

Article 6(3) Appropriate Assessment Screening Report

Knappoge Bog, Co
Longford
Decommissioning and
Rehabilitation 2022





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Table of Contents

1.	INTRODUCTION.....	1
1.1	Background	1
1.2	Appropriate Assessment	1
1.2.1	Screening for Appropriate Assessment	1
1.2.2	Appropriate Assessment (Natura Impact Statement)	2
1.2.3	Statement of authority	2
2.	DESCRIPTION OF THE PROJECT AND BASELINE ENVIRONMENT	3
2.3	Site location	3
2.4	Site description	3
2.2	Characteristics of the Peatland Climate Action Scheme.....	5
2.2.1	Overview.....	5
2.2.2	Decommissioning and rehabilitation stage.....	5
2.2.2.1	Methodology	6
2.2.2.2	Timescale	15
2.2.2.3	Use of natural resources	16
2.2.3	Operational stage.....	16
2.3	Description of the baseline ecological environment.....	18
2.3.1	Habitats.....	18
2.3.2	Fauna	19
2.3.3	Drainage and connection to European Sites.....	19
2.3.4	Consequences of proposed rehabilitation for current habitats.....	23
3.	IDENTIFICATION OF RELEVANT EUROPEAN SITES	24
3.1	Identification of the European Sites within the Likely Zone of Impact.....	24
3.2	European Sites with the potential to be significantly affected by the PCAS activities	36
3.3	Likely cumulative impact of the PCAS activities on European Sites, in-combination with other plans and projects	36
3.3.1	Review of other plans and projects.....	36
3.3.2	Conclusion of in-combination/cumulative assessment	37
4.	ARTICLE 6(3) APPROPRIATE ASSESSMENT SCREENING STATEMENT AND CONCLUSIONS	38
4.1	Data collected to carry out assessment	38
4.2	Concluding statement	38
	BIBLIOGRAPHY	39

TABLE OF TABLES

Table 2-1: Extent of dry cutaway rehabilitation proposed at Knappoge.	9
Table 2-2: Extent of deep peat cutover bog rehabilitation proposed at Knappoge.....	11
Table 2-3: Extent of wetland cutaway rehabilitation proposed at Knappoge.....	14
Table 2-4: Extent of marginal land rehabilitation proposed at Knappoge.....	15
Table 3-1: Identification of European Sites within Likely Zone of Impact	26

TABLE OF PLATES

Plate 2-1 Indicative Enhanced Rehabilitation Plan for Knappoge Bog (extracted from Rehab Plan Mapbook).....	8
Plate 2-2: Examples of installed overflow pipes.....	10
Plate 2-3 Recolonizing bare peat in the north of the site	20

Plate 2-4 View of wetland area in the west of the site. Re-colonisation of bare peat in the surrounding area is noticeable.....	20
Plate 2-5 Intact raised bog (PB1) in the western extremity of the site.	21

APPENDICES

Appendix 1 ...Knappoge Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2022	
Appendix 2	Rehabilitation Methods

1. INTRODUCTION

1.1 Background

McCarthy Keville O'Sullivan Ltd. (MKO) has been appointed to provide the information necessary to allow the undertaking of an Article 6(3) Screening for Appropriate Assessment for the decommissioning and rehabilitation of Knappoge Bog, Co Longford.

The current project is not directly connected with, or necessary for the management of any European Site, consequently the project has been subject to the Appropriate Assessment Screening process.

The assessment in this report is based on a desk study and field surveys between 2011 and 2020 by Bord na Móna ecologists and on a site visit on the 14th of December 2022 by Inga Reich of MKO. It specifically assesses whether the proposed rehabilitation works will have any impact upon European Sites.

This report has been prepared in accordance with the European Commission guidance document 'Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC' (EC, 2021) and the Department of the Environment's Guidance on the Appropriate Assessment of Plans and Projects in Ireland (December 2009, amended February 2010).

In addition to the guidelines referenced above, the following relevant guidance was considered in preparation of this report:

1. *DoEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government,*
2. *European Communities (2018) 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. European Commission,*
3. *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. European Commission,*
4. *Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission,*
5. *EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC - Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission,*
6. *EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission'*
7. *OPR (2021) Appropriate Assessment Screening for Development Management. Practice Note PN01, Office of the Planning Regulator.*

1.2 Appropriate Assessment

1.2.1 Screening for Appropriate Assessment

Screening is the process of determining whether an Appropriate Assessment is required for a plan or project. Consultants or project proponents may undertake a form of screening to establish if an Appropriate Assessment is required and provide advice or may submit the information necessary to allow the Screening to be undertaken. Where it cannot be excluded beyond reasonable scientific doubt, that a proposed plan or project, individually or in combination with other plans and projects, would have a significant effect on the conservation objectives of a European Site, an Appropriate Assessment (Natura Impact Statement) of the plan or project is required.

1.2.2 Appropriate Assessment (Natura Impact Statement)

The term Natura Impact Statement (NIS) is defined in legislation¹. An NIS, where required, should present the data, information and analysis necessary to reach a definitive determination as to 1) the implications of the plan or project, alone or in combination with other plans and projects, for a European Site in view of its conservation objectives, and 2) whether there will be adverse effects on the integrity of a European Site. The NIS should be underpinned by best scientific knowledge, objective information and by the precautionary principle.

1.2.3 Statement of authority

The site visit was undertaken by Inga Reich (Honours degree in Biology, Ph.D. in Applied Ecology). The report was written by Inga Reich and reviewed by Pat Roberts (B.Sc. (Env.) MCIEEM) who has over 15 years' post graduate experience in ecological consultancy and impact assessment.

¹As defined in Section 177T of the Planning and Development Act, 2000 as amended, an NIS means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own and in combination with other plans and projects, for a European site in view of its conservation objectives. It is required to include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for the European site in view of its conservation objectives

2. DESCRIPTION OF THE PROJECT AND BASELINE ENVIRONMENT

2.3 Site location

Knappoge Bog is located approximately 0.6km southeast of Cloondara and 6km west of Longford town in Co Longford (ITM Grid Ref. X 605562 Y 774108). The N5 runs about 900m to the north-east of the site. The site location is shown in Figure 2-1.

2.4 Site description

Knappoge Bog is located between the River Shannon, which flows to the west of the site, and the Royal Canal, which borders it to the east and Knappoge Bog is frequently flooded during the winter months. Much of the bog is drained via field drains into the Shannon or the River Camlin which flows to the north-east of the bog and is a tributary of the Shannon. Knappoge Bog is linked by an industrial railway line and a machinery travel path to further Bord na Móna (BnM) properties to the west and east. The railway line, which is still maintained to facilitate access through BnM properties, runs from east to west.

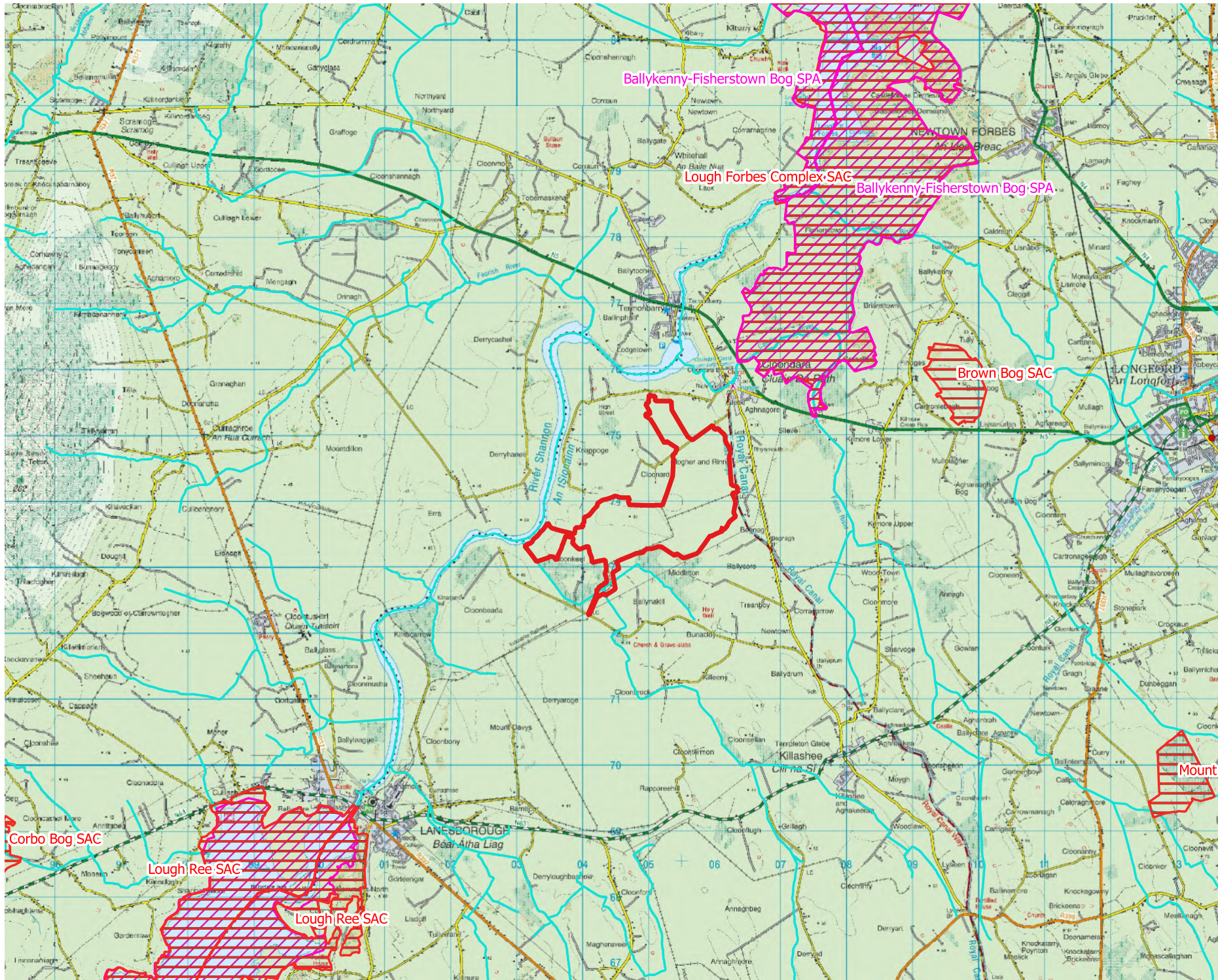
Knappoge Bog had a partially pumped drainage regime, but pumps have ceased now. Commercial peat production was undertaken at Knappoge Bog between 1963 and 2018 and the peat was used as fuel peat in Lough Ree Power in Lanesborough. Peat depths are shallow for the most part (i.e. <1m) apart from the NE corner of the northernmost section where extant peats are up to 2.5m in depth.

The underlying geology at Knappoge Bog comprises Visean Limestones (undifferentiated)². Subsoils at Knappoge comprise silty clays, silty clay loams overlain by deposits of organic mud or marl deposits.

Longford County Council proposes to undertake a project comprising the construction of amenity trackway through part of Knappoge Bog, parts of which have been built already. The development will consist of the construction of a trackway approximately 2.3km in length through the townlands of Knappoge, Cloonkeel and Ballynakill at Knappoge Bog. The works will consist of a walkway and a number of activity areas at various locations.

The surrounding landscape primarily consists of low-lying agricultural land (pasture) interspersed with other raised bogs, many of which have also been managed by BnM for peat production with some areas utilised for domestic turf-cutting. Some small areas of plantation forestry also occur in the area, particularly to the south of the site.

² <https://www.gsi.ie/en-ie/data-and-maps/Pages/Bedrock.aspx>



Map Legend

- Site boundary
- Special Area of Conservation
- Special Protection Area
- Watercourse

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Site location Knappoge Bog

Project Title

Bord na Mona Bog Rehabilitation

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2.2 Characteristics of the Peatland Climate Action Scheme

2.2.1 Overview

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), of which Knappoge Bog is part of. As part of Conditions 10.1 and 10.2 of this license, respectively, decommissioning and rehabilitation (D & R) must be undertaken to ensure the permanent rehabilitation of the cutaway bog lands within the licensed area.

A document titled ‘*Knappoge Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2022*’ has been prepared specifically to describe the proposed D & R measures at Knappoge Bog and is appended to this document as Appendix 1.

It is proposed by Government that Bord na Móna (BnM) carry out a Peatland Climate Action Scheme (PCAS) on peatlands previously used for energy production. The additional costs of the proposed Scheme will be supported by Government through the Climate Action Fund and Ireland’s National Recovery and Resilience Plan. Bord na Móna have identified a footprint of 33,000 Ha (a subset of the BnM estate that has been used for energy production) as peatlands suitable for enhanced rehabilitation – including Knappoge Bog. This proposed scheme will significantly go beyond what is required to meet rehabilitation obligations under existing EPA IPC licence conditions.

Decommissioning seeks to address condition 10.1 of license Ref. 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 dependent 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.”

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.

2.2.2 Decommissioning and rehabilitation stage

The proposed **decommissioning** at Knappoge Bog includes:

- clean-up of bog,
- cleaning of existing silt ponds,
- de-sludging of septic tanks.

If feasible, the bog pumps will be decommissioned and removed.

Enhanced measures include:

- removal of railway lines,
- decommissioning of existing level crossings,
- measures to restrict access to areas of the bog e.g., around silt ponds).

If feasible, bridges and underpasses will be decommissioned, and high voltage power lines will be removed.

Of the 314.2 Ha, 272.9 Ha or 86.9% of the present landcover will be subject to **rehabilitation** measures. These are bespoke interventions designed to stabilise the existing baseline and meet compliance with the requirements of the existing EPA, IPC License and the proposed PCAS (Plate 2-1). Prescriptive measures are unique to the existing baseline habitats and comprise 4 no. broad categories, 1) those associated with dry cutaway (Table 2-1), 2) measures associated with deep peat cutover bog (Table 2-2), 3) those associated with wetland cutaway (Table 2-3) and 4) measures associated with marginal land (Table 2-4). 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 proposed Knappoge rehabilitation will be undertaken using standard best practices in peatland restoration. These are based on published information in the Irish context, methodologies developed through rehabilitation trials, best practices employed elsewhere in Europe on peatland rehabilitation and restoration but also the experience of 40 years of research on the after-use development and rehabilitation of the BnM cutaway bogs (Clarke & Rieley 2010), including examples such as the BnM Raised Bog Restoration Project (Bord na Móna 2014).

Access during the D & R phase will be through the existing entrance on the Clogher and Rinn Road to the east of the site, where existing infrastructure is already in place via access tracks to facilitate the previous peat extraction. An additional access point is found at the Knappoge to Clonkeel Road to the south-west of the site.

In terms of rehabilitation, the ecological and site information collected during BnM ecological baseline surveys, additional site visits, stakeholder input, and monitoring and desktop analysis forms the basis for the planning of peatland rehabilitation at Knappoge Bog, along with:

- Significant international engagement during this period with other countries in relation to best-practise regarding peatland rehabilitation and after-use through the International Peatland 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;
- Hydrological modelling.

2.2.2.1 Methodology

Decommissioning

Decommissioning at Knappoge 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. P0504-01. 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 Knappoge. 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 Knappoge 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, BnM will utilize the appropriate waste hierarchy to identify waste that can be 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 an 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.

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

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 the 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.

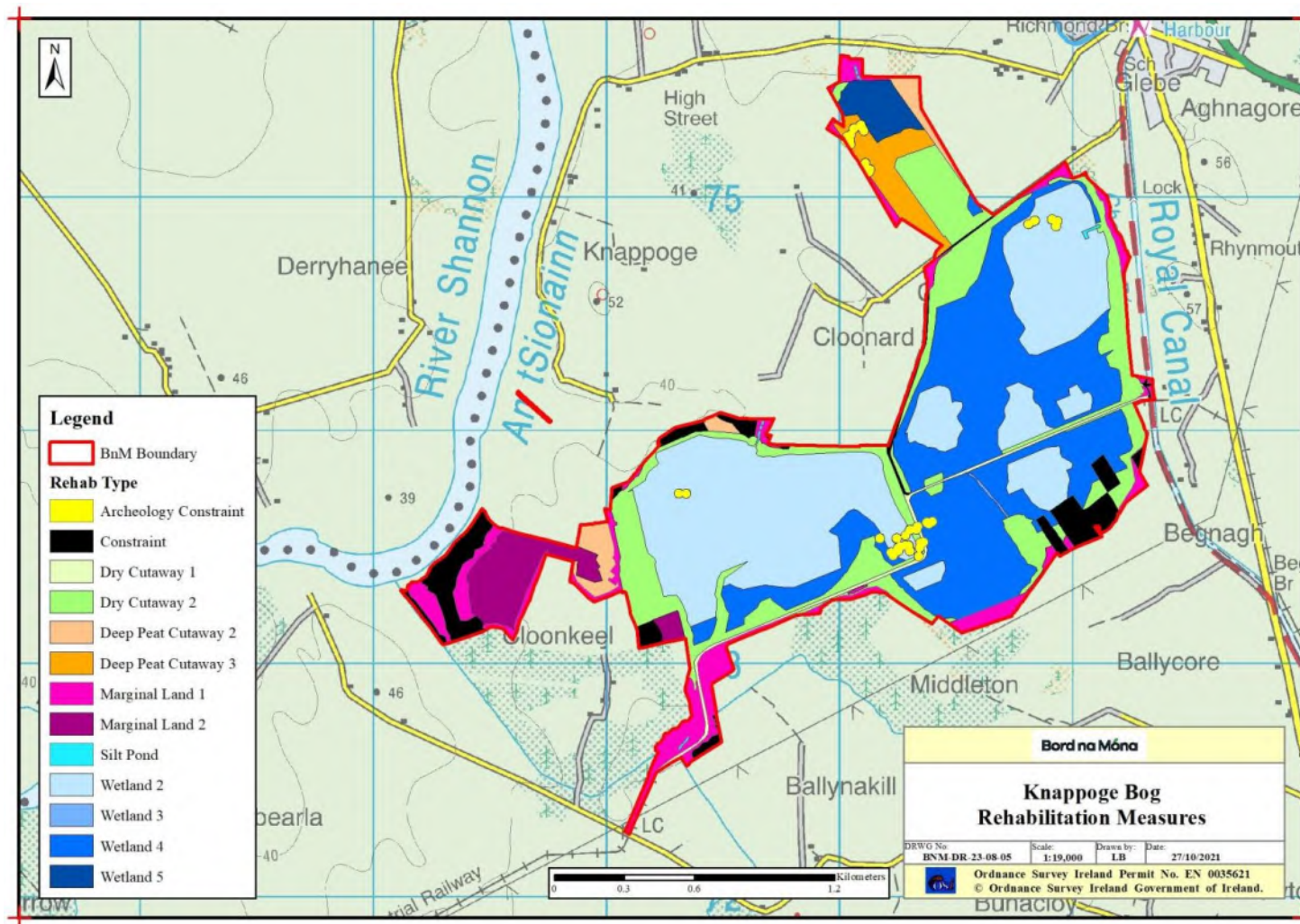


Plate 2-1 Indicative Enhanced Rehabilitation Plan for Knappoge Bog (extracted from Rehab Plan Mapbook)

Rehabilitation

Dry cutaway rehabilitation packages

The key intervention to be applied to dry cutaway is re-wetting of 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 \pm 50mm). Several different approaches can be taken to this type of restoration/rehabilitation, and three rehabilitation packages with different intensities to managing suitable hydrological conditions are proposed (Table 2-1).

Table 2-1: Extent of dry cutaway rehabilitation proposed at Knappoge.

Dry Cutaway		Extent (Ha)
DCT1	Blocking outfalls and managing water levels with overflow pipes	3.65
DCT2	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	52.66
DCT3	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	N/A

The constituent prescriptions which combine to form the dry cutaway rehabilitation packages DCT1 and DCT2 at Knappoge Bog are further described, namely:

1. Blocking outfalls
2. Managing water levels with overflow pipes
3. Regular drain blocking (3/100m)
4. Targeted fertiliser treatment

1. Blocking outfalls (Appendix 2, PCAS-0100-014)

The key objective from targeted blocking of outfalls within a bog is to re-wet peat but to manage waterlevels 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 0-0.1m 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.

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

2. Managing water levels with overflow pipes (Plate 2-2; Appendix 2, PCAS-0100-014)

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.

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



Plate 2-2: Examples of installed overflow pipes

3. Regular drain blocking (3/100m) (Appendix 2, PCAS-0100-008)

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) and in line with methodologies originally developed by McDonagh (1997).

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

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

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

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

4. Targeted fertiliser treatment

Rock phosphate will be applied to areas of bare peat on headlands, high fields and other areas to accelerate establishment of vegetation either by hand or using a tractor. The application rate will be kept to a minimum.

Deep peat cutover bog rehabilitation packages

The key intervention to be applied to deep peat cutover bog is re-wetting of 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 ($0.1\text{m} \pm 0.05\text{m}$). Several different approaches can be taken to this type of restoration/rehabilitation, and five rehabilitation packages with different intensities to managing suitable hydrological conditions are proposed (Table 2-2).

Table 2-2: Extent of deep peat cutover bog rehabilitation proposed at Knappoge.

Deep peat cutover bog		Extent (Ha)
DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes	N/A
DPT2	More intensive drain blocking (max 7/100 m) + blocking outfalls and managing water levels with overflow pipes + <i>Sphagnum</i> inoculation	6.26
DPT3	More intensive drain blocking (max 7/100 m) + field reprofiling & blocking outfalls and managing water levels with overflow pipes + <i>Sphagnum</i> inoculation	8.85
DPT4	Berms and field reprofiling (45m x 60m cell) + blocking outfalls and managing water levels with overflow pipes + drainage channels for excess water + <i>Sphagnum</i> inoculation	N/A
DPT5	Cut and fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + <i>Sphagnum</i> inoculation	N/A

The constituent prescriptions which combine to form the deep peat cutover bog rehabilitation packages DPT2 and DPT3 at Knappoge Bog are further described below, namely:

1. More intensive drain blocking (max 7/100m)
2. Blocking outfalls (see *dry cutaway rehabilitation* for details)
3. Managing water levels with overflow pipes (see *dry cutaway rehabilitation* for details)
4. *Sphagnum* inoculation
5. Field reprofiling

1. More intensive drain blocking (max 7/100m) (Appendix 2, PCAS-0100-002)

This measure can be applied to cutover bog, cutaway bog and drained raised bog with different environmental characteristics. It can be applied to residual peat of various depths including deep cutover peat. The main objective is to block drains with peat barriers to raise water levels, re-wetting peat and slowing water movements through the site. Slowing water movement will have additional benefits of reducing fluvial carbon loss (via water) and also improving water quality leaving the site by reducing emissions of silt and ammonia.

The number of peat blockages per 100m is determined by the topography of the site, but an allowance has been estimated at a maximum of 7 blocks per 100m of field drain. The methodology follows NPWS guidelines published by the National Parks and Wildlife Service (Mackin et al., 2017) and in line with methodologies originally developed by McDonagh (1997). The increased number of peat blockages (compared with the standard measures) will benefit re-wetting and trapping silt on cutaway with slightly greater slopes and will further slow the movement of water from these sites.

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

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

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

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

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

6. The borrow pit is backfilled with the peat extracted from the bottom of the drain in step 2. The sides of the peat borrow hole are firmly pressed with the excavator bucket to grade the sides of the borrow pit. This enhanced measure's main objective is to block drains with peat dams to raise water levels, re-wetting peat and slowing water movements through the bog.

4. 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.

5. Field reprofiling (Appendix 2, PCAS-0100-003/4)

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

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

Phase 1: Re-Profiling of Field Surface

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

Phase 2: Peat Dam Drain Blocking

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

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

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

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

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

OR

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

Phase 1: Re-Profiling of Field Surface

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

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

Phase 2 Levelling of Loose Peat

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

Phase 3 Peat Dam Drain Blocking

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

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

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

The borrow pit is then back filled with the peat extracted from the bottom of the drain. The sides of the borrow pit are pressed down and graded with the excavator bucket. (If any vegetation present, it is

carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.

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

Wetland cutaway rehabilitation packages

The key intervention to be applied to wetland cutaway is re-wetting of peat and maximisation of water retention to aid the development of wetland habitats comprising e.g., reed beds. This requires managing water-levels to reach depths of < 0.5m during the summer so wetland vegetation can develop. Several different approaches can be taken to this type of restoration/rehabilitation, and five rehabilitation packages with different intensities to managing suitable hydrological conditions are proposed (Table 2-3).

Table 2-3: Extent of wetland cutaway rehabilitation proposed at Knappoge.

Wetland Cutaway		Extent (Ha)
WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes	N/A
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	99.31
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	0.23
WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing water levels with overflow pipes + transplanting reeds and other rhizomes	83.76
WLT5	More intensive drain blocking (max 7/100 m), + field reprofiling + blocking outfalls and managing water levels with overflow pipes + transplanting reeds and other rhizomes	5.75

The constituent prescriptions which combine to form the Wetland Rehabilitation packages WLT2, WLT3, WLT4 and WLT5 at Knappoge Bog are further described, namely:

1. Turn off or reduce pumping (no explanation required)
2. Blocking outfalls (see *dry cutaway rehabilitation* for details)
3. Managing water levels with overflow pipes (see *dry cutaway rehabilitation* for details)
4. Blocking outfalls (targeted) (see *dry cutaway rehabilitation* for details on blocking outfalls)
5. Constructing larger berms to re-wet cutaway
6. Transplanting reeds and other rhizomes
7. More intensive drain blocking (max 7/100m) (see *deep peat cutover bog rehabilitation* for details)
8. Field reprofiling (see *deep peat cutover bog rehabilitation* for details)

5. Constructing larger berms to re-wet cutaway (Appendix 2, PCAS-0100-010)

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.

Typical existing production 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 and promote the creation of enclosed areas of wetland habitat with shallow water levels – in particular in areas where shallow peat depths remain.

The typical approach can be described as a number of phases.

Phase 1: Forming Key and Initial Drain Block

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 from the opposite side of the drain to the excavator. A key is also formed similarly on the opposite side of the production field at the end of the proposed berm.

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 an approximately 5m Wide x 500mm High Cross Berm.

6. Transplanting reeds and other rhizomes

Rhizomes will be collected from a donor area and transported to the site where they will be distributed throughout the respected area and replanted using an excavator. Through the other measures in this package, water levels will be kept high enough to encourage the development of reedbeds. This option may likely not be required as there has already been significant natural colonisation.

The number of peat blockages per 100m is determined by the topography of the site, but an allowance has been estimated at a maximum of 7 blocks per 100m of field drain. The methodology follows NPWS guidelines published by the National Parks and Wildlife Service (Mackin *et al.*, 2017) and in line with methodologies originally developed by McDonagh (1997). The increased number of peat blockages (compared with the standard measures) will benefit re-wetting and trapping silt on cutaway with slightly greater slopes and will further slow the movement of water from these sites.

Peat blocks are constructed efficiently by excavator and bulldozer generally operating at a perpendicular direction to the field drains. The process involves clearing the drain by removing dry degraded peat/vegetation and creating a 'key' (wider than the drain and approximately 0.5m deep) 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' (avoiding the top 0.1-0.2m) and involves placing layer after layer (about 0.3m each) of peat which are compacted in the drain using the bucket of the excavator. The blockage will be built up at least 0.3-0.5m above the ground level of the bog to allow for subsequent shrinkage that occurs during peat drying. If vegetation was removed from the drain before clearing it, this should be placed on top of the blockage. The 'borrow pit' will be filled in with the peat that was extracted from the bottom of the drain and the sides of the pit should be pressed down and graded.

Marginal land rehabilitation packages

Depending on the habitat, marginal land might require drainage of different intensities to managing suitable hydrological conditions (Table 2-4).

Table 2-4: Extent of marginal land rehabilitation proposed at Knappoge.

Marginal Land		Extent (Ha)
MLT1	No work required	24.1
MLT2	More intensive drain blocking (max 7/100 m)	12.3

Some of the marginal land will require no work, while more intensive drain blocking (max 7/100m) is prescribed for other areas. This method has been described in the *deep peat cutover bog rehabilitation* packages section above.

2.2.2.2 Timescale

- Decommissioning activities will be completed within a period of 12 months but may be phased across 2 calendar years and are scheduled to be completed before the end of 2022.

- 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 decommissioning stage may overlap rehabilitation activities.
- 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.
- Normal working times will be daylight hours between 08.00 and 17.30hrs Monday to Friday.

2.2.2.3 Use of natural resources

- There is no land requirement in respect of decommissioning.
- In total, rehabilitation activities will take place on 272.9 Ha 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'.
- No additional water is required for either decommissioning or rehabilitation.
- 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 dam locations and immediately used to form peat dams. Borrow pits are re-instated, as the final step in dam 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 dependent 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.
- Dozers may be used to infill drains with peat displaced by screw levelling. Peat will also be utilised to infill any blocked outfalls or raised drainage pipes.
- Reeds and other rhizomes will be transplanted into wetland cutaway.
- Hydrocarbons will be used on-site during rehabilitation activities and will be limited to the diesel or petrol fuel and mechanical oils used by any onsite site machinery and equipment.
- Fertilisers may be used to treat high fields and headlands to encourage natural colonisation.

Emissions and wastes

- 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 dams to block drains or blocking outfalls is momentary in duration and therefore considered negligible in magnitude. 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).
- Fuel and some pipes may require to be delivered. No blasting or piling is required.
- 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.

2.2.3 Operational stage

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 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.
- Access will be through the existing entrance on the Clogher and Rinn Road to the east of the site, where existing infrastructure is already in place via access tracks to facilitate the previous peat extraction. An additional access point is found at the Knappoge to Clonkeel Road to the south-west of the site.

Timing and duration 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.
- Once constructed and commissioned, the proposed decommissioning and rehabilitation will remain permanently in place.

Use of natural resources

- 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 and wastes

- 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.
- Collectively, 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.
- Following rehabilitation and into the early operational stage Knappoge 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.

Description of the baseline ecological environment

Assessing the impacts of any project and associated activities requires an understanding of the ecological baseline conditions prior to and at the time of the project proceeding. Ecological Baseline conditions are those existing in the absence of proposed activities (CIEEM, 2018).

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, Knappoge Bog was surveyed in March of 2011. Additional ecological walkover surveys and visits have taken place at Knappoge Bog between 2012-2020 (visited during winter 2013, 2014, 2018, 2019 and a final confirmatory survey took place in October of 2020). Habitat maps have been updated, where required. This rehabilitation plan is informed by the original baseline survey as well as subsequent confirmatory site walk-over surveys and visits, and updates to baseline data.

Habitat mapping followed best-practise guidance from Smith *et al.* (2011). 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 Atherton *et al.* (2010). A more detailed BnM classification system was previously 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 Knappoge Bog is contained in Appendix III of Appendix 1.

A walkover survey was conducted on the 14th of January 2022 by Inga Reich to confirm the ecological baseline as identified by Bord na Móna in the preceding surveys and as shown in the habitat map (Figure 2-2). During the survey, 2 whooper swans and a large number of mute swans as well as mallards and other small waterfowl (coot or moorhen, not discernible with the binoculars) were identified on the wetland areas and three snipes were flushed from different areas within the site. Footprints of badger and faeces of fox were also recorded from the site. Pitcher plant was recorded north of the wetland area in the west of the site.

Habitats

Vegetation is becoming established on most sections of the bog. Revegetation appears to begin with soft rush (*Juncus effusus*) along the drains, followed by birch (*Betula pubescens*) becoming established along with the soft rush (Plate 2-3). A network of railway lines exists which are elevated above the level of the surrounding (former) production bog- sections of which has effectively hedgerows to either side.

A large area of open water (**FL4**) and wetland has now developed in the western part of the site (Plate 2-4). Surrounding this is a margin of **cutover bog (PB4)** now dominated by emergent birch **scrub (WS1)** and other vegetation. Other bodies of standing water also exist to the east and northeast of the bog- and are subject to inundation from the Shannon during the winter period which increases their respective extent. Water levels reduce in the summer.

The western extremity of Knappoge contains an area of intact **raised bog (PB1)** which forms part of a larger bog (a small portion of the raised bog is not in BnM ownership) (Plate 2-5). A small section on the eastern edge of this habitat has been ditched but the majority of the raised bog has never been extensively drained.

The **wet grassland (GS4)** adjacent the River Shannon is dominated by purple moorgrass (*Molinia caerulea*) on the higher ground that slopes towards the river while a band of reed canary-grass (*Phalaris arundinacea*) dominated grassland occurred on the lower lying, flood prone ground. Reed beds dominated by common reed (*Phragmites australis*) bordered the river's edge. The wet grassland does not appear to have been grazed in recent years, as a consequence scrub is encroaching in this area.

The remainder of the bog which does not comprise open water is re-vegetating, mainly with soft rush and birch. Due to the undulating nature of the surface of the former production bog, small hills and ridges have been exposed and many of these features are impeding the original drainage on the bog resulting in smaller areas of open water developing.

2.3.2 Fauna

Bird species observed at Knappoge during the BnM surveys include Whooper Swan (*Cygnus cygnus*), up to 205 no. birds have been present on at least one occasion. Other wintering wildfowl include amber-listed Teal (*Anas crecca*) and red-listed Wigeon (*Anas penelope*) and Tufted Duck (*Aythya fuligula*), Mallard (*Anas platyrhynchos*) and Mute Swan (*Cygnus olor*) also occur. Flocks of ducks including Teal, Mallard, Wigeon and Tufted duck numbering greater than 200 individuals combined have been recorded at Knappoge. The Red-listed Greenland white-fronted goose (*Anser albifrons flavirostris*) has been recorded by BnM ecologists when 4-6 individuals were present in the winter of 2017/18. Amber-listed Hen Harrier (*Circus cyaneus*) has been recorded during the winter period at Knappoge. In October of 2020, both red-listed Northern Lapwing (*Vanellus vanellus*) (n=13) and amber-listed Common Snipe (*Gallinago gallinago*) (n=6) were present at Knappoge. Studies to inform the nearby Derryadd Wind Farm planning application recorded red-listed European Golden Plover (*Pluvialis apricaria*) at Knappoge during the winter period and breeding Northern Lapwing 'near to' Knappoge.

Signs of several mammal species have been noted by BnM during surveys of Knappoge including Red Fox (*Vulpes vulpes*), Badger (*Meles meles*), and Otter (*Lutra lutra*). The invasive Coypu (*Myocastor coypus*) has previously been observed at Knappoge in 2017.

2.3.3 Drainage and connection to European Sites

The bog is drained via field drains to the Shannon itself, the Camlin River, a tributary of the Shannon and other, smaller tributaries located to the south of Knappoge Bog. Four sets of silt ponds are present around the margins of the bog to manage discharges into the watercourses/drainage networks which drain the bog. Field drains run north-east to south-west in both the eastern and western sections of Knappoge. The northernmost segment at Clogher and Rinn, has drains which flow north-west to south-east. Where the drains enter the Camlin River, it is located downstream of the Lough Forbes Complex SAC and Ballykenny Fisherstown Bog Complex SPA and the next downstream European Sites are Lough Ree SAC and SPA, approximately 8km hydrological distance away from the bog.



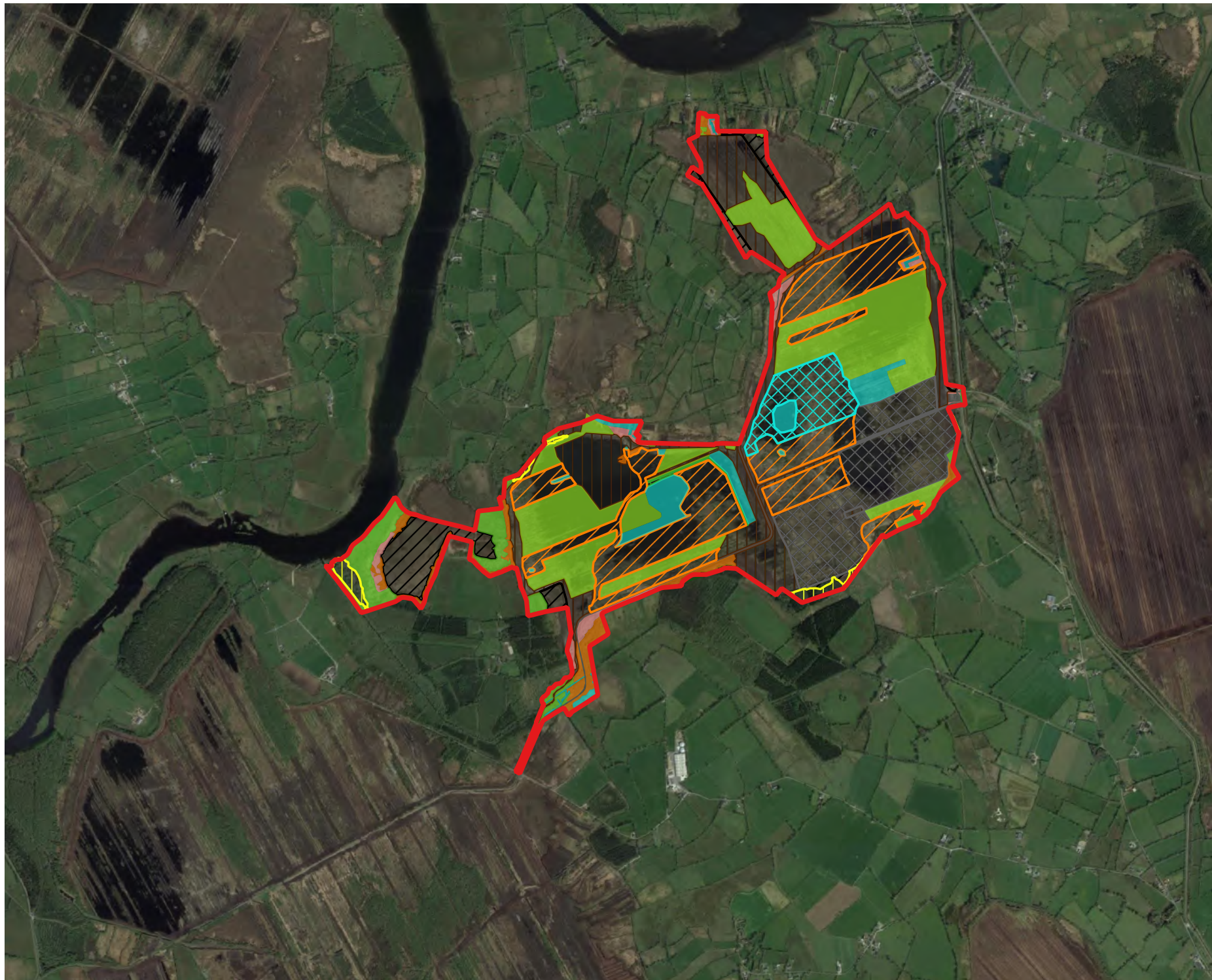
Plate 2-3 Recolonizing bare peat in the north of the site



Plate 2-4 View of wetland area in the west of the site. Re-colonisation of bare peat in the surrounding area is noticeable.



Plate 2-5 Intact raised bog (PB1) in the western extremity of the site.



Map Legend

- Site boundary
- bare peat
- bog
- built
- conifer plantation
- grassland or agriculture
- gravel sub soil
- heath
- pioneer open cutaway habitats
- riparian
- scrub
- scrub & pioneer open cutaway habitats
- wetlands
- wetlands & scrub
- woodland



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Drawing Title

Knappoge Bog Habitat Map

Project Title

Bord na Mona Bog Rehabilitation

Drawn By	Checked By
IR	PR
Project No.	Drawing No.
211019	2-2
Scale	Date
1:25000	02.02.2022



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2.3.4

Consequences of proposed rehabilitation for current habitats

Post rehabilitation, the majority of Knappoge Bog will develop a mosaic of wetland habitats including reed swamp, fen and wet woodland. There is only a small portion of residual deep peat where embryonic peat-forming (*Sphagnum*-rich) vegetation communities may develop.

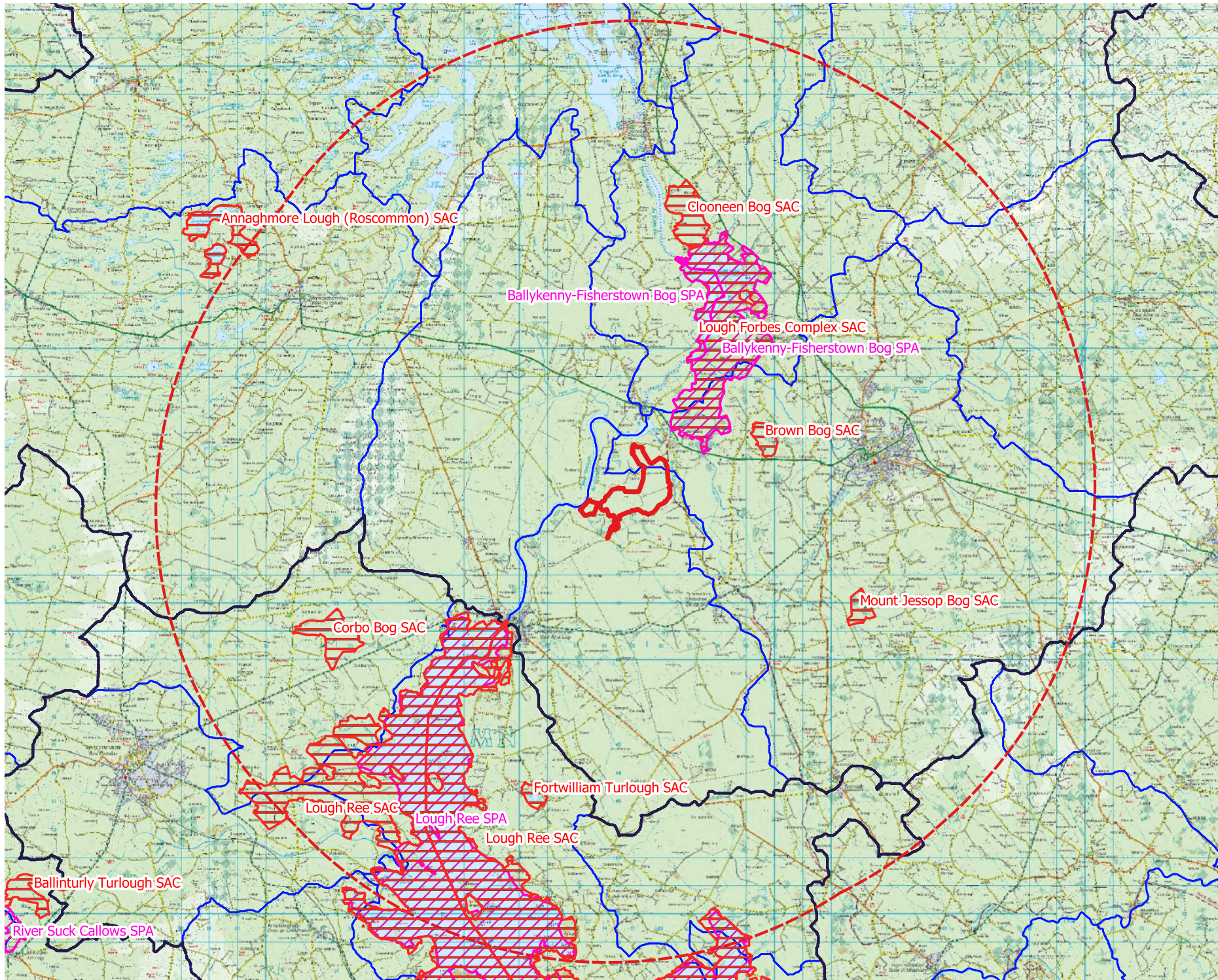
Habitats currently evaluated as not requiring rehabilitation (i.e., marginal land) will remain in line with existing baseline trends for these habitats. An amenity trackway is also proposed for this site.

3. IDENTIFICATION OF RELEVANT EUROPEAN SITES

3.1 Identification of the European Sites within the Likely Zone of Impact

The following methodology was used to establish which European Sites are within the Likely Zone of Impact of the proposed development:

- Initially the most up to date GIS spatial datasets for European designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 06/01/2022. The datasets were utilized to identify European Sites which could feasibly be affected by the proposed development.
- All European Sites within a distance of 15km surrounding Knappoge Bog were identified and are shown on Figure 3.1. In addition, the potential for connectivity with European Sites at distances of greater than 15km from the site was also considered in this initial assessment. In this case, no potential for the proposed works to result in significant effects on sites located at a distance of over 15km from Knappoge Bog was identified.
- The catchment mapping was used to establish or discount potential hydrological connectivity between Knappoge Bog and any European Sites. The hydrological catchments are also shown in Figure 3.1.
- In relation to Special Protection Areas, in the absence of any specific European or Irish guidance in relation to such sites, the Scottish Natural Heritage (SNH) Guidance, *'Assessing Connectivity with Special Protection Areas (SPA)'* (2016) was consulted. This document provides guidance in relation to the identification of connectivity between proposed development and Special Protection Areas. The guidance takes into consideration the distances species may travel beyond the boundary of their SPAs and provides information on dispersal and foraging ranges of bird species which are frequently encountered when considering plans and projects.
- Table 3-1 provides details of all relevant European Sites as identified in the preceding steps and assesses which are within the likely Zone of Impact. The assessment considers any likely direct or indirect impacts of the rehabilitation works, both alone and in combination with other plans and projects, on European Sites by virtue of the following criteria: size and scale, land-take, distance from the European Site or key features of the site, resource requirements, emissions, excavation requirements, transportation requirements and duration of the works were considered in this screening assessment.
- The site synopses and conservation objectives of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report 06/01/2022.
- Where potential pathways for Significant Effect are identified, the site is included within the Likely Zone of Impact and considered in the Screening Assessment.



Map Legend

- Site boundary
- 15km Buffer
- Special Area of Conservation
- Special Protection Area
- Hydrological Catchment
- Hydrological Subcatchment

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Drawing Title
European Sites within 15km radius of Knappoge Bog

Project Title
Bord na Mona Bog Rehabilitation

Drawn By	IR	Checked By	PR
Project No.	211019	Drawing No.	3-1
Scale	1:175000	Date	02.02.2022

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Table 3-1: Identification of European Sites within Likely Zone of Impact

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
Special Area of Conservation			
<p>Lough Forbes Complex SAC [001818]</p> <p>Distance: 1km</p>	<ul style="list-style-type: none"> ➤ [3150] Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation ➤ [7110] Active raised bogs ➤ [7120] Degraded raised bogs still capable of natural regeneration ➤ [7150] Depressions on peat substrates of the Rhynchosporion ➤ [91E0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) 	<p>Detailed conservation objectives for this site (Version 1, May 2016) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There will be no direct effects on this SAC as the project footprint is located entirely outside the designated site.</p> <p>The is no complete source-impact-pathway for the following habitats due to their terrestrial nature and distance from the site:</p> <ul style="list-style-type: none"> ➤ [7110] Active raised bogs ➤ [7120] Degraded raised bogs still capable of natural regeneration ➤ [7150] Depressions on peat substrates of the Rhynchosporion <p>There is no hydrological connection between Knappoge Bog and the SAC and there is no complete source-impact-pathway for the following habitats due to a lack of hydrological connectivity and distance from the site:</p> <ul style="list-style-type: none"> ➤ [3150] Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation ➤ [91E0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
			As such, there is no potential for indirect effects to occur. This site is not in the Likely Zone of Impact and no further assessment is required.
Brown Bog SAC [002346] Distance: 3.2km	<ul style="list-style-type: none"> ➤ [7110] Active raised bogs ➤ [7120] Degraded raised bogs still capable of natural regeneration ➤ [7150] Depressions on peat substrates of the Rhynchosporion 	Detailed conservation objectives for this site (Version 1, February 2016) were reviewed as part of the assessment and are available at www.npws.ie	<p>There will be no direct effects on this SAC as the project footprint is located entirely outside the designated site.</p> <p>Due to the terrestrial nature of the QI habitats and distance from the site, no complete source-impact-pathway was identified. As such, there is no potential for indirect effects to occur.</p> <p>This site is not in the Likely Zone of Impact and no further assessment is required.</p>
Lough Ree SAC [000440] Distance: 4.6km	<ul style="list-style-type: none"> ➤ [1355] Otter (<i>Lutra lutra</i>) ➤ [3150] Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation ➤ [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) ➤ [7110] Active raised bogs 	Detailed conservation objectives for this site (Version 1, August 2016) were reviewed as part of the assessment and are available at www.npws.ie	<p>There will be no direct effects on this SAC as the project footprint is located entirely outside the designated site.</p> <p>The is no complete source-impact-pathway for the following habitats due to their terrestrial nature and distance from the site:</p> <ul style="list-style-type: none"> ➤ 6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
	<ul style="list-style-type: none"> ➤ [7120] Degraded raised bogs still capable of natural regeneration ➤ [7230] Alkaline fens ➤ [8240] Limestone pavement ➤ [91D0] Bog woodland ➤ [91E0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) 		<ul style="list-style-type: none"> ➤ [7110] Active raised bogs ➤ [7120] Degraded raised bogs still capable of natural regeneration ➤ [8240] Limestone pavement ➤ [91D0] Bog woodland <p>As such, there is no potential for indirect effects on these habitats.</p> <p>Following the precautionary principle, a potential pathway for effect on the following QI habitats and species was identified through surface water connectivity via the Shannon River into which the bog drains and which ultimately flows into Lough Ree:</p> <ul style="list-style-type: none"> ➤ [3150] Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation ➤ [7230] Alkaline fens ➤ [91E0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) ➤ [1355] Otter (<i>Lutra lutra</i>) <p>However, the objective of the works involved in the D & R is to stabilise the bog. These works are specifically designed to reverse the drainage of the bog and to minimise the run-off of waters from it. The works will be similar in intensity to the active production that was undertaken until recently, but will be less invasive,</p>

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
			<p>short term and will involve an estimated six machines/crews working at any one time on the bog for an expected period of 2 years. There is no potential for these works to result in significant effects on downstream watercourses and ecological receptors as the works primarily involve the blocking of drainage pathways from the bog. Following the implementation of the PCAS, there will be no possibility of further effects. As such, in the absence of any mitigation, there is no potential for any significant effect on these QI receptors as a result of water pollution or change to the hydrological regime within the SAC.</p> <p>The potential for disturbance to otter, where it occurs outside the SAC was also assessed.</p> <p>While otter has been recorded from Knappoge Bog during the BuM surveys, the works will not result in any loss of otter habitat, are short term and will not be occurring over the entire bog at any one time, leaving much of the bog and potential otter habitat completely undisturbed. Hence there is no potential for the works, in the absence of any mitigation, to result in significant disturbance to this QI species.</p> <p>There is no potential for significant effects on this SAC and no further assessment is required.</p>

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
<p>Clooneen Bog SAC [002348]</p> <p>Distance: 7.2km</p>	<ul style="list-style-type: none"> ➤ [7110] Active raised bogs ➤ [7120] Degraded raised bogs still capable of natural regeneration ➤ [7150] Depressions on peat substrates of the Rhynchosporion ➤ [910D] Bog woodland 	<p>Detailed conservation objectives for this site (Version 1, August 2016) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There will be no direct effects on this SAC as the project footprint is located entirely outside the designated site.</p> <p>Due to the terrestrial nature of the QI habitats and the distance from the site, no complete source-impact-pathway was identified. As such, there is no potential for indirect effects to occur.</p> <p>This site is not in the Likely Zone of Impact and no further assessment is required.</p>
<p>Mount Jessop Bog SAC [002202]</p> <p>Distance: 7.3km</p>	<ul style="list-style-type: none"> ➤ [7120] Degraded raised bogs still capable of natural regeneration ➤ [910D] Bog woodland 	<p>This site has the generic conservation objective:</p> <p>‘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.’</p> <p>(NPWS (2021) Conservation objectives for Mount Jessop Bog SAC [002202] Generic</p>	<p>There will be no direct effects on this SAC as the project footprint is located entirely outside the designated site.</p> <p>Due to the terrestrial nature of the QI habitats and the distance from the site, no complete source-impact-pathway was identified. As such, there is no potential for indirect effects to occur.</p> <p>This site is not in the Likely Zone of Impact and no further assessment is required.</p>

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
		Version 8.0. Department of Culture, Heritage and the Gaeltacht.)	
<p>Corbo Bog SAC [002349]</p> <p>Distance: 8.8km</p>	<ul style="list-style-type: none"> ➤ [7110] Active raised bogs ➤ [7120] Degraded raised bogs still capable of natural regeneration ➤ [7150] Depressions on peat substrates of the Rhynchosporion 	<p>Detailed conservation objectives for this site (Version 1, November 2015) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There will be no direct effects on this SAC as the project footprint is located entirely outside the designated site.</p> <p>Due to the terrestrial nature of the QI habitats and the distance from the site, no complete source-impact-pathway was identified. As such, there is no potential for indirect effects to occur.</p> <p>This site is not in the Likely Zone of Impact and no further assessment is required.</p>
<p>Fortwilliam Turlough SAC [000448]</p> <p>Distance: 9.1km</p>	<ul style="list-style-type: none"> ➤ [3180] Turloughs 	<p>Detailed conservation objectives for this site (Version 1, February 2018), were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There will be no direct effects on this SAC as the project footprint is located entirely outside the designated site.</p> <p>Due to the absence of a hydrological connection and the distance from the site, no complete source-impact-pathway was identified for the QI habitat. As such, there is no potential for indirect effects to occur.</p> <p>This site is not in the Likely Zone of Impact and no further assessment is required.</p>

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
<p>Annaghmore Lough (Roscommon) SAC [001626]</p> <p>Distance: 14.6km</p>	<ul style="list-style-type: none"> ➤ [1013] <i>Vertigo geyeri</i> (Geyer's Whorl Snail) ➤ [7230] Alkaline fens 	<p>Detailed conservation objectives for this site (Version 1, January 2019), were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>There will be no direct effects on this SAC as the project footprint is located entirely outside the designated site.</p> <p>Due to the absence of a hydrological connection and the distance from the site, no complete source-impact-pathway was identified for the QI habitat. As such, there is no potential for indirect effects to occur.</p> <p>This site is not in the Likely Zone of Impact and no further assessment is required.</p>
Special Protection Area			
<p>Ballykenny-Fisherstown SPA [004101]</p> <p>Distance: 1km</p>	<ul style="list-style-type: none"> ➤ [A395] Greenland white-fronted goose (<i>Anser albifrons flavirostris</i>) 	<p>This site has the generic conservation objective:</p> <p><i>‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA’</i></p> <p>(NPWS (2021) Conservation objectives for Ballykenny-Fisherstown SPA [004101])</p>	<p>There will be no direct effects on this SPA as the project footprint is located entirely outside the designated site.</p> <p>There is no hydrological connection between Knappoge Bog and the SPA and there is no complete source-impact-pathway and potential for pollution of the supporting habitats for Greenland white-fronted goose.</p> <p>The potential for disturbance to Greenland white-fronted goose, where they occur outside the SPA, was also assessed.</p>

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
		Generic Version 8.0. Department of Culture, Heritage and the Gaeltacht.)	<p>While no Greenland white-fronted geese have been reported from the SPA since 1991 (as per Site Synopsis), some individuals were recorded by BnM ecologists from Knappoge Bog in 2017/18 which is located within the core foraging range of this species. However, the works will not result in any loss of habitat, are short term and will not be occurring over the entire bog at any one time, leaving much of the bog completely undisturbed. Hence, there is no potential for the works, in the absence of any mitigation, to result in significant disturbance to this SCI species.</p> <p>There is no potential for significant effects on this SAC and no further assessment is required.</p>
<p>Lough Ree SPA [004064]</p> <p>Distance: 4.6km</p>	<ul style="list-style-type: none"> ➤ [A004] Little grebe (<i>Tachybaptus ruficollis</i>) ➤ [A038] Whooper swan (<i>Cygnus cygnus</i>) ➤ [A050] Wigeon (<i>Anas penelope</i>) ➤ [A052] Teal (<i>Anas crecca</i>) ➤ [A054] Mallard (<i>Anas penelope</i>) ➤ [A056] Shoveler (<i>Anas clypeata</i>) ➤ [A061] Tufted duck (<i>Aythya fuligula</i>) ➤ [A065] Common scoter (<i>Melanitta nigra</i>) ➤ [A067] Goldeneye (<i>Bucephala clangula</i>) 	<p>This site has the generic conservation objective:</p> <p><i>‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA’</i></p> <p>To acknowledge the importance of Ireland's wetlands to wintering waterbirds, this site has a</p>	<p>There will be no direct effects on this SPA as the project footprint is located entirely outside the designated site.</p> <p>Following the precautionary principle, a potential pathway for effect on all SCI species and their habitats was identified through surface water connectivity via the Shannon River into which the bog drains and which ultimately flows into Lough Ree. However, the objective of the works involved in the D & R is to stabilise the bog. These works are specifically designed to reverse the drainage of the bog and to minimise the run-off of waters from it. The works will be similar in intensity to the active production that was undertaken</p>

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
	<ul style="list-style-type: none"> ➤ [A125] Coot (<i>Fulica atra</i>) ➤ [A140] Golden plover (<i>Pluvialis apricaria</i>) ➤ [A142] Lapwing (<i>Vanellus vanellus</i>) ➤ [A193] Common tern (<i>Sterna hirundo</i>) ➤ [A999] Wetland and waterbirds 	<p>second conservation objective:</p> <p><i>‘To maintain or restore the favourable conservation condition of the wetland habitat at Lough Corrib SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.’</i></p> <p>(NPWS (2020) Conservation objectives for Lough Ree SPA [004064] Generic Version 7.0. Department of Culture, Heritage and the Gaeltacht.)</p>	<p>until recently, but will be less invasive, short term and will involve an estimated six machines/crews working at any one time on the bog for an expected period of 2 years. There is no potential for these works to result in significant effects on downstream watercourses and ecological receptors as the works primarily involve the blocking of drainage pathways from the bog. Following the implementation of the PCAS, there will be no possibility of further effects. As such, in the absence of any mitigation, there is no potential for any significant effect on supporting habitats as a result of water pollution or change to the hydrological regime within the SPA.</p> <p>The potential for disturbance to the SCI species, where they occur outside the SPA was also assessed.</p> <p>There is no habitat on or adjacent to the site for the following SCI species:</p> <ul style="list-style-type: none"> ➤ [A065] Common scoter (<i>Melanitta nigra</i>) ➤ [A067] Goldeneye (<i>Bucephala clangula</i>) ➤ [A193] Common tern (<i>Sterna hirundo</i>) <p>The following SCI species have been recorded at Knappoge bog by BnM, other consultants and during the walkover survey:</p> <ul style="list-style-type: none"> ➤ [A038] Whooper swan (<i>Cygnus cygnus</i>)

European Sites and distance from Knappoge Bog	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 06/01/2022)	Conservation Objectives	Likely Zone of Impact Determination
			<ul style="list-style-type: none"> ➤ [A050] Wigeon (<i>Anas penelope</i>) ➤ [A052] Teal (<i>Anas crecca</i>) ➤ [A054] Mallard (<i>Anas penelope</i>) ➤ [A061] Tufted duck (<i>Aythya fuligula</i>) ➤ [A125] Coot (<i>Fulica atra</i>) ➤ [A140] Golden plover (<i>Pluvialis apricaria</i>) <p>Suitable habitat is, at least temporary, present at Knappoge Bog for the following species:</p> <ul style="list-style-type: none"> ➤ [A004] Little grebe (<i>Tachybaptus ruficollis</i>) <p>Many of the above wintering or passage wildfowl species are likely to occur in the site only, when there is deep enough water on areas of the bog. This may be limited dependant on pumping regimes, rainfall, flood levels in adjacent watercourse or floodplains. In addition, the works will not result in any loss of habitat, are short term and will not be occurring over the entire bog at any one time, leaving much of the bog completely undisturbed. Hence, there is no potential for the works, in the absence of any mitigation, to result in significant disturbance to these SCI species.</p> <p>There is no potential for significant effects on this SAC and no further assessment is required.</p>

3.2 European Sites with the potential to be significantly affected by the PCAS activities

No European Site has the potential to be significantly impacted by the proposed works.

3.3 Likely cumulative impact of the PCAS activities on European Sites, in-combination with other plans and projects

3.3.1 Review of other plans and projects

The potential for the rehabilitation works to contribute to a cumulative impact on European Sites was considered. The following plans and projects were considered for their potential to result in in-combination effects:

- The Planning Application Finders of Longford and Roscommon County Council were consulted on the 05.01.2022 and a number of mostly small-scale proposed or consented developments were found within 5km of Knappoge Bog. Larger projects that were considered include an application for the development of a ten year permission for a solar farm on a site of approximately 34.54 hectares consisting of the following; 184,500 m² of solar photo-voltaic panels on ground mounted steel frames; Ring main unit substation and associated hard standing; 12 no. inverter/transformer stations on 6 no. hardstandings; underground power and communication cables and ducts; boundary security fence; CCTV cameras; upgraded internal access tracks; new internal access tracks, internal bridge crossing and associated drainage infrastructure; and temporary construction compounds and all associated site services and works. The proposed development seeks to form an extension to the adjoining previously permitted "Middleton House" Solar Farm which was permitted under Longford County Council Reg. Ref 18135. Access to the proposed development is provided via the permitted "Middleton House" Solar Farm via the L-11261 local road.
- The proposal for the Mid Shannon Wilderness Park Greenway was also considered. The proposed 73km cycling & walking 'greenway' route network primarily follows the Bord na Móna industrial railway network routes through former industrial bogland south and west of Longford town, linking with the Royal Canal 4km North-West of Ballymahon. It consists of 61 km of greenway along decommissioned Bord na Móna rail lines; 6 km of greenway along existing roads; 6 km of greenway through existing cutaway bog and ancillary facilities. The AASR carried out for this proposal found that there was no potential for significant effects on European Sites.
- Bord na Móna provided a GIS shapefile of bogs where decommissioning and rehabilitation activities are scheduled to occur within the same timeframe as in Knappoge Bog. Three bogs within the Mount Dillon bog group, that share downstream connectivity to European Sites, were identified, namely Begnagh, Clooneeny and Glenlough.
- Parts of Knappoge Bog (within and outside the areas owned and under the control of Bord na Móna) are currently being 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. In addition, unauthorised turbary is likely to occur at various locations within 15km of Knappoge 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.
- There is a current ongoing NPWS Raised Bog Restoration Project, however, there are no raised bogs within 15 km of Knappoge Bog, where restoration might overlap with the D & R activities in 2022.
- The County Longford Heritage Plan 2019-2024, Longford County Development Plan 2021-2027, Roscommon County Development Plan 2021-2027 (Draft) and County Roscommon Heritage Plan 2017-2021 were also consulted and considered as part of this assessment. CPO

3.9 of the Longford County Development Plan 2021-2027 explicitly states ‘Support collaboration between local authorities, the Midland Regional Transition Team and relevant stakeholders and the development of partnership approaches to integrated peatland management for a just transition that incorporates any relevant policies and strategies such as the Bord na Móna Biodiversity Plan 2016-2021 and the national Climate Mitigation and Adaptation Plans. This shall include support for the rehabilitation and/or re-wetting of suitable peatland habitats.’

3.3.2 Conclusion of in-combination/cumulative assessment

Due to the nature, scale and short-term duration of the PCAS activities, no pathway or mechanism for the proposed works to result in any significant effect on any European Site was identified when considered on its own during the assessment process and therefore there is no potential for it to contribute to any such effects when considered in-combination with any other development or works.

The review of plans and projects that is described above did not reveal any additional potential pathways for effect on European Sites that may have arisen as a result of those plans or projects.

4.

ARTICLE 6(3) APPROPRIATE ASSESSMENT SCREENING STATEMENT AND CONCLUSIONS

The findings of this Screening Assessment are presented following the European Commission's Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2001) and Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018) as well as the Department of the Environment's Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DoEHLG, 2010).

4.1

Data collected to carry out assessment

In preparation of the assessment, the following sources were used to gather information:

- Review of NPWS Site Synopses, mapping and Conservation Objectives for the various European Sites within the Likely Zone of Impact.
- Review of 2019 EU Habitats Directive (Article 17) Report.
- Review of OS maps and aerial photographs of the site of the proposed development.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), Environmental Protection Agency (EPA), Water Framework Directive (WFD).
- Review of relevant databases including National Biodiversity Ireland Database (NBDC).
- Review of other plans and projects within the area.
- Review of location and layout mapping for proposed rehabilitation.
- Review of the results of previous ecological surveys of Knappoge Bog.
- Review of the detailed description of proposed rehabilitation measures, including methodologies specific to the main categories of land types under consideration.
- Review of Knappoge Bog Drainage Management Plan from RPS
- Review of BnM's Peatland Climate Action Scheme Environmental Management Plan.
- Liaison with Chris Cullen and Sorcha Cahill from Bord na Móna.
- Site visit conducted by Inga Reich on 14/01/2022.

4.2

Concluding statement

It is concluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European Sites, that the proposed works, individually or in combination with other plans and projects, will not have a significant effect on any European Site.

It is acknowledged that, following D & R, the presence of an undisturbed wetland habitat the size of Knappoge Bog, may provide foraging opportunities, attract wildfowl species as a refugium, and/or act as a disturbance buffer to birds utilising the River Shannon corridor. These positive quality effects may ultimately positively impact the SCIs and benefit the Conservation Objectives of the adjacent SPAs. 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.

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APPENDIX 1

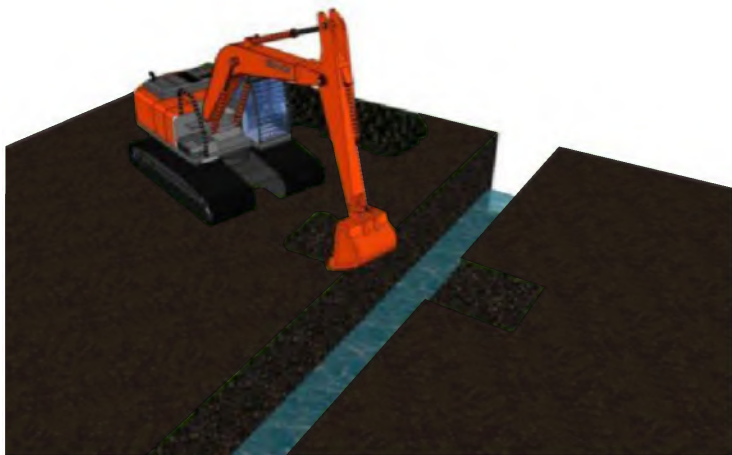
*KNAPPOGE BOG -
CUTAWAY BOG
DECOMMISSIONING AND
REHABILITATION PLAN 2022*



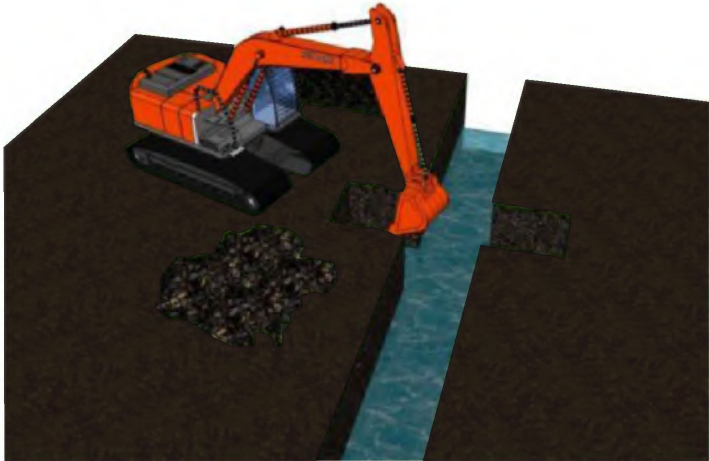
APPENDIX 2

REHABILITATION METHODS

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.

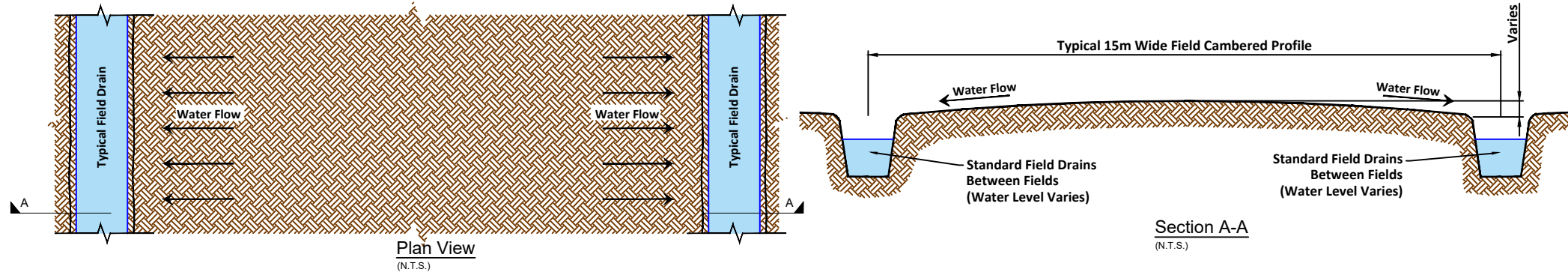


This enhanced measure's main objective is to block drains with peat drain blocks to raise water levels, re-wetting peat and slowing water movements through the bog.

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.				PROJECT: Peatland Climate Action Scheme PCAS			
BORD NA MÓNA Naturally Driven Bord Na Móna Engineering Department LEABEG, TULLAMORE CO. OFFALY Tel. 057 9345900 Fax. 057 9345160				TITLE: Rehabilitation Method DPT 2 Peat Drain Blocking			
STATUS				Drawn By: Checked By: Approved:			
b For Approval P.K. 03/03/21				CAD Designer Discip. Lead Design Lead Design Manager			
a Issued for Information P.K. 18/12/20				P.K. D.K. P.N. P.N.			
Rev Description Issued By Date				Date: 18/12/20 Scale: N.T.S. A3 Stage: For Approval			
				Drawing No.: PCAS-0100-002 Rev: b			

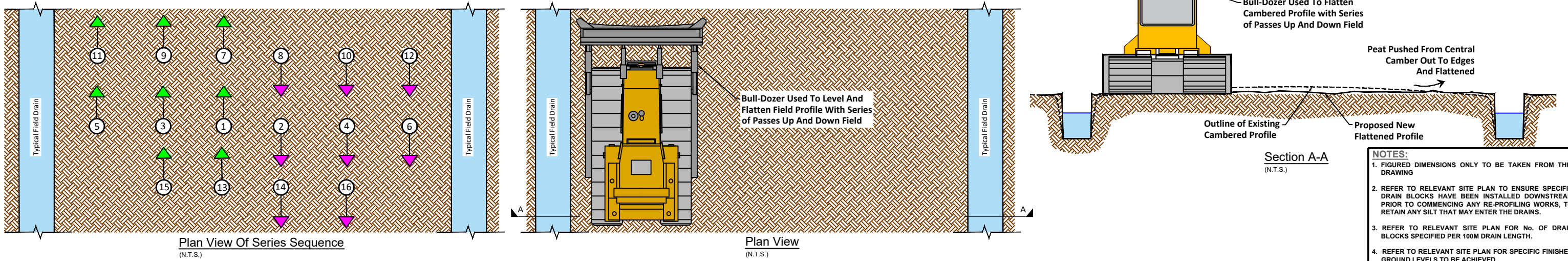
Existing Layout:

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.



Phase 1 Re-Profiling of Field Surface

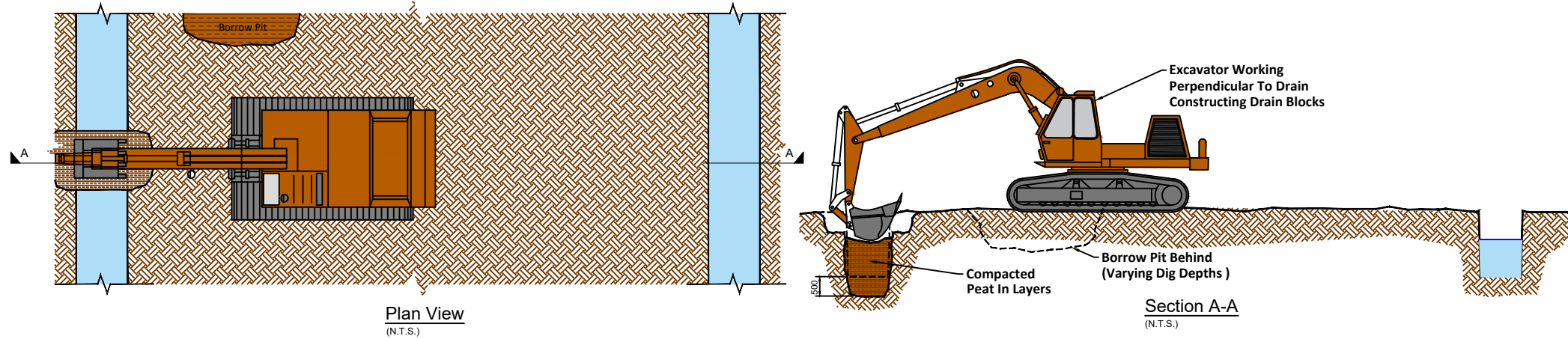
Field to be re-profiled using bull-dozer making a total of 16 passes, 8 passes up and 8 passes down, flattening the camber on the production field. (Sequence of runs shown below)



- NOTES:**
- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
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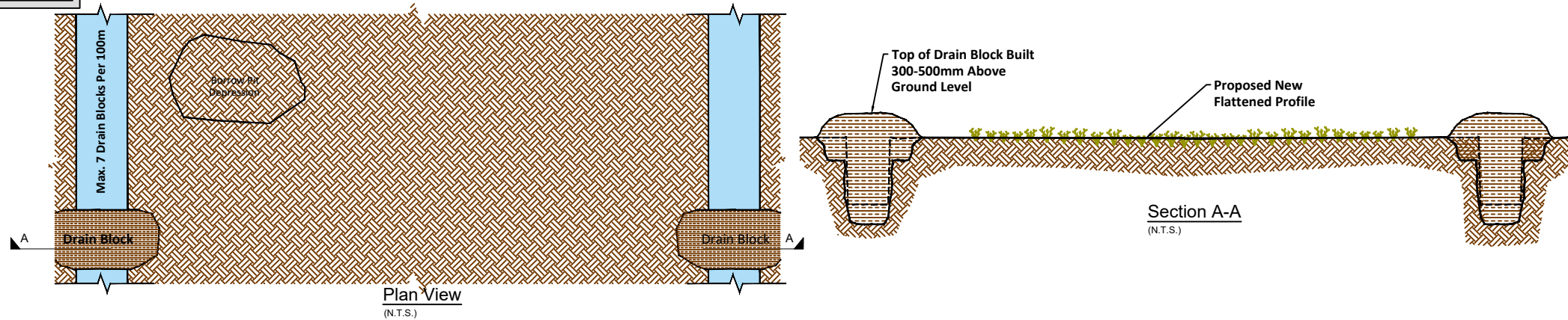
Phase 2 Peat Drain Blocking

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.)



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.



STATUS			
b	Issued For Approval	P.K.	25/02/21
a	Issued For Information	P.K.	29/01/21
Rev	Description	Issued By	Date

BORD NA MÓNA
Naturally Driven
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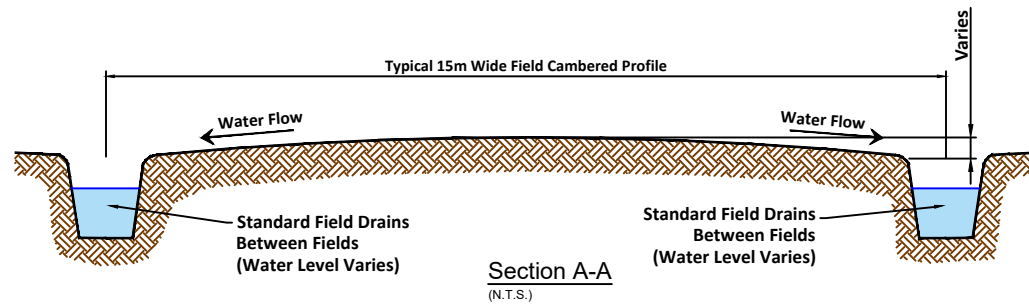
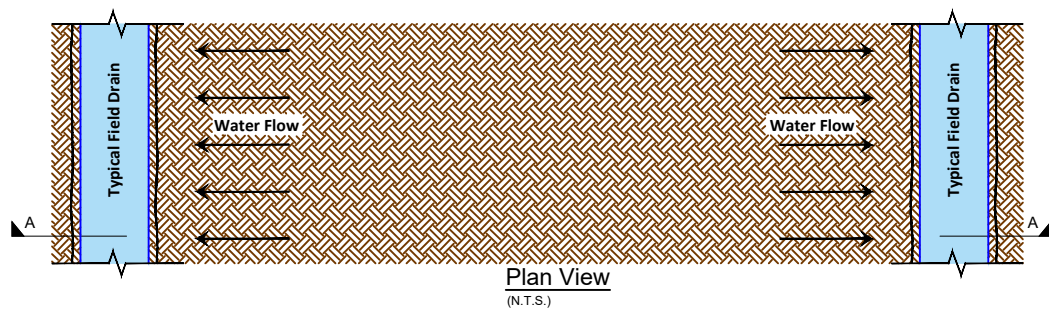
PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DPT 3A
Field Re-profiling

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.
Date:	18/12/20	Scale :	Not to Scale	A3
Drawing No.:	PCAS-0100-003			Rev:
				b

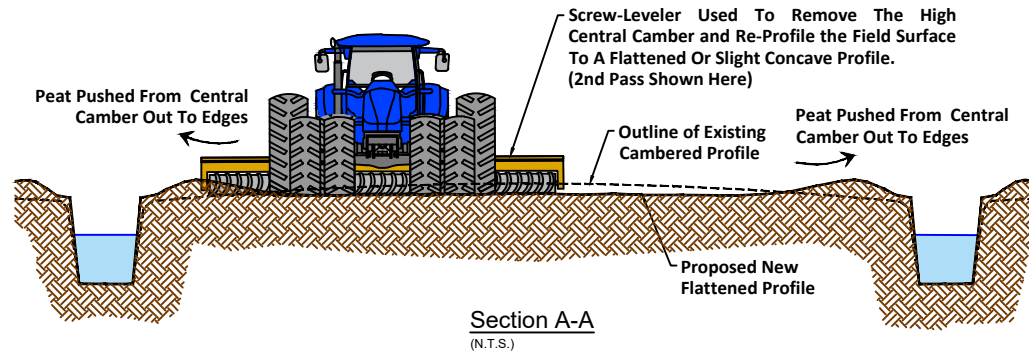
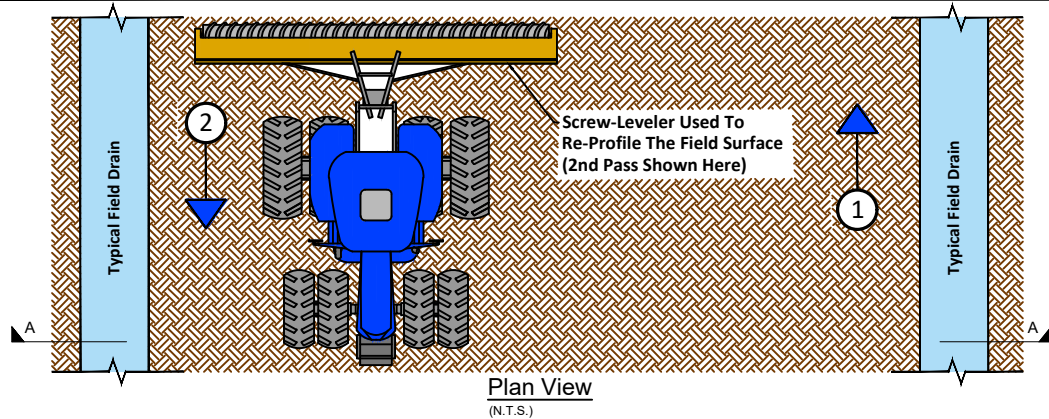
Existing Typical Field Layout:

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.



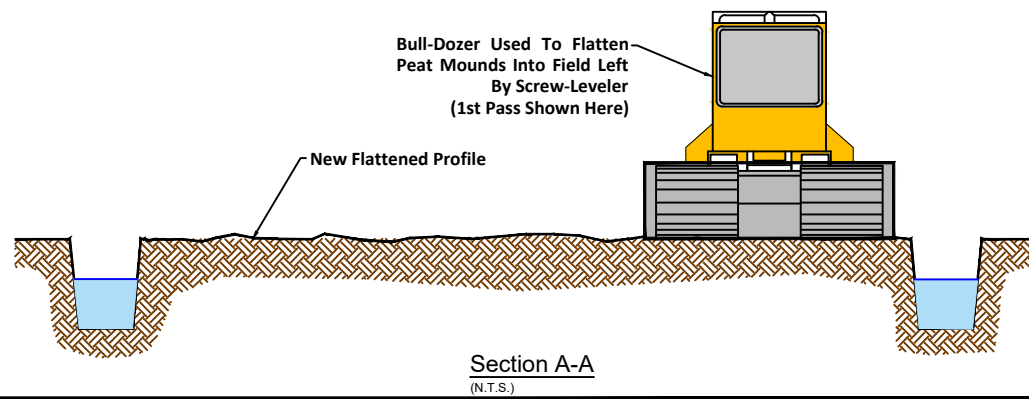
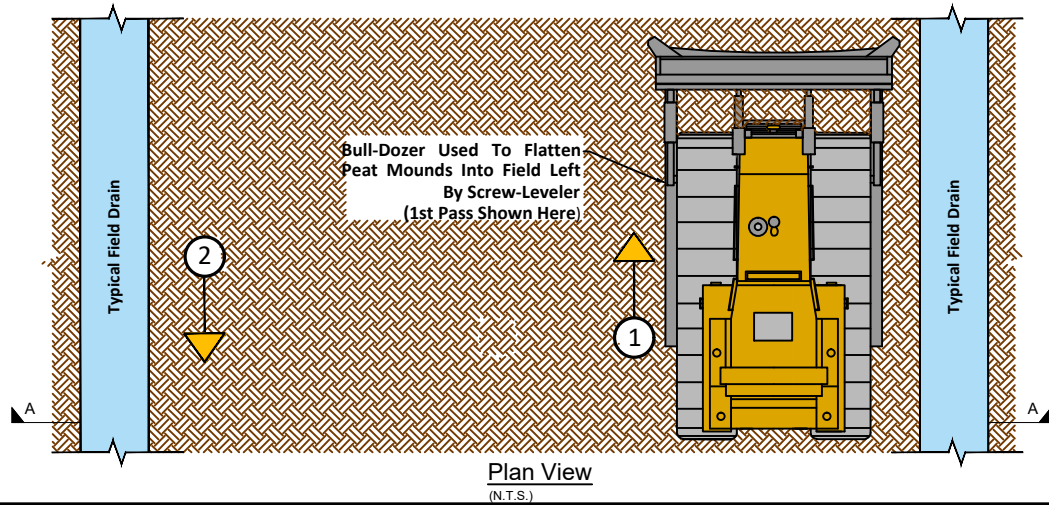
Phase 1 Re-Profiling of Field Surface

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.



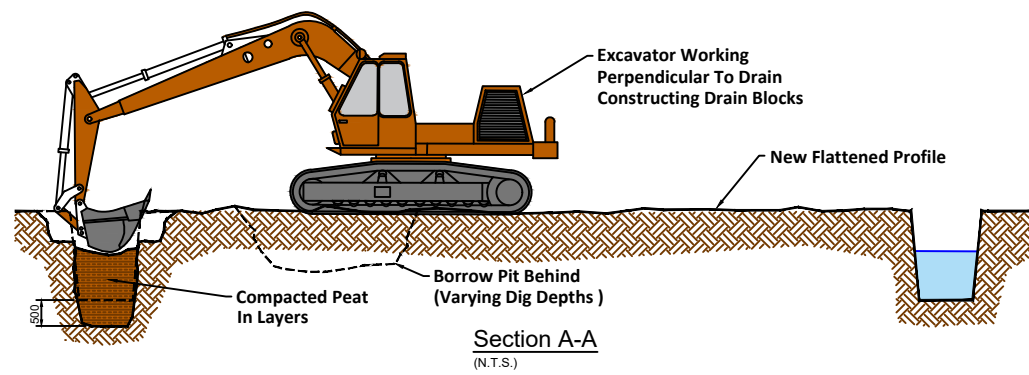
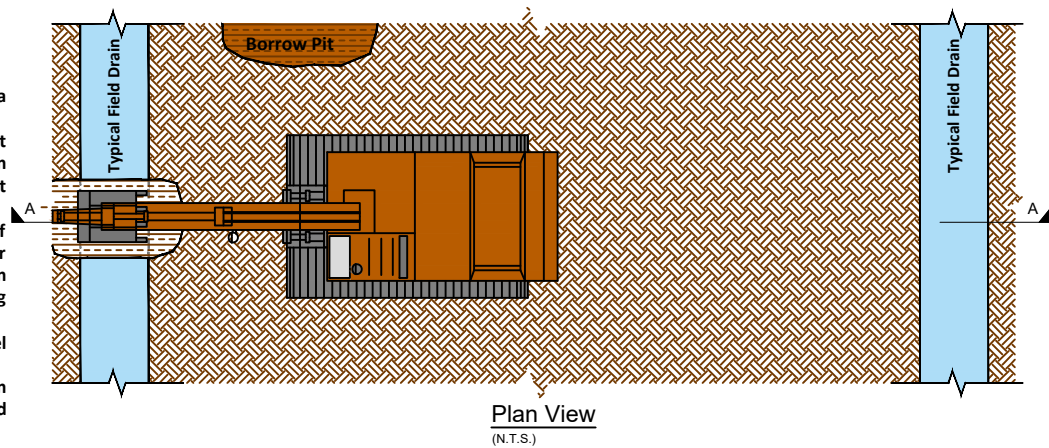
Phase 2 Leveling of Loose Peat

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.



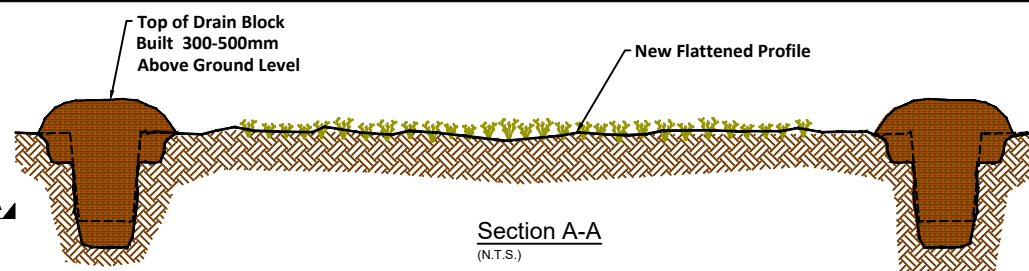
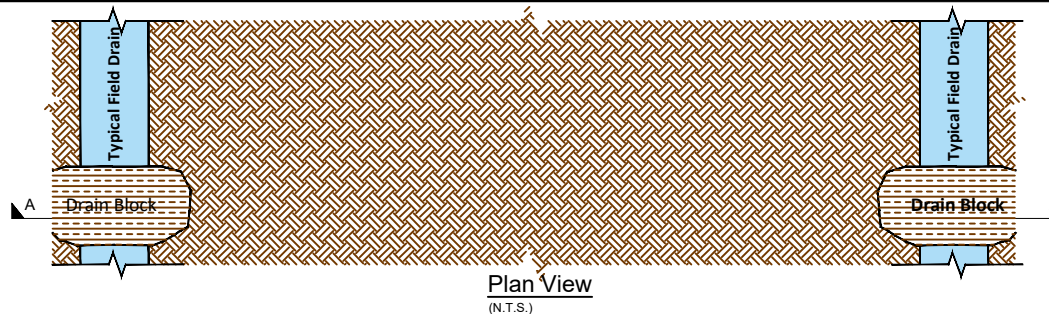
Phase 3 Peat Drain Blocking

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.)



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.



NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
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4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
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STATUS

b	For Approval	P.K.	03/03/21
a	Issued For Information	P.K.	07/01/21
Rev	Description	Issued By	Date

BORD NA MONA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

PROJECT:

Peatland Climate Action Scheme
PCAS

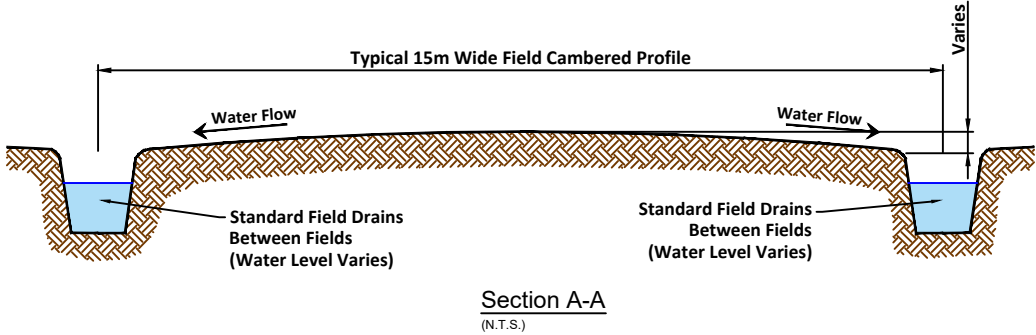
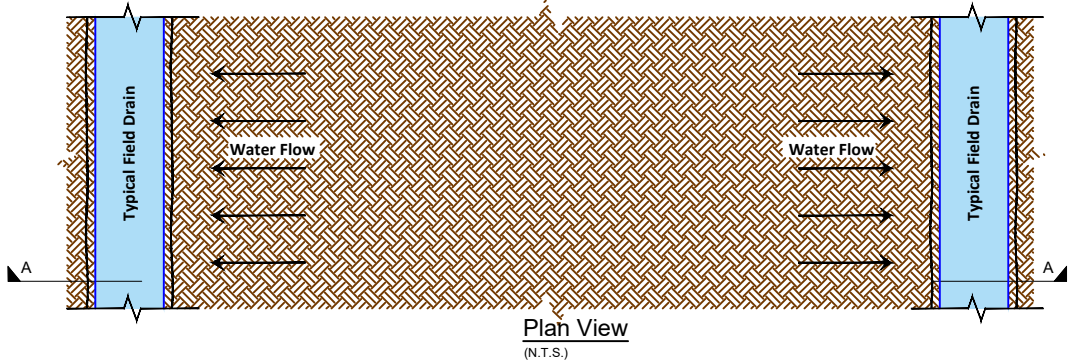
TITLE:

Rehabilitation Method DPT 3B
Field Re-profiling

Drawn By:	Checked By:	Approved:
CAD Designer	Discp. Lead	Design Lead
P.K.	D.K.	P.N.
Date: 18/12/20	Scale: Not to Scale	A3
Drawing No.: PCAS-0100-004		Rev: b

Existing Layout:

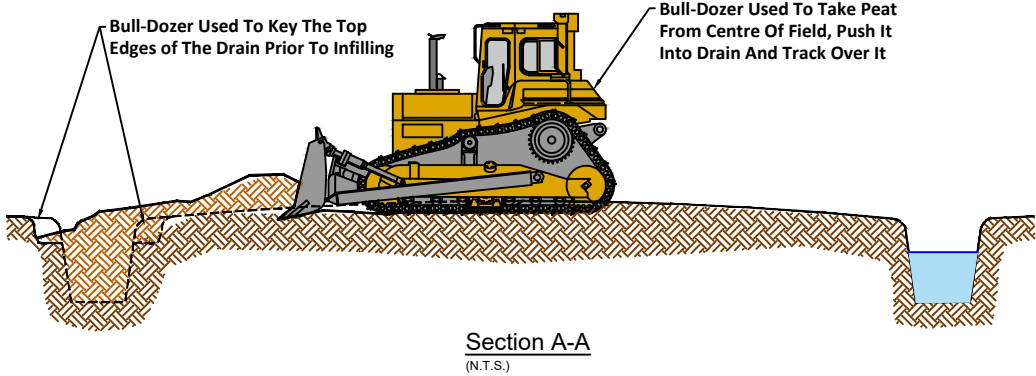
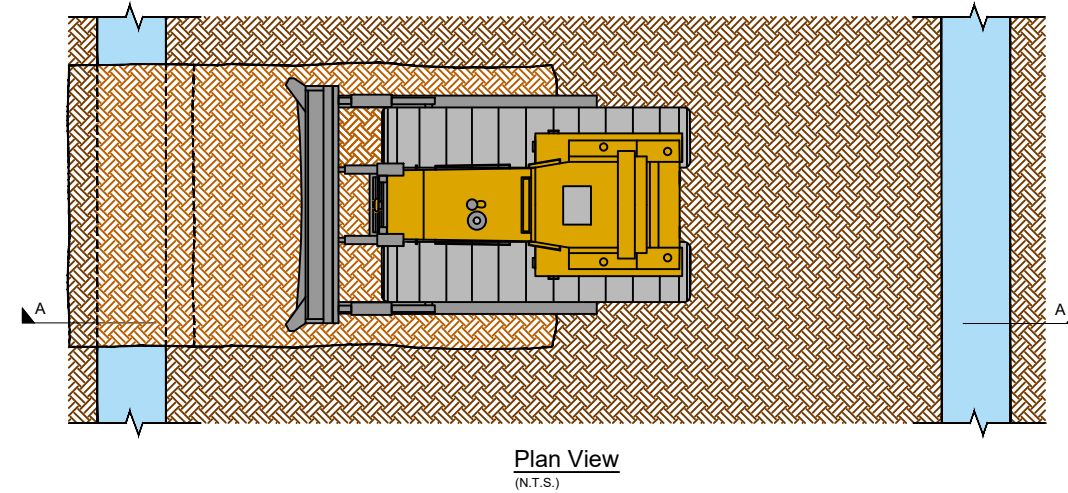
Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement through the bog.



- NOTES:**
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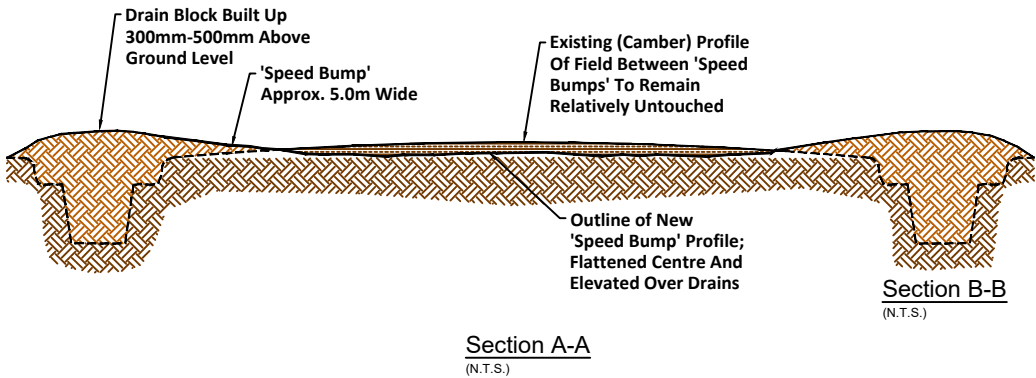
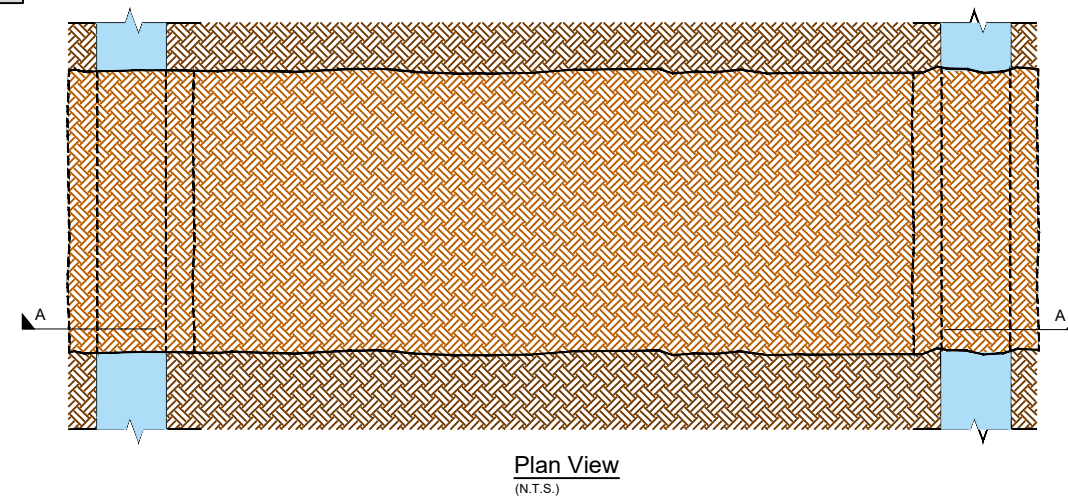
Phase 1
Forming 'Speed Bump'

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'.



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.



STATUS			
c	For Approval	P.K.	03/03/21
b	'Key' Added To Top Edges Of Drain at Drain Block Locations	P.K.	08/02/21
a	Issued For Information	P.K.	29/01/21
Rev	Description	Issued By	Date

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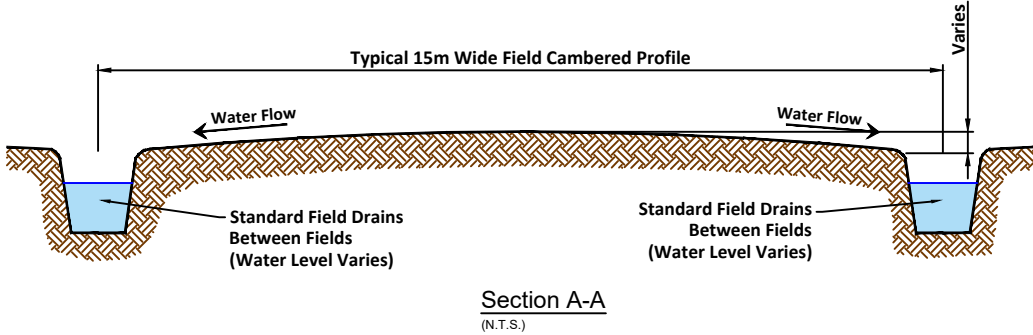
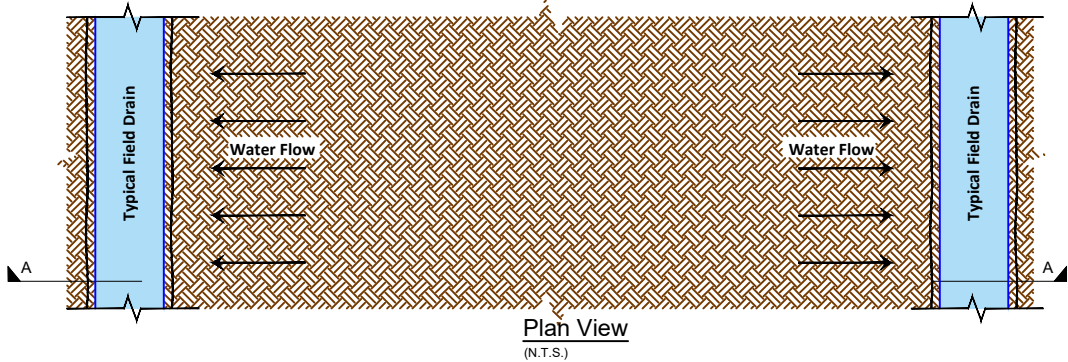
PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DCT 2
'Speed Bump' Peat Drain Block

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.
Date:	13/01/21	Scale :	Not to Scale	A3 Stage: For Approval
Drawing No.:				Rev:
PCAS-0100-008				c

Existing Layout:

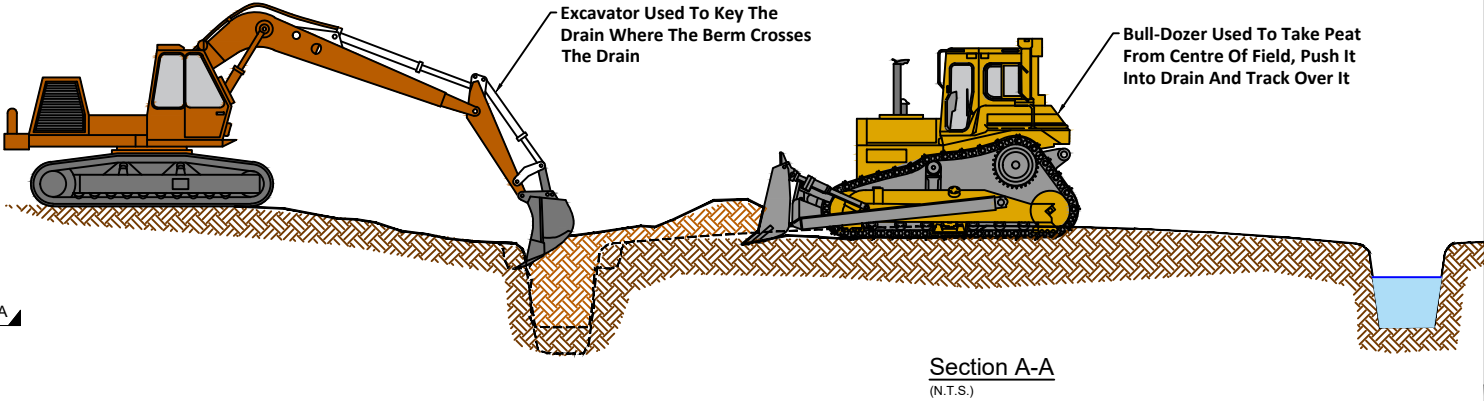
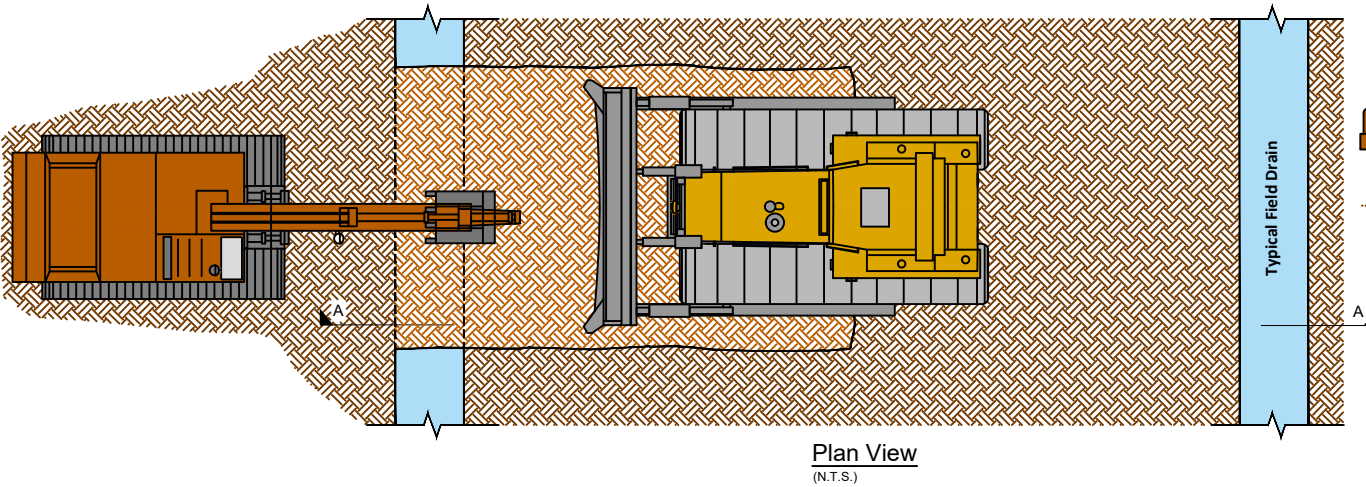
Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of Cross berms is to slow the water movement through the bog.



- NOTES:**
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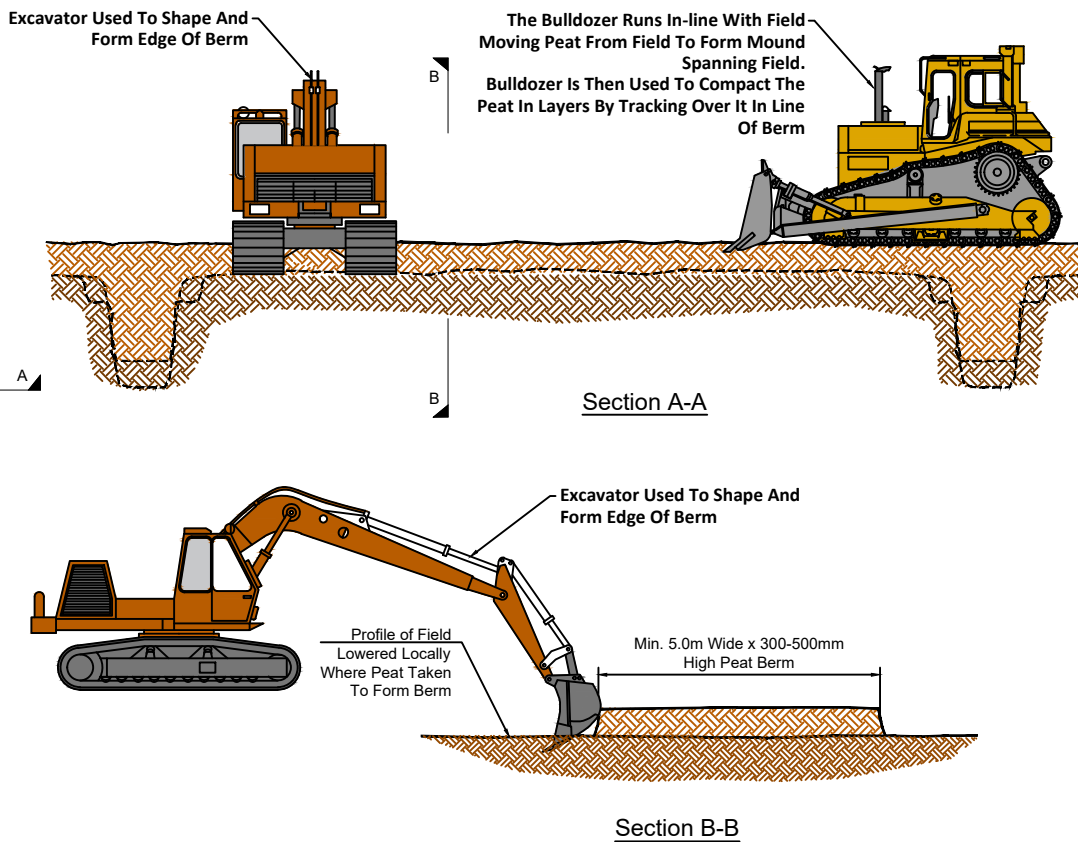
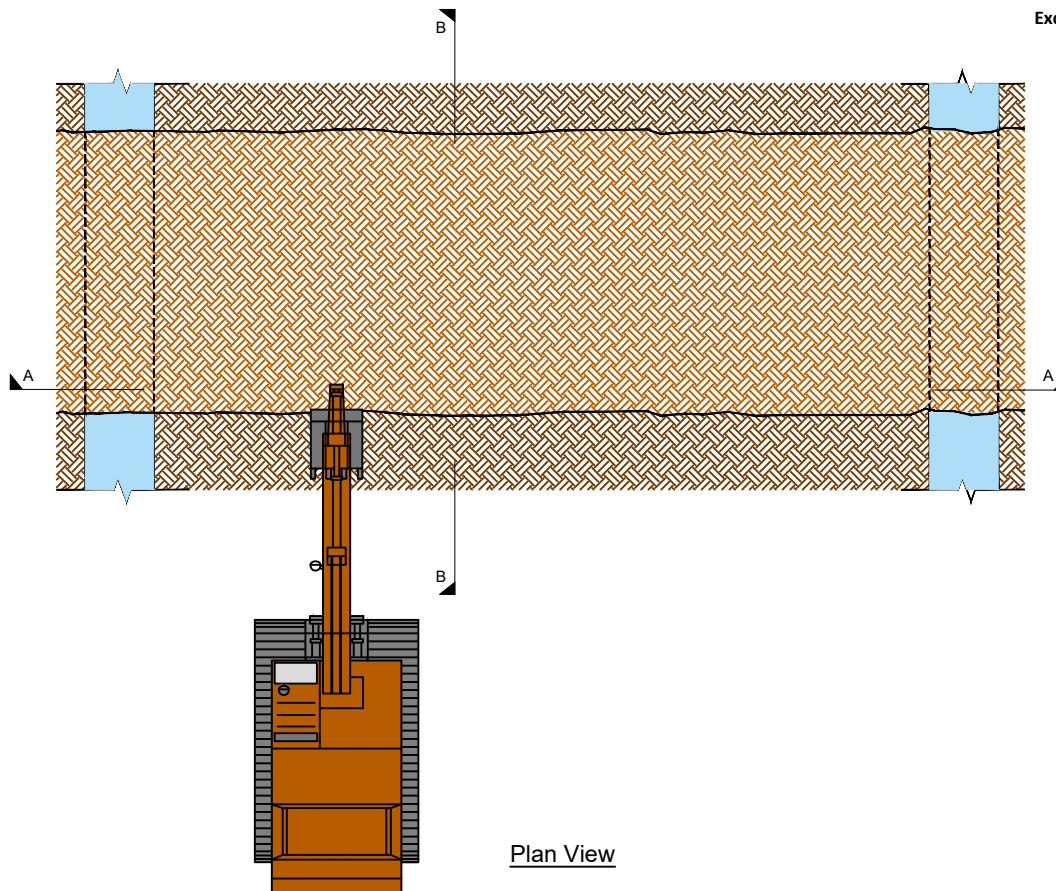
Phase 1 Forming Peat Berm

An Excavator is used to form a key in the drain where the berm crosses. A strip of peat is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block.



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.



STATUS			
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
Rev	Description	Issued By	Date

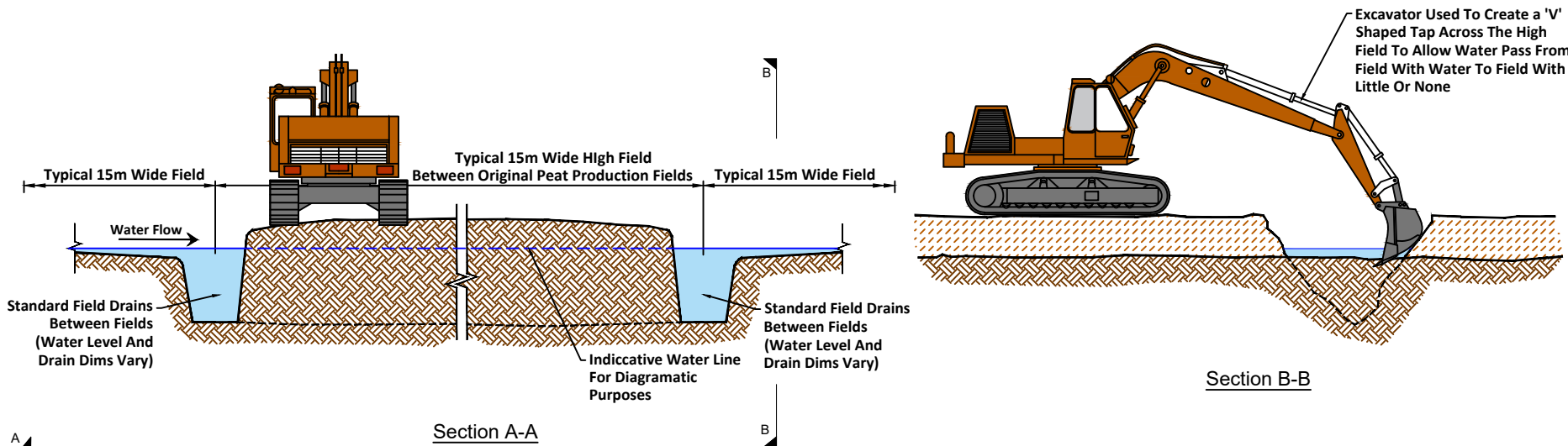
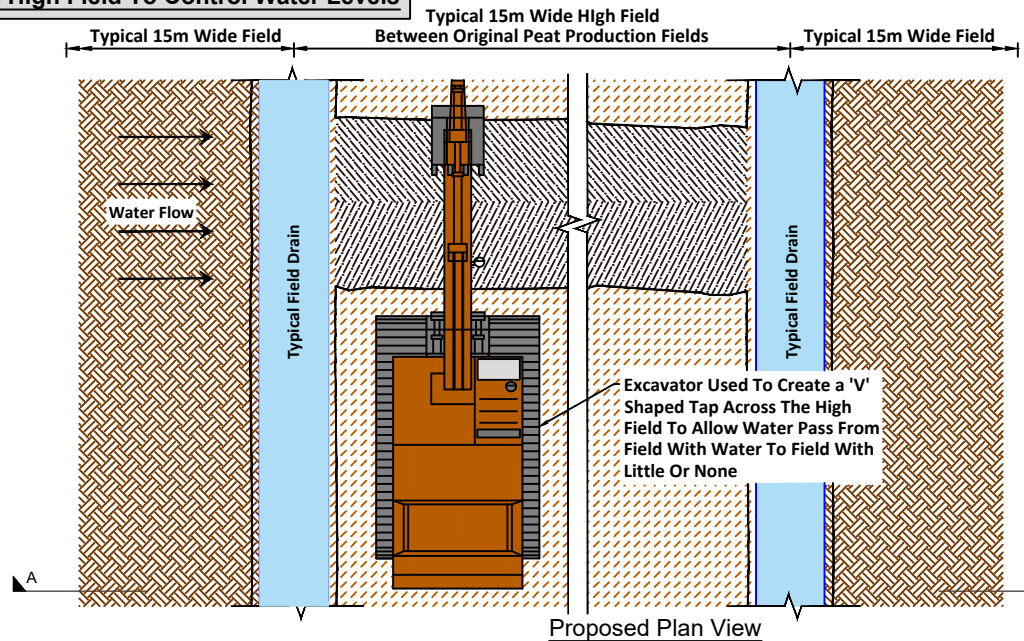
BORD NA MÓNA
Naturally Driven
Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method WLT 3
Peat Berm

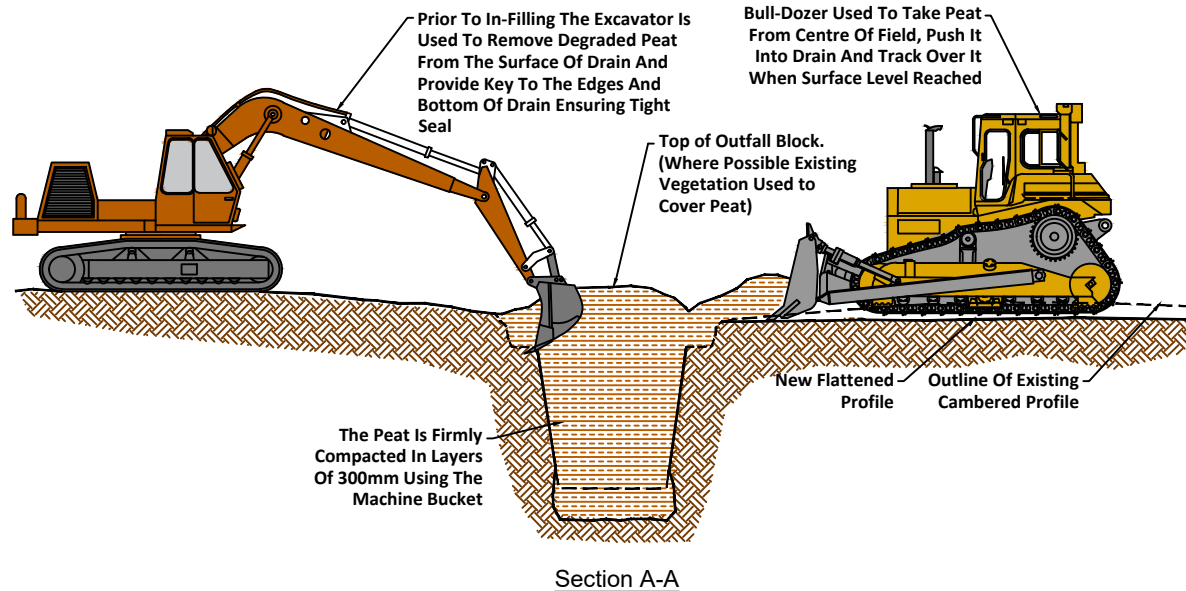
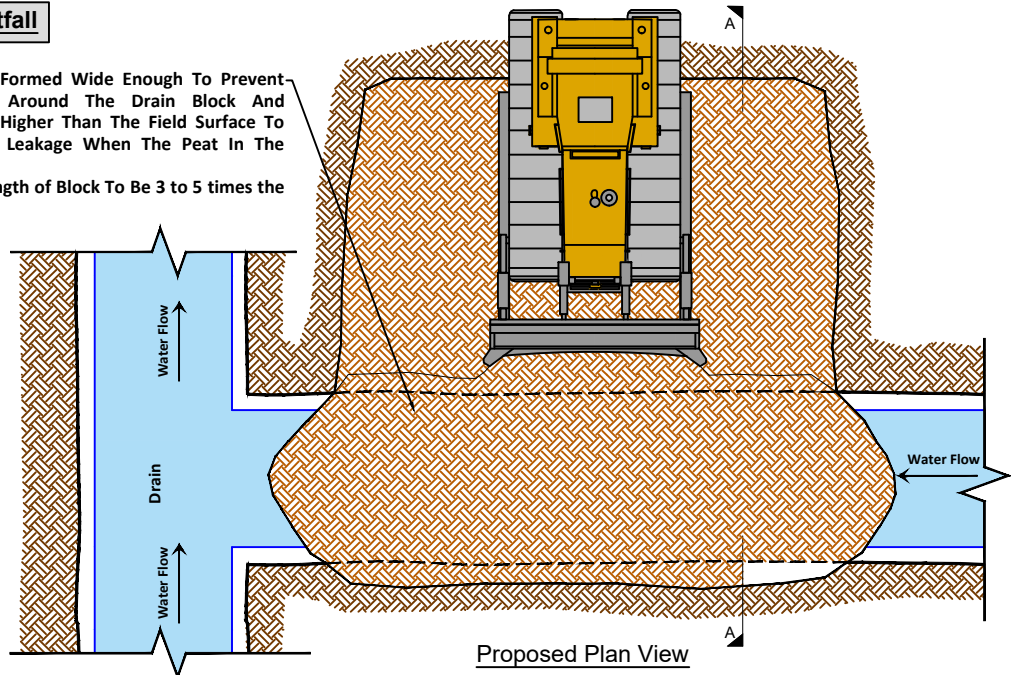
Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
P.K.	-	D.K.	P.N.	P.N.
Date:	28/01/21	Scale :	Not to Scale	A3 Stage: Information
Drawing No.: PCAS-0100-010				Rev: c

'V' Tap Across High Field To Control Water Levels



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



NOTES:

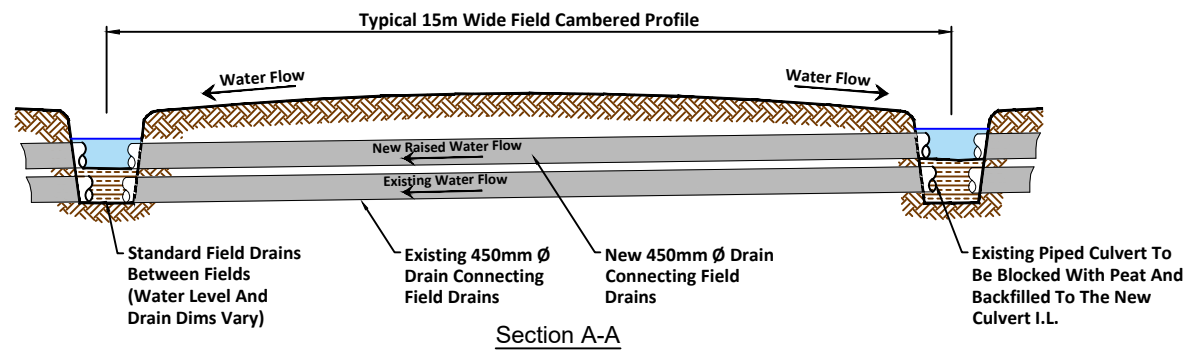
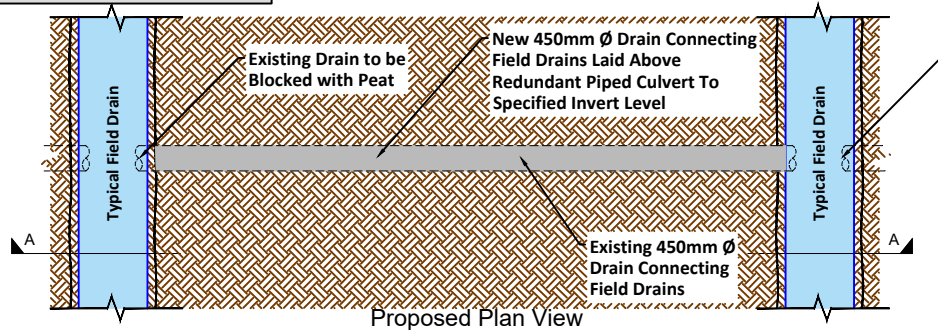
- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
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STATUS

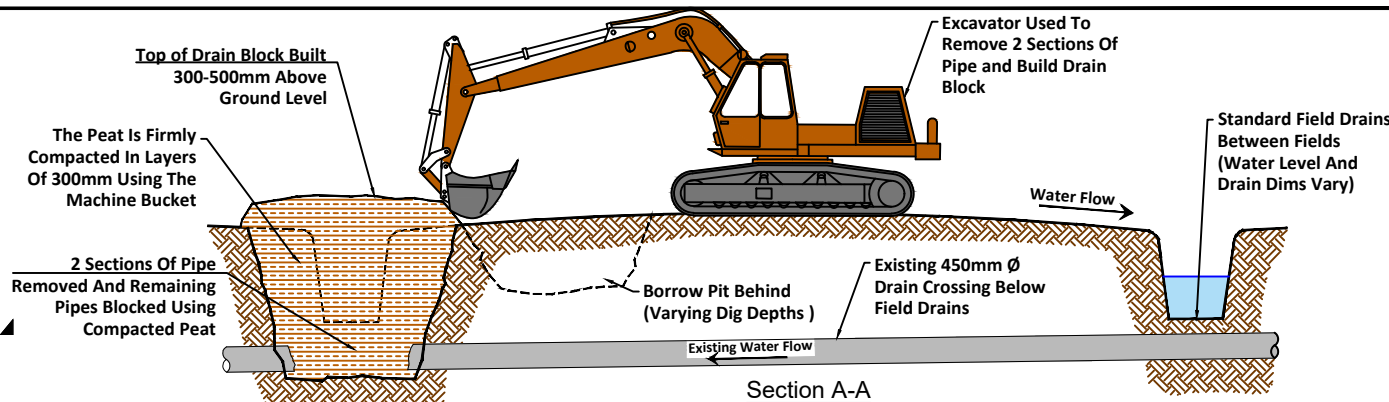
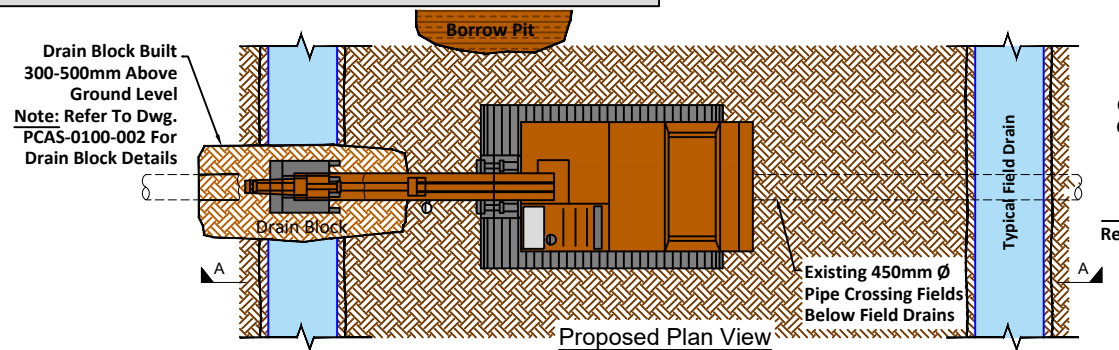
Rev	Description	Issued By	Date
d	Piped Field Drain Block Detail Added	P.K.	12/07/21
c	'Key' Added to Base Of Drain For Blocking Of Outfall Control Measure	P.K.	03/03/21
b	For Approval	P.K.	25/02/21
a	Issued For Information	P.K.	29/01/21

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Raise Piped Culverts To Control Water Levels



Blocking Of Piped Field Drain Running Below Open Field Drains



PROJECT:

Peatland Climate Action Scheme
PCAS

TITLE:

Modifying of Outfalls
& Managing Water Levels

Drawn By:	Checked By:	Approved:
CAD Designer	Discp. Lead	Design Lead
P.K.	D.K.	P.N.
Date: 20/01/21	Scale: Not to Scale	A3
Drawing No.: PCAS-0100-014	Stage: For Approval	Rev: d

