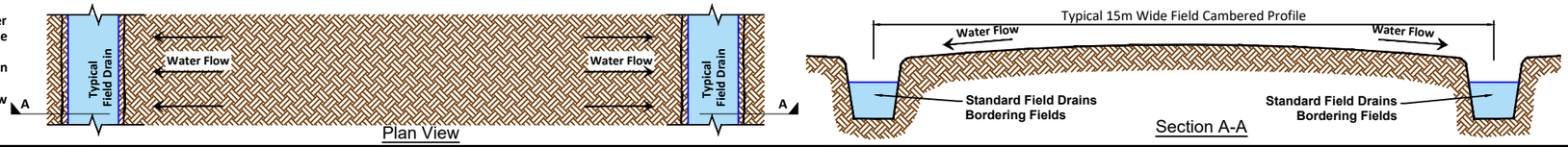
Date: 18/12/20 | Scale : Not to Scale A3 | Stage: For Approval

Drawing No.: PCAS-0100-004 | Rev: b

C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-004b_DPT_3B_ScrewlevellerReProfiling.dwg

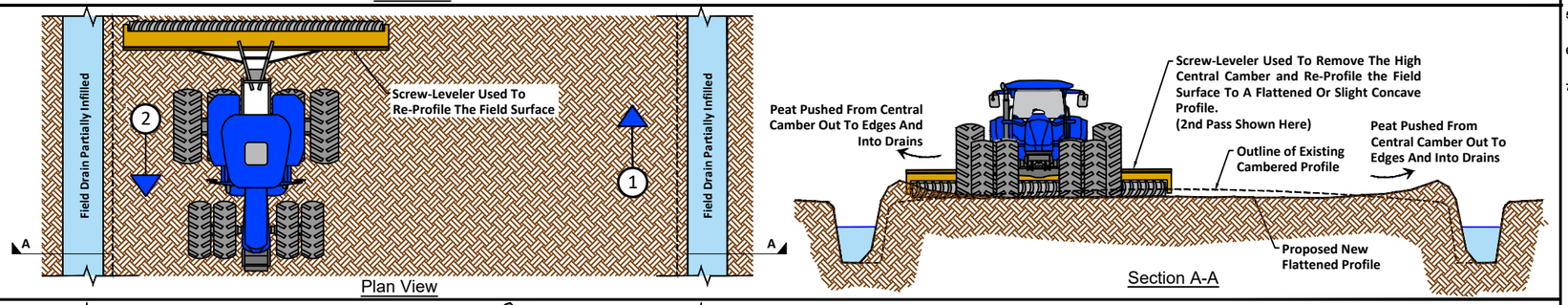
Existing Layout:

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 field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth.
On peatlands with increased slopes it will be more advantageous to create shallow depressions.



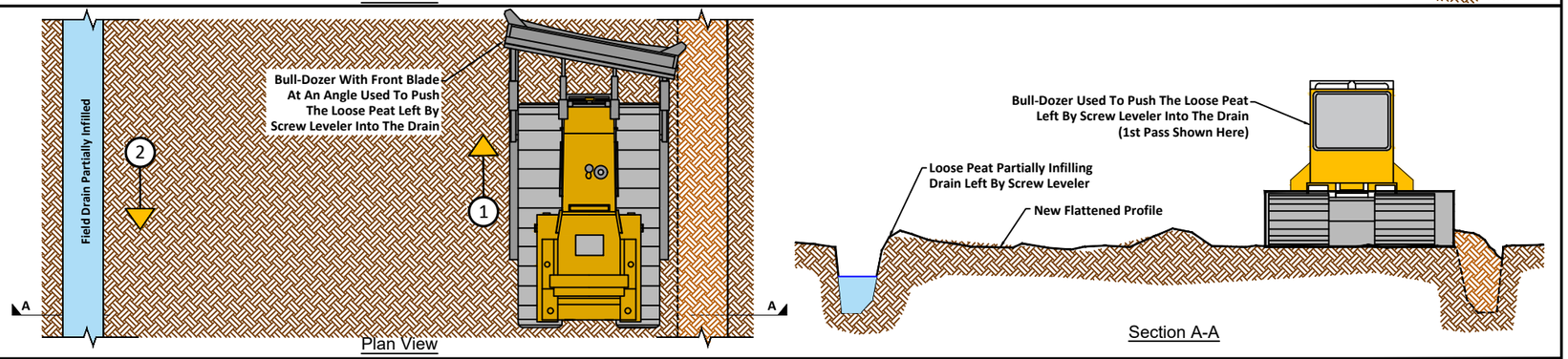
Phase 1
Re-Profiling of Field Surface

The first operation in the re-profiling process begins with using a Screw-Leveler to remove the high central camber from individual production fields and deposit the peat on the lower-lying edges of the same production field.
The Screw-Leveler, with a level axis, will run up the first side ① of the production field and down the other side ② close to the edge of the drain, resulting in some of the peat being tipped into the drain.



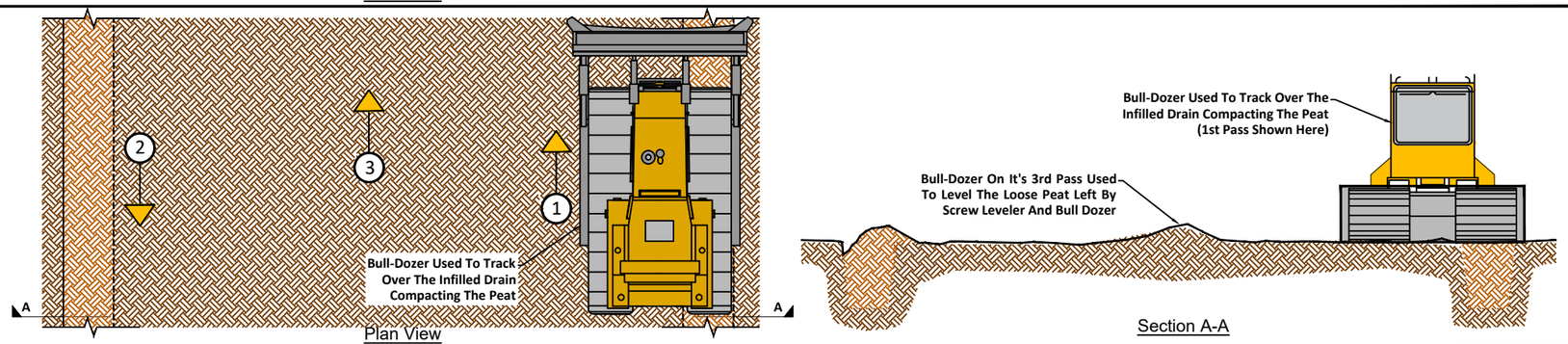
Phase 2
Infilling Of Drains

Next the Bull-dozer will run up the first side ① of the production field and down the other side ② with the front blade at an angle placing the peat in the drain.



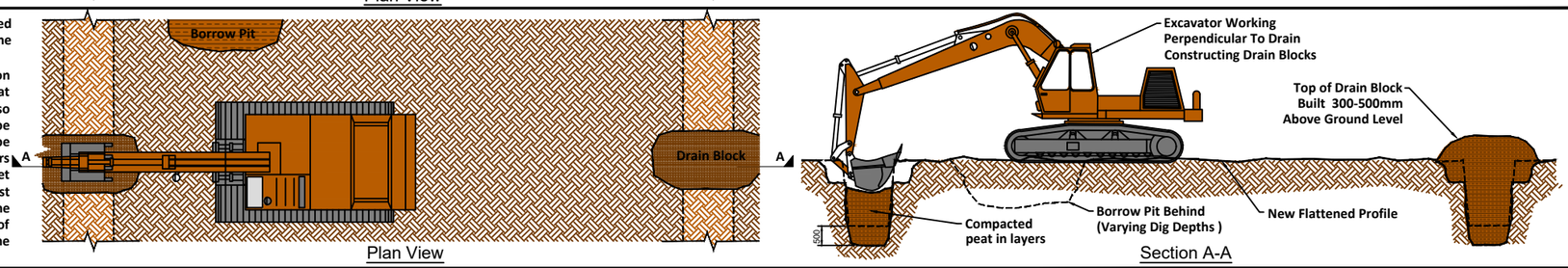
Phase 3
Final Leveling Of Drains & Field

Next the Bull-dozer will track over the first of the infilled drains ① and then back down the other drain ② compacting and leveling the peat.
It will also make a pass down the middle of field ③ flattening peat mounds left between Screw Leveler and Bull dozer runs.



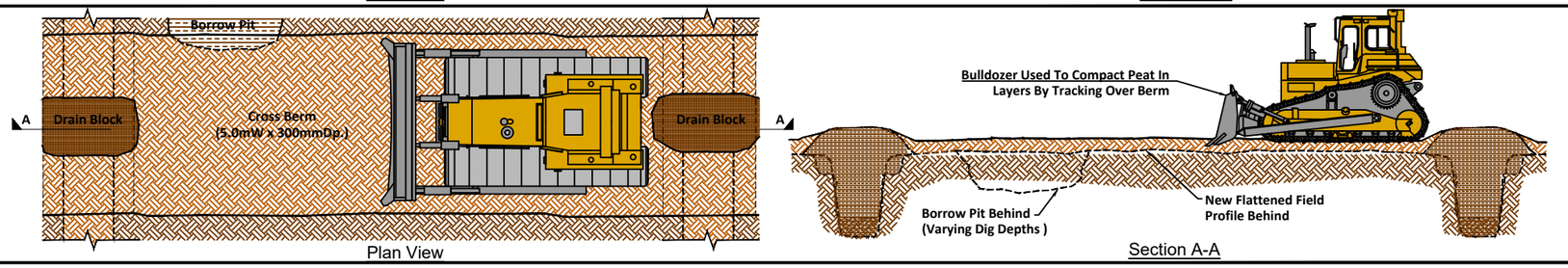
Phase 4
Drain Blocking

(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.)
Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains. Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later. Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit. The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries. The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.



Phase 5
Cross Berm

An Excavator is used to form a key(5m long) in the drain's edges where the berm crosses.
A strip of peat(5m wide) is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block.
Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form an approximately 5m Wide x 300mm High Cross Berm.
The peat material in the berm is compacted by the dozer tracking over it in layers.
Berm edge profile is shaped by using the bucket of the excavator.



NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
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.	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

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

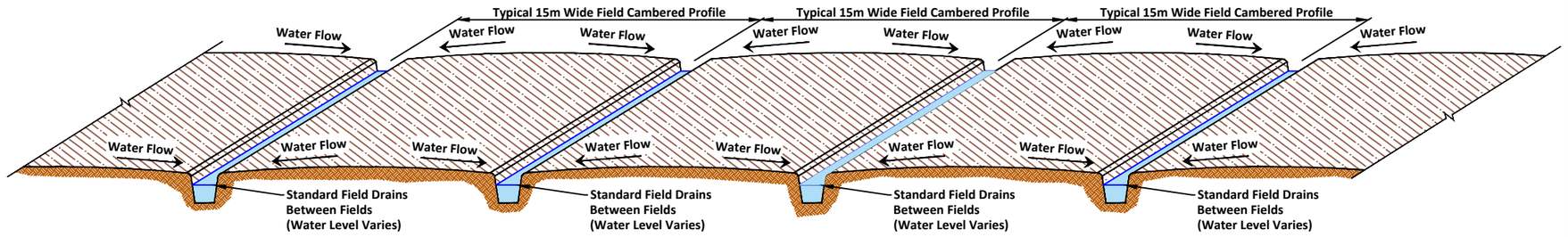
TITLE:
Rehabilitaion Method DPT 4A
Field Re-profiling

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

C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-005c_DPT_4A_ProfilingWithBerm.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.



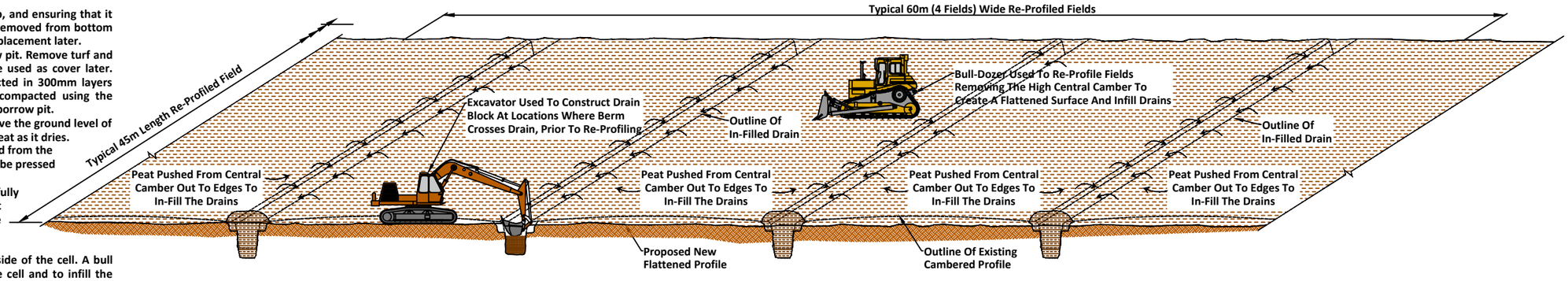
NOTES:

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.

Phase 1
Drain Blocking And Re-Profiling of Fields Surface

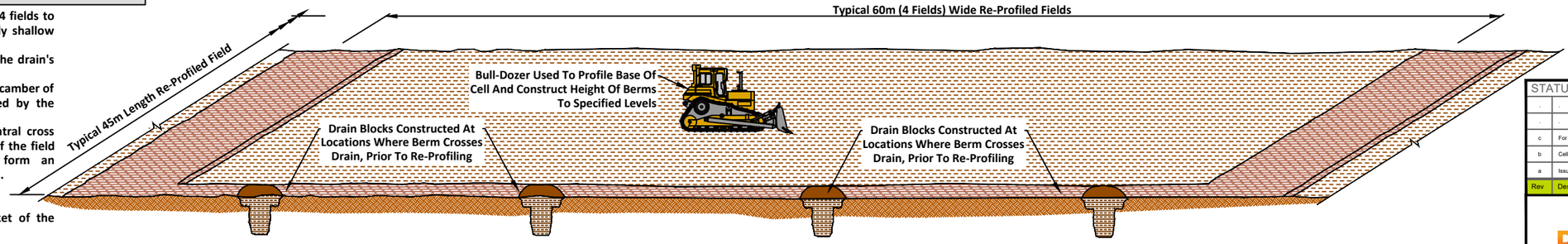
Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.
Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.
The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.
(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.)

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



Phase 2
Formation of Surface Berms And Levelling Base of Cells

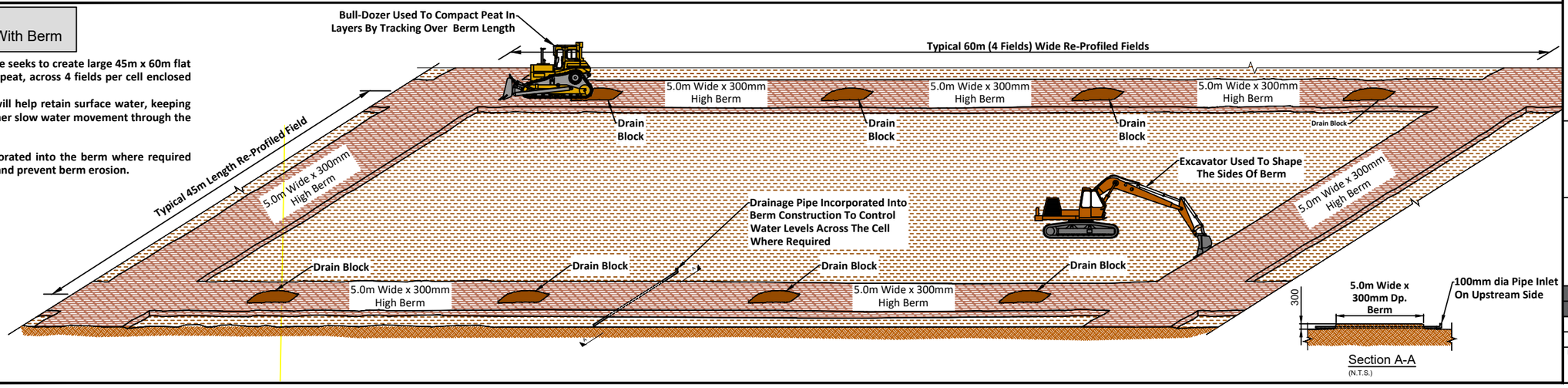
Berms are formed 45m in length and 60m across 4 fields to create an enclosed cell. The berms are relatively shallow (300mm high) and are 5.0 m wide.
An Excavator is used to form a key(5m long) in the drain's edges where the berm crosses.
A strip of peat(5m wide) is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block.
Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form an approximately 5m Wide x 300mm High Cross Berm.
The peat material in the berm is compacted in layers by the dozer tracking over it.
Berm edge profile is shaped by using the bucket of the excavator.



Final Profile:
45m x 60m Cell With Berm

This enhanced measure seeks to create large 45m x 60m flat areas or cells on bare peat, across 4 fields per cell enclosed by shallow berms.
The creation of cells will help retain surface water, keeping peat wet and will further slow water movement through the bog.

Drainage pipes incorporated into the berm where required to manage overflows and prevent berm erosion.



STATUS

Rev	Description	Issued By	Date
.	.	.	.
.	.	.	.
c	For Approval	P.K.	24/02/21
b	Cell Size Text Amended	P.K.	28/01/21
a	Issued For Information	P.K.	07/01/21

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 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.

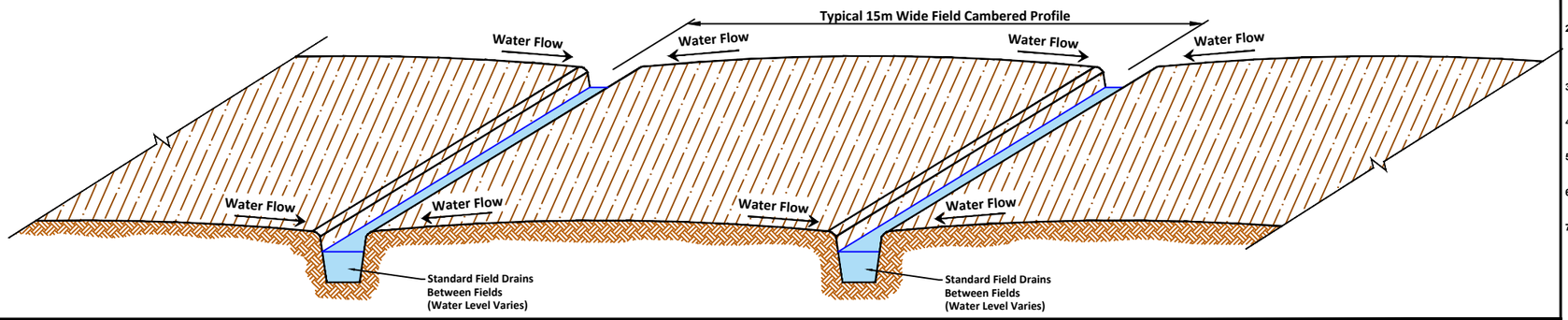
Date: 22/12/20 | Scale: Not to Scale A3 | Stage: For Approval

Drawing No.: PCAS-0100-006 | Rev: c

C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-006c_DPT_4_45x60Cell_With_Berm.dwg

Existing Layout:

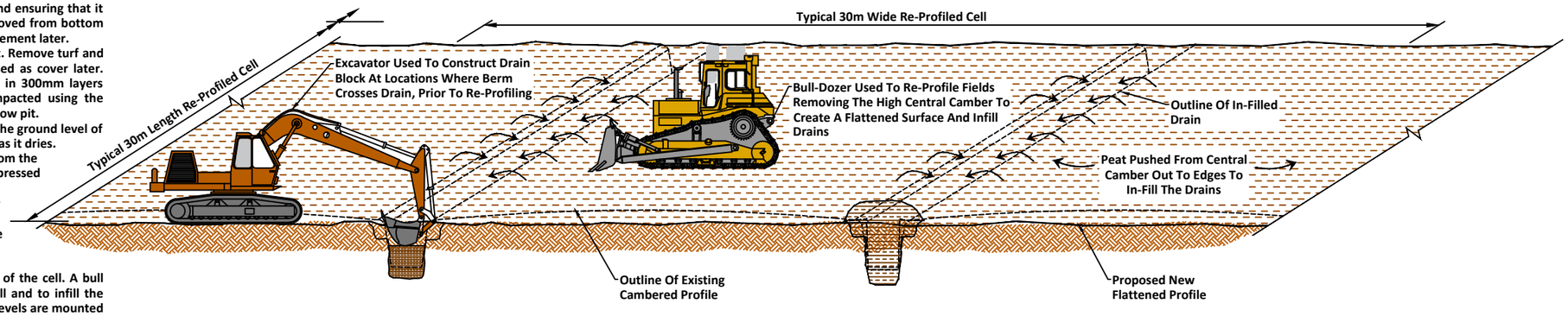
Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.



Phase 1
Drain Blocking And Re-Profiling of Fields Surface

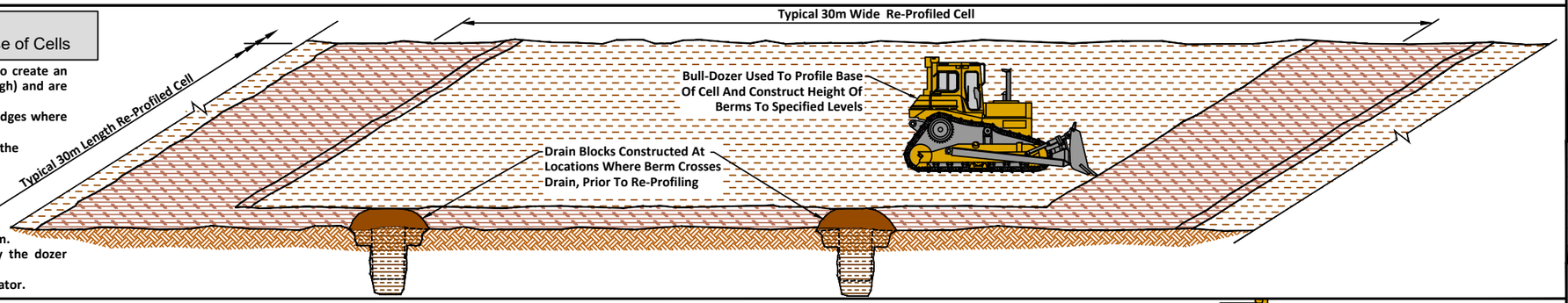
Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement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

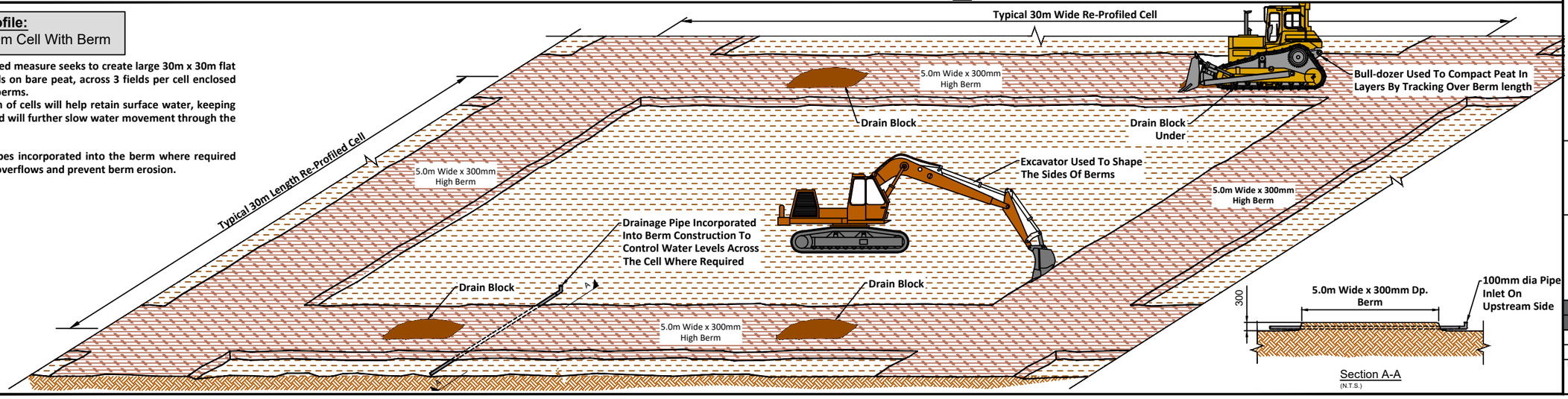
Berms are formed 45m in length and 60m across 4 fields to create an enclosed cell. The berms are relatively shallow (300mm high) and are 5.0 m wide.
An Excavator is used to form a key(5m long) in the drain's edges where the berm crosses.
A strip of peat(5m wide) is taken from the central camber of the 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:
30m x 30m Cell With Berm

This enhanced measure seeks to create large 30m x 30m flat areas or cells on bare peat, across 3 fields per cell enclosed by shallow berms.
The creation of cells will help retain surface water, keeping peat wet and will further slow water movement through the bog.

Drainage pipes incorporated into the berm where required to manage overflows and prevent berm erosion.



NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

STATUS

Rev	Description	Issued By	Date
.	.	.	.
.	.	.	.
.	.	.	.
b	For Approval	P.K.	25/02/21
a	Issued For Information	P.K.	28/01/21

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:
Rehabilitation Method DPT 5
30m x 30m Cell With Berms

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.

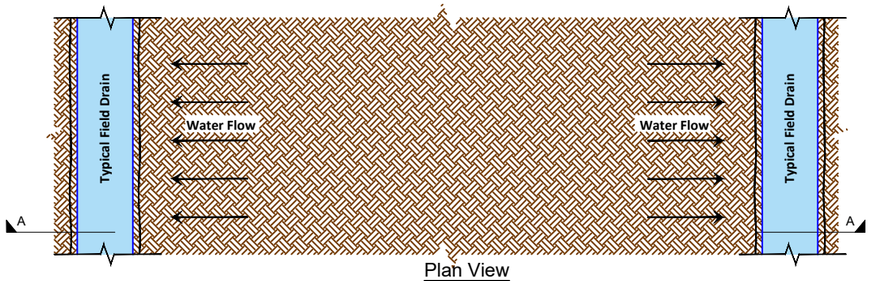
Date: 18/12/20 | Scale : Not to Scale A3 | Stage: For Approval
Drawing No.: PCAS-0100-007 | Rev: b

C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-007b_DPT_5_30x30CellWithBerms.dwg

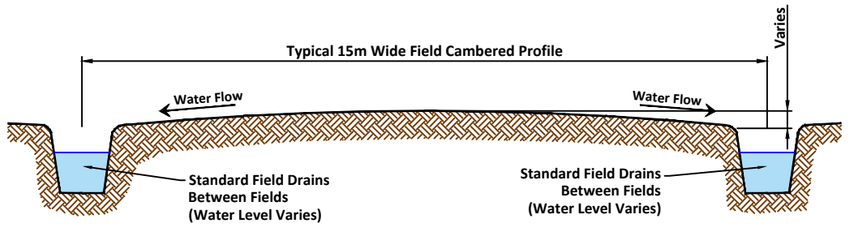
DCT 2: 'Speed Bump' Peat Dams to Re-Wet Measure

Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area.
The concept of drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement through the bog.



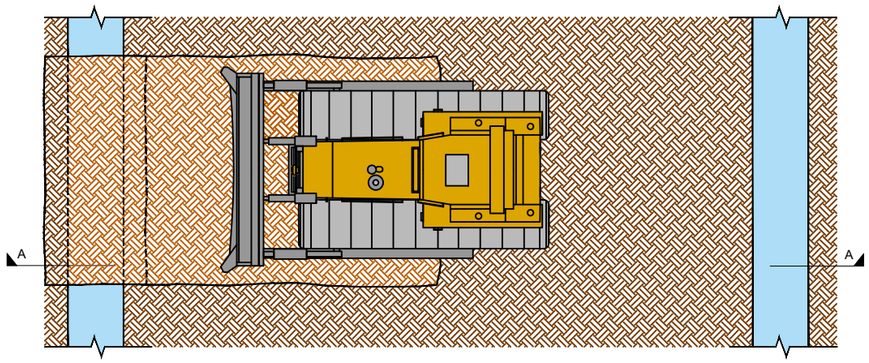
Plan View
(N.T.S.)



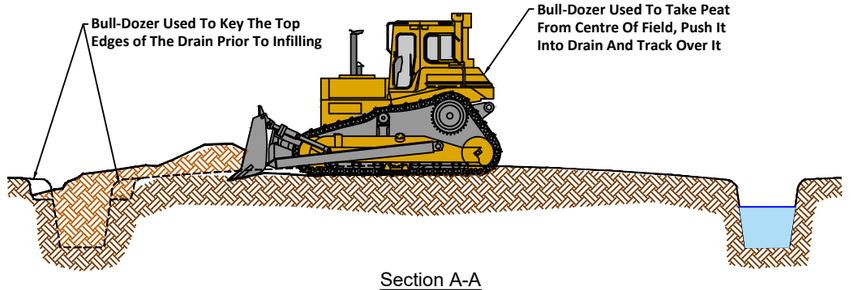
Section A-A
(N.T.S.)

Phase 1
Forming 'Speed Bump'

The Bull-dozer is used to create a 5m Length key along both edges of the drain, approximately 500mm Wide x 500mm Deep.
Next a strip of peat is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block, to form an approximately 5m Wide 'Speed Bump'.



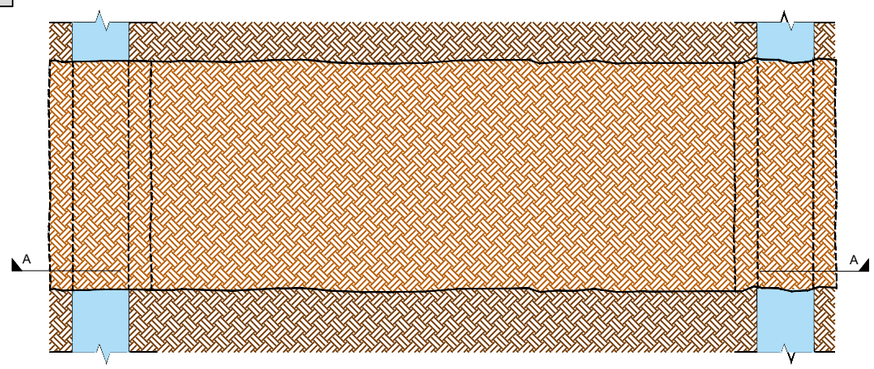
Plan View
(N.T.S.)



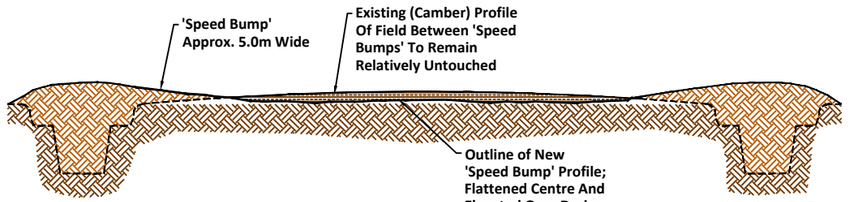
Section A-A
(N.T.S.)

Complete Fields With Speed Bump (3 Per 100m)

'Speed Bumps' are created to allow for peat subsidence and to prevent water from flowing over the drain block and eroding it before it becomes stabilised.



Plan View
(N.T.S.)



Section B-B
(N.T.S.)

Section A-A
(N.T.S.)

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

DRAFT 09/02/21

STATUS

Rev	Description	Issued By	Date
.	.	.	.
.	.	.	.
.	.	.	.
b	'Key' Added To Top Edges Of Drain at Drain Block Locations	P.K.	09/02/21
a	Issued For Information	P.K.	29/01/21

BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

PROJECT:
Peatland Climate Action Scheme
PCAS

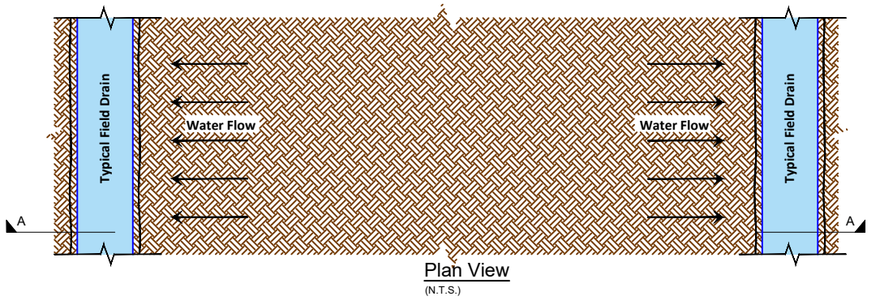
TITLE:
Rehabilitation Method DCT 2
'Speed Bump' Peat Dam

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.
Date: 13/01/21		Scale : Not to Scale	A3	Stage: Draft
Drawing No.: PCAS-0100-008				Rev: b

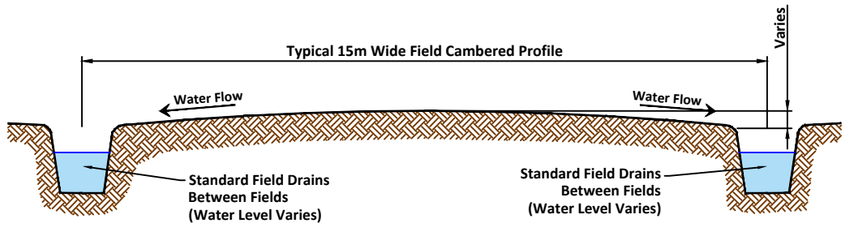
C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-008b_DCT_2_SpeedBumps.dwg

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 drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement through the bog.



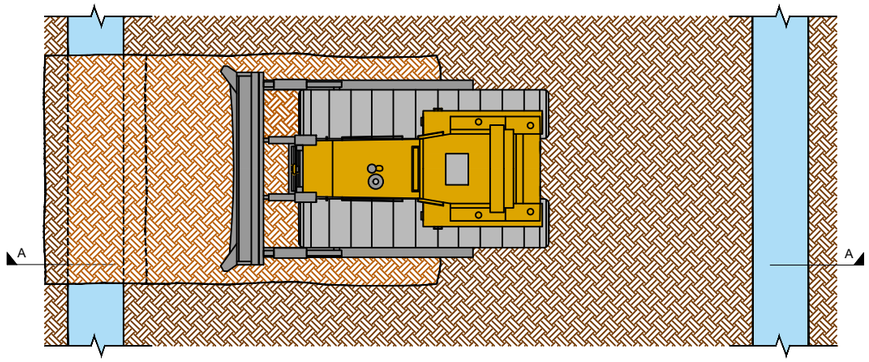
Plan View
(N.T.S.)



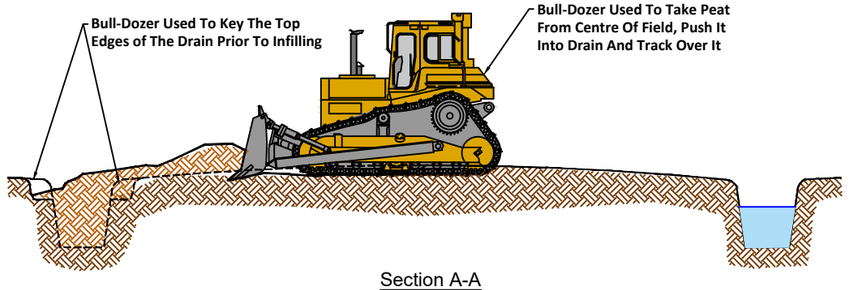
Section A-A
(N.T.S.)

Phase 1
Forming 'Speed Bump'

The Bull-dozer is used to create a 5m Length key along both edges of the drain, approximately 500mm Wide x 500mm Deep.
Next a strip of peat is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block, to form an approximately 5m Wide 'Speed Bump'.



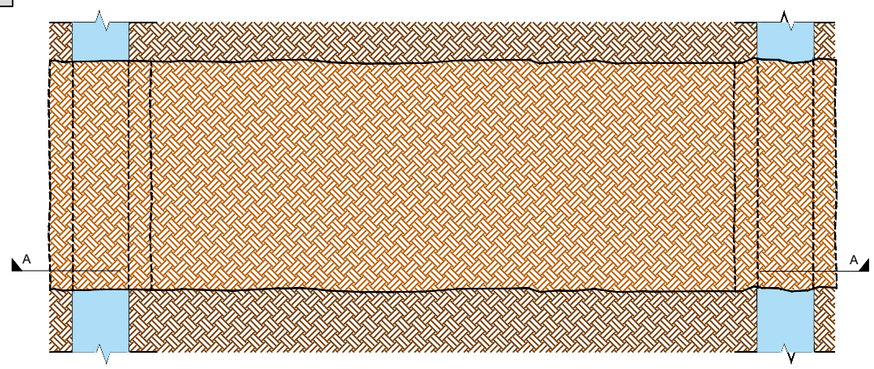
Plan View
(N.T.S.)



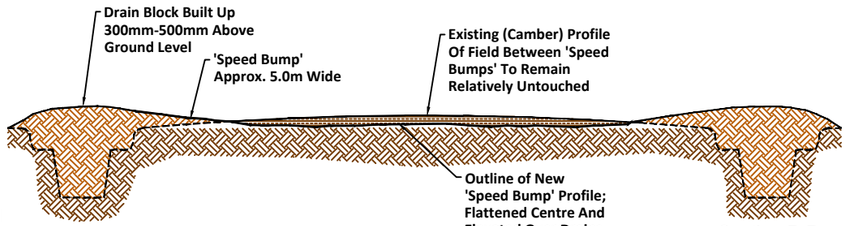
Section A-A
(N.T.S.)

Complete Fields With Speed Bump (3 Per 100m)

Drain Blocks are built up at least 300mm-500mm above the existing ground level to allow for peat subsidence and to prevent water from flowing over the drain block and eroding it before it becomes stabilised.



Plan View
(N.T.S.)



Section A-A
(N.T.S.)

Section B-B
(N.T.S.)

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
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

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

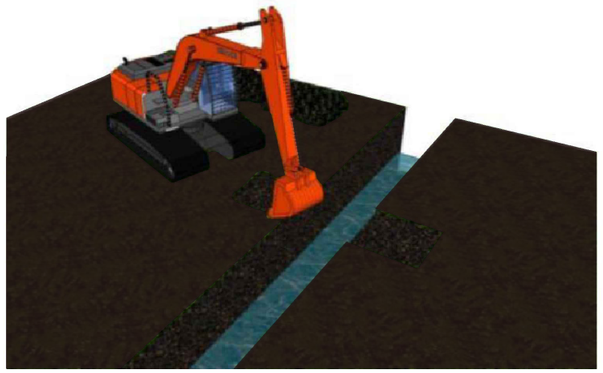
TITLE:
Rehabilitation Method DCT 2
'Speed Bump' Peat Drain Block

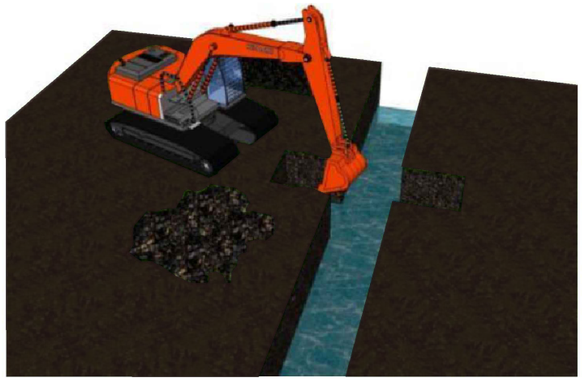
Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.

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

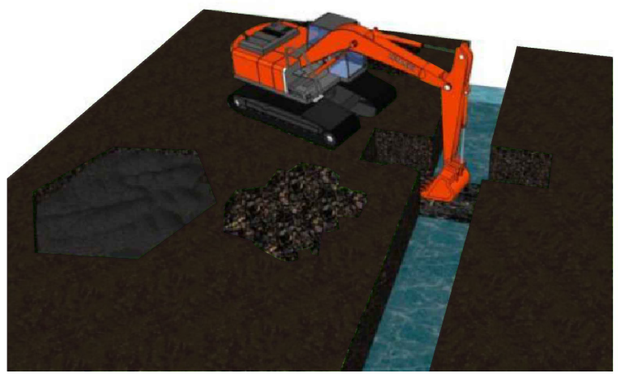
1. Before building of drain blocks, the sides and bottom of the ditch is cleaned using the excavator to remove dry degraded peat, to ensure a good peat-to-peat contact.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

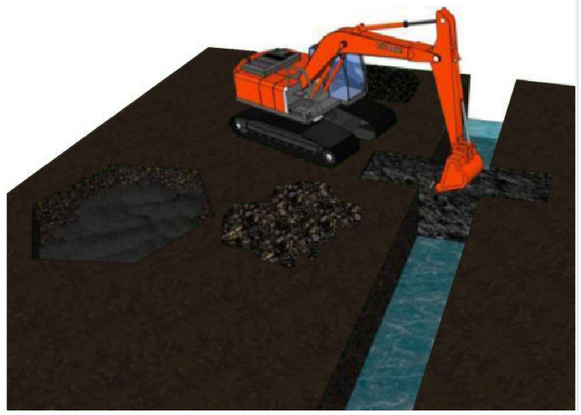




2. Cut key in either side of the drain approximately 500mm deep, and ensure that it is wider than the actual drain.
Remove 500mm of peat from bottom of the drain also and place behind the machine for replacement later.

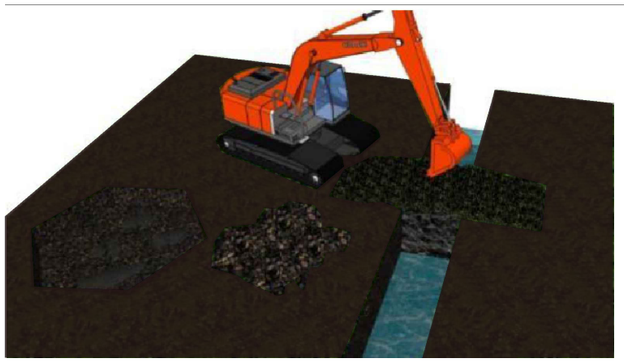
3. Open an area behind machine to be used as a borrow pit. Avoid using the surface layer of peat (top 100-200mm) which is likely to be very permeable. Only use the deeper, more compacted peat to build the drain block.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

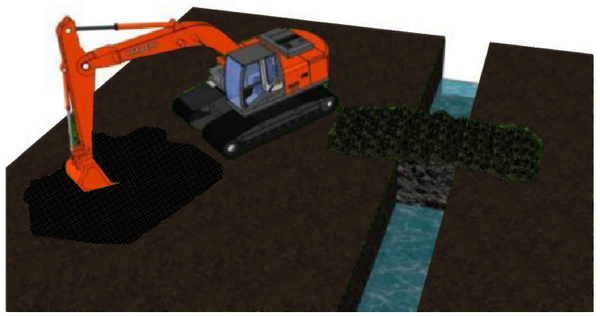




4. Dig out peat from the borrow pit and place into the drain compacting in 300mm layers. Compact the peat firmly using the excavator bucket before laying more peat from the borrow pit.

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:

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.

BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

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 DCT 3
Peat Drain Blocking

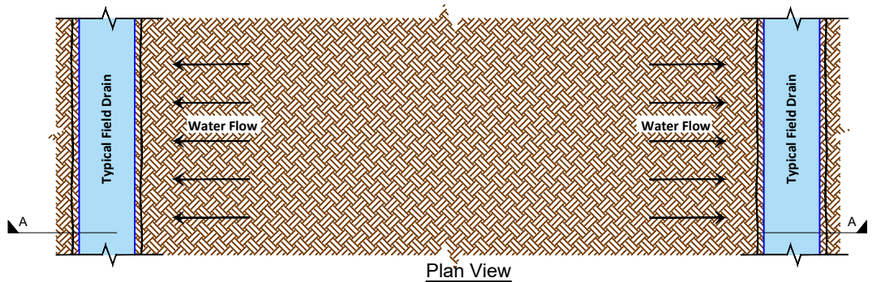
Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.		D.K.	P.N.	P.N.

Date: 13/01/21 Scale : N.T.S. A3 Stage: For Approval

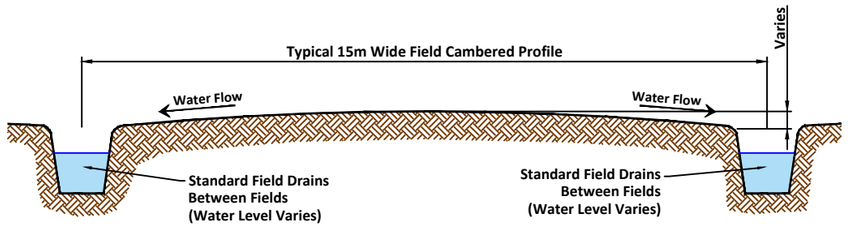
Drawing No.: PCAS-0100-009 Rev: b

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 Cross berms is to slow the water movement through the bog.



Plan View



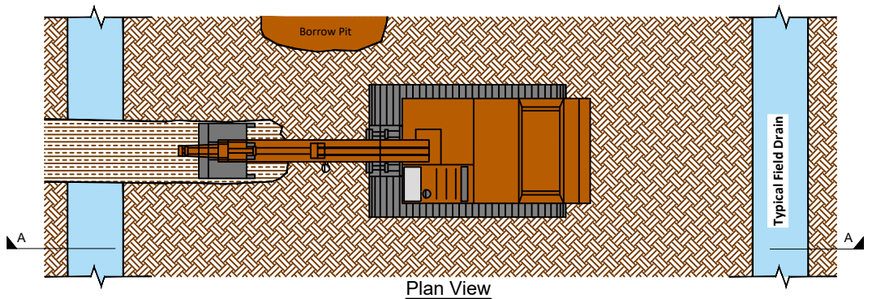
Section A-A
(N.T.S.)

NOTES:

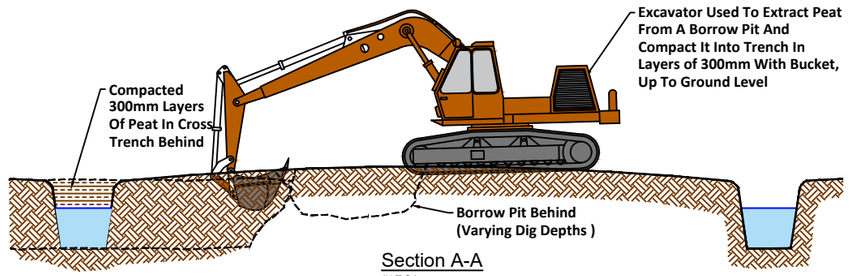
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

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.



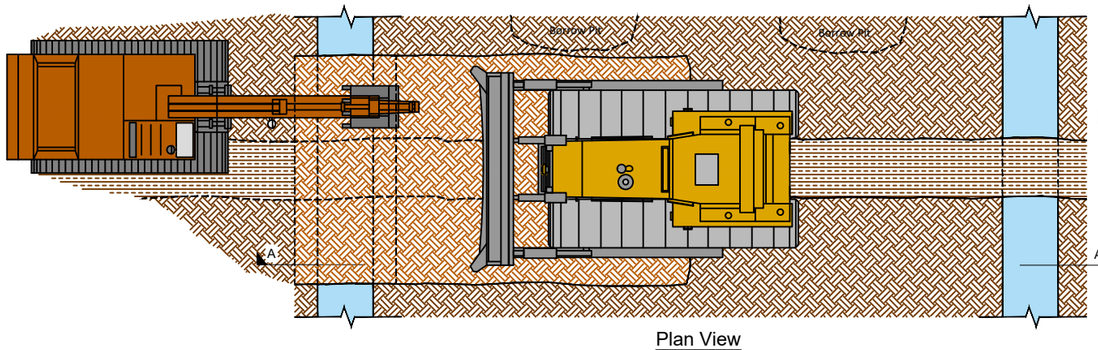
Plan View



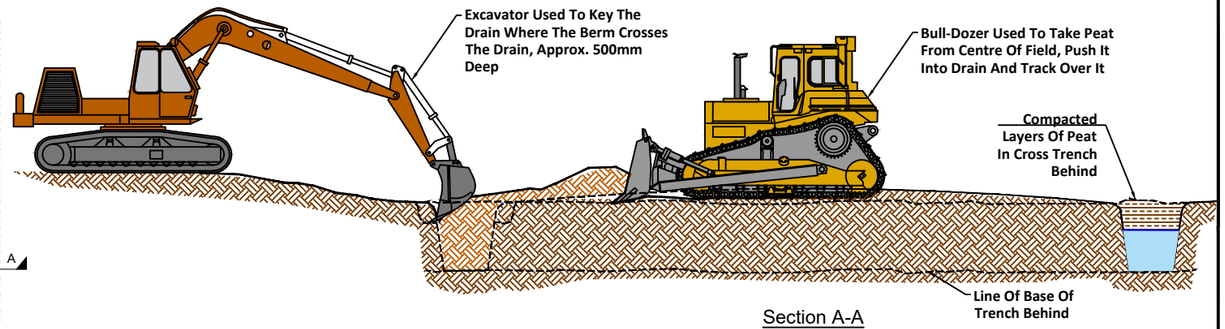
Section A-A
(N.T.S.)

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.



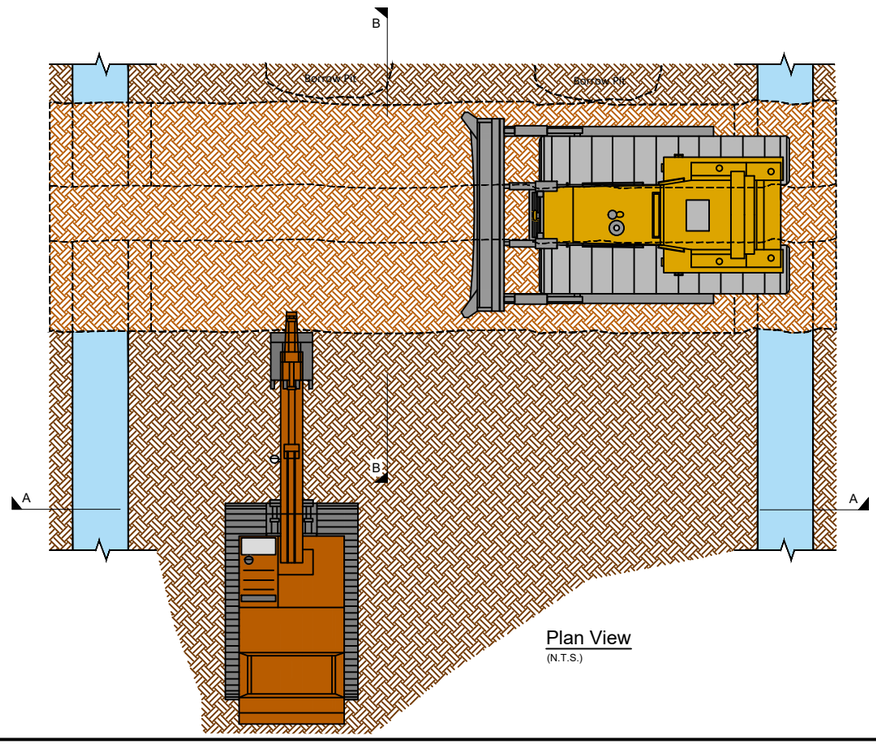
Plan View



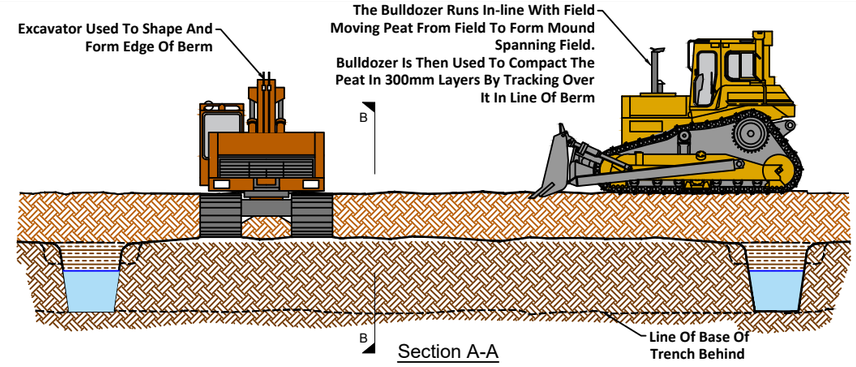
Section A-A

Phase 3
Forming Peat Berm

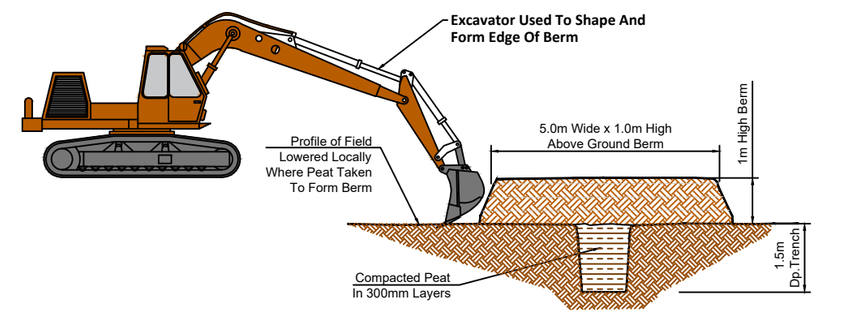
Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form an approximately 5m Wide x 1m High Cross Berm.
The peat material in the berm is compacted in layers of 300mm by the dozer tracking over it.
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			
.	.	.	.
.	.	.	.
.	.	.	.
b	Berm Height Increased And Trench Detail Added	P.K.	25/02/21
a	Issued For Information	P.K.	29/01/21
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

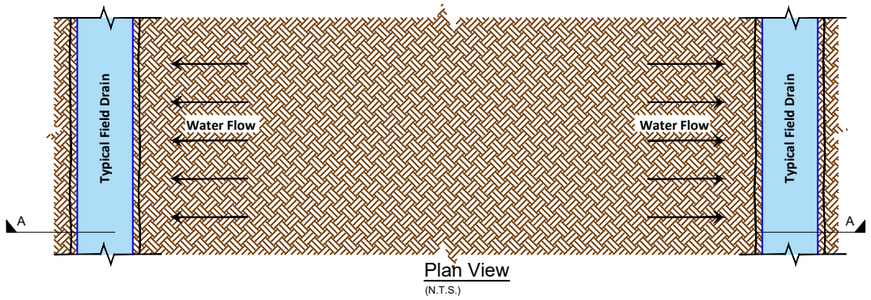
TITLE:
Rehabilitation Method WLT 3
Peat Berm

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: For Approval
Drawing No.: PCAS-0100-010				Rev: b

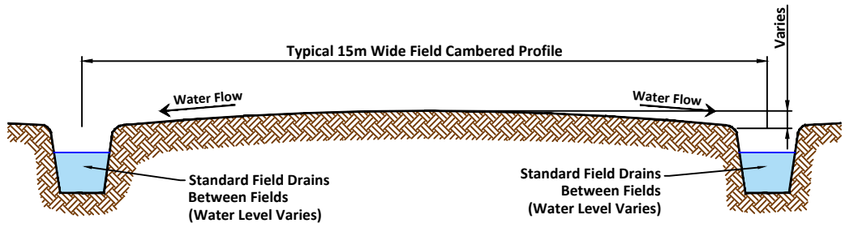
C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-010b_WLT_3_Berm.dwg

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.)



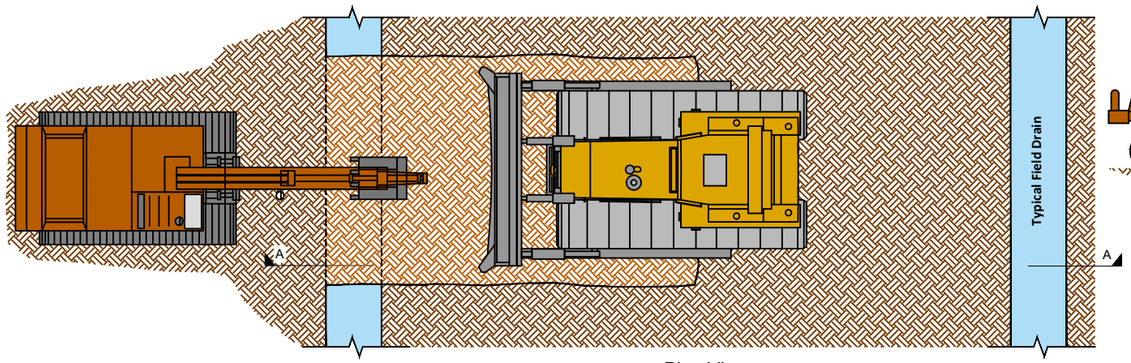
Section A-A
(N.T.S.)

NOTES:

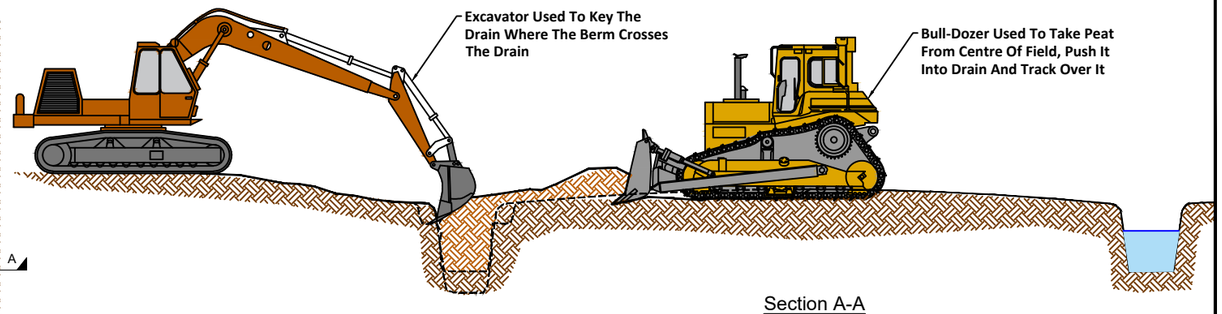
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED 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.

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.



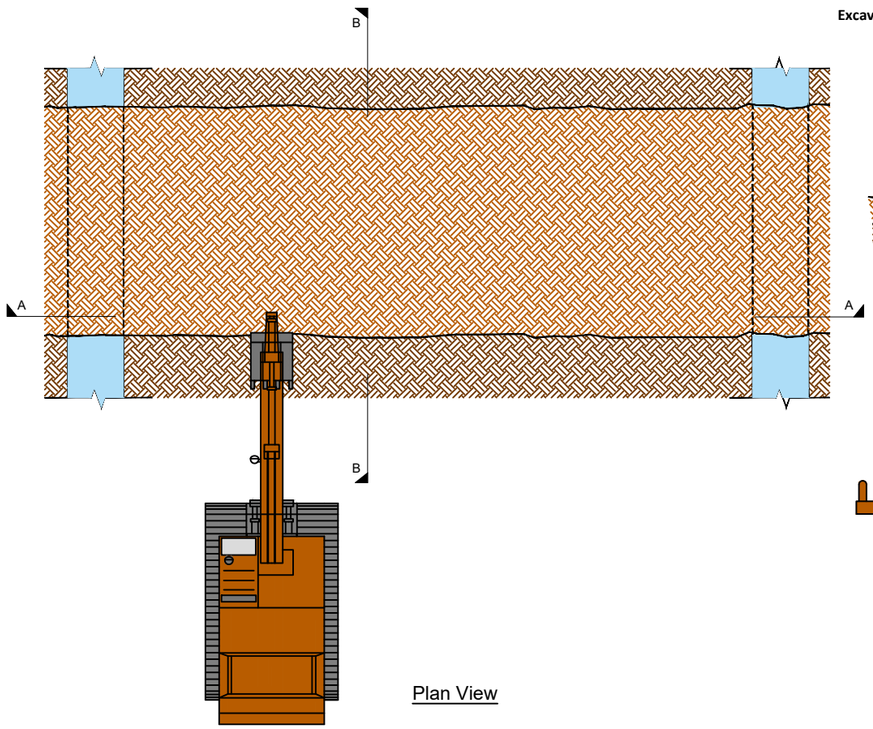
Plan View
(N.T.S.)



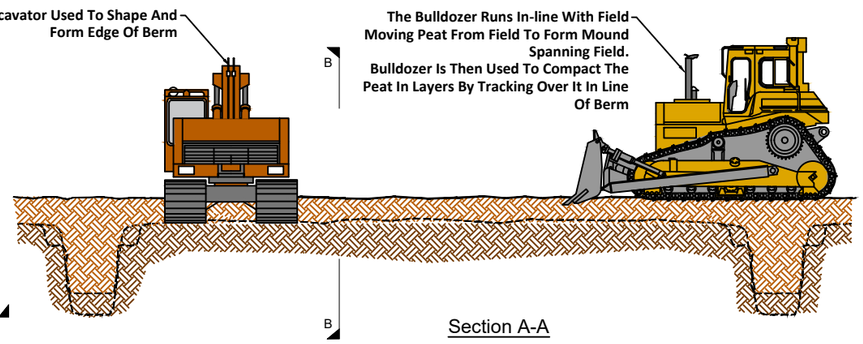
Section A-A
(N.T.S.)

Phase 2
Forming Peat Berm

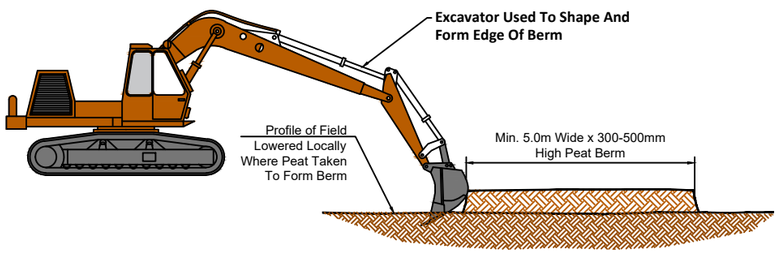
Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form a minimum 5m Wide x 300-500mm High Cross Berm.
The peat material in the berm is compacted in layers by the dozer tracking over it.
The excavator 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

BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

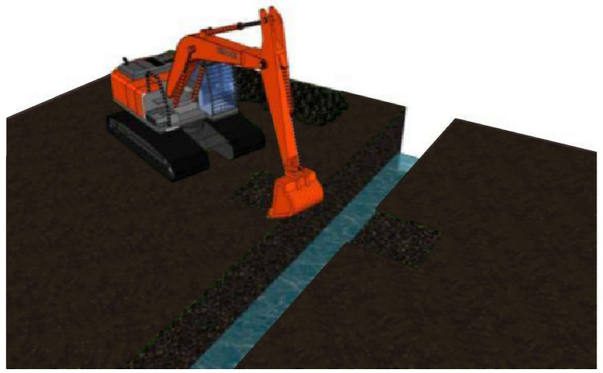
PROJECT:
Peatland Climate Action Scheme
PCAS

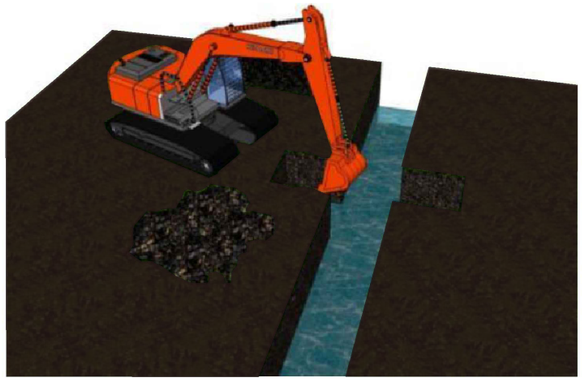
TITLE:
Rehabilitation Method WLT 3
Peat Berm

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

C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-010c_WLT_3_Berm.dwg

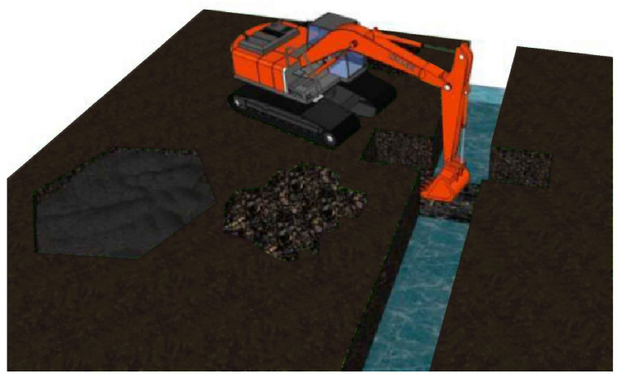
1. Before building of drain blocks, the sides and bottom of the ditch is cleaned using the excavator to remove dry degraded peat, to ensure a good peat-to-peat contact.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

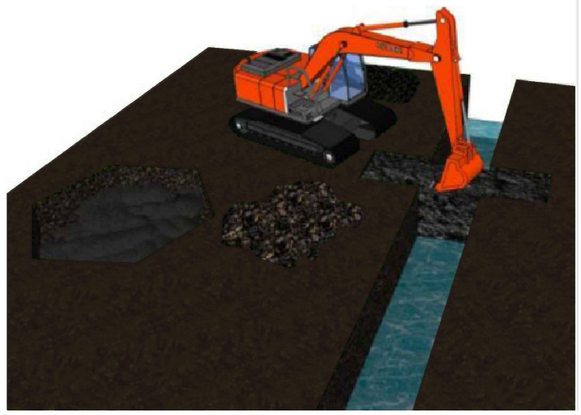




2. Cut key in either side of the drain approximately 500mm deep, and ensure that it is wider than the actual drain.
Remove 500mm of peat from bottom of the drain also and place behind the machine for replacement later.

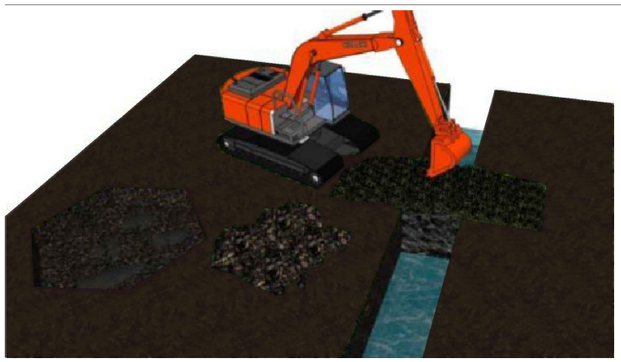
3. Open an area behind machine to be used as a borrow pit. Avoid using the surface layer of peat (top 100-200mm) which is likely to be very permeable. Only use the deeper, more compacted peat to build the drain block.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)

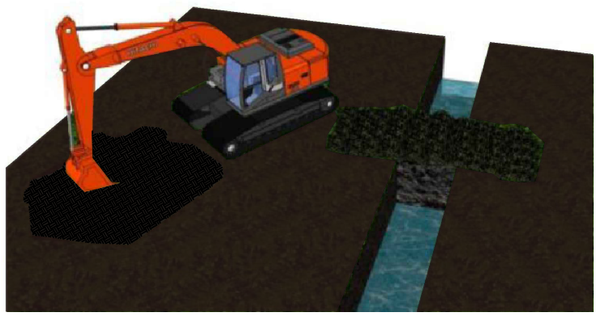




4. Dig out peat from the borrow pit and place into the drain compacting in 300mm layers. Compact the peat firmly using the excavator bucket before laying more peat from the borrow pit.

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:

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.

BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

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

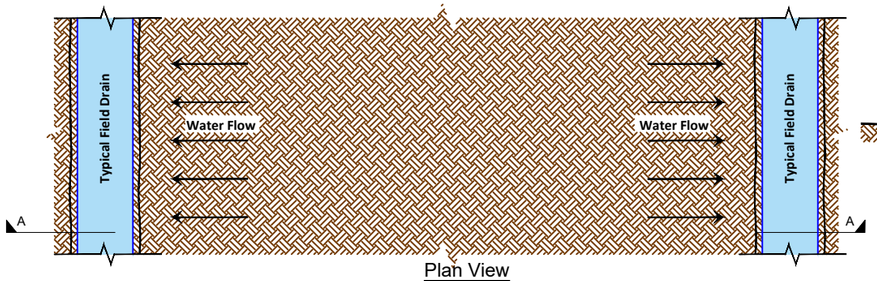
Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.		D.K.	P.N.	P.N.

Date: 13/01/21 Scale : N.T.S. A3 Stage: For Approval

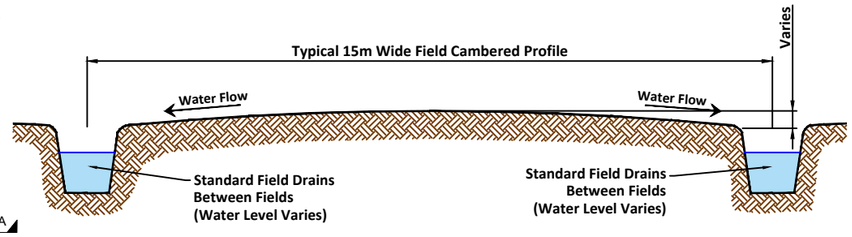
Drawing No.: PCAS-0100-011 Rev: b

Existing Layout:

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth.



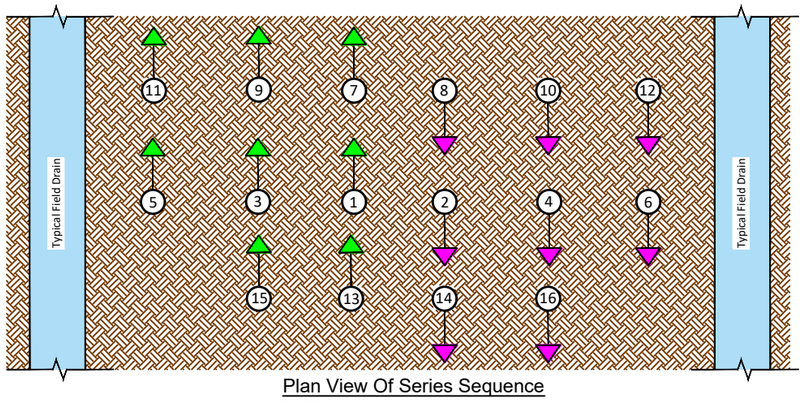
Plan View
(N.T.S.)



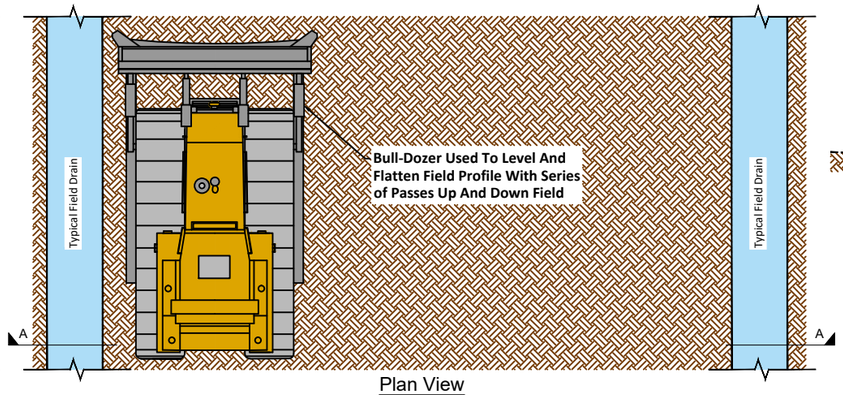
Section A-A
(N.T.S.)

Phase 1
Re-Profiling of Field Surface

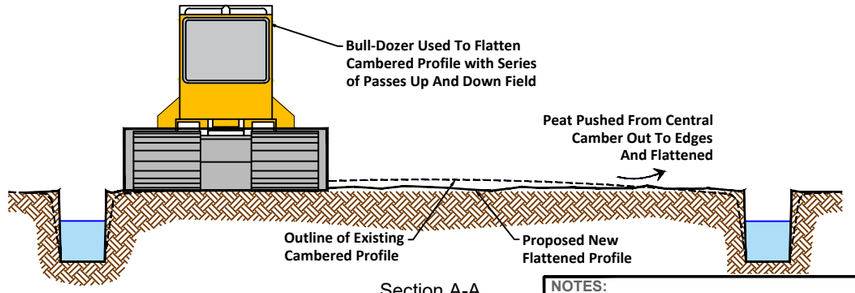
Field to be re-profiled using bull-dozer making a total of 16 passes, 8 passes up and 8 passes down, flattening the camber on the production field. (Sequence of runs shown below)



Plan View Of Series Sequence
(N.T.S.)



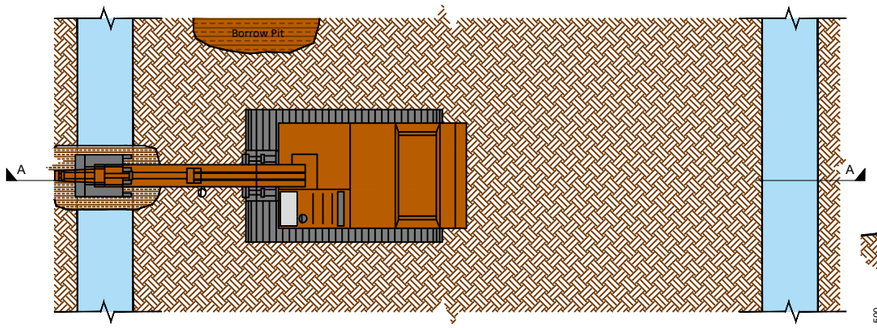
Plan View
(N.T.S.)



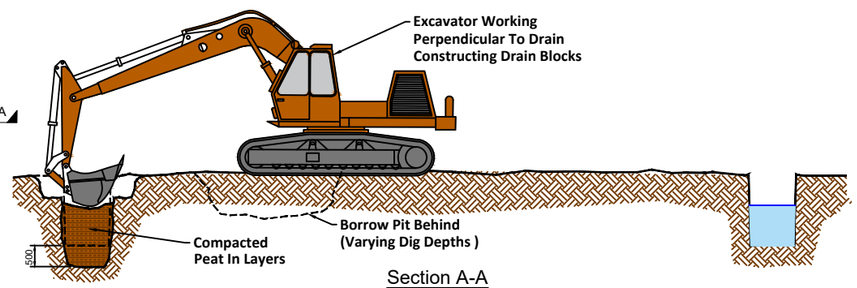
Section A-A
(N.T.S.)

Phase 2
Peat Drain Blocking

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains.
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.
Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket.
The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.
The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.
(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.)



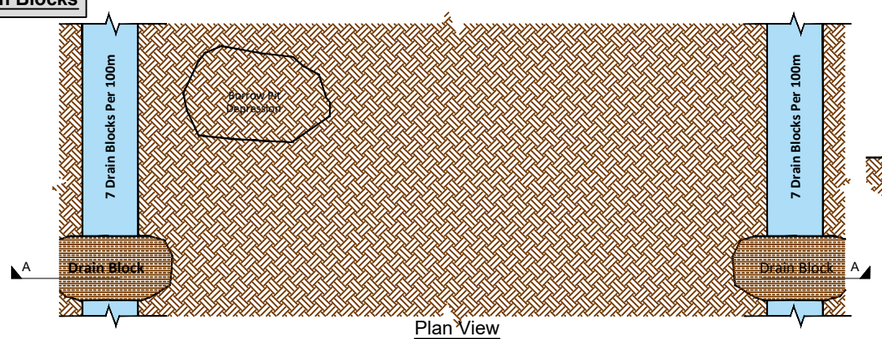
Plan View
(N.T.S.)



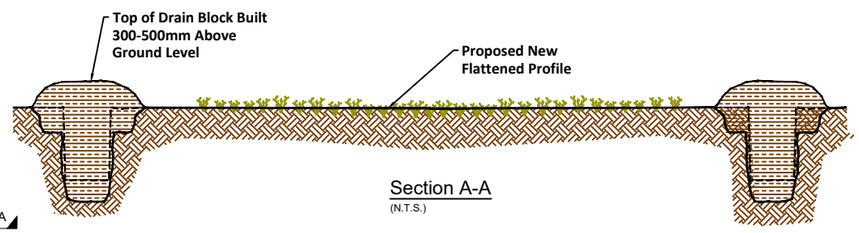
Section A-A
(N.T.S.)

Complete Shallow Field Profile with Regular Drain Blocks

Field re-profiling is developed as a technique to slow the surface water loss from the bog and to retain as much water as possible on the bog, at the required depth.



Plan View
(N.T.S.)



Section A-A
(N.T.S.)

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

STATUS

Rev	Description	Issued By	Date
.		.	.
.		.	.
.		.	.
b	For Approval	P.K.	25/02/21
a	Issued For Information	P.K.	29/01/21

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:
Rehabilitation Method WLT 5
Field Re-profiling

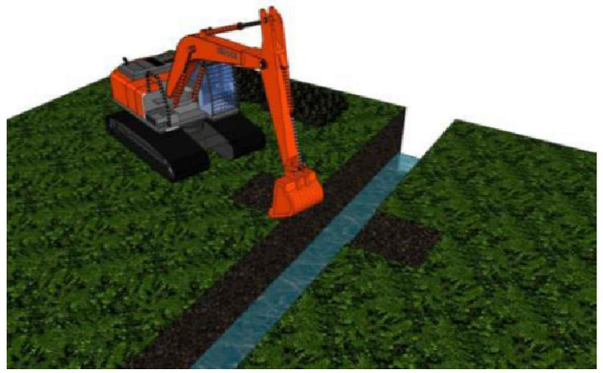
Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.

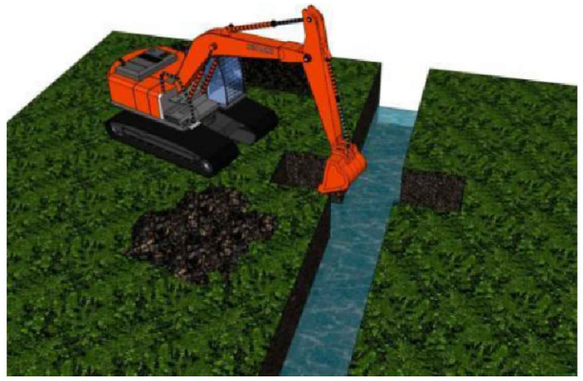
Date: 28/01/21 | Scale : Not to Scale A3 | Stage: For Approval

Drawing No.: PCAS-0100-012 | Rev: b

C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-012b_WLT_5_DozerOnlyFieldProfiling.dwg

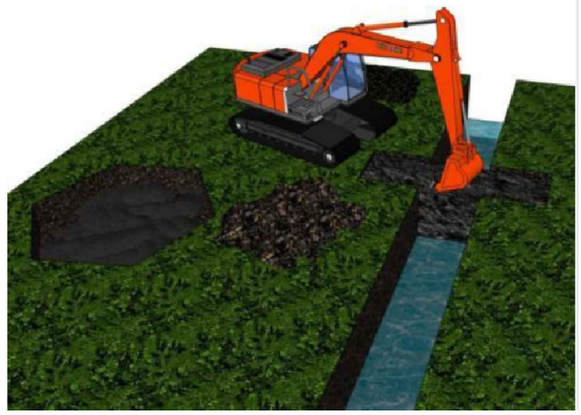
1. Before building of drain blocks, the sides and bottom of the ditch is cleaned using the excavator to remove dry degraded peat, to ensure a good peat-to-peat contact.
Any vegetation should be carefully removed and left aside for replacement at the end of the process.





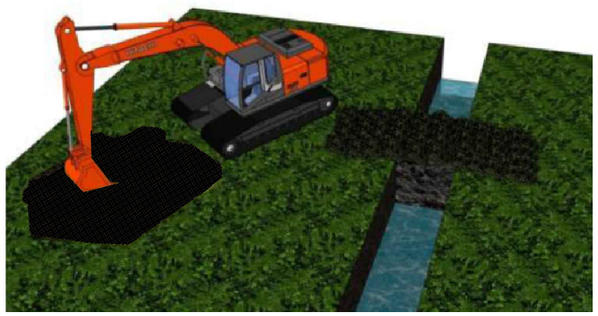
2. Cut key in either side of the drain approximately 500mm deep, and ensure that it is wider than the actual drain.
Remove 500mm of peat from bottom of the drain also and place behind the machine for replacement later.

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.
Any vegetation 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 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.

BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

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

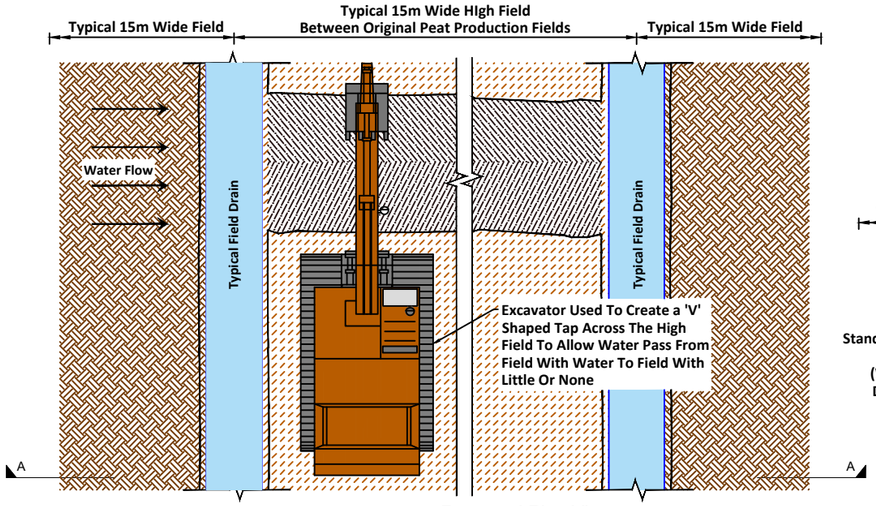
TITLE:
Rehabilitation Method MLT 2
Peat Drain Blocking

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.		D.K.	P.N.	P.N.

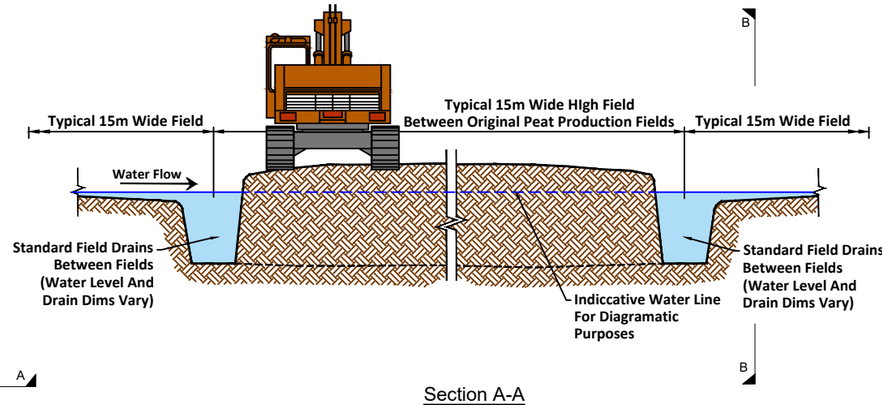
Date: 28/01/21 Scale : N.T.S. A3 Stage: For Approval

Drawing No.: PCAS-0100-013 Rev: b

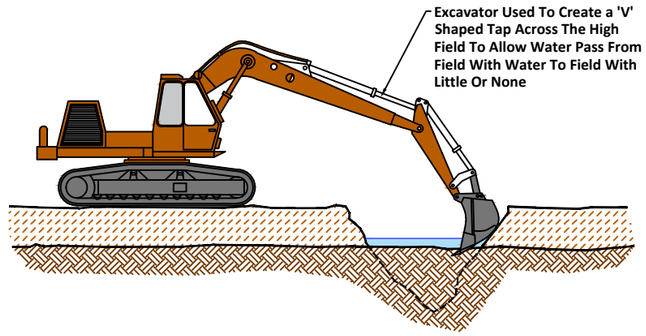
'V' Tap Across High Field To Control Water Levels



Proposed Plan View
(N.T.S.)



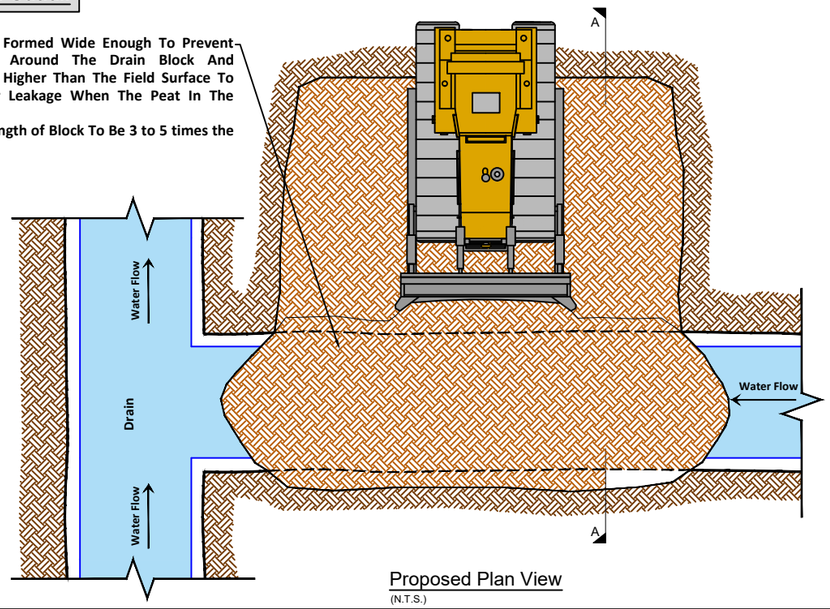
Section A-A
(N.T.S.)



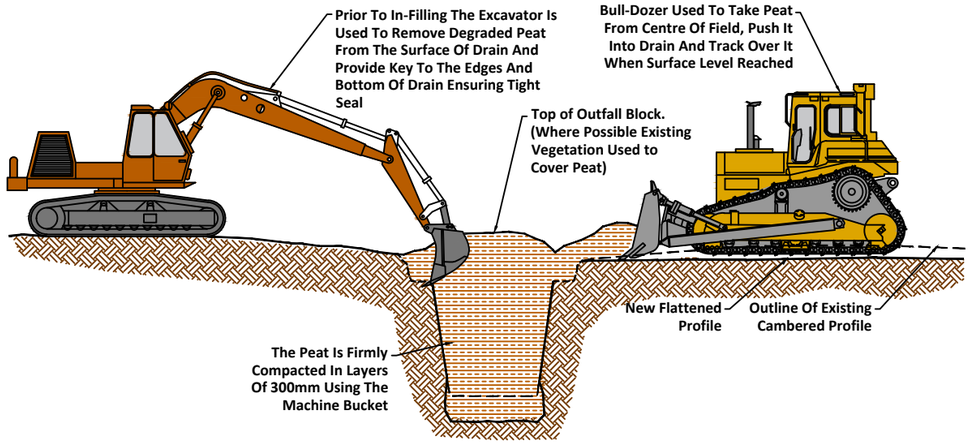
Section B-B
(N.T.S.)

Blocking Of Outfall

The Blocks Are Formed Wide Enough To Prevent Water Moving Around The Drain Block And 300mm-500mm Higher Than The Field Surface To Prevent Further Leakage When The Peat In The Blocks Subsides.
Approximate Length of Block To Be 3 to 5 times the Width Of Drain

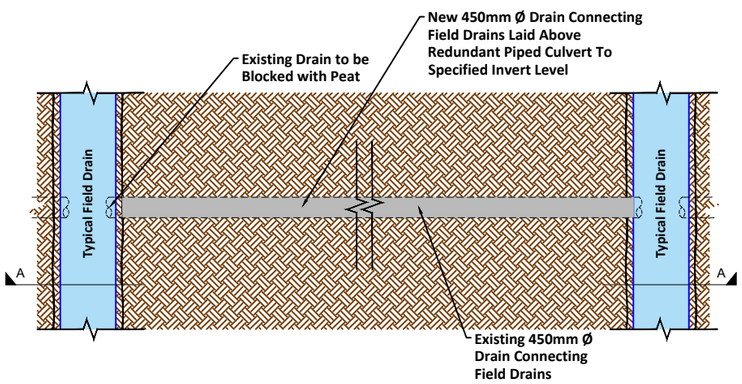


Proposed Plan View
(N.T.S.)

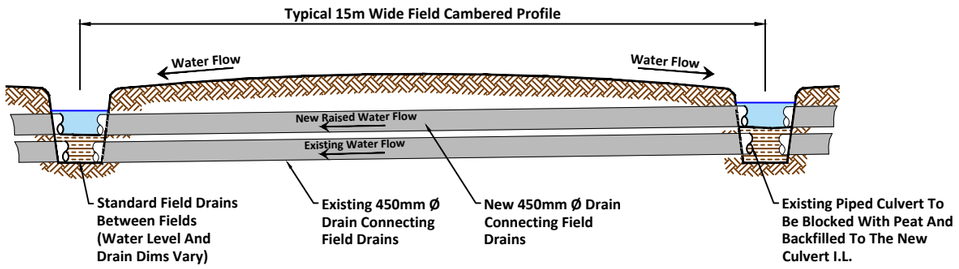


Section A-A
(N.T.S.)

Raise Piped Culverts To Control Water Levels



Proposed Plan View
(N.T.S.)



Section A-A
(N.T.S.)

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
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	'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
Naturally Driven
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.

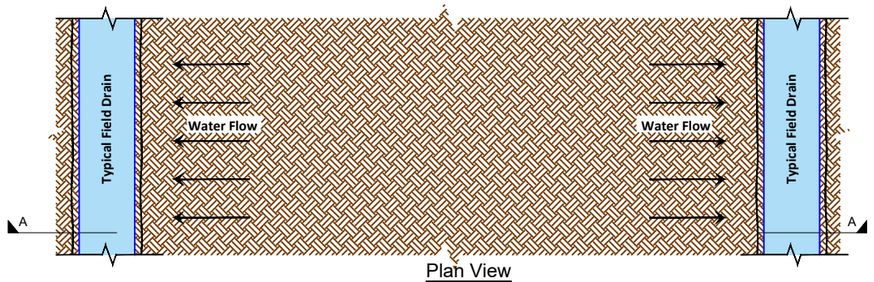
Date: 20/01/21 | Scale : Not to Scale A3 | Stage: For Approval

Drawing No.: PCAS-0100-014 | Rev: c

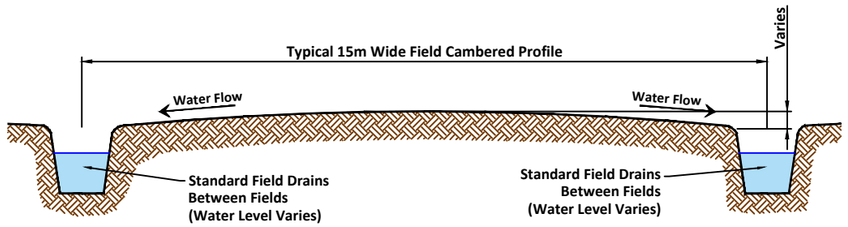
C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-014c_ModifyingOutfalls.dwg

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



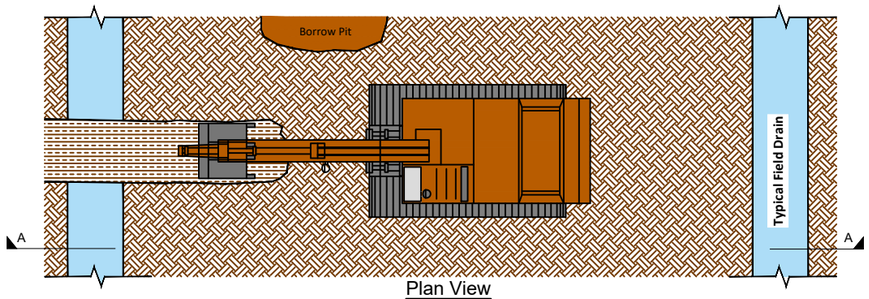
Section A-A
(N.T.S.)

NOTES:

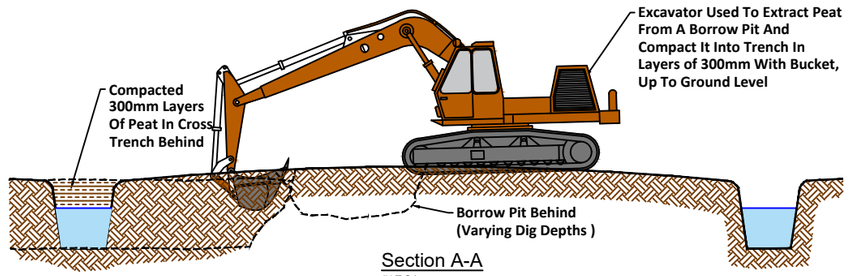
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

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.



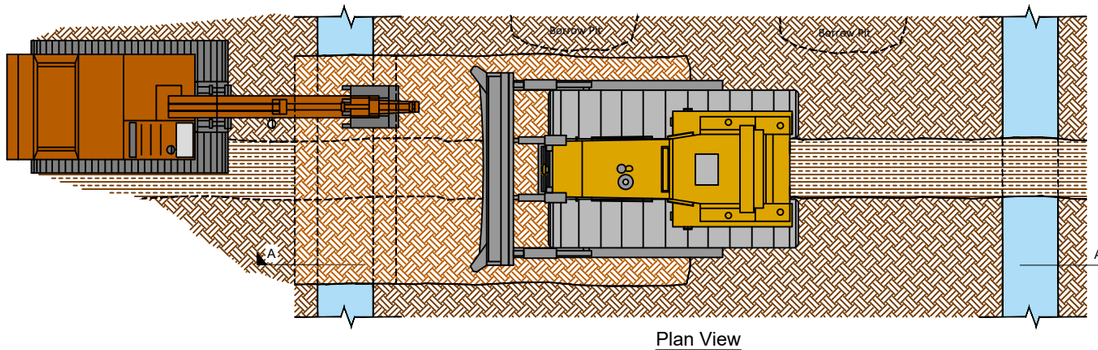
Plan View



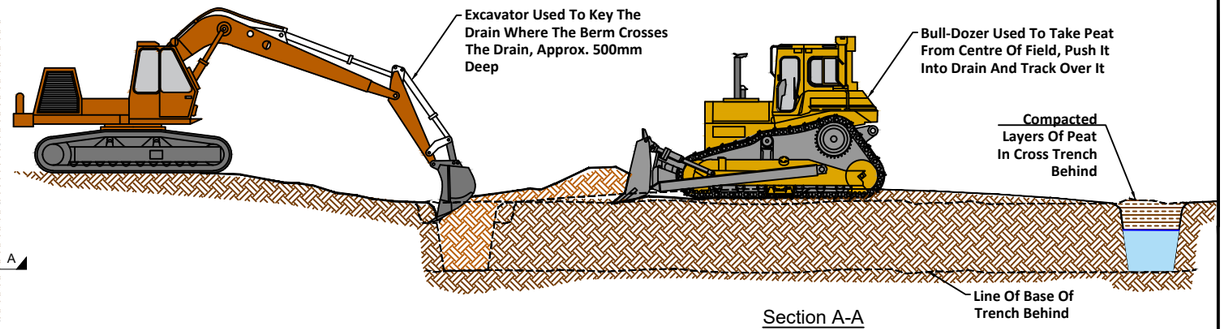
Section A-A
(N.T.S.)

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.



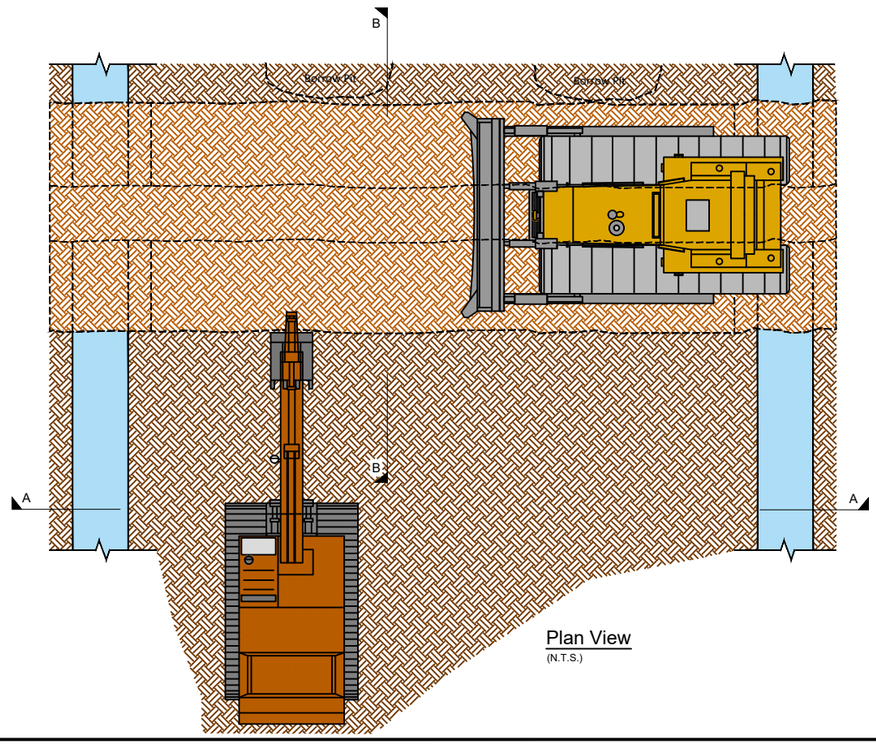
Plan View



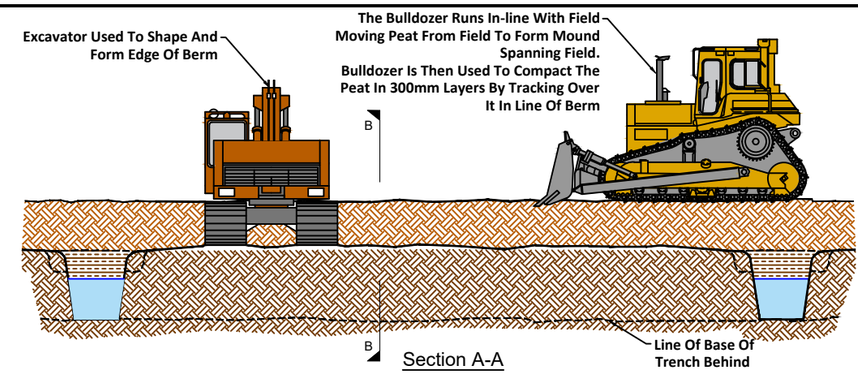
Section A-A

Phase 3
Forming Peat Berm

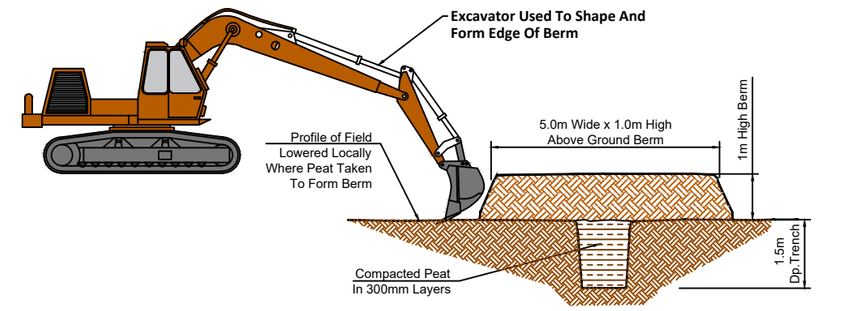
Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form an approximately 5m Wide x 1m High Cross Berm.
The peat material in the berm is compacted in layers of 300mm by the dozer tracking over it.
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

C:\Users\KiernanP\Desktop\Castlegar\DR\PCAS-0100-015a_BoundaryBerm.dwg

Appendix E: Edera Rehabilitation Measures: Engineering and Rehabilitation Design Specification

PCAS Project

Edera Bog Rehabilitation Measures

Engineering and Rehabilitation Design Specification

DOCUMENT CONTROL SHEET

Client	Bord na Móna					
Project Title	Edera Bog Rehabilitation Measures					
Document Title	Engineering and Rehabilitation Design Specification					
Document No.	PCAS-0-ED-01-SP01					
This Document Comprises	DCS	TOC	Text	No. of Tables	No. of Figures	No. of Appendices
	1	1	36	1	13	2

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
0	TE	PK / LH / GD	DK	PN	BnM CIVIL ENG DEPARTMENT	25/02/2021

Contents

APPENDICES

1. Introduction

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Mount Dillon bog group (Ref. P0504-01). 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.

This document - *Edera Bog Engineering and Rehabilitation Design Specification* – should be read in association with both the *Edera Bog Site Characterisation and Monitoring 2021* and the *Edera Drainage Management Plan 2021*. These three reports should be read in association with **Edera Rehabilitation Plan 2021**, which addresses **all** of the requirements of Condition 10.2 of IPC License Ref. P0504-01.

The - *Edera Bog Rehabilitation Measures Engineering and Rehabilitation Design Specification* - specifically focuses on the design specification of the peatland rehabilitation measures proposed for Edera Bog and includes the following:

- Description of the proposed rehabilitation measures.
- Identification of the location of the proposed rehabilitation measure.
- Description of the site-specific parameters that resulted in the selection of the proposed rehabilitation measures.
- Description of the method of implementation for each rehabilitation measure.
- Assessment of the likelihood of failure for each rehabilitation measure
- Description of the method of setting out and verification of completion of rehabilitation measures.
- *An **Emergency Response Plan*** is outlined in the event of failure of a rehabilitation element.

2. Site Location

Edera Bog is located approximately 4.5km to the west of Ballymahon in Co. Longford on the shore of Lough Ree (see Figure 3.1). The surrounding landscape is a mosaic primarily consist of low-lying agricultural land (pasture) interspersed with other raised bogs, many of which have also been managed by Bord na Móna for peat production with some areas utilised for domestic turf-cutting. Lough Ree is immediately adjacent to the south-west corner of Edera and the Bilberry River flows through the bog.

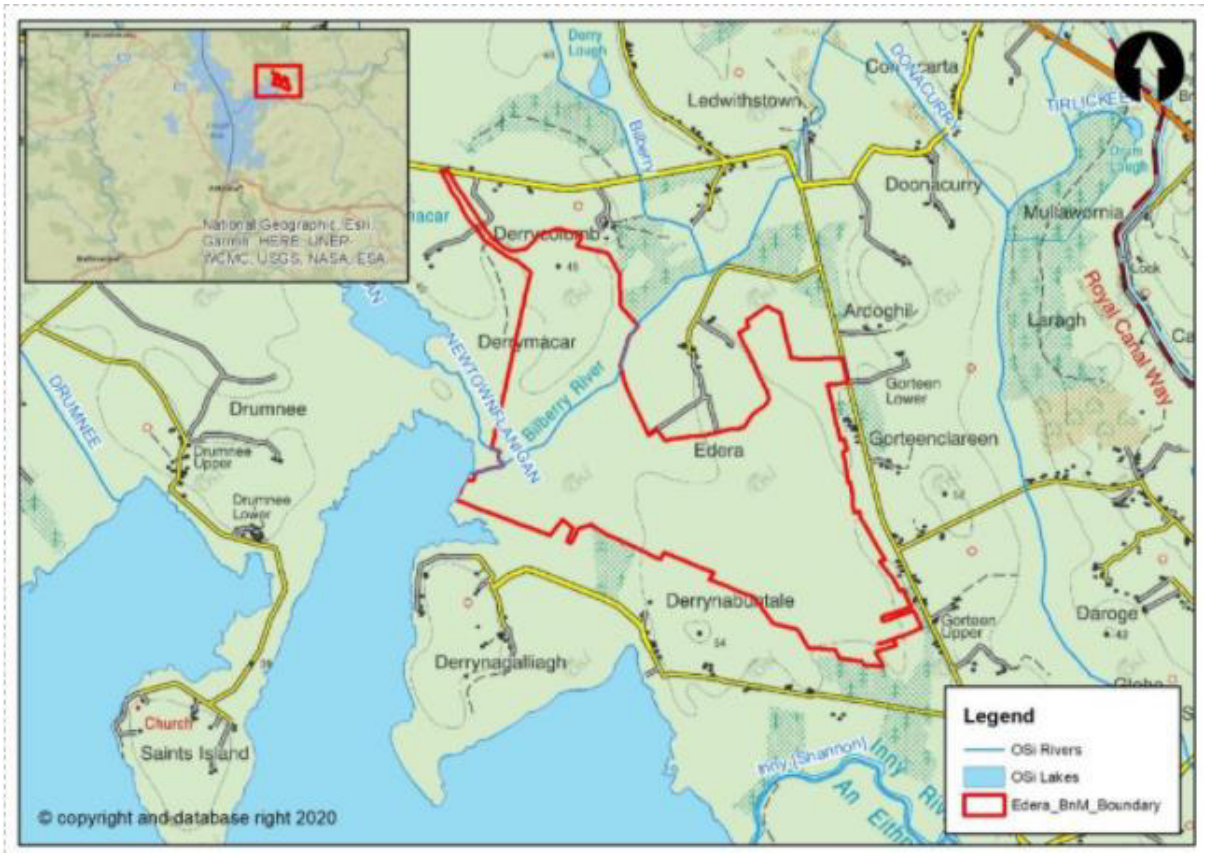


Figure 2.1 Edera Location Map

3. Scope of Works

The area of proposed rehabilitation measures for Edera Bog is approximately 282.1 Ha. The rehabilitation measures can be summarised as follows:

- Provision of peat drain blocks within existing drains.
- Provision of berms.
- Field re-profiling.
- Provision of re-profiled field cells.
- Provision of control measures.
- Modifying outfalls.
- Managing water levels.

Pertinent rehabilitation methods are detailed in the following drawings, also provided as part of the PCAS package:

- PCAS-0100-003 Rehab Method DPT 3A – Field Re-profiling
- PCAS-0100-005 Rehab Method DPT 4A – Field Re-profiling with Edge Berm

- PCAS-0100-006 Rehab Method DPT 4 – 45m x 60m Cell with Berms
- PCAS-0100-007 Rehab Method DPT 5 – 30m x 30m Cell with Berms
- PCAS-0100-009 Rehab Method DCT 3 – Peat Drain Block
- PCAS-0100-010 Rehab Method WLT 3 – Peat Berm
- PCAS-0100-011 Rehab Method WLT 4 – Peat Drain Block
- PCAS-0100-012 Rehab Method WLT 5 – Field Re-profiling
- PCAS-0100-013 Rehab Method MLT 2 – Peat Drain Block
- PCAS-0100-014 Rehab Method – Modifying Outfalls - Managing Water Levels

4. Proposed Rehab Measures

The location of the Proposed rehabilitation measures within Edera Big are identified in Figure 4.1 below. A description of each rehabilitation measure and the target area within Edera bog is outlined in Table 4.1

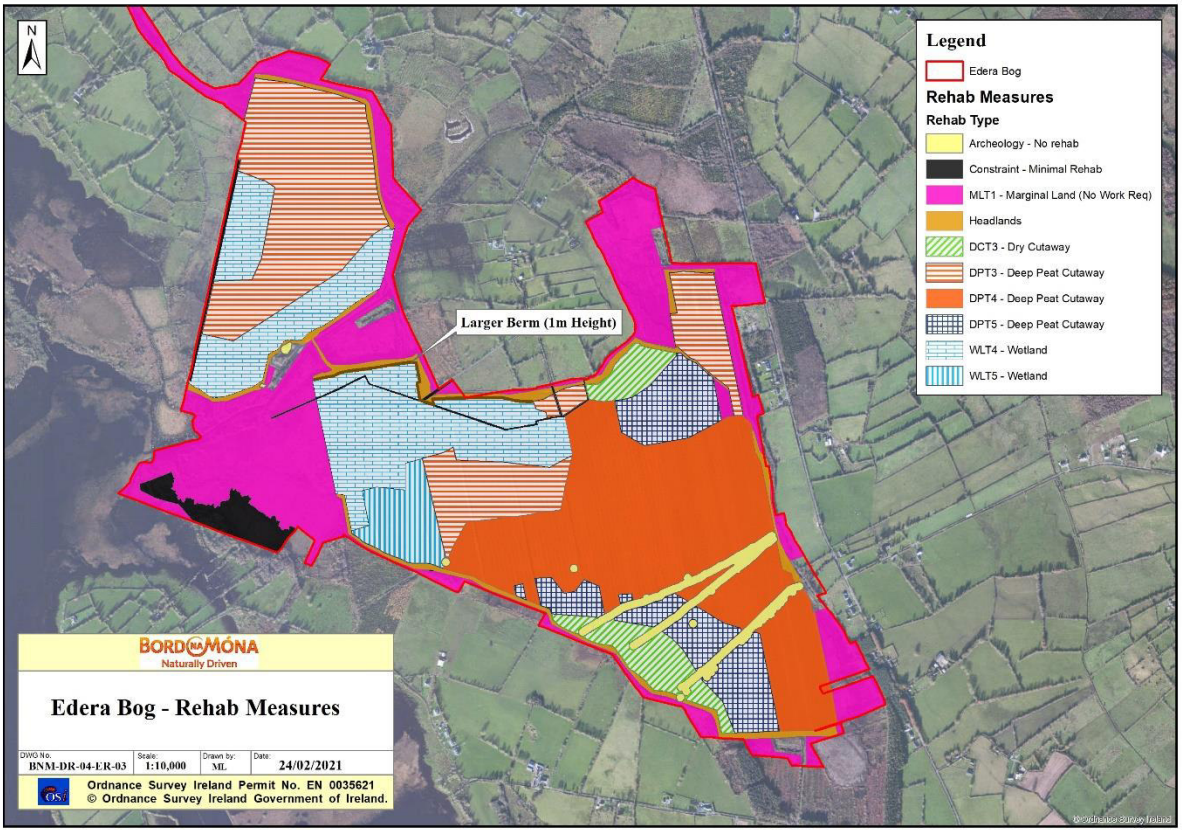


Figure 4.1 Proposed Enhanced Rehabilitation Plan for Edera Bog

Type	Code	Description	Area (Ha)
Deep peat cutover bog	DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes	
	DPT2	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows	
	DPT3	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows	48.9
	DPT4	Berms and field re-profiling (45m x 60m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	60.5
	DPT5	Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + *Sphagnum* inoculation	19.7
Dry cutaway	DCT1	Blocking outfalls and managing water levels with overflow pipes	
	DCT2	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	10.3
	DCT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows + targeted fertiliser treatment	9.7
Wetland cutaway	WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	
	WLT2	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site	
	WLT3	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site + constructing larger berms to re-wet cutaway + transplanting Reeds and other rhizomes	
	WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	41.9
	WLT5	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	7.0
Marginal land	MLT1	No work required	67.4
	MLT2	More intensive drain blocking (max 7/100 m)	
	MLT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows with + boundary berm	
Other		Silt-ponds	3.3
		Constraints	6.7
		Archaeology constraints	6.7
Total			282.1

Table 4.1 Rehabilitation measures and the proposed target area for Edera bog

The rehabilitation measures has been selected based on a number of site-specific measures below and the basis for the selection of the main rehabilitation types is outlined in the *Edera Site Categorisation and Monitoring 2021 Report.*

- Bog type, and peat depth;
- Drainage type, gravity or pumped;
- Hydrological and Topographical modelling;
- Type of surface (vegetated or not);
- Slope/topography;
- Hydrology and piezometer baseline data (where available).)

The above criteria feeds into a rehabilitation decision matrix contained in Appendix A which provides a general basis for selecting a particular rehabilitation measure on a specific bog, in combination with site specific issues outlined in the *Edera Site Categorisation and Monitoring 2021 Report*, Table 4.1 outlines the particular rehabilitation measures for Edera Bog with a detailed description below.

4.1. Rehabilitation measures proposed at Edera bog

The following are the proposed rehabilitation measures at Edera Bog outlining the process in general and the key criteria necessary to apply the measures to particular areas of the bog

4.1.1. DPT3 – Field Re-profiling with Drain Blocks

DPT3- More intensive drain blocking (Up to 7 drain blocks per 100 m), field reprofiling, blocking of outfalls and managing overflows are the elements within the DPT3 rehabilitation measure which are elaborated upon within Chapter 5.

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains to facilitate drainage of the production fields during peat production. This camber limits the re-wetting of the central area. The concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth. Field re-profiling is developed as a technique to optimise the extent of suitable water levels (shallow, soggy conditions).

This measure is proposed where the peat depth is generally in excess of 2 metres and the topography is relatively flat.

- DPT3 is adopted in sections of Edera bog as per Figure 4.1 The key criteria used to adopt the DPT3 approach in these areas is a deep peat profile in excess of 2 metres along with a relatively level topography.

4.1.2. DPT4 - 45m x 60m Cell with Berms - Drain Blocks

DPT4- Berms and field re-profiling (45m x 60m cell), blocking outfalls, managing overflows and drainage channels for excess water and *Sphagnum* inoculation are the elements within the DPT4 rehabilitation measure which are elaborated upon within Chapter 5.

The creation of cells will help retain shallow surface water, keeping peat wet while further slowing water movement through the bog..

The centre of the cambered field is used as one side of the cell. A bulldozer is used to level and flatten the base of the cell and to infill the drains by removing the camber from the fields.

- DPT4 is adopted in sections of Edera bog as per Figure 4.1. The key criteria used to adopt the DPT4 approach is a deep peat profile generally in excess of 2 metres and areas that have gentle slopes that require bunding to maintain optimum hydrological conditions.
- DPT4A is an alternative means of achieving a similar outcome to DPT4 and there is a potential to substitute DP4A for DP4 in areas of Edera Bog. This methodology is detailed in section 4.3 below. Rehabilitation Method DPT 4A Field Re-profiling with Cells and Berms.

DPT4A- Drain blocking at pre-determined intervals, field reprofiling, filling in of drains, Cross berms, blocking outfalls and managing overflows are the elements within the DPT4A rehabilitation measure which are elaborated upon within Chapter 5.

As part of the ongoing rehabilitation measures trials at Castlegar Bog, a variation to DPT4 evolved. This option of using a screw leveller as well as a dozer to re profile the production fields was identified during the trials. The screw levelling apparatus that was originally used to provide the convex camber on the field when peat harvesting was taking place is inverted which allows the screw leveller to now create a concave camber to the production field and thus reducing significantly the number of passes by the bulldozer to create the desired profile. In addition, the bulldozer places the loose peat within the drains removing their original function and increasing the area to be rehabilitated. The provision of the drain blocks and cross berms are still necessary to ensure there are no preferential flow paths through the drains path. The cross berms which run between high fields control wave action and sheet flow and depending on the intervals between the high fields, longitudinal berms can also be provided to create cells, This approach is seen as a viable alternative to DPT4 Cells due to the following points:

- Simpler construction process to DPT4;
- Broader range of time in which it is expected to be able to carry out the measure (not as sensitive to bad weather as DPT4);
- Equal to or better rehabilitation impacts expected compared to DPT4;
- Increase in extent of re-wetted peat and target water-levels;

- Improvement in health and safety as drains are infilled;
- Potential for improved operator productivity.

The following phases outline the processes of DPT4A which is expected to replace DPT4 measures, further detail in relation to the measures below are outlined in Section 5

Phase 1: Re-Profiling of Field Surface

The first operation in the re-profiling process begins with using a Screw-Leveller to remove the high central camber from individual production fields and deposit the peat on the lower-lying edges of the same production field.

Phase 2: Infilling of Drains

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

Phase 3: Final Levelling of Drains & Field

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

Phase 4: Drain Blocking

Drain blocks are constructed using an Excavator operating at a perpendicular direction to the field drains. Key drain blocks will be located downstream of the measures prior to infilling of the drains to ensure no release of silt occurs during the activities

Phase 5: Cross berms

Cross berms will be placed at regular centres essentially creating large cells across the production fields which will control unfavourable wave action and sheet flow where the measure is located in level areas.

4.1.3. DPT5 - 30m x 30m Cell with Berms with Drain Blocks

DPT5 Cut and Fill cell bunding (30m x 30m cell), blocking outfalls and managing overflows, drainage channels for excess water, *Sphagnum* inoculation are the elements within the DPT5 rehabilitation measure which are elaborated upon within Chapter 5.

The creation of cells will help retain surface water, keeping peat wet further slowing water movement through the bog.

- DPT5 is adopted in sections of Edera bog as per Figure 4.1. The key criteria used to adopt the DPT4 approach in these areas is a deep peat profile generally in excess of 2 metres and areas that have gentle slopes that require bunding to maintain optimum hydrological conditions.
- DPT5 is adopted rather than DPT4 within areas where it is positioned higher along the hydrology gradient and in areas where it is anticipated to be slightly more difficult to wet.

4.1.4. Dry cutaway areas- DCT3 Peat Drain Block

DCT3 More intensive drain blocking (Up to 7 drain blocks per 100 m), blocking outfalls and managing overflows, and targeted fertiliser treatment are the elements within the DCT3 rehabilitation measure which are elaborated upon within Chapter 5.

- A portion of Edera Bog the can be categorised as dry cutaway where it is not practical or feasible to re-wet these areas completely. It is inevitable that many areas of cutaway will remain relatively dry due to the heterogeneous topography of the cutaway. DCT3 is adopted in sections of Edera bog as per Figure 4.1. The key criteria used to adopt the DCT3 approach in these areas is 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 (i.e.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. Generally, it is not practical to re-wet these areas and they will develop other drier habitats (heath, grassland, woodland) that will blend into peatland landscape.

4.1.5. Designated Wetland areas WLT3- Peat Berm

WLT3 Turn off or reduce pumping to re-wet cutaway, blocking of outfalls and managing water levels with overflow pipes, Targeted blocking of outfalls within a site, provision of larger berms to re-wet cutaway and transplanting Reeds and other rhizomes are the elements within the WLT3 rehabilitation measures which are elaborated upon within Chapter 5.

Areas prone to seasonal winter inundation are designated for wetland creation. Standing water will be allowed to occur resulting in increased water storage. Areas of Edera as shown as WLT3 in Figure 4.1 match this criteria.

- WLT3 is adopted in sections of Edera bog as per Figure 4.1, The key criteria used to adopt the WLT3 Areas that are likely to develop into wetlands can largely be determined from a combination of LIDAR images, supplemented by flood mapping and surveys of levels (with the latter referencing existing water levels such as silt ponds or other outfalls from the site). Wetland

cutaway has 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. Optimal peatland rehabilitation seeks to maintain a water table just above the ground level (circa. 100mm ± 50mm) during the summer.

4.1.6. WLT4 - Peat Drain Block

WLT4 More intensive drain blocking (Up to 7 drain blocks per 100 m), blocking outfalls and managing overflows and transplanting Reeds and other rhizomes are the elements within the WLT4 rehabilitation measure which are elaborated upon within Chapter 5.

This measure's main objective is to block drains with drain blocks to raise water levels, re-wet peat and slow water movements through the bog.

This method is similar as that described under Deep Peat methodologies as Dry Cutaway methodology 'DCT3', but is provided in areas more prone to flooding

- WLT4 is adopted in sections of Edera bog as per Figure 4.1. The key criteria to adopt the WLT4 approach includes areas that are subject to seasonal winter inundation but generally dry out during the summer with the drainage in place. The objective of the measures to eliminate the drainage functionality and to maintain summer water levels close to the ground surface. Areas that are likely to develop into wetlands in a similar manner to that outlined in WLT3.

4.1.7. WLT5 - Field Re-profiling - Drain Blocks

WLT5 - More intensive drain blocking (Up to 7 drain blocks per 100 m), field reprofiling, blocking outfalls and managing overflows, and transplanting Reeds and other rhizomes are the elements within the WLT5 rehabilitation measure which are elaborated upon within Chapter 5.

This measure assumes similar criteria to WLT4 with the addition of the re-profiling of production fields based on the topography where this element is deemed a necessary measure.

- WLT5 is adopted in sections of Edera bog as per Figure 4.1. The key criteria to adopt the WLT5 approach includes areas that are modelled to develop as wetlands (sub-basins), but generally dry out during the summer with the drainage in place and where re-re-profiling help optimise the extent of targeted water-levels.

4.1.8. MLT1- Marginal Lands

Lands around the margin of the former peat production area

Marginal lands are defined as those areas (generally around the margins but can also be located on islands within sites) where industrial peat production has not taken place. These can be identified from habitat maps coupled with aerial images of the sites.

The habitat present on these sites can vary substantially, from near-intact raised bog remnants to cutover bog associated with domestic turf-cutting and the varied habitats such activities create (potentially including grasslands, wetlands and woodlands, as well as dry heath or peatland habitats).

It will be dependent upon the habitats and management objectives for the bog as a whole and in particular, adjacent areas of peatland where rehabilitation is being undertaken.

No rehabilitation measures are proposed in the MLT1 areas.

4.1.9. *Sphagnum* Inoculation

The main objective of *Sphagnum* inoculation 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.

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 and this can be scattered by hand or planted into the peat substrate. The use of significant volumes of *Sphagnum* donor material is constrained by the small amount of suitable donor material and donor sites. It is therefore proposed to use *Sphagnum* donor material developed in greenhouses (e.g. Beadaplugs), where suitable donor material can be made available. These *Sphagnum* plugs will then be planted into each cell (c. 1-5m^2 is suggested per cell for planting plugs).

4.1.10. Fertiliser application

In some instances, cutaway bog areas are very slow to colonise naturally. Areas where vegetation is slower to naturally colonise tend to be drier areas such as headlands and high fields that dry out in the summer.

It is proposed to use fertiliser to help accelerate natural colonisation on headlands (the area around the edges of the production bogs) and on high fields (former stockpile fields). Both areas are prone to drying in the summer, inhibiting vegetation establishment and growth. This enhanced measure will be combined with other measures to optimize ecosystem service benefits. Fertiliser will be applied during the August September period to encourage seedling establishment towards the end of the growing season. Seedlings that establish in the spring tend to suffer grater rates of mortality as the peat dries out in the summer and this factor is significantly reduced in the later summer-autumn period.

Where applied, it is proposed to use a slow-release, Phosphorous-rich fertiliser (such as Rock Phosphate) to accelerate natural colonisation and the development of pioneer vegetation cover. Low

application rates (aligned to 50% of the recommended rate provided by the Forest Service Guidelines for fertilisation of forestry on peat) will be used. Furthermore, due to Bord na Móna's organic certification status on its landholding, any fertilisers applied will need to conform to these standards.

5. Methods of Site Construction (Elements of various rehabilitation measures)

This Section covers the design and construction approach to the elements which make up the enhanced rehabilitation measures described in section 4 above which includes site clearance; peat drain blocking, berm construction, field re-profiling, provision off re-profiled field cells, installation of discharge control features and managing water levels where required.

5.1. Peat Drain block

Basis for design:

Peat drain blocking is a common proven rehabilitation measure on many bogs in Ireland, resulting in a successful re-wetting of peat through the reduction of water flowing off the bog.

Description of process:

Drain blocks are formed using a tracked excavator operating at a perpendicular direction to the field drains. The method used follows the approach outlined by McDonagh (1996) in accordance with the **Best Practise in Raised Bog Rehabilitation in Ireland (2017).**

- A key is cut in the drain approximately 500mm deep ensuring that it is wider than the actual drain. A 500mm depth of peat is removed from bottom of drain also and placed behind the machine for replacement later. (If any vegetation present, it is carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.)
- An area behind the machine, within reach of the excavator arm, is used as a borrow pit. Turf and degraded peat are removed from the surface. This material is placed close by to be used as cover later.
- 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket, to form the drain block. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.
- The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
- The borrow pit is then back filled with the peat extracted from the bottom of the drain. The sides of the borrow pit are pressed down and graded with the excavator bucket.

Risks identified:

- Erosion of the drain block particularly in steeply sloping sections
- Failure of drain block resulting in localised negative impact on rehabilitation measure (excessive ponding etc.)
- Failure of drain block resulting in localised escape of silt/sediment.
- Failure of drain block resulting in localised increase in hydrostatic pressures to adjacent drain blocks.
- Failure of drain block resulting in localised increase in hydrostatic pressure to berms enclosing different rehabilitation measure types
- Failure of drain block resulting in an increase in water flow to hydraulic breaks protecting adjoining lands

- **Mitigation through design:**
  - The selection of an appropriate drain block spacing.
  - Drain blocks are formed at a minimum of 300mm higher than the adjacent ground level and are relatively wide to create a relatively strong structure out of peat that will mitigate water flow eroding the drain block construction.
  - The provision of a key in the drain as per drawing PCAS-0100-009 coupled with the compaction of peat in layers (max depth 300mm), ensures a tight seal is maintained and a strong structure is developed to mitigate the formation of preferential flow paths around the edges of the drain block. Design follows best practise.
  - Operators assigned to this work element are familiar with the technique and process and provide effective robust drain blocks. The operators are experienced and capable of adapting to the particular conditions encountered within the bog.
  - Qualified, experienced Engineers overseeing the works during the installation phase ensure that quality procedures of the various elements are implemented and effectively meet the standards for quality service and performance.

- **Mitigation through maintenance and avoidance:**
  - Ongoing monitoring of completed peat drain blocks in the weeks after formation will ensure they have consolidated.
  - The risk drains associated with peat drain block failure from an environmental and rehabilitation measures impact is generally categorised as low as a peat drain block failure will result in an impact that is localised and silt control measures are provided upstream of all discharge points. There is an allowance for a reactive approach to remediation measures where required.

- A post rehabilitation Lidar and imagery survey will take place which will capture any areas where failures occurred resulting in remediation measures in a particular area if required. The Lidar survey will be implemented when the rehabilitation measures have been in place for a reasonable period of time allowing areas of weakness or potential concern to become apparent.
- In the event of a peat drain block failure, the adjacent peat drain blocks will generally have sufficient capacity to accommodate any additional hydrostatic pressures generated ensuring the negative impact is localised.
- If, after heavy rainfall, significant water flows in the drains cause localised drain block failure, the regular and frequent placing of drain blocks along the drain further downstream will mitigate the impact to the immediate area.
- As peat drain blocks are designed to retain water on the cutover resulting in a reduction in discharge into the boundary drains, preventing any negative impacts on adjacent agricultural land. (See chapter 7 below 'Emergency Failure Response' outlining mitigation measures to be put in place should any risks of unexpected hydrological impacts occur).

Figure 5.1.1 Peat drain block trials at Castlegar bog

5.2. Berm (300mm High)

Basis for Design:

The concept of cross berms is to optimise the extent of re-wetted peat and target water levels, create enclosed areas of peat with shallow water levels and slow the water movement through the bog. These berms are used in the DP4DPT4, and DP5DPT5 methodologies.

The berm design adopts an empirical design approach. It is proposed to apply proven sizes, proportions, materials, and assemblies from existing successful rehabilitation measures and flood defense berm features carried out in the past by Bord na Móna. The proposed berms are relatively shallow, circa 300mm high and are constructed across or perpendicular to the fields acting to enclose a cell to retain a shallow layer of surface water (circa 100mm).

Description of process:

- A tracked excavator working perpendicular to the drain is used to form a 500mm deep key in the drain edges where the berm crosses.
- A strip of peat 5m in width is taken from the central camber of the field, pushed into the drain, using the bucket of a tracked bulldozer. The peat is compacted by the bull-dozer tracking over the drain block to ensure the peat forms a tight seal in the drain.
- A key is also formed similarly in the drain on the opposite side of the production field at the end of the proposed berm and the drain infilled and compacted as above.
- 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 300 / 500mm high cross berm. Consistency of peat is important, which should be firm enough to be shaped and compacted. The peat berm is compacted using the dozer and when this complete the excavator trims and shapes the completed berm. The berm is circa 5m in width.

Risks identified:

  - Peat berm failure resulting in localised negative impact on rehabilitation measure (excessive ponding etc.)
  - Peat berm failure resulting in localised escape of silt/sediment.
  - Increase in hydrostatic pressures to adjacent restoration methods leading to berm failure.
  - Increase in hydrostatic pressure to berms enclosing different rehabilitation measure types leading to berm failure.
  - Overtopping of berm resulting in an uncontrolled escape of silt/sediment.
  - Subsidence of berm.

- **Mitigation through design:**
  - Peat Berms are not proposed for use in areas subject to seasonal winter inundation.
  - It is recognized that consistency of peat is important, in that it should be firm enough to be shaped and compacted.

- Peat Berms are constructed circa 300mm higher than the adjacent ground level to create targeted hydrological conditions. The berms are built to a width of 5m to create a low wide strong structure that is capable of maintaining these suitable hydrological conditions.
- The berm installation process includes a key formation in the drains. A 500mm deep key is formed by taking a strip of peat from the field and pushing it in to the drain where it is compacted by the bulldozer ensuring a tight seal. The excavator trims and shapes the completed berm.
- The low and robust design of the peat berms means that overflow pipes are not required for all berms and it is expected that in flatter ground, water will overflow over the berms with minimal risk of erosion. Where necessary they will be incorporated to ensure water levels are controlled, do not rise over top of the berm and mitigate against the erosion of the berm while ensuring water level control.
- Operators assigned to this work element are familiar with the technique and process and provide effective robust berms. The operators are experienced and capable of adapting to the particular conditions encountered within the bog.
- Qualified, experienced Engineers overseeing the works during the installation phase ensure that quality procedures of the various elements are implemented and effectively meet the standards for quality service and performance.

- **Mitigation through maintenance and avoidance:**
  - Avoidance of berms in areas subject to seasonal winter inundation.
  - A post construction lidar and imagery survey will capture the impact of the completed rehabilitation measures indicating if any appropriate remedial action is required or deemed necessary.
  - As peat berms are designed to retain a shallow level of water on the cutover there will be no increase in water discharging into the boundary drains preventing any negative impacts on adjacent agricultural land. (See chapter 7 below ‘Emergency Failure Response’ outlining mitigation measures to be put in place should any risks of undesirable hydrological impacts occur).

Figure 5.2.1 Peat Berm at Castlegar Bog

5.3. Berm (1000mm High)

Basis for Design:

The concept of cross berms is to slow the water movement through the bog and promote the creation of enclosed areas of wetland habitat with shallow water levels. The berm design adopts an empirical design approach. It is proposed to apply proven sizes, proportions, materials, and assemblies from existing successful rehabilitation measures and flood defense berm features carried out in the past by Bord na Mona. The 1m high Berm will act as a boundary berm to protect marginal lands. This berm is used in WLT 3.

Description of process:

Drawing Reference: PCAS-0100-010 WLT 3

- A tracked excavator working perpendicular to the drain is used to dig a trench 1.2m wide (4ft. wide excavator bucket) and up to 1.5m deep depending on ground conditions along the location of the berm. If good 'clay like', highly humidified peat exists in the trench the peat is turned over and compressed back into trench. Alternatively, sub-soil will be used, where possible.

- Area behind the machine is used as a borrow pit. Top layer of degraded peat is removed and placed close by to be used as cover later.
- Clay like peat is extracted from the pit and compacted in 300mm layers using the excavator bucket before laying more peat from the borrow pit, until ground level is reached. The borrow pit is backfilled with the degraded peat extracted from the trench and the surface of pit.
- Next an excavator is used to form a 500mm deep key in the drain edges where the berm crosses. A strip of peat 5m in width is taken from the central camber of the field, pushed into the drain, using the bucket of a tracked bulldozer.
- The peat is compacted by the bull-dozer tracking over the drain block to ensure the peat forms a tight seal in the drain
- A key is also formed similarly on the opposite side of the production field at the end of the proposed berm and the drain infilled and compacted as above
- 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.
- Consistency of peat or sub-soil is important, which should be firm enough to be shaped and compacted in layers of 300mm. The excavator bucket is used to form and shape the edges of the compacted berm.

Risks identified:

  - Peat berm failure resulting in localised negative impact on rehabilitation measure (excessive ponding etc.)
  - Peat berm failure resulting in localised escape of silt/sediment.
  - Increase in hydrostatic pressures to adjacent restoration methods leading to berm failure.
  - Increase in hydrostatic pressure to berms enclosing different rehabilitation measure types leading to berm failure.
  - Overtopping of berm resulting in an uncontrolled escape of silt/sediment.
  - Subsidence of berm.

- **Mitigation through design:**
  - It is recognized that consistency of peat and or sub-soil and its compaction in layers is important, resulting in a robust trench and berm mitigating water seepage. It should be

firm enough to be shaped and compacted. Adequate compaction of the peat will be ensured.

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

- **Mitigation through maintenance and avoidance:**
  - A post construction lidar and imagery survey will capture the impact of the completed rehabilitation measures indicating if any appropriate remedial action is required or deemed necessary.
  - As peat berms are designed to retain a shallow level of water on the cutover there will be a reduction in discharge into the boundary drains preventing any negative impacts on adjacent agricultural land. (See chapter 7 below 'Emergency Failure Response' outlining mitigation measures to be put in place should any risks of undesirable hydrological impacts occur).

Figure 5.3.1 Garryduff 1 Flood Defence Berm,

5.4. Production field re-profiling

Basis for Design:

Field re-profiling is developed as a technique to level the production fields thereby optimising the extent of target re-wetting and water levels and slowing the surface water loss across the bog. From previous Bord na Móna experience and in similar environments in Castlegar bog, the geometry and process as set out below is proven effective in creating suitable topography and hydrological conditions for re-wetting. This method of re-profiling is utilised in the DP3DPt3 methodology.

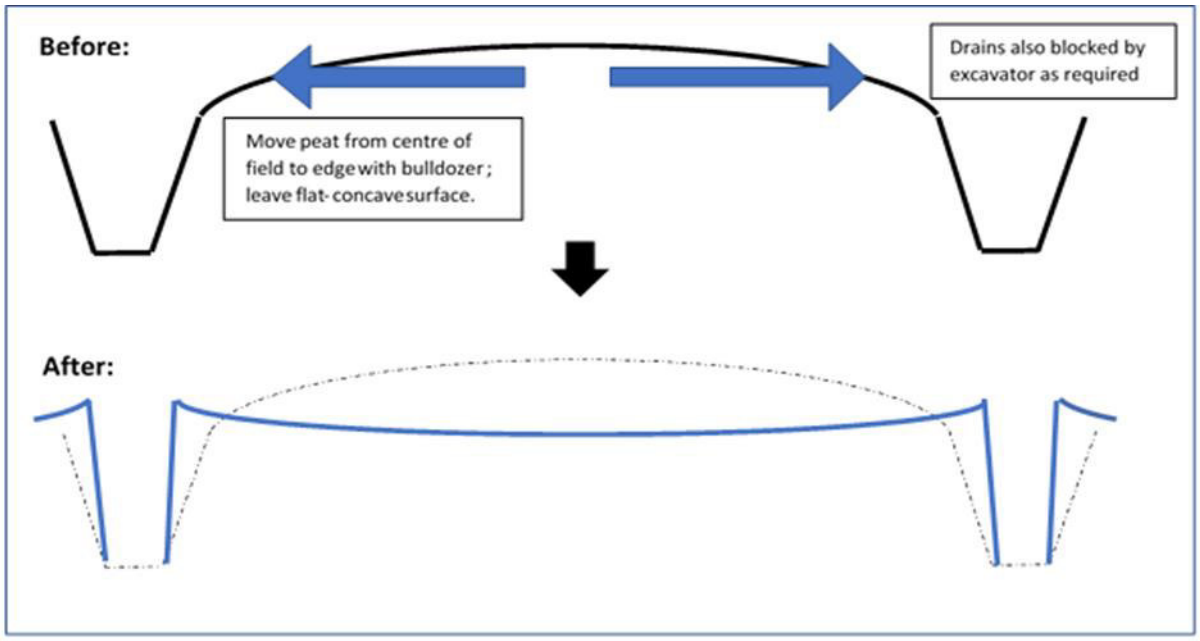


Figure 5.4.1 Indicative methodology for field profiling

Description of process:

- The field is re-profiled using a tracked bulldozer only, making a total of 16 passes; 8 passes up and 8 passes down the length of the former production field, flattening the camber in the centre of the field.

Risks identified:

- Uncontrolled escape of silt/sediment into adjacent drains and downstream during rainfall events.
- Excess surface water flow leading to 'Sheet flow' and erosion of silt and emerging vegetation from surface of the bog.

- **Mitigation through design:**
    - Risk of additional silt created by peat disturbance. Field drains upstream and downstream will be blocked to mitigate water flow in the drain to reduce silt run-off. (See chapter 7 below 'Emergency Failure Response' outlining mitigation measures to be put in place should any risks of undesirable increased movement of peat occur during construction stage).
    - Drain blocks provided downstream at the end of the fields in advance of field reprofiling will ensure any silt that enters the drains is retained in the drain.
    - Operators assigned to this work element are familiar with the technique and process. The operators are experienced and capable of adapting to the particular conditions encountered within the bog
    - Qualified, experienced Engineers overseeing the works during the installation phase ensure that quality procedures of the various elements are implemented and effectively meet the standards for quality service and performance.
- **Mitigation through maintenance and avoidance:**
    - A post construction Lidar and imagery survey will capture the impact of the completed rehabilitation measures indicating if any appropriate remedial action is required or deemed necessary.

Figure 5.4.2 Field re-profiling using Bulldozer Only

5.5. Screw levelling/In-filling of Production field drains

Basis for Design:

This concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth. From previous Bord na Móna experience and in similar environments in Castlegar bog, the geometry and process as set out above has proven effective by creating a suitable flat profile where water is held at suitable levels by edge berms forming a cell. The basis of empirical design is previous experience. This measure which includes a screw leveller combined with a dozer is used in the DPT4A methodology.

Description of process:

- The first operation in the re-profiling process requires the blocking of the downstream field drains to mitigate silt run-off
- The Screw-Leveller will remove the high central camber from individual production fields and deposit the peat on the lower-lying edges of the same production field. The Screw-Leveller, with a level axis, will run up the first side of the production field and down the other side close to the edge of the drain, resulting in some of the peat being tipped into the drain.
- Next the Bulldozer will run up the first side of the production field and down the other side with the front blade at an angle placing the peat in the drain.
- The Bulldozer will then track over the first of the infilled drains and then back down the other drain compacting and levelling the peat. It will also make a pass down the middle of field flattening any peat mounds left between Screw Leveller and Bulldozer runs.
- The original channels will be carefully filled in with suitable material as specified on the drawings. The materials shall be compacted in accordance with the requirements on drawings.

Risks identified:

  - Uncontrolled escape of silt/sediment into adjacent drains and downstream during rainfall events.
  - Excess surface water flow leading to ‘Sheet flow’ and erosion of silt and emerging vegetation from surface of the bog

- **Mitigation through design:**
  - Risk of additional silt created by peat disturbance. Field drains upstream and downstream will be blocked to mitigate water flow in the drain minimising silt run-off. (See chapter 7 below ‘Emergency Failure Response’ outlining mitigation measures to be put in place should any risks of undesirable increased movement of peat occur during construction stage).
  - Peat drain blocks to be provided immediately after field reprofiling to prevent preferential flow paths in infilled drains.

- Operators assigned to this work element are familiar with the technique and process. The operators are experienced and capable of adapting to the particular conditions encountered within the bog.
- Qualified, experienced Engineers overseeing the works during the installation phase ensure that quality procedures of the various elements are implemented and effectively meet the standards for quality service and performance.

- **Mitigation through maintenance and avoidance:**
  - A post construction lidar and imagery survey will capture the impact of the completed rehabilitation measures highlighting if any appropriate remedial action is required or deemed necessary.

Figure 5.5.1 Field re-profiling using Screw-Leveller

5.6. Modifying Outfalls and Controlling Water Levels

A description of several techniques in respect of outfall modification and management of water levels follows.

Some, such as blocking of outfalls, are applicable across multiple rehabilitation prescriptions, whilst techniques such as the cutting of 'taps' through high production fields are more applicable to those bogs

which are subject to periodic inundation. This inundation may be due to rainfall or flooding or where water needs to be diverted from one part of the bog to another by way of management, or to create wetland areas. Both measures are essential to the management of water levels.

5.6.1. 'V' Tap Across High Field to Control Water Levels

Basis for Design:

This is effectively a method for diverting surface water from one side of a high field to another, to manage the water level in both fields and eventually direct excess surface water towards an outfall. This approach has been implemented across various Bord na Móna bogs to manage water levels and an example of this is Baunmore Bog in Littleton Bog Group.

Description of process:

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

Risk and Proposed Mitigation Measures:

- The analysis of Lidar maps and topography in conjunction with the Drainage Management Plan will be elemental to targeting the most appropriate locations for the “tap”.

Figure 5.6.1.1 'V' Tap across a high field at Baunmore to control water levels

5.6.2. Blocking of Outfall

Basis for Design:

The blocking of outfalls drains on the cutaway is a measure that is only carried out in a limited number of circumstances where it is essential to manage hydrology by raising water levels in a particular area and controlling the overflow via a new channel or pipe at an appropriate level .

It is an effective method of controlling water loss from the bog and is proven in its effectiveness in Littleton Bog. This measure is used in the WLT2 and WLT3 rehabilitation methodologies.

Description of process:

- 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. For a deep drain the peat will be compacted in layers of 300mm using the bucket of the excavator. The approximate width of the block is 3-5 times the width of the drain.

- Blocks will 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.

Risk and Proposed Mitigation Measures:

- Complete filling of drains should require little ongoing maintenance if carried out to a high standard.
- Prior to infilling, any loose or dried out peat in the base or sides of drain should be removed.
- Blocking of outfalls will be planned so that it will be fully completed in one day and will be carried out in suitable weather conditions.
- Adequate compaction of the peat will be ensured.
- Water level management will be considered and an overflow channel or pipe will be constructed at an appropriate level.

Periodic inspections will be conducted to ensure they remain robust and are working effectively.

5.6.3. Raise Piped Culverts to control water levels

Basis for Design:

This measure is particularly effective for cutaway bogs with relatively flat basins where raising of pipes produces water flow at a higher invert level, within specified areas of the pre-existing drainage network. This measure is utilised in methodologies DPT1, DCT2, WLT1, WLT2, WLT3 and WLT4. It may also be used in place of a controlled weir where required for other rehab methodologies.

Description of process:

- The drain shall be temporarily blocked upstream of the existing outfall pipe or diverted if blocking of drain is not feasible. Water will still exit at the designated emission points via the silt ponds.
- A new transverse field drain, and pipe is then placed at a higher specified invert level than the existing outfall.
- The pipe shall be placed and covered in accordance with manufacturers specifications and adequate cover shall be provided to protect the pipe integrity.

Risk and Proposed Mitigation Measures:

- Blocking of the outfalls upstream of existing silt ponds will prevent increased silt run-off. The drain will be temporarily blocked upstream or diverted.

- Works will only be carried out in suitable weather conditions.

Figure 5.6.3.1 Raised water outlet at Cavemount

5.6.4. DPT4 & DPT5 Proposed cell drainage to external network

Cell Drainage to external network requirement

Within the areas of Edera bog where The DPT4 & DPT5 cells are located there is a risk of the water levels increasing to excessive depths, particularly in winter months and during large flood events should there not be a defined route for the water to discharge back to the external drainage network. This requirement is mainly in the central eastern area of Edera bog where the fields slope into a depression. It is proposed to ensure a flow path exists in these areas to the outfall at the external drainage network. In addition, as contributing catchment area increases progressively from cell to cell, there is a greater risk of frequent overtopping of the berms which will increase erosion risk. As a result, pipe overflows are proposed within berms considered to be at risk.

Approach to Drainage paths

In Edera Bog where catchments flow into the areas that DPT4 or DPT5 is proposed, as the contributing catchment area increases through subsequent cells there will be greater potential for the cells downstream to be overtopped, increasing risk of erosion of the bunds and generating excessive water depths. To mitigate against this, it is proposed to interconnect the cells with overflow pipes and direct the water flow towards the outfalls. **It will not be necessary in all instances** to pipe the cells such as where smaller catchments upstream or no localised depressions exist as infrequent overtopping of these cells is not considered a significant risk given the robust design of the cells. However in line with a precautionary approach it is proposed to include overflow pipes in any cells with a minimum contributing catchment area of 1 hectare. Indicative overflow locations are shown in Figure 5.6.4.1 and thus creating a flow path through the cells to the outfall. The one Hectare area threshold is an initial threshold adopted based on previous experience. However, this threshold is subject to change from bog to bog depending on a number of factors such as rate of effective rainfall, rate of infiltration etc. However, it is anticipated that the area adopted will enable an assessment of the approach and inform an adjustment of the threshold should it be required.

It should be noted in some instances where catchments are located in depressions and cannot be drained without the use of overflow pipes, then these will also be proposed regardless of whether the cells have a contributing catchment area of <1 hectares or not..

Within the DPT4 & DPT5 measures there is an ability to come back in and add pipes to cells and additional taps, where required as hydrological conditions begin to stabilise.

As can be seen in Figure 5.6.4.1 DPT4 & Cell drainage it is proposed to have overflow pipes from cell to cell in the direction of flow. The flow paths throughout the site following the rehabilitation measures have been considered based on current and anticipated topography. The cells have been designed to drain towards a specific discharge point which will extend to the outfall.

These main drainage routes will consist of a series of open drains and culverts through the high fields (taps) and will align with existing discharge outfall points. Some minor modifications may be required

based on final surface levels across the site to ensure gravity flow can be maintained. Based on the overall catchment size draining to the outfall to the East of Edera it is proposed to tap the high fields with 450mm pipes, which will have a an estimated capacity of 0.68 m3/s assuming free flowing and a gradient of 0.05. This is considered conservative in the context of the contributing catchment area and calculated flows for a 1% AEP event. furthermore, this size of pipe (450mm) is a typical size utilized within BnM bogs to drain similar or greater catchments areas. The open drains connecting to the taps will have equal to or greater capacity than the 450mm Pipe.

Due to the nature of the measures it is not possible to specify specific levels prior to the rehabilitation measures as the level will depend on amendments to topography through field reprofiling. However, an assessment of current and anticipated surface levels along with levels of the current piped outfall indicates that an adequate fall can be achieved (at a higher elevation than the current piped outfall).

Figure 5.6.4.1 Demonstrates the general direction of flow of water through the cells towards the main drainage routes and outfall.

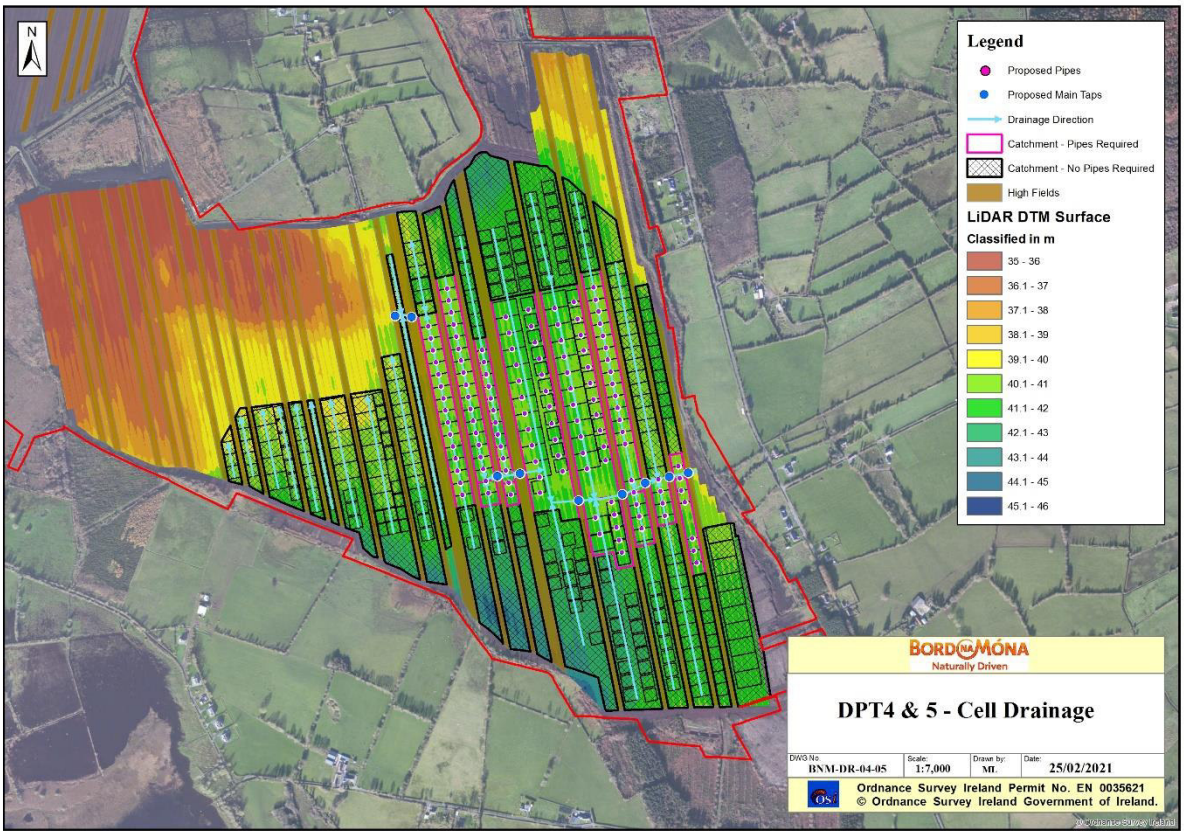


Figure 5.6.4.1 DPT4 & 5- Cell Drainage

6. Setting Out and Archaeology Buffer Zones

6.1. Setting Out Locations of Rehabilitation Measures

The following outlines the procedure for the setting out of locations of rehabilitation measures:

- Prior to commencement on site, co-ordinates of all drain blocks berm locations will be published onto the Bord na Móna ArcGIS Online Cloud.
- Operations staff will access that data using the ESRI Fields Maps application, on high accuracy GPS tablets.
- Locations of these drain blocks and berms will be presented to the machine drivers via the built-in GPS tablet and ESRI application and the machine drivers will use this technology to locate the position of the measures.
- In areas where additional clarity is required as in the case where rehabilitation measures are located in proximity to an SAC, then the location of the proposed boundary will be set out and marked on site by Bord na Móna surveyors.

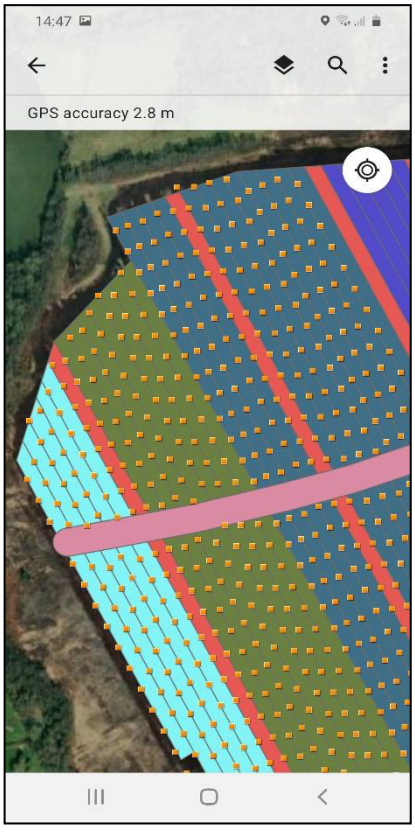


Figure 6.1.1 An example of the onscreen setting out interface

- Engineering staff will use the same ArcGIS cloud technology to verify the rehab measures being carried out. This will enable weekly GIS status maps of works being carried out on a site.

Figure 6.1.1 An example of a site verification survey

6.1.1. Archaeology Buffer Zone

- There are 3 archaeology areas identified as Toghers/ Pathways in Edera Bog.
- In order to protect the integrity of these areas a 20m buffer zone will be implemented where no rehab measures will be undertaken.
- As referred to in Section 6.1 the location of the proposed boundary to this buffer zone will be set out and marked on site by Bord na Móna surveyors prior to measures commencing in that location.

7. Emergency Response Plan

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

- Isolate the source of peat spillage the source of which could include a silt pond failed berm or failed drain block.
- Assess the extent of the peat spill and follow to local receiving waters.
- Switch off any associate bog pumps.
- Construct dry peat berms around extent of peat flow and monitor.

- If the peat spillage is assessed to have the potential to extend to a receiving water deploy a silt curtain on the receiving water.
- Continue clean as instructed by/under direction of Local Authority/ Inland Fisheries Ireland / EPA.

Appendix A

Decision Matrix

Stage 1 What type of BnM bog?	Stage 2 What type of drainage? (Gravity/pumped?) Affected by winter inundation ?	Stage 3 Hydrological/ topographical modelling Can be strongly correlated with previous flooding data	Stage 4 What type of surface (vegetated or not?)	Stage 5 Slopes/topography?	Stage 6 Hydrology/Piezometers	Rehab type	Expected habitats	Typical sites/habitats	FY22 Bogs
Development bog (drained but retains original vegetation)	Gravity (never pumped)	variable	Vegetated	Variable	Variable	Bog restoration proposed (DPT2) block drains Target is to raise water levels close to peat surface	This will lead to raised bog (active and inactive)	Examples of typical sites include Ballydangan & Kellysgrove	Kellysgrove
Deep peat production bog (peat depths > 2 m, indication of residual acidic peat, more acidic influence, less groundwater influence)	Deep peat (gravity)	Modelled as wet (topographical basins)	Bare peat	Flatter, more uniform topography	Higher/stable water level for most of year	Deep peat methodologies (DPT 3-5) Should be relatively easy to re-wet when drains are blocked Target is to raise water levels to peat surface (< 10 cm surface water) Sphagnum inoculation?	This will lead to embryonic raised bog communities (Sphagnum-rich) (Mosaic with Birch scrub/woodland and potential to develop mosaic with Sphagnum-rich bog woodland)	Examples of typical sites include Castlegar, Timahoe North and Bracklin (Sphagnum-rich, Bog cotton)	Castlegar; Belmont; Edera;
Deep peat			Vegetated	Variable	Variable	bog restoration proposed (DPT2) block drains Should be relatively easy to re-wet when drains are blocked Target is to raise water levels to peat surface (< 10 cm surface water) re-profiling not appropriate (vegetation)	This will lead to raised bog/embryonic raised bog communities	Example of typical site is Ballysorrell & Timahoe North	Belmont; Cavemount
Deep peat		Modelled as dry (slopes drain surface)	Bare peat	Flatter, more uniform topography	Higher/stable water level for most of year	Deep peat methodologies (DPT3 with cross bunding) Bunding essential (Consider type 4 /5 if suitable) Target is to raise water levels to peat surface (< 10 cm surface water) Sphagnum inoculation	This will lead to embryonic raised bog communities (Sphagnum-rich) (Mosaic with Birch scrub/woodland and potential to develop mosaic with Sphagnum-rich bog woodland)	Examples of typical sites include Castlegar & Pollagh	Belmont; Cavemount; Clonad; Edera;
Deep peat					Fluctuating water level - likely to dry out for periods	Deep peat methodologies (Type 1/3) Drain blocking Bunding (?) Re-profiling not cost-effective Target is re-wet, or to make ground as wet as possible Less intensive measures likely to be more sustainable	This will lead a mosaic of Birch woodland, Heather and pockets of wet habitats (Sphagnum-rich bog woodland?) (Sphagnum-rich) (Mosaic with drier scrub)	Examples of typical sites include Castlegar, Clooniff and Pollagh	Turraun; Ummeras
Deep peat				Steep, variable (headlands, high fields, mounds, ridges)	Fluctuating water level - likely to generally dry	Deep peat - DPT1 Block drains (if appropriate - no blocking of marginal drains), Fertiliser treatment Encourage natural colonisation (Removing effect of slope on steep ground is much less cost-effective)	This will lead to dry bog woodland with Heather Face bank type cutover vegetation	Examples of typical sites include Castlegar , Clooniff and Pollagh	
Deep peat			Vegetated	Variable	Variable	Deep peat methodologies (DPT3) block drains bunding required (Deep peat 3 with out re-profiling) re-profiling not appropriate (vegetated) Target is to raise water levels to peat surface (< 10 cm surface water) higher areas high fields left to naturally develop	This will lead to raised bog/embryonic raised bog communities in mosaic with drier Birch woodland	Example of typical site is Derryhogan, Bracklin and Timahoe North	Oughter
Deep peat	Deep peat (winter flooded or pumped)	Modelled as wet (topographical basins)	Surface water or vegetated	Variable	Higher water level, likely to be permanent surface water	Wetland (WPT1/2) block drains if possible Target is to optimise summer water levels for emergent vegetation Set summer drainage levels via gravity so encourage emergent vegetation (< 10 cm) re-profiling/bunding not appropriate - (too wet)	Uncertainty as to future habitat development Influence of winter flooding may be most significant and lead to Reed Swamp, poor fen and wet woodland rather than more acidic communities but there is likely to be an eventual ecological continuum based in various hydrological influences	Examples of typical sites includes parts of Clooniff or Pollagh (currently part deep peat and being pumped). Open water habitat in Timahoe North may be eqivalent. As is the transition mire developing at Derryhogan (Deep peat with deeper water)	
		Modelled as wet (topographical basins)	Bare peat or vegetated	Variable	Higher water level, likely to be some permanent surface water, water levels will flucuate in summer	Wetland methodologies (WPT3/4) block drains Bunding may not be feasible if there is winter flooding or water levels rise significantly Use natural topographical basins to hold water in summer Target is to optimise summer water levels for emergent vegetation Set summer drainage levels so encourage emergent vegetation (< 10 cm) re-profiling not appropriate	Uncertainty as to future habitat development Influence of winter flooding may be most significant and lead to Reed Swamp, poor fen and wet woodland rather than more acidic communities but there is likely to be an eventual ecological continuum based in various hydrological influences	Examples of typical sites inlcudes parts of Clooniff or Pollagh (currently part deep peat and being pumped). Open water habitat in Timahoe North may be eqivalent. As is the transition mire developing at Derryhogan (Deep peat with deeper water)	Derrycolumb; Clooniff; Pollagh
Shallow cutaway (peat depths < 2 m, increased ground-water influence)	Shallow cutaway (gravity-drained)	Modelled as wet (topographical basins)	Shallow bare peat (< 2 m deep)	Flatter, more uniform topography	Higher/stable water level for most of year	Wetland methodologies (WPT3/5) Block drains & bunding Should be relatively simple to re-wet Re-profiling may be feasible (on peat) Target is stable water level close to peat or subsoil surface Consider seeding of vegetation - Reeds/rhizomes	This will lead to a wetland mosaic with fen, Reed Swamp, wet woodland	Examples of typical sites inlcude Boora, Cavemount, Turraun (fen vegetation)	Mountlucas; Cavemount
			Bare sub-soil (likely strong alkaline influence on water chemistry)	Flatter, more uniform topography	Higher/stable water level for most of year	Wetland methodologies (WPT3) Block drains & Bunding Target is to re-wet as much as possible - should be relatively easy to re-wet Enhanced measures for peat re-wetting not cost-effective as there is no carbon storage benefit (no peat) Consider seeding of vegetation - Reeds/rhizomes	This will lead to a wetland mosaic with fen, Reed Swamp, wet woodland	Examples of typical sites inlcude Boora, Cavemount, Turraun (fen vegetation)	Cavemount

						Vegetated (fen, Reedbeds, open water, wet woodland)	Variable - but tends to be flatter (correlated with wetland)	Higher/stable water level for most of year	Wetland methodologies (WPT2) Targeted drain blocking to re-wet basins manage summer water levels via outfall management Bunding not a widespread option due to heavy vegetation Target is to raise water levels across larger areas if possible Optimise water levels for wet emergent vegetation	**This will lead to a wetland/dryland mosaic dominated by Birch, and pockets of wetland, fen, Reed swamp, open water**	Examples of typical sites inlcude Derries bog	Derrybrat; Derries; Oughter; Boora
	Shallow cutaway		Shallow cutaway (gravity-drained)		Modelled as dry (slopes drain surface)	Shallow bare peat (< 2 m deep)	Flatter, more uniform topography	Higher/stable water level for most of year	Wetland methodologies (WPT3-5) Block drains & bunding Bunding essential Re-profiling may be feasible (on peat) Target is stable water level close to peat or subsoil surface	**This will lead to a wetland mosaic with fen, Reed Swamp, wet woodland**	Examples of typical sites include Boora and Turraun (Birch, Heather, Bog Cotton & Molinia)	
	Shallow cutaway		Shallow cutaway (gravity-drained)					Fluctuating or low water level - likely to dry out for periods	Wetland methodologies (WPT3-5) Block drains & bunding Bunding essential Re-profiling may be feasible (on peat) Target is stable water level close to peat or subsoil surface	**This will lead to a wetland/dryland mosaic dominated by Birch, and pockets of wetland, fen, Reed swamp, open water**	Examples of typical sites inlcude Derries bog	
	Shallow cutaway		Shallow cutaway (gravity-drained)				Steep, variable (headlands, high fields, mounds, ridges)	Low water levels - likely to relatively dry	Dryland methodologies (DCT2) Block drains Fertiliser treatment, if required Bunding and re-profiling not likely to be cost effective Encourage natural colonisation	**This will lead to a dry mosaic with Birch woodland pre-dominant**	Examples of typical sites inlcude drier parts of many sites (Birch woodland)	
	Shallow cutaway		Shallow cutaway (gravity-drained)			Bare sub-soil (glacial & marls)	Flatter, more uniform topography (marls)	Fluctuating or low water level - likely to dry out for periods	Wetland methodologies (WPT3) Block drains & Bunding Target is to re-wet as much as possible Enhanced measures like re-profiling for peat re-wetting not cost-effective as there is no carbon storage benefit (no peat)	**This will lead to a wetland mosaic with fen, Reed Swamp, wet woodland**	Typical sites inlcude sections of Garryduff and Kilmacshane that dry out in summer	
	Shallow cutaway		Shallow cutaway (gravity-drained)				Steeper, variable (mounds and ridges of sub-soil, glacial)	Low water levels - likely to relatively dry	Dry cutaway (DCT2) Block drains (if effective, drains may be eroded) Fertiliser treatment Bunding and re-profiling not likely to be cost effective Encourage natural colonisation	**This will lead to a dryland mosaic dominated by Birch, dry grassland with high biodiversity value heath, and pockets of wet habitats**	Examples of typical sites include parts of Drinagh and Clongawny (mounds)	
	Shallow cutaway		Shallow cutaway (gravity-drained)			Vegetated (scrub, heath, woodland, fen)	Flatter, more uniform topography	Fluctuating or low water level - likely to dry out for periods	Wetland methodologies (WPT2) Targeted drain blocking Look to manage summer water levels via outfall management Bunding not likely to be a cost/effective option due to heavy vegetation Target is to raise water levels across larger areas if possible Optimise water levels for wet emergent vegetation	**This will lead to a wetland/dryland mosaic dominated by Birch, and pockets of wetland, fen, Reed swamp, open water**	Examples of typical sites inlcude Derries bog	Oughter; Boora
	Shallow cutaway		Shallow cutaway (gravity-drained)				Steep (headlands, mounds and ridges)	Low water levels - likely to relatively dry	Dry cutaway (DCT2) Targeted drain blocking if there is potential value Leave habitats to naturally develop	**This will lead to a dryland mosaic dominated by Birch, dry grassland with high biodiversity value heath, and pockets of wet habitats**	Examples of typical habitats include Carrickhill, Drinagh and Clongawny (mounds)	
	Shallow peat cutaway		Shallow peat cutaway (winter flooded or pumped)		Modelled for shallower summer water levels	Shallow bare peat (< 2 m deep) & bare sub-soil	Variable - but tends to be flatter (correlated with wetland)	high	Wetland methodologies (WPT2) Block drains reduce or cease pumping manage summer water levels by setting new gravity outfall Bunding not likely to be feasible Target is emergent vegetation with water levels < 10 cm Water levels will rise in the winter	**This will lead to wetland mosaic with Reed swamp, fen, wet woodland mosaic of water-levels**	Examples of typical sites include parts of Oughter, Drinagh, Baunmore	
	Shallow cutaway					Vegetated (wetlands)	Variable - but tends to be flatter (correlated with wetland)	high	Wetland methodologies (WPT2) Block drains reduce or cease pumping manage summer water levels by setting new gravity outfall Target is emergent vegetation with water levels < 10 cm Water levels will rise in the winter	**This will lead to wetland mosaic with Reed swamp, fen, wet woodland**	Examples of typical sites include Cavemount ,Drinagh and parts of Blackwater	
	Shallow cutaway		Shallow peat cutaway (winter flooded or pumped)		Modelled for deeper summer water levels	Shallow bare peat (< 2 m deep) & bare sub-soil	Variable - but tends to be flatter (correlated with wetland)	high	Wetland methodologies (DPT1-2) Reduce or cease pumping manage summer water levels by setting new gravity outfall, if possible (subject to DMP) Target is to minimise deeper water where possible in summer via new gravity outfalls These areas will flood in winter	**This will lead to wetland mosaics (fen, Reedbeds) with greater proportions of permanent deeper open water**	Examples of typical sites include Coolumber (Clooniff), Garryduff, Kilmachshane	
	Shallow cutaway					Vegetated (wetlands)	Variable - but generally flatter as wetlands have already formed	high	Wetland methodologies (WPT1-2) Reduce or cease pumping manage summer water levels by setting new gravity outfall, if possible (subject to DMP) Target is to minimise deeper water where possible in summer via new gravity outfalls Water levels will rise in winter	**This will lead to wetland mosaics with greater proportions of permanent deeper open water**	Examples of typical sites inlcude Knappogue and Derrycashel, Kilmacshane	

Appendix B

Emergency Response Plan

Emergency Response Clean-up procedures.

PROCEDURE

Fuel/Oil Spillage

Isolate/switch off fuel/oil spillage source

Obtain access to closest oil-spillage kit located at _____

Travel to closest downstream receiving river bridge and deploy/ secure booms across river width, if spillage has potential to extend to local river.

Assess extent of fuel spillage and deploy booms at associated drain, silt pond inlet or closest outfall or furthest spill extent

Switch off any associated bog pumps.

Depending on spillage source location, construct peat berm to contain spillage

Use adsorbent pads to commence soaking of fuel contaminated water

Store depleted absorbent pads in wheelie bin for hazardous waste disposal

Continue to monitor spillage source, contaminated soils, deployed booms and receiving water and change kit as required.

Peat Spillage

Isolate source of peat spillage (silt pond, failed berm, failed drain block)

Assess extent of peat spill and follow to local receiving water.

Switch off any associated bog pumps.

Construct dry peat berms around extent of peat flow and monitor.

Deploy silt curtain on receiving water if peat spillage has potential to extended to local river.

Continue clean-up as instructed by/under direction of Local Authority / Inland Fisheries Ireland/EPA

BORD NA MÓNA
Naturally Driven

Fuel/Oil spill kit (containment booms and adsorbent materials)

Fuel/oil booms

Adsorbent Pads

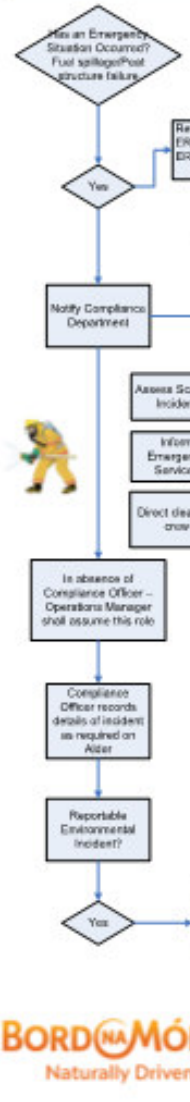
Adsorbent socks

Boom securing pegs

Spill kit

Silt Curtain

EP 5.0 General Emergency Response (IPC Licence Condition 13)



Condition 13 Emergency Response

13.1 The licensee shall, within six months of date of grant of this licence, ensure that a documented Emergency Response Procedure is in place which shall address any emergency situation which may originate on-site. This Procedure shall include provision for minimising the effects of any emergency on the environment.

(xii) Effective spill/leak management of mobile fuelling units.

9.1.1 No potentially polluting substance or matter shall be permitted to discharge to off-site surface waters, off site storm drains or groundwaters.

9.1.13 The licensee shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage.

The licensee shall notify the Agency by both telephone and facsimile, if available, to the Agency's Headquarters in Wexford, or to such other Agency office as may be specified by the Agency, as soon as practicable after the occurrence of any of the following:

4.1.1 Any release to atmosphere resulting in significant impairment of, or significant interference with amenities or the environment.

4.1.2 Any emission which does not comply with the requirements of this licence.

4.1.3 Any incident with the potential for environmental contamination of surface water or groundwater, or posing an environmental threat to air or land, or requiring an emergency response by a Local Authority.

The licensee shall include as part of the notification, date and time of the incident, details of the occurrence, and the steps taken to minimise the emissions and avoid recurrence.

4.2 The licensee shall make a record of any incident as set out in Condition 4.1 above. The notification given to the Agency shall include details of the circumstances giving rise to the incident and all actions taken to minimise the effect on the environment and minimise wastes generated.

4.3 A summary report of reported incidents shall be submitted to the Agency as part of the AER. The information contained in this report shall be prepared in accordance with any relevant guidelines issued by the Agency.

4.4 In the case of any incident as set out in Condition 4.1 above which relates to discharges to water, the licensee shall notify the appropriate Regional Fisheries Board, as soon as practicable after such an incident.

4.5 In the event of any incident, as set out in Condition 4.1.3 having taken place, the licensee shall notify the appropriate Local Authority as soon as practicable, after such an incident.

4.6 In the case of any incident, as set out in Condition 4.1.3, which has the potential to impact the conservation objectives of the Special Areas of Conservation and Natural Heritage Areas identified in Attachment 10.1 of the IPC application having taken place, the licensee shall notify D□chas of the Department of Arts, Heritage, Gaeltacht and the Islands as soon as practicable after such an incident.

BORD NA MÓNA
Naturally Driven

Appendix F: Ecological Survey Report for the Edera Rehabilitation Plan 2021

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:	**Edera**	**Area (ha):**	283ha
Works Name:	Mount Dillon	**County:**	Longford
Recorder(s):	BnM Ecology Section	**Survey/ monitoring Date(s):**	13th July 2012 December 2013 March 2015 January 2019

Habitats present (in order of dominance)

The most common habitats present at this site include:

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

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

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

Description of site

Edera Bog is located approximately 9km to the west of Ballymahon in County Longford. This site is located on the shore of Lough Ree. Industrial peat production ceased on site in 2018. The peat was used as fuel peat in Lough Ree Power in Lanesborough. The Bilberry River flows through the site and a relatively large section of wet grassland and remnant section of raised bog still exist on the site. A rail line connects Edera bog with Derrycolumb Bog to the north. Edera bog is underlain with both marl and gravel.

The main section of production bog to the south of the Bilberry River has only been in production for <20 years and slopes towards the Bilberry River.

The Bilberry river flows through the site and there are two crossing points that machinery and trains use to cross this river. The River has been canalised to an extent but it still retains some natural features such as bends in the river and some deeper pools. The River is surrounded on both sides by relatively extensive areas of wet grassland that are subject to flooding when the River is in flood. The grassland was comprised of species such as Soft Rush, Floating Sweet-Grass, Yorkshire Fog, Reed Canary Grass, Yellow Rattle, Purple Moor Grass, Marsh Arrow Grass and Iris. Scattered trees consisting of Alder and Willow are located throughout this area. There was no evidence of grazing in the area and it is likely to be too wet for any significant amounts of grazing to be carried out. A number of silt ponds are also located in this area. A small round clump of Birch and Alder are located in one area and this

feature is thought to be the remains of a Crannog by archaeologists. To the south of this area lies the location of an old house that has local historical importance.

To the north of the Bilberry river an area of production bog is located. This area contains between 1-2.5 m of peat; however some small sections appear to have been cut away with marl protruding in areas. Common Reed is becoming established on these areas and in some of the field drains.

A significant area of scrub, raised bog and wet grassland is located in the west of the site. This area is located next to Lough Ree and has never been in industrial peat production; however, some domestic turf cutting has been carried out in this area. The remnant section of raised bog does not appear to contain deep peat and is located in the transition zone between what was the former intact raised bog (Edera) and the wet grassland that borders the Lake. Purple Moorgrass was dominant across much of this section of raised bog along with species such as Bog Asphodel, Sundew, Yellow Rattle, Willow, Bog Myrtle, Devil's Bit-Scabious, Gorse, Bog Cotton, Heather, *Sphagnum papillosum*, *S. subnitens*, *S. squarrosum* and *Aulacomnium palustre*. Occasional tufts of Black Bog Rush were located along the edges of this habitat. This area still retained a quaking feel in most parts. This area had been burned in the past two years. The area of wet grassland that occurs between the remnant section of raised bog and Lough Ree was flooded at the time of the ecological survey and could not be accessed.

A small area of remnant raised bog and cutaway bog is located along the north-eastern boundary of the site. This area is used extensively for domestic turf production. This is licensed by Bord na Móna. Sand Martins are nesting in some sections of face bank in this area.

Other habitats along the margins of the site include Birch woodland, wet grassland, dry heath and cutover bog. Overall this bog is young in terms of industrial peat production and still retains a dome towards the centre of the site. The bog is gravity drained and does not have any pumps.

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

The Lough Ree SPA and the Lough Ree SAC (site codes 004064 and 000440 respectively) overlap with a section of the western edge of the site.

Adjacent habitats and land-use

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

Watercourses (major water features on/off site)

- The Bilberry River flows through the site. This River flows into Lough Ree.
- The Owenacharra River flows within 0.5km of the southern boundary of the site.
- The western edge of the site is adjacent to Lough Ree.

Peat type and sub-soils

The majority of the site contains "red" or "*Sphagnum*" peat, especially in the main area of production bog. The peat is underlain with marl and gravel.

Fauna biodiversity

Birds

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

- Marsh Harrier (Bilberry River)
- Water Rail
- Kestrel
- Sand Martin
- Raven
- Other more common species include Grey Heron, Gold Finch, Wood Pigeon, Grey Crow, Robin, Blackbird and Swallow.

Mammals

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

- Fox.
- Badger.
- Mink.
- Pine Marten.
- Otter.

Other species

Large Heath, Green Veined and Meadow Brown butterfly.

References

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).

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

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

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

Appendix G: Standard Operating Procedure for Otters

BORD NA MÓNA Naturally Driven	**Procedure: ECO-001**	**Rev: 1**
Title: Protection of Otter	**Approved:**	**Date: 16/03/21**

1) Purpose

To describe the environmental measures required to protect Otter across all Bord na Móna activities.

2) Scope

To avoid likely significant effects of disturbance, displacement or physical injury to Otter which occur or are likely to occur at any locations where Bord na Móna may be carrying out activities with the potential for effects.

The potential for negative effects will be avoided through adherence to Best Practice measures and the use of confirmatory surveys to establish any requirements such as derogations and/or restriction zones around confirmed breeding or resting sites as appropriate.

This Procedure should be read in association with any other pertinent procedures, in particular around vegetation clearance and working near water.

3) Related Documents

Bord na Mona Silt Pond Maintenance Procedure

Bord na Mona Silt Pond Inspection Procedure

National Roads Authority (2006). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. The National Roads Authority, Dublin.

National Roads Authority (2008.) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. The National Roads Authority, Dublin.

Highways Agency (1999). Design Manual for Roads and Bridges - Nature Conservation Advice in Relation to Otters HA81/99. The Highways Agency, London.

4) Procedure

<u>Environmental Controls</u>

1. Each project, scheduled activity or proposed works will liaise with the Bord na Móna ecology team who will approve and provide guidance on all on site activities which could have an ecological impact.
2. All staff will receive environmental training and/or an Environmental site induction/Toolbox talk before being allowed to work on a Bord na Móna bog.
3. Work will only be able to take place once the Bord na Móna ecology team has signed off on the installation of any required mitigation measures.
4. Adherence to any specified mitigation measures are to be subject to audit by the Bord na Móna ecology team and/or Site Supervisor/Environmental Officer or PSCS as appropriate.
5. Where non-compliance is detected, a system of follow up and corrective action will be implemented.

<u>Preparation</u>

1. Confirmatory surveys will be carried out 150m upstream and downstream of suitable Otter habitat where relevant activities are programmed to occur. This will include silt ponds (cleaning and maintenance), channelized sections of watercourses and bog drainage channels with connectivity to suitable habitat. These confirmatory Otter surveys will be undertaken no more than 12 months in advance of proposed activities, during the period November and April when vegetation cover is reduced. For silt ponds surveys will include an area comprising the pond plus a 50m buffer.
2. Confirmatory surveys will be undertaken by a suitably qualified ecologist.
3. The results of surveys will be communicated to the site manager responsible for scheduling activities on a need to know basis.
4. Zones or locations containing confirmed breeding or resting locations (holts/couches) are to be delineated with signage at an appropriate distance (150m) to prevent disturbance.
5. In addition, any restriction zones are to be digitised and provided in shapefile format for upload to machine PDA's where this facility is available.
6. These Ecological Restriction Zones will be marked out at regular intervals using a combination of appropriate signage or visual markers as appropriate, prior to works or activities commencing during the identified sensitive period.
7. The above will be carried out by a suitably qualified Ecologist/ Bord na Móna ecology team.
8. Surveys results will be confirmed no less than 3 days prior to scheduled activities commencing.
9. If required any derogation applications will be made by the Bord na Móna ecology team/designated project manager.

Operator Training

1. All operators will receive a toolbox talk by a suitably qualified Ecologist/ Bord na Móna ecology team, to educate them on any relevant restrictions prior to the commencement of activities.
2. This will include any restricted areas, the requirement for same, the location of reference documentation such as the schedule of mitigation measures, and the procedure to follow if in doubt as to the locations of activities in respect of any restricted areas.
3. A copy or map illustrating the restriction zones's per bog, and periods wherein activities can be undertaken will be available at all times at the site office.
4. Where pertinent, a schedule of Mitigation Measures per bog will also be available at all times in the site office.

Responsibilities

1. The appointed site manager/PSCS as appropriate will be responsible for recording attendance at toolbox talks and making sure all operators have access to the required reference material, including drawings of restricted areas/ ERZ's.
2. The appointed site manager/PSCS as appropriate as will be responsible for the scheduling of activities
3. The appointed site manager/PSCS as appropriate must be aware of any other site specific mitigation around Otter
4. The Bord na Móna ecology team or Project Ecologist is responsible for conformance auditing

5. If a derogation is required, any activities under same will be overseen by the Bord na Móna ecology team or appointed Project Ecologist.
6. Local NPWS will be made aware of any derogated works/activities before commencement.

Carrying out Activities

1. No works or activities are to be carried out in restricted areas or identified ERZ's during the relevant period as specified by the project ecologist. No works will be carried out within 150m of an active holt.
2. NPWS will be notified of any confirmed active holts.
3. As per NRA (2006) guidelines, following consultation with NPWS, works or activities closer to such breeding holts may take place – provided appropriate mitigation measures are in place, e.g. screening and/or restricted working hours on site;
4. No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under licence (NRA, 2006);
5. Where holts are present in close proximity to invasive activities, but are determined not to require destruction, such activities may commence once recommended alternative mitigation measures to address otters have been complied with (NRA, 2006);
6. Only operators who have received the required training and toolbox talks are to be assigned duties within the above period.
7. Conformance will be audited through compliance checks by the Bord na Móna ecology team /Project Ecologist with 'stop-works' authority.
8. Activities will only be carried out between 08.00 and 17.30 to minimise the potential for disturbance.

5) Records

Evidence of approval (electronic)
Archive files

Revision Index			
Revision	Date	Description of change	Approved

Appendix H: Emergency Response Plan

Emergency Response Clean-up procedures.

PROCEDURE

Fuel/Oil Spillage

Isolate/switch off fuel/oil spillage source

Obtain access to closest oil-spillage kit located at _____

Travel to closest downstream receiving river bridge and deploy/ secure booms across river width, if spillage has potential to extend to local river.

Assess extent of fuel spillage and deploy booms at associated drain, silt pond inlet or closest outfall or furthest spill extent

Switch off any associated bog pumps.

Depending on spillage source location, construct peat berm to contain spillage

Use adsorbent pads to commence soaking of fuel/ contaminated water

Store depleted absorbent pads in wheelie bin for hazardous waste disposal

Continue to monitor spillage source, contaminated soils, deployed booms and receiving water and change kit as required.

Peat Spillage

Isolate source of peat spillage (silt pond, failed berm, failed drain block)

Assess extent of peat spill and follow to local receiving water.

Switch off any associated bog pumps.

Construct dry peat berms around extent of peat flow and monitor.

Deploy silt curtain on receiving water if peat spillage has potential to extended to local river.

Continue clean-up as instructed by/under direction of Local Authority / Inland Fisheries Ireland/EPA

BORD NA MÓNA
Naturally Driven

Fuel/Oil spill kit (containment booms and adsorbent materials)

Fuel/oil booms

Adsorbent Pads

Adsorbent socks

Boom securing pegs

Spill kit

Silt Curtain

EP 5.0 General Emergency Response (IPC Licence Condition 13)

Has an Emergency Situation Occurred? Fuel spillage/Peat structure failure

Yes

Refer to :
ERP Fuel/Oil spill clean-up
ERP Peat spill clean-up

Condition 13 Emergency Response

13.1 The licensee shall, within six months of date of grant of this licence, ensure that a documented Emergency Response Procedure is in place which shall address any emergency situation which may originate on-site. This Procedure shall include provision for minimising the effects of any emergency on the environment.

(xii) Effective spill/leak management of mobile fuelling units.

9.1.1 No potentially polluting substance or matter shall be permitted to discharge to off-site surface waters, off site storm drains or groundwaters.

9.1.13 The licensee shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage.

Notify Compliance Department

The licensee shall notify the Agency by both telephone and facsimile, if available, to the Agency's Headquarters in Wexford, or to such other Agency office as may be specified by the Agency, as soon as practicable after the occurrence of any of the following:
4.1.1 Any release to atmosphere resulting in significant impairment of, or significant interference with amenities or the environment.
4.1.2 Any emission which does not comply with the requirements of this licence.
4.1.3 Any incident with the potential for environmental contamination of surface water or groundwater, or posing an environmental threat to air or land, or requiring an emergency response by a Local Authority.
The licensee shall include as part of the notification, date and time of the incident, details of the occurrence, and the steps taken to minimise the emissions and avoid recurrence.

Assess Scale of Incident

Inform Emergency Services

Direct clean-up crew

In absence of Compliance Officer – Operations Manager shall assume this role

4.2 The licensee shall make a record of any incident as set out in Condition 4.1 above. The notification given to the Agency shall include details of the circumstances giving rise to the incident and all actions taken to minimise the effect on the environment and minimise wastes generated.
4.3 A summary report of reported incidents shall be submitted to the Agency as part of the AER. The information contained in this report shall be prepared in accordance with any relevant guidelines issued by the Agency.
4.4 In the case of any incident as set out in Condition 4.1 above which relates to discharges to water, the licensee shall notify the appropriate Regional Fisheries Board, as soon as practicable after such an incident.
4.5 In the event of any incident, as set out in Condition 4.1.3 having taken place, the licensee shall notify the appropriate Local Authority as soon as practicable, after such an incident.
4.6 In the case of any incident, as set out in Condition 4.1.3, which has the potential to impact the conservation objectives of the Special Areas of Conservation and Natural Heritage Areas identified in Attachment 10.1 of the IPC application having taken place, the licensee shall notify D□chas of the Department of Arts, Heritage, Gaeltacht and the Islands as soon as practicable after such an incident.

Compliance Officer records details of incident as required on Alder

Reportable Environmental Incident?

Yes

Report to EPA via EDEN and Phone Call (056 7796700)

Out of Hours Emergency?

Yes

Contact Designated On-Call Person (056 7796700)

Complete EPA Incident Notification Form on Eden https:// www.edenireland.ie/

BORD NA MÓNA
Naturally Driven