



Delichon Ecology

Cutaway Bog Decommissioning and Rehabilitation Plan Screening for Appropriate Assessment & Natura Impact Statement

Bunahinly-Kilgarvan Bogs, Co. Westmeath

Prepared For¹

Bord na Móna

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Contents

1	INTRODUCTION	6
1.1	Appropriate Assessment Process.....	7
1.1.1	Stages of the Appropriate Assessment Process	8
1.1.2	Statement of Authority	9
2	Stage 1: Screening	9
2.1	Screening Evaluation Process	9
2.2	Overview of Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation.....	11
2.3	Screening Evaluation: Is the Project Directly Connected to or Necessary for Management of a European Site?	12
2.4	Description of the proposed Decommissioning and Rehabilitation.....	13
2.4.1	Location, Size, Scale, Landcover	13
2.5	Description of the Receiving Environment	20
2.5.1	Desk Based Assessments	20
2.5.2	Field Assessments	41
2.5.3	Species of Conservation Interest	51
2.5.4	Invasive species	52
2.5.5	Certainty and Sufficiency of Data	52
2.6	Decommissioning and Rehabilitation Stage	53
2.6.2	Operational Stage	68
2.7	European Sites under consideration	70
2.7.1	Distance of the Project to European Sites	70
2.7.2	Other Projects and Plans with Potential to Cause In-Combination Effects	83
2.8	Sources of Information & Consultation.....	89
2.8.1	Consultation	89
2.8.2	Sources of Information	89
2.9	Potential Sources, Pathways and Timing of Impacts to European Sites (SACs & SPAs)	92
2.9.1	Potential Sources, Pathways and Timing of Impacts to SACs	92

2.9.2	Potential Sources, Pathways and Timing of Impacts SPAs	94
2.10	Screening Evaluation of the Potential for Effects on European Sites (SACs & SPAs).....	97
2.11	Screening for Appropriate Assessment: Conclusion Statement	110
3	STAGE 2: APPROPRIATE ASSESSMENT	111
3.1	Introduction to Stage 2	111
3.1.1	Current Status of the Qualifying or Special Conservation Interests of the European Sites under consideration.....	111
3.1.2	Threats and Pressures of European Sites.....	129
3.1.3	Conservation Objectives for the relevant European Sites.....	132
3.2	Summary of Impact Pathways screened in for examination at Stage 2	132
3.3	Evaluation of potentially adverse impacts at Stage 2 (Alone & In Combination)	134
3.3.1	Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC.....	134
3.3.2	Indirect/ex-situ disturbance or displacement of species of Qualifying Interest (Otter).....	134
3.3.3	Indirect/ex-situ mortality to species of Qualifying Interest (Otter).....	135
3.3.4	Indirect loss, reduction or degradation of aquatic habitats within the SAC and consequent effects to reliant aquatic species of Qualifying Interest.....	136
3.3.5	Direct Impacts to Habitats within SPAs.....	139
3.3.6	Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site.....	139
3.3.7	Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest. 142	
3.4	Mitigation Measures	147
3.4.1	Description of the measure.....	147
3.4.2	Effectiveness of these measures.....	168
3.4.3	Implementation of Mitigation Measures.....	170
3.4.4	Degree of confidence in the likely success of the mitigation measure.....	170
3.4.5	Monitoring of the Implementation and Effectiveness of the Mitigation Measures.....	170
3.4.6	How any mitigation failure will be addressed.....	171
3.5	Evaluation of the impact of Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation on the Integrity of the European Sites under consideration	172

3.6	Conclusion	173
4	REFERENCES	175

Table of Figures

Figure 1	Site Location of Bunahinly Bog
Figure 2	Site Location of Kilgarvan Bog
Figure 3	Aerial photo of Bunahinly Bog
Figure 4	Aerial photo of Kilgarvan Bog
Figure 5	Water Quality Map for Bunahinly Bog
Figure 6	Water Quality Map for Kilgarvan Bog
Figure 7	Current Habitats at Bunahinly
Figure 8	Current Habitats at Kilgarvan
Figure 9	Mammal Signs and Features within the Bunahinly-Kilgarvan Site
Figure 10	Completed Peat blockage (reproduced from Mackin et al., 2017)
Figure 11	Examples of installed overflow pipes
Figure 12	Indicative methodology for DPT4
Figure 13	Rehabilitation Method WLT3 Peat Berm
Figure 14	Bunahinly Rehabilitation Measures
Figure 15	Kilgarvan Rehabilitation Measures
Figure 16	Other Projects and Plans within the Zone of Influence of the proposed Decommissioning and Rehabilitation works
Figure 17	European Sites within 15km of Bunahinly-Kilgarvan Bog
Figure 18	Proximal and adjacent European Sites
Figure 19	BnM Emergency Response Clean Up Procedures
Figure 20	Bunahinly Bog Site Drainage and Silt Ponds
Figure 21	Kilgarvan Bog Site Drainage and Silt Ponds
Figure 22	Flood Defences and Hydraulic Breaks
Figure 23	Ecological Restriction Zones in respect of over-wintering birds

Figure 24	BnM Peat Loading SOPs
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Table of Appendices

Appendix A	Finding of No Significant Effects (FONSE) Report
Appendix B	Bunahinly-Kilgarvan Bog: Cutaway Bog Decommissioning and Rehabilitation Plan 2022
Appendix C	Site Synopses
Appendix D	Drawings of Proposed Rehabilitation Methodologies
Appendix E	Environmental Management Plan
Appendix F	Protection of Otter Standard Operating Procedure

1 INTRODUCTION

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

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

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. P0502-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Bunahinly-Kilgarvan bog is part of the Blackwater bog group (see Appendix II for details of the bog areas within the Blackwater Bog Group). Bunahinly-Kilgarvan Bog is located in Co. Westmeath.

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme on its peatlands. Note this proposal is also known colloquially as the 'Peatlands Climate Action Scheme' (PCAS). The additional costs of the Scheme will be supported by Government through the Climate Action Fund and Ireland's National Recovery and Resilience Plan, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator. Bord na Móna have previously identified a footprint of 33,000 ha as peatlands suitable for this scheme. This Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations (Appendix VII & IX) under existing EPA IPC licence conditions. Improvements supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. The Scheme commenced in 2021.

Only the costs associated with the additional, enhanced and accelerated rehabilitation, i.e. those measures which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10, will be eligible for support under the Scheme. Bord na Móna have now announced the complete cessation of industrial peat production across its estate (January 2021).

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

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

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

hydrological conditions and more intensive intervention means that the extent of suitable hydrological conditions can be optimised.

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

Bunahinly-Kilgarvan Bog is proposed to be part of this Scheme (PCAS), which commenced in 2021 and this rehabilitation plan outlines the approach to be taken.

This Screening for Appropriate Assessment Report / Natura Impact Statement Report has been prepared by Delichon Ecology on behalf of Bord na Móna, and contains sufficient objective scientific information to facilitate Bord na Móna to determine whether the decommissioning and rehabilitation outlined in the plan referenced above requires Appropriate Assessment, or whether the potential for significant effects on any designated European Site can be excluded. Should a Natura Impact Statement be required, the impact of the project on the integrity of the Natura 2000 site is considered with respect to the conservation objectives of the site and to its structure and function. Mitigation measures should be applied to the point where no adverse impacts on the site(s) remain.

The preparation of this Screening for Appropriate Assessment / Natura Impact Statement Report has had regard to;

- EU Habitats Directive (92/43/EEC),
- EU Birds Directive (Council Directive (2009/147/EC),
- European Communities (Birds and Natural Habitats) Regulations 2011-2021,
- Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001,
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (2010),
- Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC, European Commission, 2018,
- Office of the Planning Regulator (OPR) (2021) Practice Note PN01 - Appropriate Assessment Screening for Development Management,
- EC (2021) Assessment of Plans and Projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
- *Bunahinly-Kilgarvan Bog: Cutaway Bog Decommissioning and Rehabilitation Plan 2022* as prepared by BnM – see **Appendix B** of this document.

1.1 Appropriate Assessment Process

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

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

This current document comprises a Screening for Appropriate Assessment to determine whether Appropriate Assessment is required, in addition to a Stage 2 Appropriate Assessment Report. The Screening must identify whether the project, alone or in combination with other plans and projects, is likely to have significant effects on any European Site in view of the qualifying interests and conservation objectives of these sites; or whether the potential for such significant effects can be excluded. This test is completed with cognisance of emerging case law. For the avoidance of doubt, within Screening for Appropriate Assessment process, no reliance is made on existing mitigation measures which form part of current or previous industrial peat production. The scope of this appraisal refers to the proposed decommissioning and rehabilitation only, as described in the Plan included as **Appendix B**.

In the current context, where significant effects are considered likely, in view of the qualifying interests or special conservation interests and the respective conservation objectives of any European site, the Screening identifies that Appropriate Assessment is required. Therefore, this NIS report provides mitigation to avoid adverse effects on European site integrity. This report is conducted in line with the requirements of Article 6(3) of the EU Habitats Directive (92/43/EEC) and the National Parks and Wildlife Service (NPWS) Guidance for Planning Authorities (2010), and it is intended that the information contained within this document will form the basis for the Article 6(3) Appropriate Assessment process completed by the Competent Authority.

1.1.1 Stages of the Appropriate Assessment Process

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

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

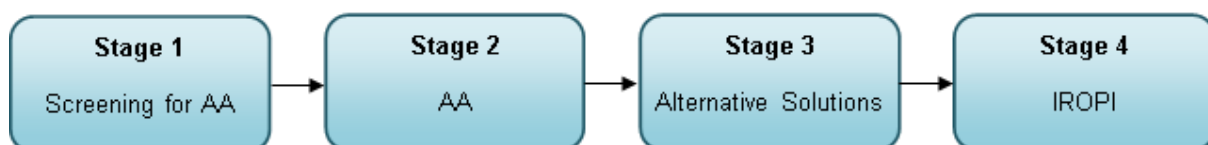


Image 1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DEHLG, 2009).

Stage 1 - Screening for AA

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

Stage 2 – Appropriate Assessment

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

Stage 3 - Alternative Solutions

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

Stage 4 - IROPI

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

1.1.2 Statement of Authority

Eamonn Delaney BSc, MSc, MCIEEM, CECOL prepared this Natura Impact Statement. Eamonn has fifteen years consultancy experience and has prepared Screening for Appropriate Assessment and Natura Impact Statements for various projects, including residential, amenity, renewable energy and transport developments in addition to strategic policy and planning proposals. Eamonn conducted field visits to the Bunahinly-Kilgarvan Bog site in January 2022. Eamonn's initial years in ecological consultancy involved botanical and habitat surveys for the purposes of EIA, EcIA and large scale habitat surveys for local authorities. This included plant species identification and habitat classification in a wide range of rural, urban and peri-urban environments. Eamonn is a member of the Botanical Society of Britain and Ireland (BSBI) and regularly attends local and regional BSBI field meetings in addition to carrying out recording for the proposed BSBI 2020 Atlas, in north Co. Galway and south Co. Mayo.

Eamonn has extensive experience in the Ecological Clerk of Works (ECOW) role for Flood Relief Schemes, roads and pipeline developments which requires weekly site visits, monitoring of mitigation measures, reviewing contactors method statements in addition to ongoing liaison with site operational staff and the design team. Eamonn has also been involved in the preparation and review of numerous Screening for Appropriate Assessment reports, Natura Impact Statements, Ecological Impact Assessments and Invasive Species Management Plans for a range of project types including roads, water infrastructure, solar farms, wind farms and peatland rehabilitation works. Through his involvement in all of these projects, Eamonn has honed his skills in field based assessments and the subsequent reporting and interpretation of information yielded from desk and field based resources.

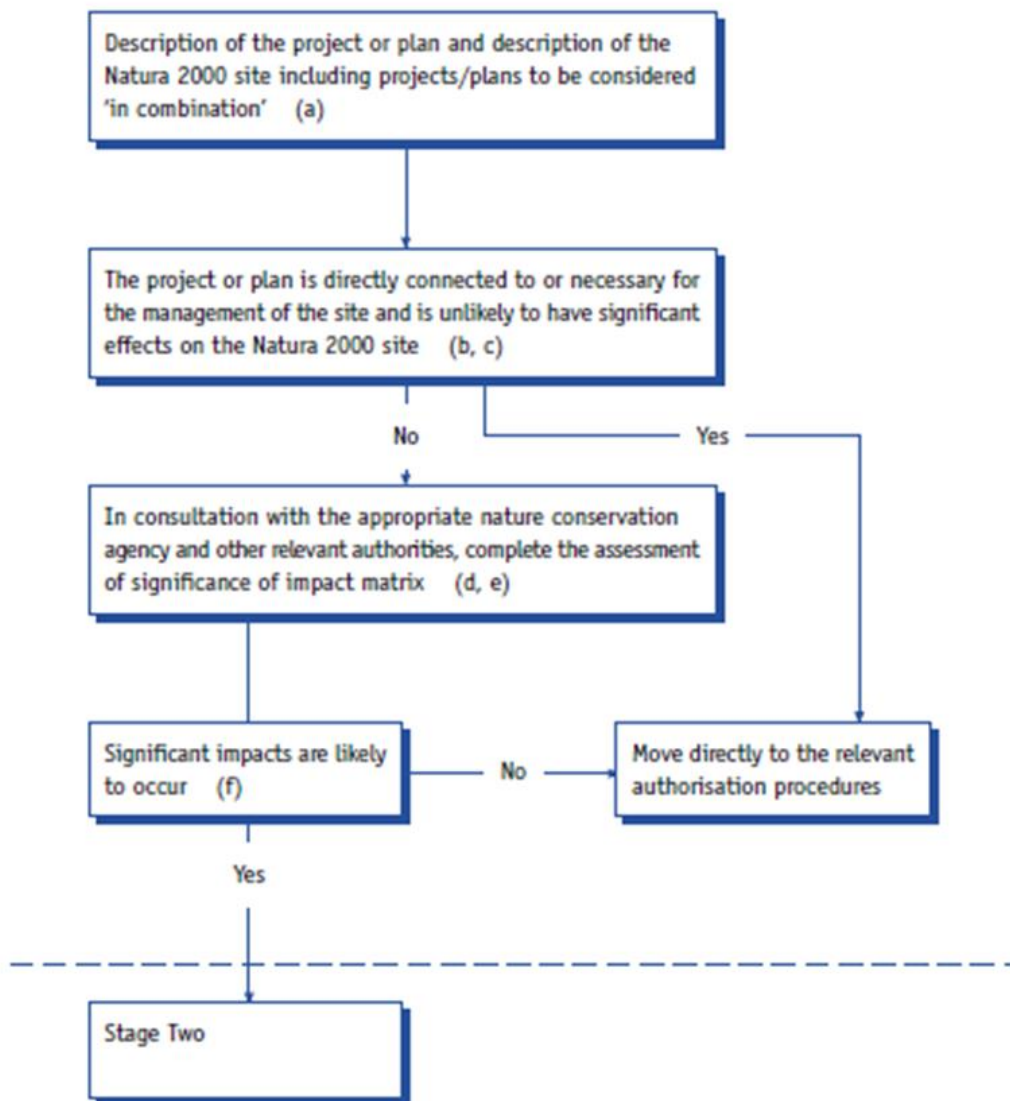
Eamonn routinely drafts, reviews and completes AA's for numerous projects. As the project design is developed, Eamonn seeks to influence the project design and refine the AA process to avoid and reduce potential impacts to the habitats and species for which the potentially impacted European site is designated. The outcome ensures that the finalised AA has been developed through an iterative process where the findings of the AA inform and are being informed by the project design throughout.

2 Stage 1: Screening

2.1 Screening Evaluation Process

The Screening process examines the likely effects of the proposed Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, as described in the appended 'plan' (**Appendix B**), either alone or in combination with other projects or plans, upon any European Site and considers whether it can be objectively concluded that these effects will not be significant. The below figure outlines the assessment pathways and considerations held in the Stage One Screening for Appropriate Assessment process.

Stage One: Screening



2.2 Overview of Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. PO-502-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The bog is part of the Blackwater group. This regulatory requirement is the main driver of the development of this rehabilitation plan.

A document titled ‘*Bunahinly-Kilgarvan Bog Cutaway Bog Decommissioning and Rehabilitation 2022*’ has been prepared specifically to describe the proposed decommissioning and rehabilitation measures at Bunahinly-Kilgarvan Bog and is appended to this document as **Appendix B**.

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme (PCAS) on peatlands previously used for energy production. The additional costs of the proposed Scheme will be supported by Government through the Climate Action Fund. Bord na Móna have identified a footprint of 33,000 ha (a subset of the BnM estate that has been used for energy production) as peatlands suitable for enhanced rehabilitation – including Bunahinly-Kilgarvan 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. PO502-01, which requires the following:

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

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

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

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

Rehabilitation seeks to address the requirements of Condition 10.2 of IPC License Ref. PO502-01, 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. PO502-01:

“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.”

Bunahinly-Kilgarvan Bog was drained and developed for industrial peat production in from the 1990’s. Industrial peat production ceased in 2018. The primary rehabilitation goal and outcome for Bunahinly-Kilgarvan Bog is **environmental stabilisation** of the bog.

Enhanced Rehabilitation interventions supported by the above referenced Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered.

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

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

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

2.4 Description of the proposed Decommissioning and Rehabilitation

2.4.1 Location, Size, Scale, Landcover

2.4.1.1 Location

Bunahinly-Kilgarvan Bog is located 1km south of Athlone in Co. Westmeath. It is also adjacent to the River Shannon, which is located 50-150m away from the western boundary of the site. Bunahinly-Kilgarvan comprises two separate bogs that are connected via a narrow strip of peatland with Bunahinly to the north and Kilgarvan to the south. This site is located in a low-lying area and the adjoining grassland to the west is prone to flooding during winter months.

The main landscape feature in this area is the River Shannon and its associated riparian zone and floodplain.

See **Figure 1: Site Location of Bunahinly Bog** (over).

Figure 2: Site Location of Kilgarvan Bog (over).

Figure 3: Aerial photo of Bunahinly Bog (over).

Figure 4: Aerial Imagery of Kilgarvan Bog (over).

Figure 7: Current habitats at Bunahinly Bog (over).

Figure 8: Current Habitats at Kilgarvan (over).

2.4.1.2 Size, Scale, Landcover

Size and Scale: Bunahinly-Kilgarvan Bog comprises 394Ha in total.

Bunahinly-Kilgarvan Bog (production area) is mainly composed of bare peat as the bog was in active peat production until 2018 (See **Appendix B**). There are some remnant sections of raised bog still present, but these are generally small.

The River Shannon flows within close proximity to the western boundary of the site. The River Shannon and its associated riparian habitats are important wildlife corridors and are key links for connectivity of habitats and species.

At Bunahinly, the underlying geology is categorised as 'Waulsortian limestones' comprising massive, unbedded limestone; whilst the underlying geology at Kilgarvan is the 'Ballysteen formation' which comprises dark muddy limestone, shale.

Published bedrock and Quaternary geological maps only present the shallowest deposits encountered, and fail to present in information on the buried peat substrate. Coring carried out by RPS in 2021 across Bunahinly-Kilgarvan provided further insight into the deposits underlying the site, particularly when combined with Ground Penetrating Radar (GPR) data concerning the elevation of the peat substrate.

Industrial peat production at Bunahinly-Kilgarvan Bog ceased in 2018. The peat harvested from this site was used for fuel peat for power stations at Shannonbridge (WOP) and Lanesborough (LRP).

The total area of Bunahinly-Kilgarvan Bog is 394Ha of which 393.12ha or 99.78% of the present Landcover (2021) has been allocated enhanced rehabilitation measures.

Landcover

Existing:

The proposed rehabilitation extent is dominated by cutaway bare peat (PB4). Cutover areas support little plant species cover. The cutover bog areas support a network of field drains support that wetland plants such

as Common Reed (*Phragmites australis*). Marginal habitats² include Birch woodland (WN7)³, remnant sections of raised bog (PB1), scrub (WS1) and cutaway bog (PB4). The remnant sections are generally small and are dry with a dominance of Ling Heather (*Calluna vulgaris*).

The streams that flow through the site have been canalised and supports a small number of aquatic plant species. Riparian vegetation was mainly composed of Willow (*Salix* sp.), Common Reed and Reed Canary Grass (*Phalaris arundinacea*). A number of silt ponds, some of which were recently constructed, are located adjacent to the streams. A map showing existing habitats at Bunahinly-Kilgarvan Bog is presented in **Figure 7** and **Figure 8**.

Extent of Landcover requiring Decommissioning: Decommissioning will be applicable across all of Bunahinly-Kilgarvan Bog, where relevant.

Extent of Landcover requiring Rehabilitation: The total area of Bunahinly-Kilgarvan Bog is 394Ha of which 393.12ha or 99.78% of the present Landcover (2021) has been allocated enhanced rehabilitation measures.

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

For habitats where rehabilitation is undertaken, landcover is expected to eventually comprise wetlands, reed swamp and fen on shallow cutaway peat and eventually naturally functioning wetland and peatland habitats. The margins of these habitats will comprise additional habitats such as marginal raised bog, broadleaved woodland and riparian areas. The development of these habitats will reflect the varying underlying environmental conditions and in part will develop as a mosaic of habitats. Rehabilitation will also modify the local environmental conditions (e.g. hydrology and topography).

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

In general, the key rehabilitation objective is to optimise the area of suitable hydrological conditions for climate action benefits This is defined as:

- Carrying out intensive rehabilitation with the application of enhanced rehabilitation measures (including drain-blocking, re-profiling, cell-bunding, fertiliser application, seeding of vegetation & inoculation of *Sphagnum*).
- Optimising hydrological conditions for the development of wetlands, Reed swamp and fen on shallow cutaway peat, and eventually naturally functioning wetland and peatland habitats. Bunahinly-Kilgarvan has a pumped drainage regime and a significant area is likely to develop as wetland habitats.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities in suitable conditions.
- Stabilisation or reduction in water quality parameters (e.g. suspended solids).
- Environmental stabilisation.
- Setting the site on an appropriate trajectory to develop naturally functioning peatland habitats over time. It is not expected that the site has the potential to develop active raised bog (ARB) analogous to the priority EU Habitats Directive Annex I habitat within the foreseeable future (c.50 years). Nevertheless, re-wetting across the entire bog, as part of the proposed Scheme, will improve habitat conditions of the whole bog, making the overall bog wetter. Other peatland habitats such as

² Defined as occurring around the margin of the bog

³ Alphanumeric codes follow the classification presented in 'A Guide to Habitats in Ireland' Fossitt (2000)

embryonic *Sphagnum*-rich vegetation, fen and associated Reed swamp will develop in a wider mosaic that reflects underlying conditions. It will take some time for stable naturally functioning habitats to fully develop at Bunahinly-Kilgarvan Bog.

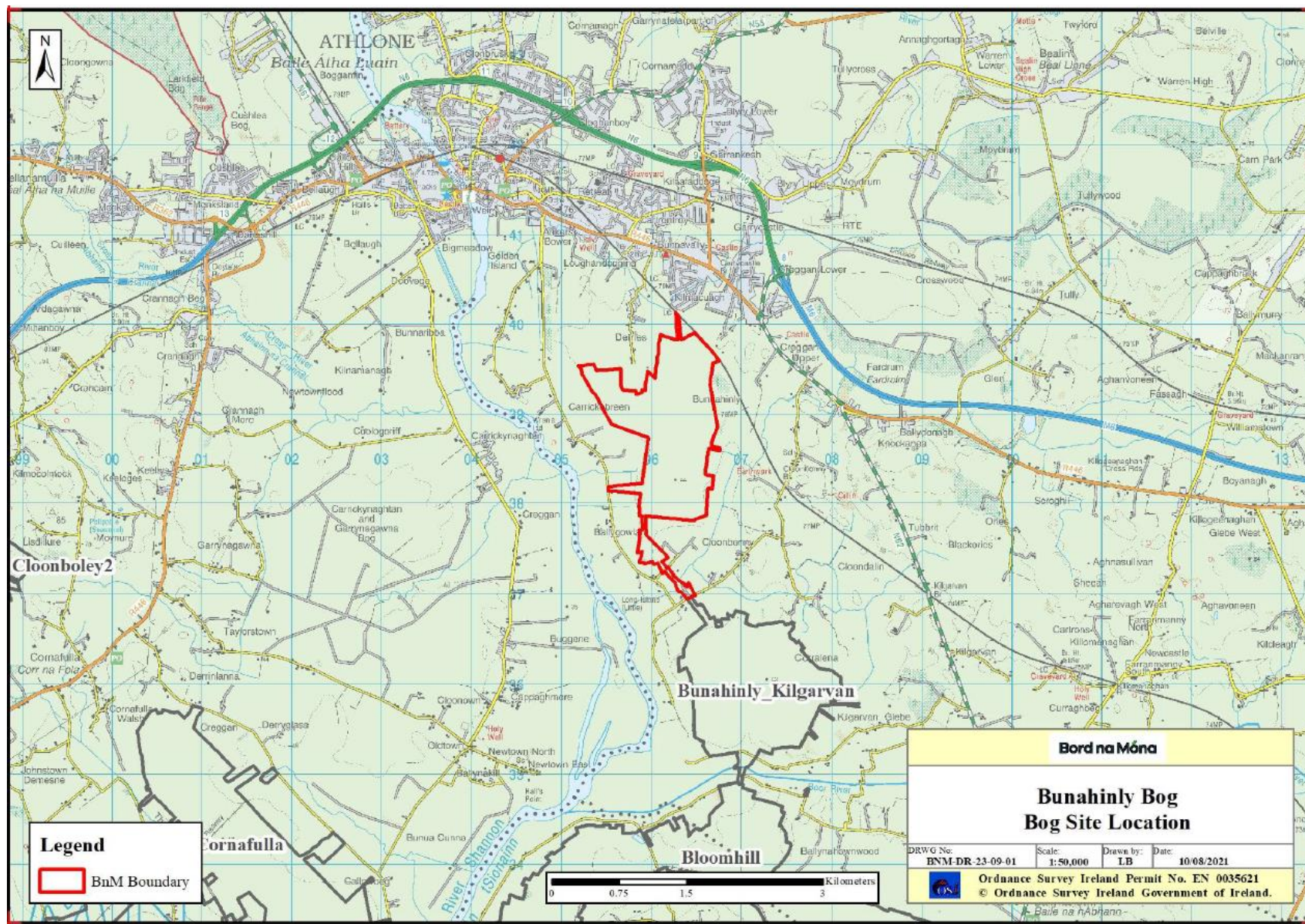


Figure 1: Site Location of Bunahinly Bog

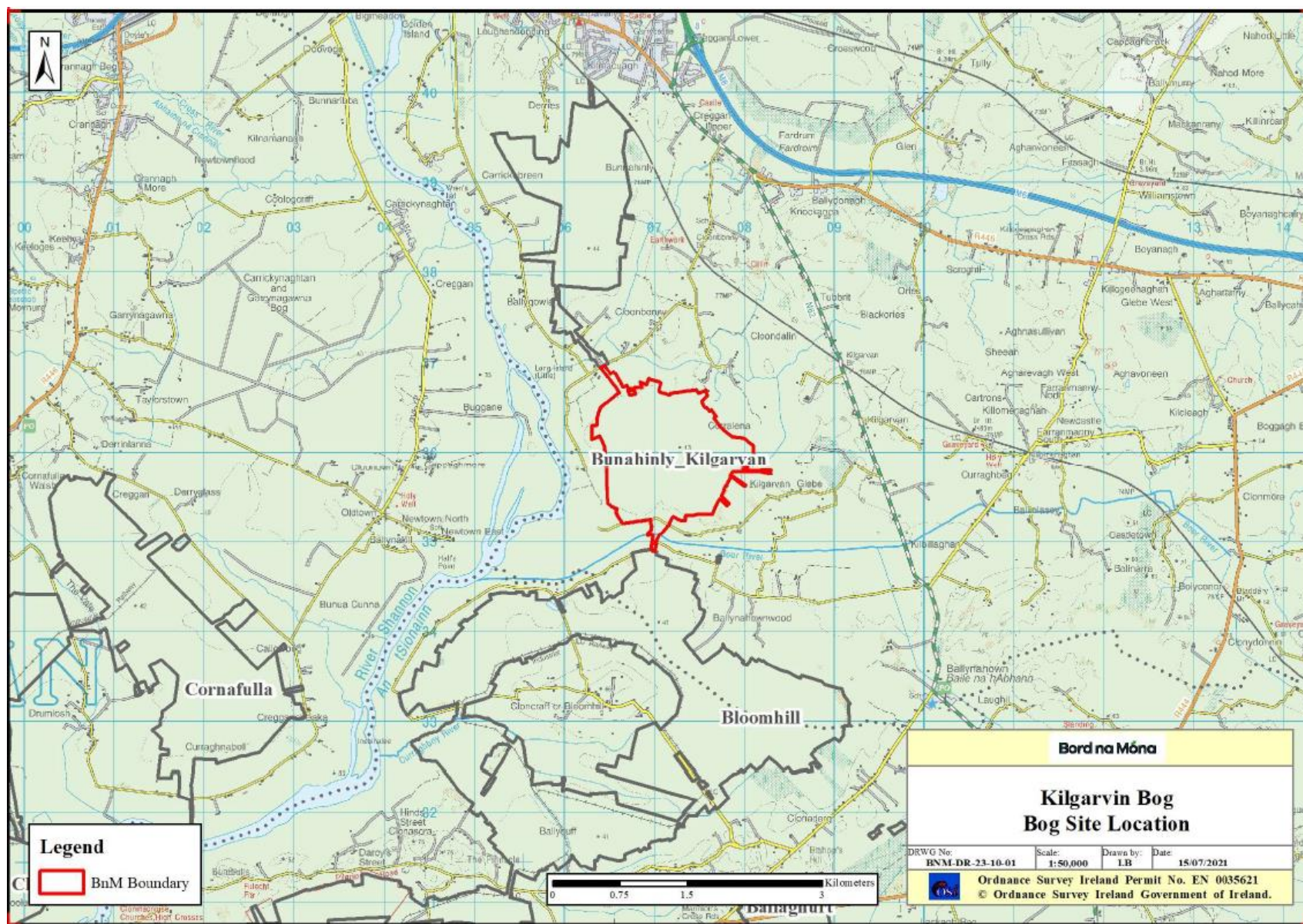


Figure 2: Site Location of Kilgarvan Bog

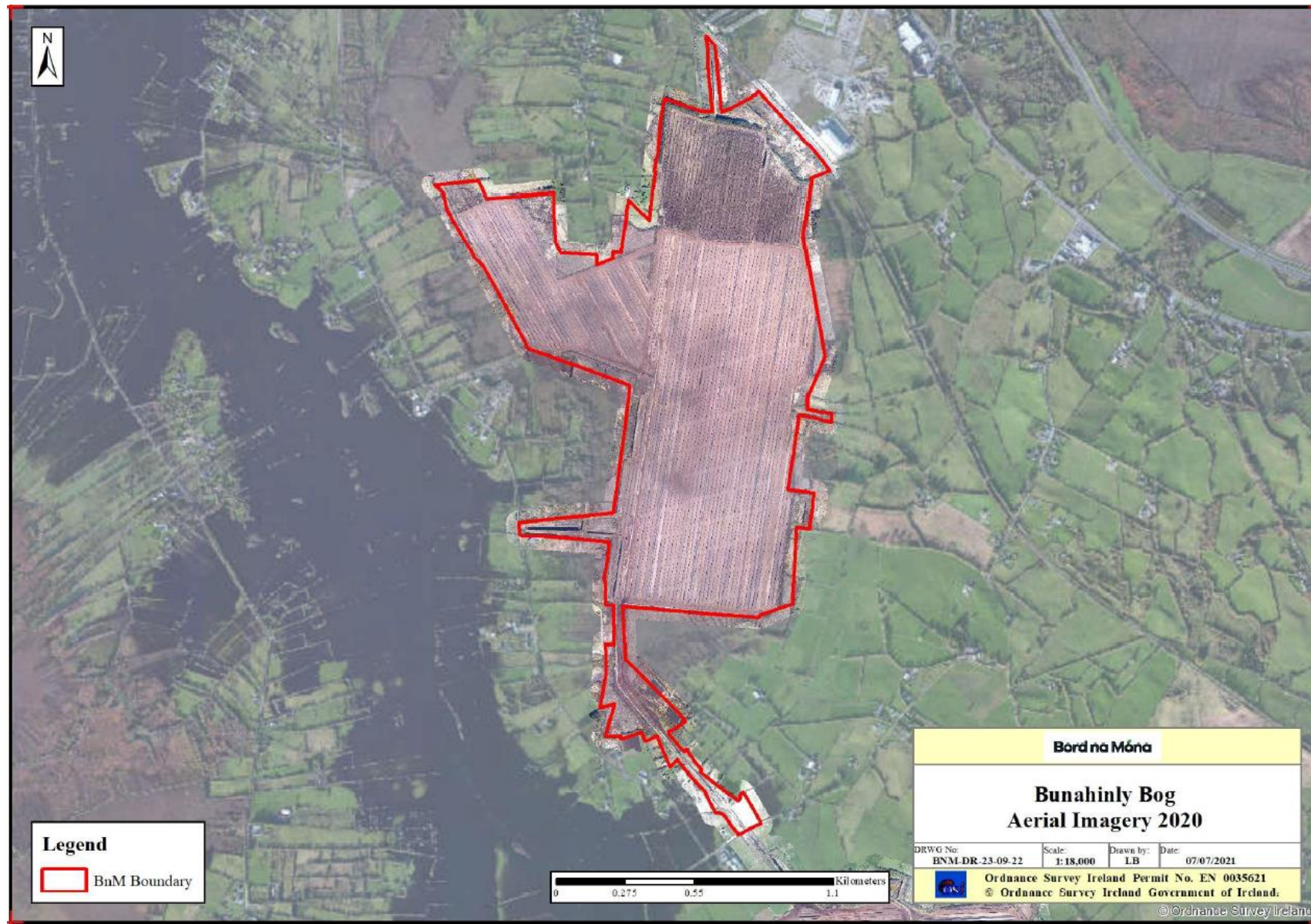


Figure 3: Aerial photo of Bunahinly Bog

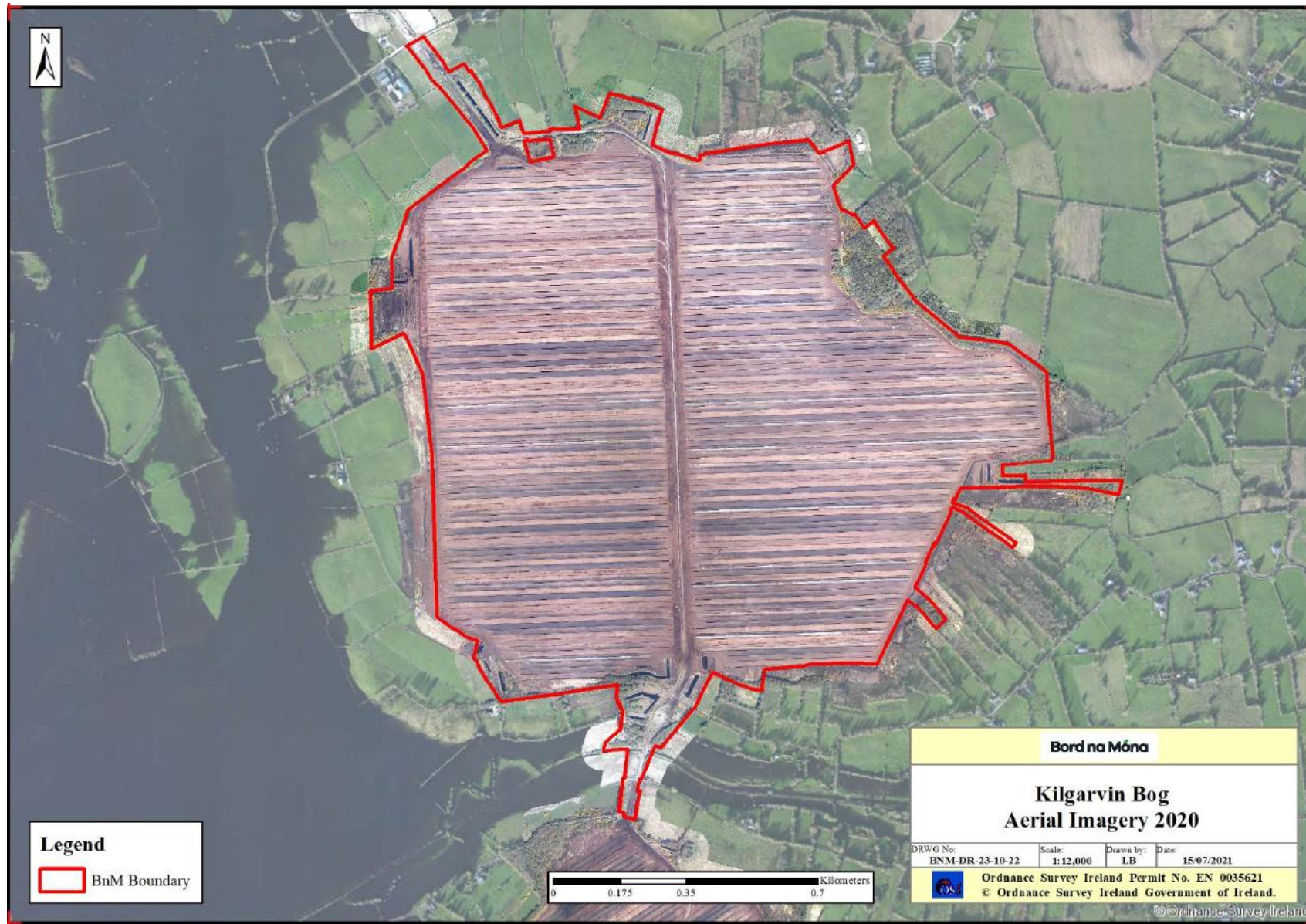


Figure 4: Aerial photo of Kilgarvan Bog

2.5 Description of the Receiving Environment

The majority of Bunahinly-Kilgarvan Bog within the Bord na Móna boundary is bare peat as this site was in production until 2018 (see Image 1). The site is drained by tributaries of the Shannon (Upper)_120 watercourse (Boor and Cloonbonny streams), which provides connectivity to the River Shannon which is designated as part of the Middle Shannon Callows SPA (004096) and River Shannon Callows SAC (000216).

2.5.1 Desk Based Assessments

2.5.1.1 National Biodiversity Data Centre

A search was undertaken on the National Biodiversity Data Centre⁴ for Protected and Invasive Species presence in the vicinity of the proposed development. Bunahinly-Kilgarvan Bog is located within hectad N03⁵. The protected and invasive species records available for this hectad is shown in **Table 1**.

Table 1: NBDC records of protected and invasive species in N03 10km grid square (hectad)

Common Name (Species Name)	Date of Record	Designation
Common Frog (<i>Rana temporaria</i>)	09/05/2020	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
Barn Owl (<i>Tyto alba</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Barn Swallow (<i>Hirundo rustica</i>)	11/08/2021	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Black-headed Gull (<i>Larus ridibundus</i>)	30/03/2019	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Black-tailed Godwit (<i>Limosa limosa</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Coot (<i>Fulica atra</i>)	30/03/2019	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

⁴ Available at <https://www.biodiversityireland.ie/>. Accessed in January 2022

⁵ 10x10km Irish Grid Square

Common Name (Species Name)	Date of Record	Designation
Common Grasshopper Warbler (<i>Locustella naevia</i>)	11/07/2017	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Kestrel (<i>Falco tinnunculus</i>)	30/03/2019	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Kingfisher (<i>Alcedo atthis</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Linnet (<i>Carduelis cannabina</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Pheasant (<i>Phasianus colchicus</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
Common Pochard (<i>Aythya ferina</i>)	29/02/1984	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Quail (<i>Coturnix coturnix</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Common Redshank (<i>Tringa totanus</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Common Sandpiper (<i>Actitis hypoleucos</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Common Name (Species Name)	Date of Record	Designation
Common Snipe (<i>Gallinago gallinago</i>)	11/07/2017	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section III Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Starling (<i>Sturnus vulgaris</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Swift (<i>Apus apus</i>)	11/05/2019	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Tern (<i>Sterna hirundo</i>)	19/06/2018	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Wood Pigeon (<i>Columba palumbus</i>)	30/03/2019	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
Corn Crane (<i>Crex crex</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Dunlin (<i>Calidris alpina</i>)	29/02/1984	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Eurasian Curlew (<i>Numenius arquata</i>)	16/07/2021	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List

Common Name (Species Name)	Date of Record	Designation
Eurasian Marsh Harrier (<i>Circus aeruginosus</i>)	13/05/2010	Protected Species: Wildlife Acts
Eurasian Oystercatcher (<i>Haematopus ostralegus</i>)	11/08/2016	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Eurasian Teal (<i>Anas crecca</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Eurasian Tree Sparrow (<i>Passer montanus</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Eurasian Wigeon (<i>Anas penelope</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Eurasian Woodcock (<i>Scolopax rusticola</i>)	31/07/1991	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section III Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
European Golden Plover (<i>Pluvialis apricaria</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Protected Species: EU Birds Directive >> Annex II, Section II Bird Species Protected Species: EU Birds Directive >> Annex III, Section III Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Great Black-backed Gull (<i>Larus marinus</i>)	19/06/2018	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Common Name (Species Name)	Date of Record	Designation
Great Cormorant (<i>Phalacrocorax carbo</i>)	30/03/2019	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Great Crested Grebe (<i>Podiceps cristatus</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Great Northern Diver (<i>Gavia immer</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species
Greater White-fronted Goose (<i>Anser albifrons</i>)	29/02/1984	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Protected Species: EU Birds Directive >> Annex II, Section II Bird Species Protected Species: EU Birds Directive >> Annex III, Section III Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Hen Harrier (<i>Circus cyaneus</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Herring Gull (<i>Larus argentatus</i>)	29/02/1984	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
House Martin (<i>Delichon urbicum</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
House Sparrow (<i>Passer domesticus</i>)	15/06/2017	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Jack Snipe (<i>Limnocryptes minimus</i>)	29/02/1984	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section III Bird Species

Common Name (Species Name)	Date of Record	Designation
Lesser Black-backed Gull (<i>Larus fuscus</i>)	19/06/2018	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Little Egret (<i>Egretta garzetta</i>)	11/05/2019	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species
Little Grebe (<i>Tachybaptus ruficollis</i>)	07/12/2009	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Little Gull (<i>Larus minutus</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species
Mallard (<i>Anas platyrhynchos</i>)	19/06/2018	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
Merlin (<i>Falco columbarius</i>)	28/07/2016	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Mew Gull (<i>Larus canus</i>)	29/02/1984	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Mute Swan (<i>Cygnus olor</i>)	11/05/2019	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Northern Lapwing (<i>Vanellus vanellus</i>)	11/08/2016	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Northern Pintail (<i>Anas acuta</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section II Bird Species Threatened Species: Birds of Conservation Concern

Common Name (Species Name)	Date of Record	Designation
		Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Northern Shoveler (<i>Anas clypeata</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section III Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Peregrine Falcon (<i>Falco peregrinus</i>)	11/05/2019	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species
Red Grouse (<i>Lagopus lagopus</i>)	29/02/1984	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Red-breasted Merganser (<i>Mergus serrator</i>)	31/07/1991	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section II Bird Species
Ringed Plover (<i>Charadrius hiaticula</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Sand Martin (<i>Riparia riparia</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Sky Lark (<i>Alauda arvensis</i>)	15/06/2017	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Spotted Flycatcher (<i>Muscicapa striata</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Stock Pigeon (<i>Columba oenas</i>)	31/07/1991	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Common Name (Species Name)	Date of Record	Designation
Tufted Duck (<i>Aythya fuligula</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Water Rail (<i>Rallus aquaticus</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Whinchat (<i>Saxicola rubetra</i>)	11/05/2019	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
White-tailed Eagle (<i>Haliaeetus albicilla</i>)	31/12/2011	Protected Species: Wildlife Acts
Whooper Swan (<i>Cygnus cygnus</i>)	07/03/2021	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Yellowhammer (<i>Emberiza citrinella</i>)	15/06/2018	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Fir Clubmoss (<i>Huperzia selago</i>)	31/12/2010	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex V
Freshwater White-clawed Crayfish (<i>Austropotamobius pallipes</i>)	25/06/2014	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex II Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
Canadian Waterweed (<i>Elodea canadensis</i>)	04/08/1983	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Green-winged Orchid (<i>Orchis morio</i>)	11/05/2019	Threatened Species: Endangered
Indian Balsam (<i>Impatiens glandulifera</i>)	25/09/2018	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)

Common Name (Species Name)	Date of Record	Designation
Japanese Knotweed (<i>Fallopia japonica</i>)	29/04/2021	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Sycamore (<i>Acer pseudoplatanus</i>)	15/06/2017	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
<i>Agabus (Acatodes) congener</i>	30/06/1987	Threatened Species: Vulnerable
Dingy Skipper (<i>Erynnis tages</i>)	11/05/2019	Threatened Species: Near threatened
Grayling (<i>Hipparchia semele</i>)	04/08/2019	Threatened Species: Near threatened
Large Heath (<i>Coenonympha tullia</i>)	08/06/2017	Threatened Species: Vulnerable
Small Blue (<i>Cupido minimus</i>)	15/06/2019	Threatened Species: Endangered
Small Heath (<i>Coenonympha pamphilus</i>)	08/06/2019	Threatened Species: Near threatened
Wall (<i>Lasiommata megera</i>)	11/05/2019	Threatened Species: Endangered
<i>Andrena (Cnemidandrena) fuscipes</i>	16/08/2004	Threatened Species: Vulnerable
<i>Andrena (Oreomelissa) coitana</i>	07/07/2004	Threatened Species: Vulnerable
<i>Andrena (Taeniandrena) wilkella</i>	20/05/2004	Threatened Species: Data deficient
Gipsy Cuckoo Bee (<i>Bombus (Psithyrus) bohemicus</i>)	16/08/2004	Threatened Species: Near threatened
Great Yellow Bumble Bee (<i>Bombus (Subterraneobombus) distinguendus</i>)	29/08/2005	Threatened Species: Endangered
<i>Halictus (Seladonia) tumulorum</i>	28/08/2008	Threatened Species: Near threatened
Large Red Tailed Bumble Bee (<i>Bombus (Melanobombus) lapidarius</i>)	14/04/2017	Threatened Species: Near threatened
<i>Lasioglossum (Lasioglossum) lativentre</i>	28/08/2008	Threatened Species: Critically Endangered

Common Name (Species Name)	Date of Record	Designation
Moss Carder-bee (<i>Bombus (Thoracombus) muscorum</i>)	04/08/2019	Threatened Species: Near threatened
<i>Nomada obtusifrons</i>	07/07/2004	Threatened Species: Endangered
Red-tailed Carder Bee (<i>Bombus (Thoracombus) ruderarius</i>)	29/08/2005	Threatened Species: Vulnerable
Shrill Carder Bee (<i>Bombus (Thoracombus) sylvarum</i>)	29/08/2005	Threatened Species: Endangered
<i>Sphecodes ferruginatus</i>	28/08/2008	Threatened Species: Endangered
<i>Kageronia fuscogrisea</i>	31/12/1996	Threatened Species: Near threatened
Common Garden Snail (<i>Cornu aspersum</i>)	18/09/1977	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
<i>Corbicula fluminea</i>	25/07/2017	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Duck Mussel (<i>Anodonta (Anodonta) anatina</i>)	31/08/2004	Threatened Species: Vulnerable
English Chrysalis Snail (<i>Leiostryla (Leiostryla) anglica</i>)	31/12/1899	Threatened Species: Vulnerable
Heath Snail (<i>Helicella itala</i>)	31/08/2004	Threatened Species: Vulnerable
Jenkins' Spire Snail (<i>Potamopyrgus antipodarum</i>)	31/08/2004	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Keeled Slug (<i>Tandonia sowerbyi</i>)	18/09/1977	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Marsh Whorl Snail (<i>Vertigo (Vertigo) antivertigo</i>)	04/10/1998	Threatened Species: Vulnerable
Moss Chrysalis Snail (<i>Pupilla (Pupilla) muscorum</i>)	18/09/1977	Threatened Species: Endangered
Smooth Grass Snail (<i>Vallonia pulchella</i>)	22/08/2006	Threatened Species: Vulnerable
Whirlpool Ramshorn (<i>Anisus (Disculifer) vortex</i>)	18/09/1977	Threatened Species: Vulnerable

Common Name (Species Name)	Date of Record	Designation
Zebra Mussel (<i>Dreissena polymorpha</i>)	31/08/2004	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
<i>Fontinalis antipyretica</i> var. <i>cymbifolia</i>	06/09/2007	Threatened Species: Data deficient
Slender Cow-horn Bog-moss (<i>Sphagnum subsecundum</i>)	31/12/1986	Threatened Species: Near threatened
Velvet Feather-moss (<i>Brachytheciastrum velutinum</i>)	06/09/2007	Threatened Species: Endangered
Willow Feather-moss (<i>Amblystegium varium</i>)	31/05/1952	Threatened Species: Near threatened
Common Lizard (<i>Zootoca vivipara</i>)	01/07/2019	Protected Species: Wildlife Acts
American Mink (<i>Mustela vison</i>)	13/10/2014	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Bank Vole (<i>Myodes glareolus</i>)	31/08/2011	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Daubenton's Bat (<i>Myotis daubentonii</i>)	02/09/2012	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Eurasian Badger (<i>Meles meles</i>)	04/05/2018	Protected Species: Wildlife Acts
Eurasian Pygmy Shrew (<i>Sorex minutus</i>)	31/08/2011	Protected Species: Wildlife Acts
Eurasian Red Squirrel (<i>Sciurus vulgaris</i>)	31/12/2012	Protected Species: Wildlife Acts
European Otter (<i>Lutra lutra</i>)	23/03/2012	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex II Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
European Rabbit (<i>Oryctolagus cuniculus</i>)	28/11/1991	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Fallow Deer (<i>Dama dama</i>)	23/03/2012	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species

Common Name (Species Name)	Date of Record	Designation
		Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland) Protected Species: Wildlife Acts
Lesser Noctule (<i>Nyctalus leisleri</i>)	22/09/2009	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Pine Marten (<i>Martes martes</i>)	21/04/2018	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	22/09/2009	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
West European Hedgehog (<i>Erinaceus europaeus</i>)	17/07/2020	Protected Species: Wildlife Acts

2.5.1.2 National Parks and Wildlife Service Data Request

Table 2 presents protected species records held for hectad N03 by the National Parks and Wildlife Service.

Table 2: NPWS records of protected and invasive species in N03 10km grid square

Species Name	Common Name	Record Date	Location(s)
<i>Anthriscus caucalis</i>	Bur Chervil	1899	Clonmacnoise, King's Co. Esker ridge
<i>Austropotamobius pallipes</i>	White-clawed Crayfish	1996, 2002, 2005 & 2008	Boor / Br NW Ballynahown wood Boor / Br NW Kilbillaghan
<i>Brachythecium velutinum</i>	Velvet Feather-moss	2007	W. of Clonmacnoise, Co. Offaly
<i>Cephalanthera longifolia</i>	Narrow-leaved Helleborine	1885 & 1914	Lough Ree, Co. Westmeath
<i>Cladina rangiferina</i>	Reindeer Moss	1984	Carrickynaghtan Bog
<i>Cladonia ciliata</i>	<i>Cladonia ciliata</i>	1982 1984 1986	Carrickynaghtan Bog Bunnahinly Bog Corralena Bog
<i>Cladonia ciliata</i> var. <i>tenuis</i>	<i>Cladonia ciliata</i> var. <i>tenuis</i>	1977	Tullaghbeg, S of Clonmacnoise

Species Name	Common Name	Record Date	Location(s)
<i>Cladonia portentosa</i>	<i>Cladonia portentosa</i>	1977 1982 1984 1986	Carrickynaghtan Bog Tullaghbeg, S of Clonmacnoise Bunnahinly Bog Corralena Bog
<i>Erinaceus europaeus</i>	West European Hedgehog	1972	Athlone, Co. Westmeath
<i>Huperzia selago</i>	Fir Clubmoss	2005	E. of Clonmacnoise
<i>Lepus timidus subsp. hibernicus</i>	Irish Hare	2010	Bunahinly and Kilgarvan, Co. Westmeath
<i>Lutra lutra</i>	Eurasian Otter	1980, 1991 2010	Kilgarvan, Co. Westmeath Various not identified on the dataset
<i>Orchis morio</i>	Green-winged Orchid	Various	Cregganabeaka Gorravinch Clonmacnoise, Co. Offaly Bunthulla, Clonmacnoise, Co. Offaly Clonmacnoise, Hanging Hill, Pilgrim's Road Ballygowlan, Athlone, Shannon Callows, Co. Westmeath
<i>Rana temporaria</i>	Common Frog	Various	Various including Cloonbonny, Athlone
<i>Rhynchospora fusca</i>	Brown Beak-sedge	2005	East of Clonmacnoise
<i>Scandix pecten-veneris</i>	Shepherd's-needle	1899	Clonmacnoise
<i>Sphagnum angustifolium</i>	Fine Bog-moss	1986	Bunnahinly Bog
<i>Viola persicifolia</i>	Fen Violet	1886	Seven Churches

2.5.1.3 Baseline Water Quality Data for Bunahinly-Kilgarvan Bog

Drainage is an important feature of industrial peat production and there were extensive field drains maintained throughout bog areas to facilitate industrial peat production annually, each of which eventually drains into a terminal silt pond that allows for settlement of suspended solids before entering the main river systems. In accordance with the existing Integrated Pollution Control licence, all drainage water from boglands in a licensed area is discharged via an appropriately designed silt pond treatment arrangement as required in Condition 6.6. of the licence. Industrial peat production has now permanently ceased at Bunahinly-Kilgarvan Bog.

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

Bunahinly bog has three treated surface water outlets, two to the Shannon Upper tributary IE_SH_26S021800, and one direct to the Shannon (Upper)_120. Kilgarvan Bog also has three treated surface water outlets, two to the same Shannon (Upper)_120 tributary as Bunahinly Bog and the remaining one to the IE_SH_26B071200 BOOR_020 (Boor River).

Both the Shannon Upper tributary and the Boor River body are currently classified as At Risk and listed as being under pressure from peat extraction in the third cycle of the river basin management plan, currently under preparation.

Details of silt ponds, associated surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed on the accompanying structures maps along with water quality maps. See Drawing numbers BNM-DR-23-09-02 titled Bunahinly Bog: Structures and Sampling and Drawing number BNM-DR-23-10-02 titled Kilgarvan Bog: Structures and Sampling, along with Drawing number BNM-DR-23-09-WQ01 titled Bunahinly Bog: Water Quality Map and Drawing number BNM-DR-23-10-WQ01 titled Kilgarvan Bog: Water Quality Map within the accompanying Mapbooks, which illustrate the various drainage and water quality infrastructure present at Bunahinly-Kilgarvan.

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

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

Initial monthly ammonia concentrations from November to May 2021 have a range of 0.009 to 2.18mg/l with an average of 0.646mg/l.

Results for suspended solids for the same period indicate a range of >2 to 9mg/l with an average of 4.35mg/l.

From an analysis of any monitoring over the past 5 yrs. of the IPC licence environmental monitoring of some of the discharges from this bog, indicate that results were under the ELV for SS and broadly under the trigger levels for ammonia and COD. (Table 3).

Table 3 Baseline water quality information for Bunahinly-Kilgarvan Bog

Bog	SW	Monitoring	pH	SS mg/l	TS mg/l	Ammonia mg/l	TP mg/l	COD mg/l	Colour
Kilgarvin	SW-88	Q2 19	7.1	17	150	1.3	<0.05	80	240
Kilgarvin	SW-89	Q2 19	7.4	<5	196	3.4	<0.05	80	200
Kilgarvin	SW-89A	Q2 19	7.5	12	180	2.5	<0.05	62	146
Kilgarvin	SW-90	Q2 19	7.2	<5	119	1	<0.05	85	262
Kilgarvin	SW-91	Q2 19	7.7	<5	242	2.2	<0.05	59	132
Bunahinly	SW-92	Q2 19	6.6	<5	116	0.42	<0.05	126	248
Bunahinly	SW-93	Q2 19	6.2	<5	88	0.17	<0.05	108	269
Bunahinly	SW-94	Q2 19	7.1	<5	128	0.71	<0.05	129	236
Kilgarvin	SW-95	Q2 19	7.4	<5	130	0.15	<0.05	52	187
Kilgarvin	SW-96	Q2 19	7.4	6	192	0.09	<0.05	102	196
Bunahinly	SW-97	Q2 19	7	<5	134	0.1	<0.05	117	272
Kilgarvin	SW-88	Q1 18	7.2	5	62	1.3	0.05	47	293
Kilgarvin	SW-89	Q1 18	7.7	5	146	4	0.05	43	142
Kilgarvin	SW-89A	Q1 18	7.7	5	182	3.8	0.05	46	132
Kilgarvin	SW-90	Q1 18	7.3	5	108	1.6	0.05	55	189
Kilgarvin	SW-91	Q1 18	7.8	5	396	4.4	0.05	36	211
Bunahinly	SW-92	Q1 18	6.7	5	88	0.17	0.05	52	183
Bunahinly	SW-93	Q1 18	6.2	5	70	0.23	0.05	70	215
Bunahinly	SW-94	Q1 18	7.2	5	106	0.9	0.05	41	167
Kilgarvin	SW-95	Q1 18	7.5	5	132	0.37	0.05	35	64
Kilgarvin	SW-96	Q1 18	7.4	5	153	0.02	0.05	75	220
Bunahinly	SW-97	Q1 18	7.5	5	192	0.15	0.05	69	153
Bunahinly	SW-92	Q1 17	6.5	5	92	0.57	0.05	66	218
Bunahinly	SW-93	Q1 17	6.2	5	196	0.4	0.05	73	262
Kilgarvin	SW-88	Q3 15	7.4	5	152	1.9	0.05	77	207
Kilgarvin	SW-89	Q4 15	7.1	19	94	1.1	0.05	69	238
Kilgarvin	SW-89A	Q4 15	6	5	153	0.18	0.16	91	339
Kilgarvin	SW-90	Q4 15	6	5	92	0.38	0.05	62	466
Kilgarvin	SW-91	Q4 15	7.6	5	300	0.1	0.05	39	114
Bunahinly	SW-94	Q4 15	5.6	13	114	0.73	75	75	133

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

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

Water will still discharge from designated emission points when rehabilitation at Bunahinly-Kilgarvan has been completed. This discharge will have improving water quality and there will be increased wetland attenuation, meaning slower release of water. This is expected to have a positive impact on status of the key

water body receptor, the Shannon [Lower]__SC_120, and is expected to support the future status of the waterbody as being of Good Status.

Details of the internal drainage network and surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed on the attached Water Quality Map (See **Figure 5** and **Figure 6**).

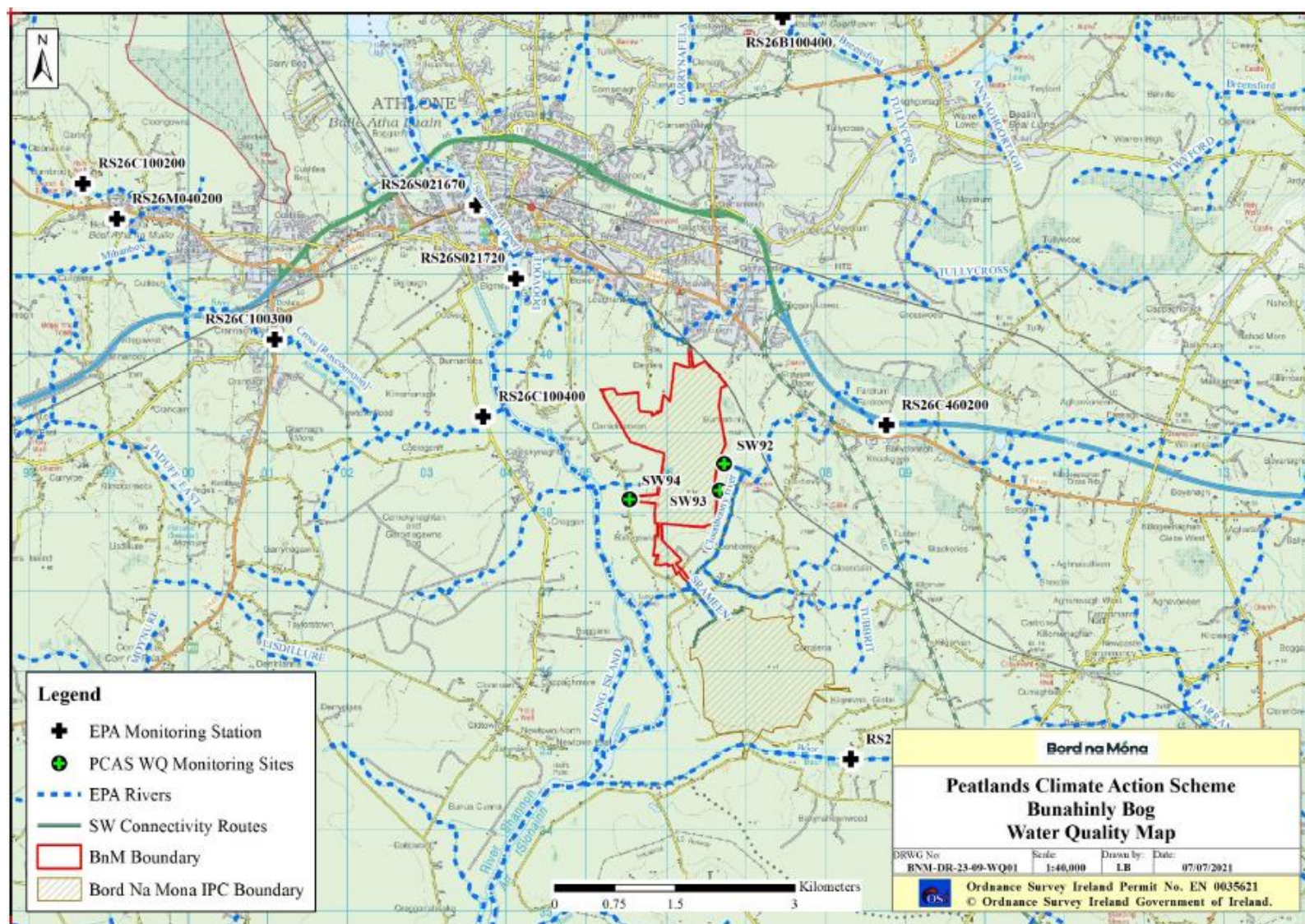


Figure 5: Water Quality Map for Bunahinly Bog

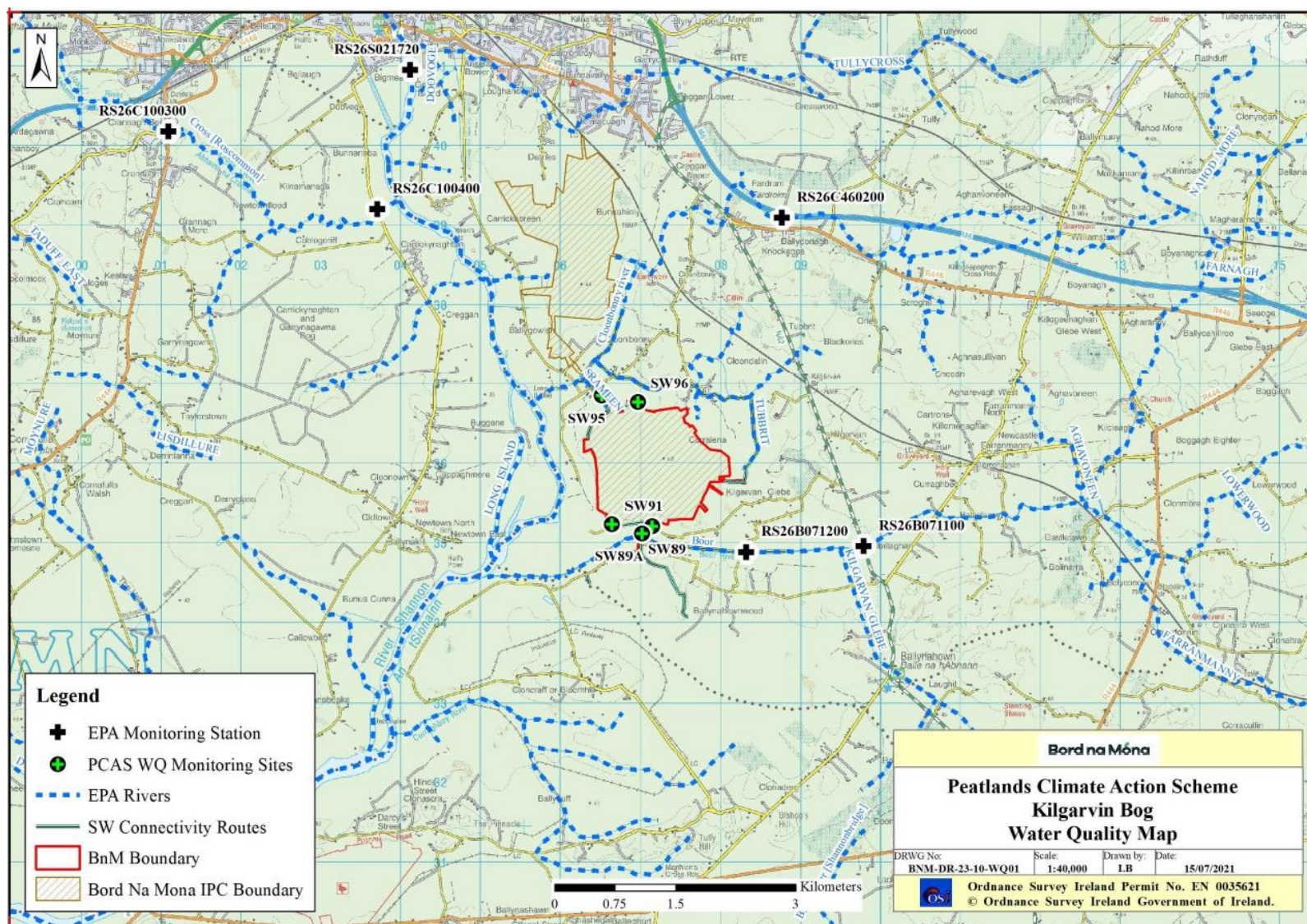


Figure 6: Water Quality Map for Kilgarvin Bog

Decommissioning and Rehabilitation Programme Water Quality Monitoring.

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

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

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

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

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

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

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

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

The water quality emission limit values (under condition 6.2 of the Integrated Pollution Control (IPC) licence issued for Bunahinly-Kilgarvan Bog) are unique to the water quality impacts from peat extraction, and as requested by the EPA. These values are not appropriate to use as a measures of success with regard to the expected water quality improvements that will arise from ceasing the annual peat extraction activity, removal of all stock and the associated rehabilitation of this bog. Existing water quality results from Bunahinly - Kilgarvan Bog indicate that suspended solids are well under the ELV that are applied during peat extraction, with ammonia also well under the associate trigger level. Silt ponds are an IPC Licence requirement to manage expected suspended solids that can arise from peat extraction and are not solely relied upon to mitigate impacts from rehabilitation of the peatlands. The silt pond locations are highlighted on (**Figure 20** and **Figure 21**), and all silt ponds are sized as required under condition 6.10 of the associated IPC Licence with regard to expected impact from the activity of milling peat and associated production processes, and maintained as required under condition 6.7 and 6.8. To that end, it is considered that silt ponds within the

Bunahinly-Kilgarvan Bog are sufficiently sized to attenuate any silt or particulate matter received during or following the proposed rehabilitation works.

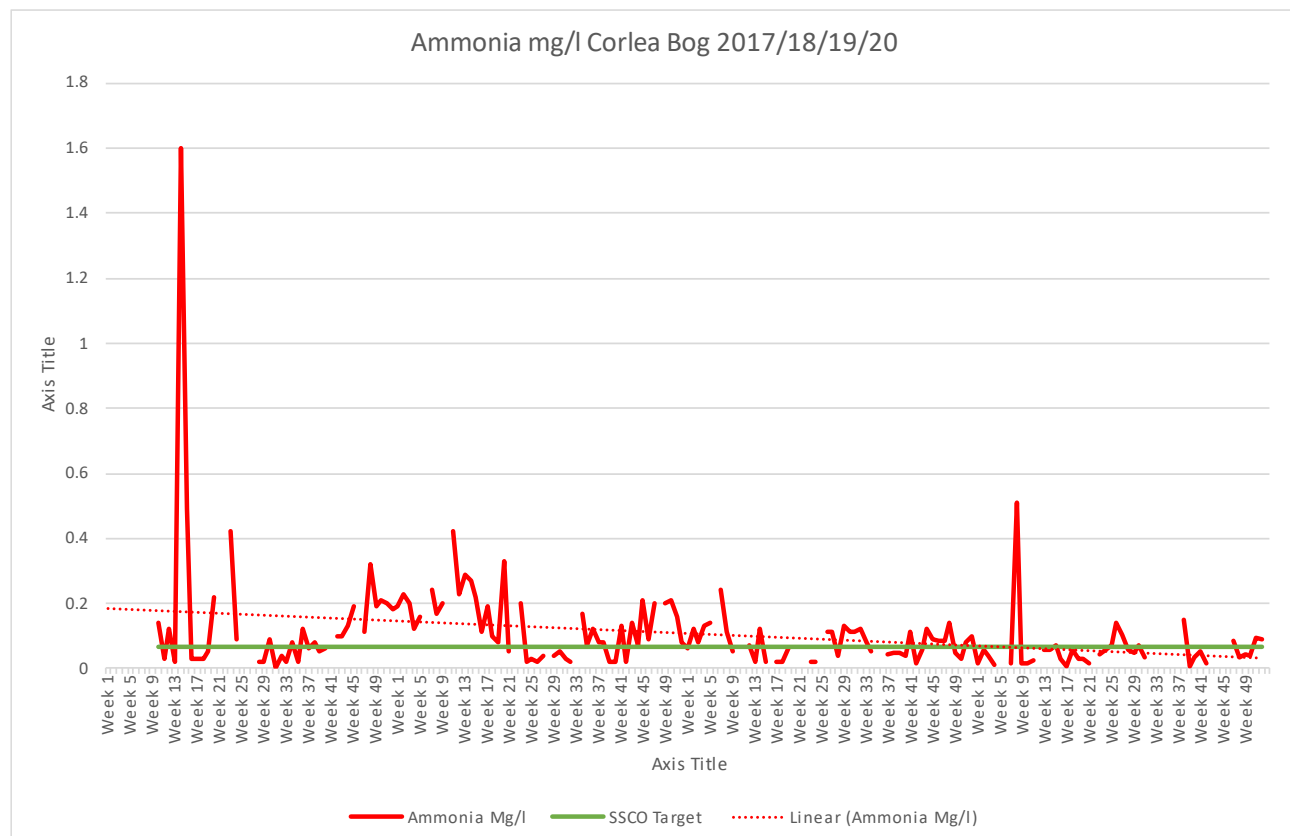
Forecasted Water Quality Trends following the PCAS Works

It is expected that following the implementation of the PCAS at Bunahinly-Kilgarvan Bog the concentration of TP, ammonia, as well as Suspended Solids (SS) will follow a downward trend and will within the short-term (i.e. within a 3-year period) reduce concentrations of these parameters to below the NPWS limits.

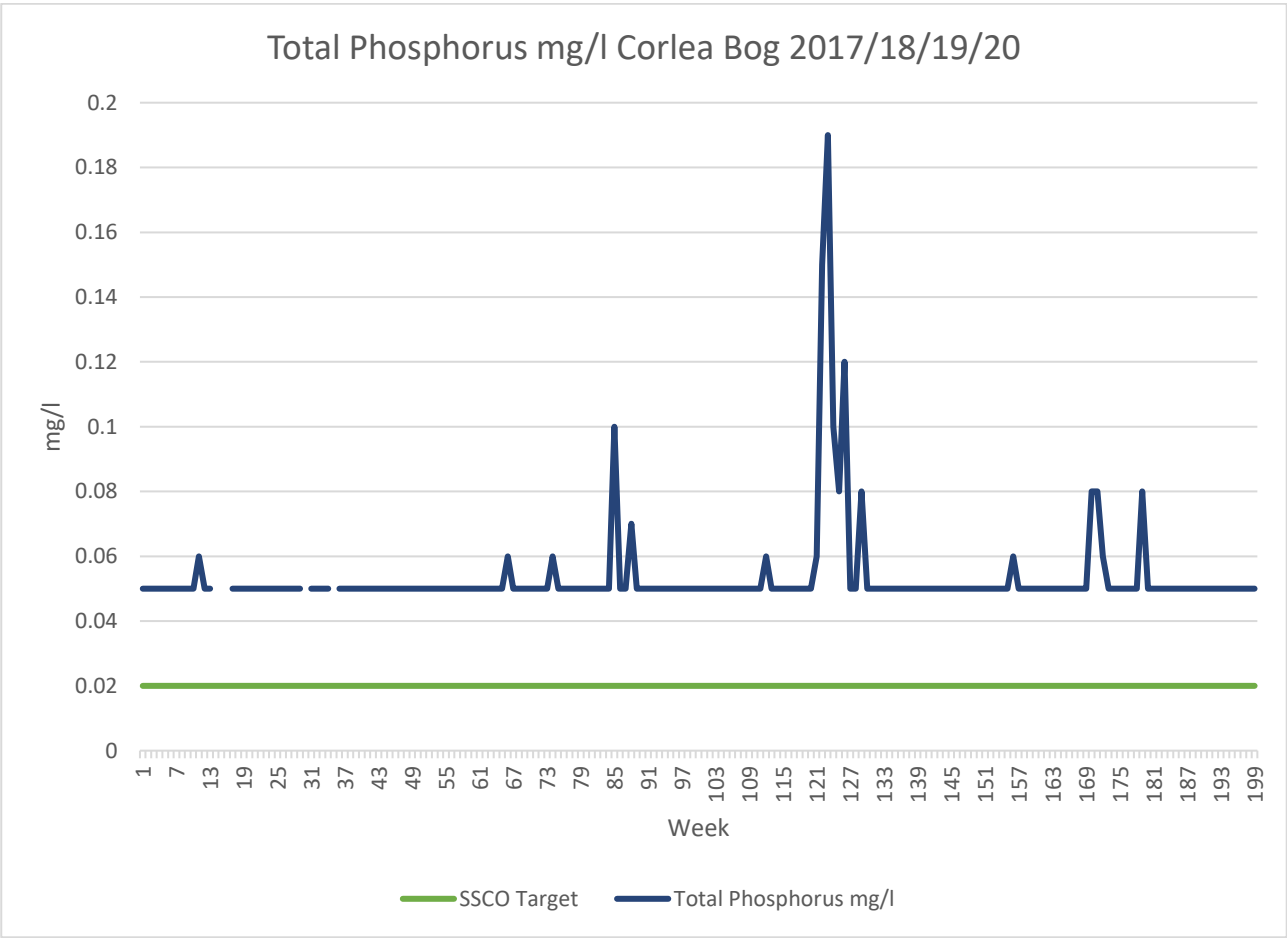
This projection is supported by water quality monitoring of 2 other similar raised bogs (Longfordpass Bog, Co Tipperary and Corlea Bog, Co Longford) that were previously subject to industrial peat extraction and that have since been subject to peatland rehabilitation.

Graph 1 below shows the downward trend for ammonia at Corlea Bog, which is also located within Bilberry_SC_010 sub-catchment. Corlea Bog is located >25km north of Bunahinly-Kilgarvan Bog. Graph 2 shows a consistent low level of TP recorded for Corlea Bog. The laboratory detection limit for TP is 0.05mg/l and Graph 2 shows that concentrations for TP are below the laboratory limits of detection, indicating very low levels. Similarly, the laboratory detection limits for SS was 5ml/l up until July 2019. The laboratory was changed in July 2019 and a new detection limit for SS of 2mg/l was applied. The SS concentrations were consistently below the 5mg/l and the 2mg/l at both laboratories, indicating very low SS concentrations in silt pond outfalls. Rehabilitation measures continue to establish at Corlea Bog and it has yet to stabilise, but the downward trend for ammonia found during the stabilisation of rehabilitation measures shows that once stabilised, the re-wetted bog will reduce ammonia emissions to meet the SSCO parameters / limits. It is also reasonable to predict a downward trend for SS and TP as the rehabilitation measures become established.

Following commencement, and as the monthly monitoring program at Bunahinly-Kilgarvan continues in 2022 during the rehabilitation works, and data from the 2022 monitoring program is compiled, further trending will be produced to verify any ongoing trends.



Graph 1: Ammonia Concentrations and Trend at Corlea Bog



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

2.5.2 Field Assessments

2.5.2.1 Current Habitats

The most common habitats present within the Bunahinly-Kilgarvan site include:

- Bare Peat (PB4)
- Bare peat (PB4) and dry heath mosaic (HH1) (establishing on older production bog)
- Bare peat (PB4), dry heath (HH1) and Bog Cotton-dominated vegetation establishing at north of site
- Gorse scrub (WS1)
- Dry grassland (along bog margin) (GS2, GS3)
- Silt ponds (including ridges of spoil and adjacent land) (FL8)
- Riparian zones (with scrub along verges)
- Works area (BL3, ED2, ED3)

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

- Non-Annex degraded Raised bog (PB1) (several fragments) (Codes refer to Heritage Council habitat classification, Fossitt 2000).
- Scrub (WS1) (Gorse scrub and Birch scrub developing of dry high bog around margins)
- Bog woodland (WN7)
- Conifer plantation (WD4) (minor screen of Pine planted around margin at northern end of site).
- Cutover bog (PB4) (several small fragments)
- Improved grassland (GA1) (several small patches where BnM boundary extends over adjacent fields)
- Wet grassland (GS4) (several small patches where BnM boundary extends over adjacent fields)
- Depositing river (Boor River)

See Drawing number BNM-DR-23-09-17 titled Bunahinly Bog: Bog Habitat Map and BNM-DR-23-10-17 titled Kilgarvan Bog: Bog Habitat Map, included in the accompanying Mapbooks.

Habitat Description of Bunahinly

The majority of this bog was mapped as bare peat and is relatively 'clean' with very little recolonisation of vegetation. There are tall stockpiles regularly spaced through the bog and these seem to have been left in-situ for several years as Heather is growing on the peat that covers the plastic. No actual harvesting has been carried out since 2005 but main production area has been kept 'clean' by the miller etc. These stockpiles will be taken off the site prior to rehabilitation activities. This area is mapped as being 'available' for production.

There is a small side-arm to this bog along the western side. The bog is generally quite firm and dry and there are deep (1-2 m) active drains with running water. Activity within this area seems to have been less intensive over the past few years and there has been some recolonisation of vegetation on the bog surface. This is mainly represented by small developing Heather bushes and most of the area is mapped as a bare peat and pioneer dry heath mosaic (BP/dheath) (although the vegetation cover is generally about 33%). There are also some patches of *Campylopus introflexus* moss developing on the bare peat. Other common species include Purple Moorgrass, Common Bog Cotton, Bulbous Rush, Soft Rush and Hare's Tail Bog Cotton. Less frequent species include Birch, Bog Asphodel, Deergrass, Tufted Hairgrass, Heath Sorrel, Heath Bed-straw, Male Fern, Star Sedge, Tormentil, Carnation Sedge, Cross-leaved Heath, *Cladonia spp.*, *Polytrichum commune* and *Polytrichum juniperum*.

Recolonisation is best-established along the bases of old stockpiles where a strip of Heather-dominated vegetation has established. Birch, Gorse, Bramble and Broad-Buckler Fern have also established along these strips. Several very small patches of *S. papillosum* were noted in these zones. Some sections are dominated

by Purple Moorgrass. Further west, Purple Moorgrass becomes much more prevalent in the production files and in the regeneration along the western stockpile. This area was a former flush (PF2) dominated by Purple Moorgrass on the high bog (visible from the 2000 aerial photos). Bog Myrtle is also present in the recolonising vegetation. Some small areas have 100% vegetation cover dominated by Purple Moorgrass and Heather. Several drains close to the western stockpile did have impeded drainage and *S. cuspidatum* did appear in the drains with *S. papillosum* and *S. capillifolium* forming some hummocks along the edges of the drains. Other sections of the drains were lined with Soft Rush and Bulbous Rush with no Sphagnum cover. Some parts of the drains were infilling with Heather and Purple Moorgrass.

Further north in the small western side-arm there was a small area that had been ditched but it did not seem to have gone into production. This area has re-vegetated well (perhaps the vegetation was never cleared) with about 10% bare peat and was dominated by Heather and Bog Asphodel. There were hummocks of *S. papillosum*, *S. subnitens* and *S. capillifolium* on the bog and *S. cuspidatum* was present in the drains. The bog was quite firm and Birch and pine saplings were also present on the high bog.

Part of the northern end of the site has now been 'cut off' from the rest of the production bog by a fire-break (drainage ditch). This area has come out of production as there is a recent commercial development adjacent to this area and there were concerns about dust and fire risk from the site affecting this development. The stock-piles were removed from this section or production was never intensive. The former production fields are now re-colonising with a mosaic of bare peat (PB4), dry heath (HH1) and Bog Cotton. Vegetation cover was > 50% in places and recolonisation was more established compared to the western side-arm. There are several small patches of Purple Moorgrass-dominated vegetation and further east this community is greater in extent. Other common species present include Bog Asphodel, Carnation Sedge (*Carex panicea*) and Hare's-tail Bog Cotton. *Campylopus introflexus* is the main moss coloniser and no *Sphagnum* was noted on the former production fields, which were generally quite dry and firm.

The vegetation regeneration is much more typical of regeneration of cutover bog. Lodgepole Pine saplings are relatively frequent around the margins of this section adjacent to the narrow band of conifers that were planted on the margins and are obviously spreading onto the bog. The bog is quite firm and the drains are active with flowing water and relatively 'clean' of recolonising vegetation. Sphagnum regeneration was relatively rare in the drains and appeared at the head of some drains where there was some drainage impedance. Drainage of this area seems to flow north towards a head drain running along the boundary of the site and flowing into a series of old silt ponds.

Several areas have been used for the production of mini-sod peat. These small sods were stored in stockpiles along the southern and eastern sections of the site.

A railway line runs along the boundary of the north eastern corner of the site. Between the railway line and the area of bog that was under industrial peat production until 2005 lies a small valley. This area appears to have been used in the past for turf cutting but it has now revegetated. The lowest lying areas here were waterlogged with Bog Cotton, Reedmace (*Typha latifolia*), *Sphagnum cuspidatum*, *S. capillifolium*, *Aulacomnium palustre* and Bottle Sedge (*Carex rostrata*). The sections alongside the railway line were raised and contained a mixture of bog woodland and wet grassland. Areas of bog woodland had also developed in this area where the old cutaway meets the newer industrial peat areas. A silt trap is also located within this area along with a small area that has been planted with Lodgepole Pine (*Pinus contorta*) over 25 years ago. Within the past 10 years, a tree line has been planted along the boundary of the industrial peat harvesting area. This tree line consisted of a mixture of Scot's Pine and *Leylandii* and was likely planted in order to reduce dust from peat harvesting operations from blowing across the railway line to some of the commercial areas of Athlone.

The vegetation of the marginal areas is quite typical with small patches of remnant raised bog (PB1) being colonised by scrub (Birch and Gorse), with some established bog woodland (WN7). Some adjacent cutover bog (PB4) is relatively old and has developed Heather-dominated vegetation (typical of face-banks). There is active domestic cutting of peat along the southern side of the western side-arm and this area has some relatively young cutover bog (PB4).

Kilgarvan

There has been ongoing production over nearly all of this bog. The production bog is also quite clean with bare peat and virtually no recolonisation. There is a small area towards the east side where Gorse has been allowed to re-colonise on a small mound. This bog also has deep drains with running water. There is still a definite mound towards the centre of the bog from the margins. A temporary railway divides the bog into two main sections and runs the length of the bog.

The north side and east sides contain some Bog woodland that has developed on old cutover bog. This woodland is dominated by Birch and also contains some Pine. The ground cover is species-poor and dominated by Bramble and Bracken. Gorse is also scattered through the woodland. There are also old dried out remnant patches of high bog along the margins that have tall Heather. The margin of the production bog is also used for drainage and a long drain links several silt ponds.

A narrow access point connects the southern end of Kilgarvan with Bloomhill Bog further south. Four silt ponds are located within this area with mainly wet grassland surrounding the silt ponds. Some scrub is encroaching in some areas. These silt ponds were being cleaned out at the time of the ecological survey. The Boor River flows at the south of the site, this river was in flood at the time of the ecological survey but there were indications that Otter are using it, six Mute Swans were also present on the river. The Boor River is a tributary of the River Shannon.

BnM hold historical records of otter using the site, particularly along the western edge of the site and along the southern boundary, especially along the Boor River and the nearby silt traps. There was no evidence of otter using the Bunahinly-Kilgarvan site during the 2022 site walkover survey.

Habitat complexes within Bunahinly-Kilgarvan Bogs are presented in **Figure 7** and **Figure 8**. This displays an overlap comprising bare peat, broadleaved woodland, scrub and pioneer peatland habitat.

The majority of the terrestrial habitats in isolation are deemed to be of Local Importance (Lower value) (dominated by bare peat). A small section of the site partially overlaps with the River Shannon Callows SAC and Middle Shannon Callows SPA (south-western section). Both designated sites are recognised as Internationally Important. Some of the small remnant areas of non-annex high bog (PB1) are deemed to be of Local Importance (Higher value) as this is a habitat of significant ecological importance and they have intact carbon stores, even though the remnant areas are quite small in extent.

2.5.2.2 Bird Surveys

The Bunahinly-Kilgarvan Bog site was visited on January 12th 2022. Bird Survey methodology included a series of spot-counts vantage points across the bog affording good views. These spot counts were supplemented by walkovers of habitats and targeted survey areas. All bird species encountered (seen or heard) during the surveys were recorded, together with the abundance of each species. Birds flying over the site were also included as part of the observations. Casual records of birds encountered during the spot counts and field walkovers, but outside of dedicated survey period were also noted.

The site walkover survey did not identify large flocks waterbirds or wildfowl using the bog areas for roosting or foraging purposes. In addition, the bog sites did not support large areas of ponding or standing water to support suitable foraging or roosting habitat for waterbirds. The largest waterbodies on site included silt ponds which are small localised waterbodies with the potential to support individual or small numbers of waterbird species.

Bird species identified during the January 2022 walkover survey are presented in **Table 4** below.

Table 4: Bird Species identified during the site walkover survey in winter 2022

Common Name	Species Name	Activity within the site
Blackbird	<i>Turdus merula</i>	Foraging within treeline, scrub and woodland habitats fringing the larger areas of expansive cutover bogs.
Blue Tit	<i>Cyanistes caeruleus</i>	Foraging within treeline, scrub and woodland habitats fringing the larger areas of expansive cutover bogs.
Robin	<i>Erithacus rubecula</i>	Foraging within treeline, scrub and woodland habitats fringing the larger areas of expansive cutover bogs.
Dunnock	<i>Prunella modularis</i>	Foraging within treeline, scrub and woodland habitats fringing the larger areas of expansive cutover bogs.
Chaffinch	<i>Fringilla coelebs</i>	Foraging within treeline, scrub and woodland habitats fringing the larger areas of expansive cutover bogs.
Snipe	<i>Gallinago gallinago</i>	Flushed from the marginal wetland areas and silt pond margins.
Jack Snipe	<i>Lymnocyptes minimus</i>	Flushed from the marginal wetland areas and silt pond margins
Pied Wagtail	<i>Motacilla alba</i>	Foraging along bog access tracks.
Reed Bunting	<i>Emberiza schoeniclus</i>	Foraging along marginal wetland areas and drainage channels.
Meadow Pipit	<i>Anthus pratensis</i>	Foraging over marginal bog habitats.
Linnet	<i>Linaria cannabina</i>	Foraging along marginal wetland areas and drainage channels.
Redpoll	<i>Carduelis flammea cabaret</i>	Overflying the site from wooded margins
Wren	<i>Troglodytes troglodytes</i>	Foraging within treeline, scrub and woodland habitats fringing the larger areas of expansive cutover bogs.
Mallard	<i>Anas platyrhynchos</i>	Flushed from the marginal wetland areas and silt pond margins.
Mute Swan	<i>Cygnus olor</i>	Foraging on River Shannon Floodplain west of Bunahinly-Kilgarvan. Not identified within the bog sites.
Kestrel	<i>Falco tinnunculus</i>	Using marginal bog and scrub near the southern margins of Bunahinly Bog.
Whooper Swan	<i>Cygnus cygnus</i>	Foraging on River Shannon Floodplain west of Bunahinly-Kilgarvan. Not identified within the bog sites.
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Foraging on River Shannon Floodplain west of Bunahinly-Kilgarvan. Not identified within the bog sites.

Common Name	Species Name	Activity within the site
Grey Heron	<i>Ardea cinerea</i>	Using the wetland habitats such as drainage channels and silt ponds. Also identified adjacent to the bog site within the callows areas.
Rook	<i>Corvus frugilegus</i>	Overflying the site and associated with built ground near the site margins
Starling	<i>Sturnus vulgaris</i>	Overflying the site and associated with built ground near the site margins
Magpie	<i>Pica pica</i>	Overflying the site and associated with built ground near the site margins

2.5.2.3 Mammal Surveys

A mammal survey of Bunahinly-Kilgarvan Bog was undertaken on January 12th 2022. An otter survey was completed along silt ponds and drainage channels within and adjoining Bunahinly-Kilgarvan Bog. As well as the silt ponds and drainage channels used for past peat harvesting works, the watercourses adjoining and being fed by the silt ponds were also surveyed for the presence of otter and other semi-aquatic mammals. It should be noted that pathways for otter injury and mortality as a result of the proposed rehabilitation works primarily exist only at silt ponds. Therefore, survey emphasis was concentrated, but not confined, to these features.

In addition, Bunahinly-Kilgarvan Bog and environs were also surveyed for the presence and usage of non-volant mammal species including badger, fox, Irish Hare, mink etc.

The otter survey methodology followed those methods employed in the 'Otter Survey of Ireland 2004/2005' (Bailey & Rochford, 2006) comprising a modification of the Standard Otter Survey Method developed by Jefferies (1980).

In addition, the mammal survey incorporated badger surveys that were completed in accordance with the *Guidelines for the treatment of badgers prior to the construction of National Road Schemes* (TII, 2006) and *The Badger and Habitat Survey of Ireland* (Smal, 1995).

The mammal survey undertaken on January 12th 2022 at the Bunahinly-Kilgarvan Bog site identified the signs of Badger and Fox. The findings of the survey are presented in **Table 5** below and illustrated in **Figure 9**.

Table 5: Findings of the January 2022 mammal survey

Common Name	Species Name	Grid Co-ordinates (in ITM)		Description
		X	Y	
Badger	<i>Meles meles</i>	605701	738207	Badger print identified on soft peat located along the margins of the cutover area.

Common Name	Species Name	Grid Co-ordinates (in ITM)		Description
		X	Y	
		605855	738297	Badger print identified on soft peat located along the margins of the cutover area.
		606549	738655	Badger print identified on soft peat located along the margins of the cutover area.
Fox	<i>Vulpes vulpes</i>	606214	737870	Fox scat identified on soft peat located along the margins of the cutover area.
		606607	738311	Fox scat identified along railway line near the southern boundary of the Bunahinly site

All silt ponds and watercourses at and in the vicinity of Bunahinly-Kilgarvan Bog were surveyed for signs of otter usage. There were no signs of ongoing or recent usage of these silt pond features, drainage channels or watercourses during the January 2022 walkover surveys. However, it should be noted that the nearby areas of the Boor_020 and Shannon (Upper)_120 watercourse located immediately south of the Kilgarvan Bog site boundary is most likely of all watercourses within the vicinity of the site to provide suitable otter foraging and commuting habitat.

No evidence of other mammals such as pine marten were identified during the site walkover surveys. These mammals are highly unlikely to utilise the expansive cutover bog areas. However, there is suitable habitat for these mammals outside of the proposed works footprint on the marginal bog areas, woodland and scrub areas located along the site bounds and outside of the proposed works footprint.

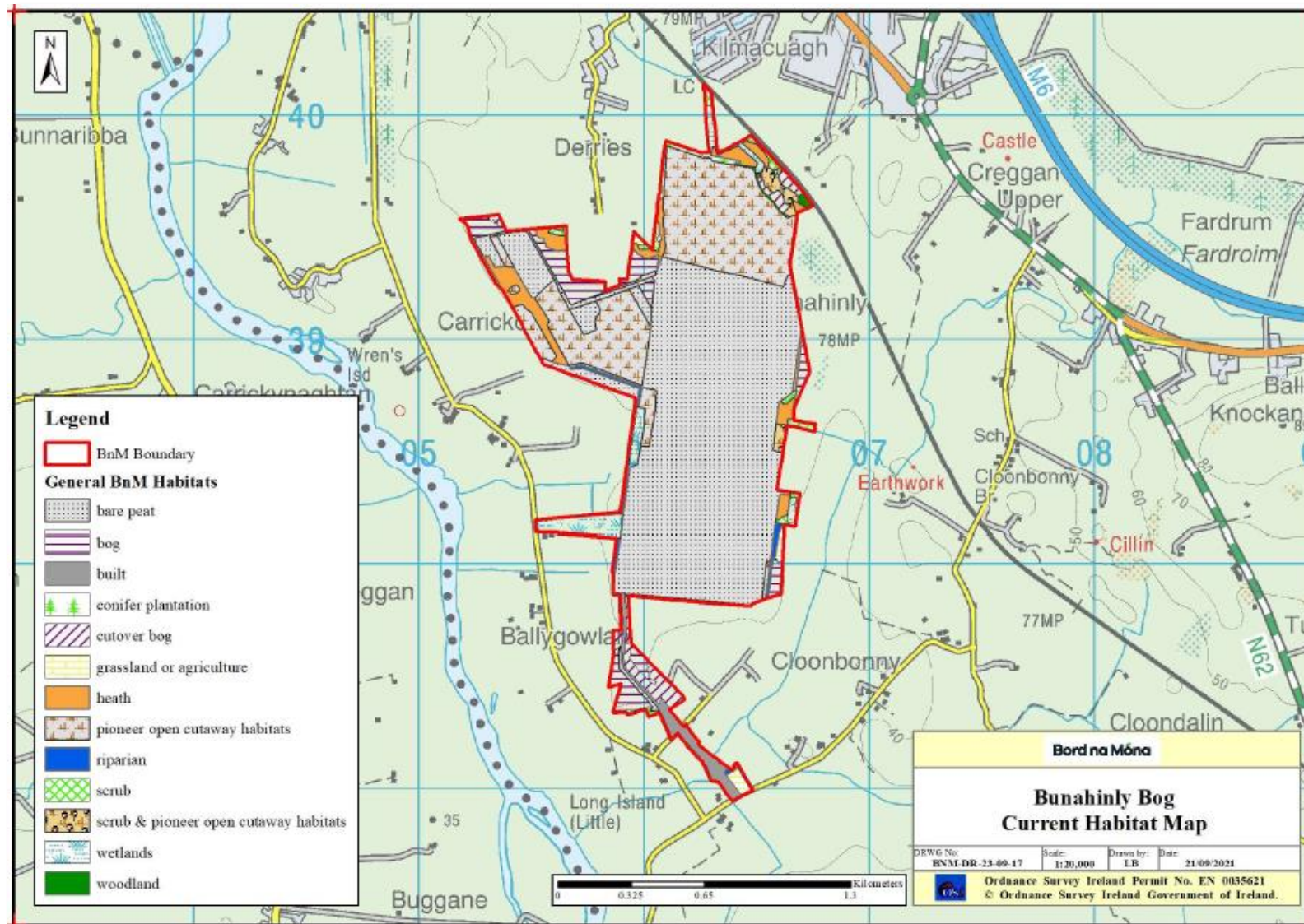


Figure 7: Current Habitats at Bunahinly

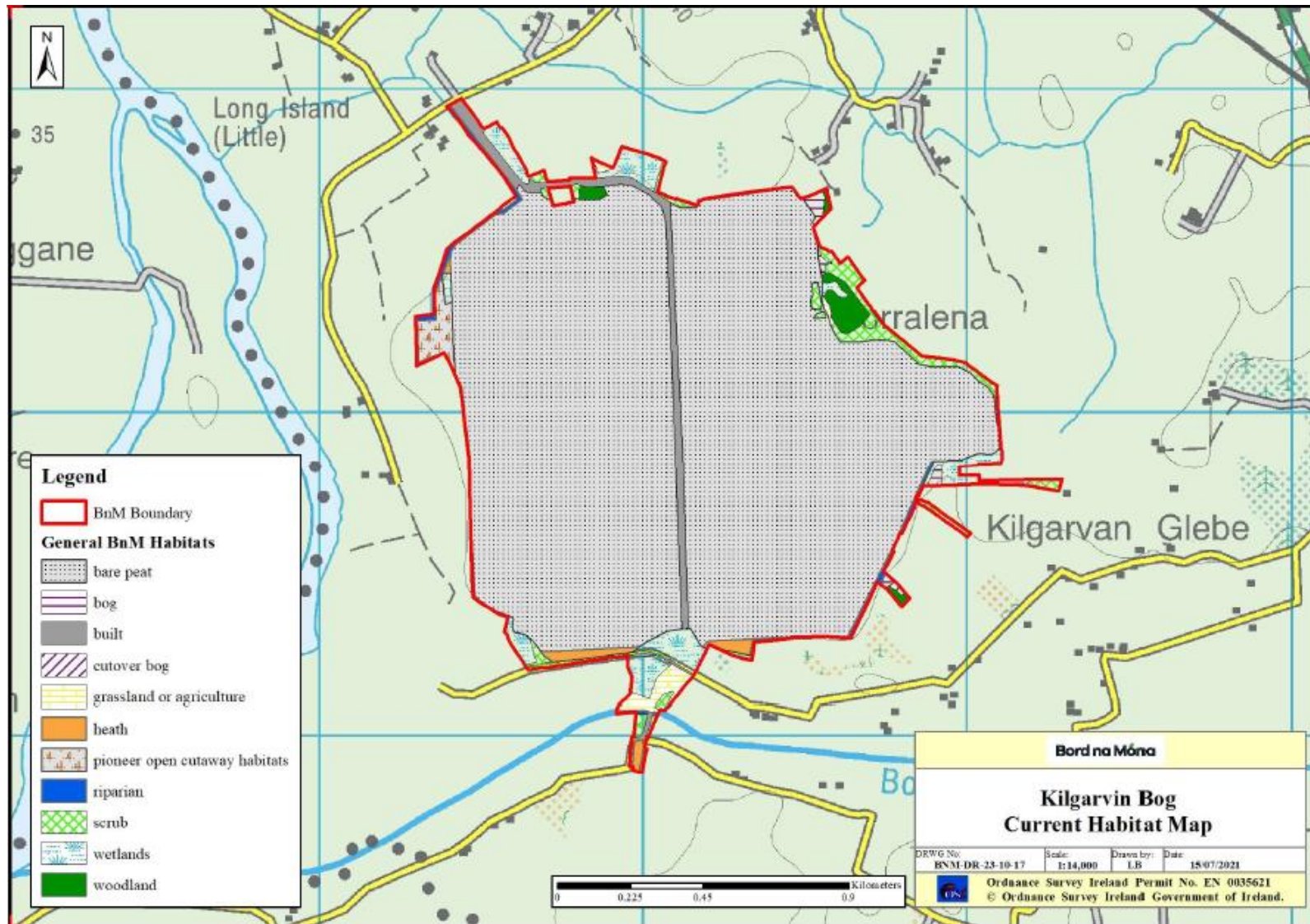


Figure 8: Current Habitats at Kilgarvan

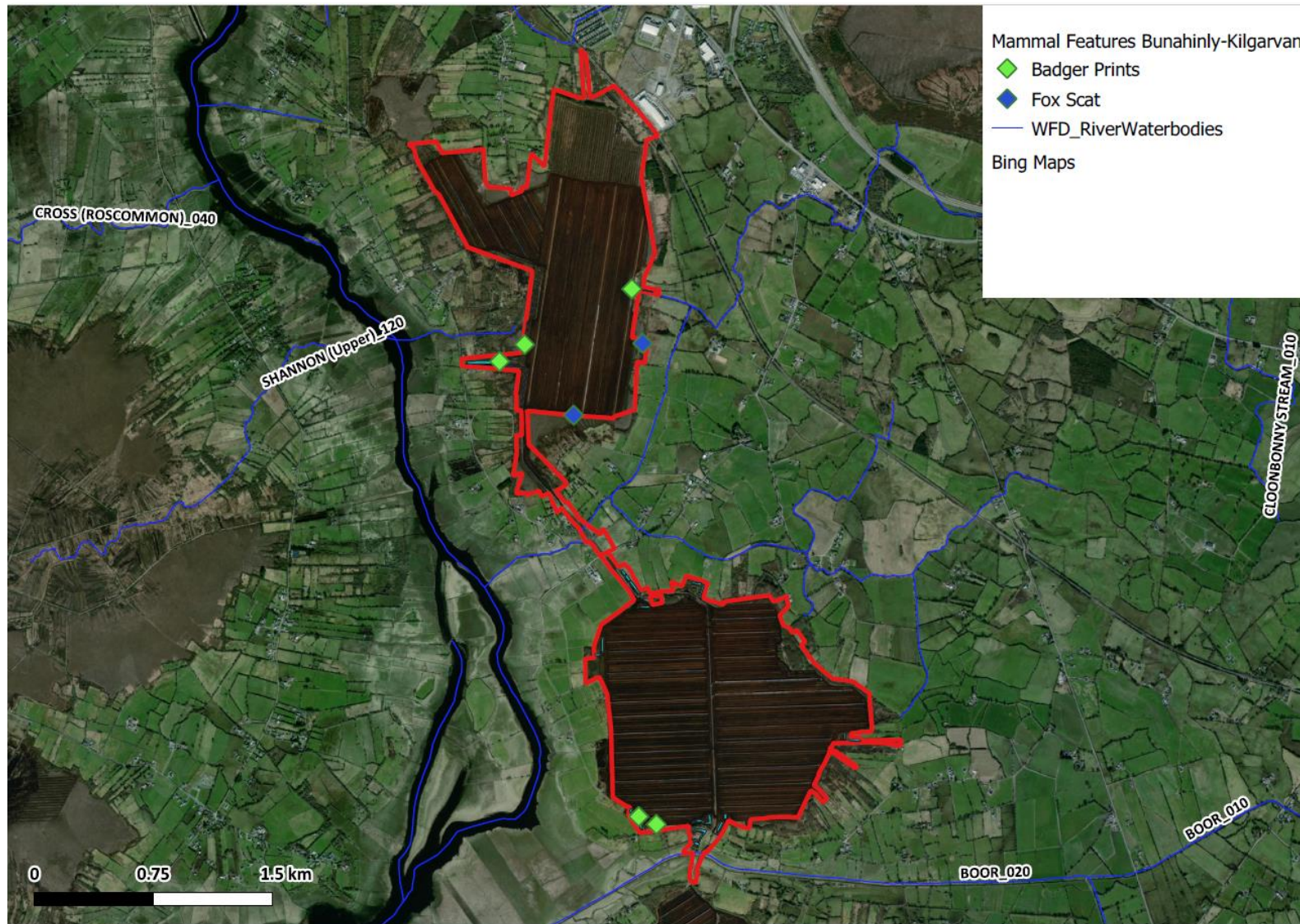


Figure 9: Mammal Signs and Features within the Bunahinly-Kilgarvan Site



Image 1: Silt pond BH200C located near the western boundary of Bunahinly Bog



Image 2: Silt pond BH200E located near the western boundary of Bunahinly Bog



Image 3: Open cutover bog located near the western boundary of Bunahinly Bog



Image 4: Cutover bog located near the southern boundary of Bunahinly Bog



Image 5: Floodplain of the Shannon located to the west and outside of Kilgarvan and Bunahinly Bogs



Image 6: Silt Pond KG201 located near the northern boundary of Kilgarvan Bog



Image 7: Silt pond KG196 located near the south-western boundary of Kilgarvan Bog



Image 8: Silt pond KG192c located near the southern boundary of Kilgarvan Bog



Image 9: Open bog habitat located near the southern margins of Kilgarvan Bog



Image 10: The Shannon (Upper)_120 (Boor) watercourse located immediately south of Kilgarvan Bog

2.5.3 Species of Conservation Interest⁶

Bird species previously recorded at Bunahinly Kilgarvan include the Red listed Lapwing (*Vanellus vanellus*), which has been recorded onsite during the winter period, when birds from the adjacent SPA may utilise the bog to roost and/or feeding. Lapwing was identified on the south-western corner of Kilgarvan site in July 2021. No definite evidence of breeding was identified on this occasion however.

Other wintering species of bird include the also Red listed Common Snipe (*Gallinago gallinago*) which likely uses the marginal habitats present to feed and/or roost.

The general assemblage of birds utilising the bog reflects the current extent of largely bare peat with species such as Meadow pipit (*Anthus pratensis*), Pied Wagtail (*Motacilla alba*) and Raven (*Corvus corax*) recorded on recent visits in 2021 to inform Rehab Planning.

Mammal species known to occur include Irish Hare (*Lepus timidus hibernicus*), Badger (*Meles meles*) and Otter (*Lutra lutra*).

⁶ Otter is a Conservation Interest Species for River Shannon Callows SAC. Whooper Swan, Wigeon, Golden Plover, Lapwing and Black-headed Gull are SCI species for the Middle Shannon Callows SPA and have been recorded at Bunahinly-Kilgarvan Bog and environs.

In July of 2021, Meadow brown (*Maniola jurtina*) and Red admiral (*Vanessa atalanta*) butterflies were recorded.

Marsh Fritillary (*Euphydryas aurinia*) have been recorded to the north east of Bunahinly at Crosswood Bog but there are no on-site records.

2.5.4 Invasive species

Invasive alien species known to occur at the subject bog (or desktop review suggests presence is likely), and for which reasonably foreseeable source impact pathways for dispersal may result from the proposed PCAS are described here.

Invasive Alien Plant species were not identified at Bunahinly-Kilgarvan Bog or their environs during the site walkover survey.

2.5.5 Certainty and Sufficiency of Data

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

All field survey work was carried out by qualified and experienced ecologists.

In addition, where required, or possible, specific data requests have been made to NPWS via the online data request facility⁷, specifically with regards to records of sensitive species.

Further sources of data used to supplement the current appraisal, included current, up to date, Bord na Móna held habitat mapping datasets, as well as previously commissioned baseline reporting of Bord na Móna Bog Groups, reporting to inform Bord na Móna wind farm proposals, and any available Bord na Móna wind farm monitoring reports where it was deemed there was overlap with the current scope of PCAS activities. Citations are provided at the end of this report for any reports which have been referenced.

For the avoidance of doubt although some of this supplementary baseline data was 3+ years old, due regard has been given to the passage of time & any changes to the baseline environment at Bunahinly-Kilgarvan in the interim period were considered by a suitably qualified ecologist; visits to inform the current appraisal were used as ground-truthing exercises to confirm the relevance or not of any previously defined baseline information.

In the most part, due the continuation of industrial Peat Extraction by Bord na Móna up to and including the year 2018 at Bunahinly-Kilgarvan, it was considered that habitats at the bog remained relatively unchanged from the point at which many prior baseline surveys were undertaken, and therefore, it is considered that data presented in prior baseline reporting was of relevance, with exceptions noted. Nonetheless reliance is focussed primarily on the most recently available or collected data.

⁷ <https://www.npws.ie/maps-and-data/sensitive-data-access>

2.6 Decommissioning and Rehabilitation Stage

The proposed **decommissioning** at Bunahinly-Kilgarvan Bog includes the following:

- Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices
- Cleaning Silt Ponds
- Decommissioning Peat Stockpiles
- Decommissioning Fuel Tanks and associated facilities
- Decommissioning or Removal of Septic Tanks

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

There are only sealed/locked and in use portacabins in place at Kilgarvan and Bunahinly bogs. These portacabins don't support optimal bird nesting or bat roosting potential. Should bird nesting activity occur along the portacabin roof edges, the portacabin won't be removed until all works are completed at Bunahinly - Kilgarvan, which will be outside the closed nesting season; i.e. after September 2022. The EMP presented in **Appendix E** provides the following commitment in relation to the safeguarding of bird nesting habitat during the project decommissioning phase.

Confirmatory surveys will be undertaken by a suitably qualified ecologist to identify the presence of any bird species of conservation concern which may potentially be disturbed. The survey will typically include habitats suitable for ground nesting birds, in particular sensitive species (e.g. Lapwing/Ringed Plover/Curlew/Red Grouse) but also buildings scheduled for decommissioning, potential winter period feeding or roosting areas for Wildfowl, roosting areas for Hen Harrier etc.

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

The proposed Bunahinly-Kilgarvan Bog **rehabilitation** comprises a series of bespoke (to Bunahinly-Kilgarvan Bog) interventions designed to stabilise the existing baseline and meet compliance with the requirements of the existing EPA, IPC License and the proposed PCAS. Prescriptive measures are unique to the existing baseline habitats and comprise 4 no. broad categories,

- 1) those associated with (exposed) Deep Peat; drain blocking (different intensities), berms and field reprofiling and cut and fill cell bunding;
- 2) those associated with Dry cutaway; i.e. drain blocking, managing water levels and overflows; and
- 3) measures associated with Wetland Cutaway, including restricting and reducing pumping regimes and associated drain blocking.
- 4) those associated with remnant high bog namely drain blocking.

The aim of Rehabilitation is as much as possible to place existing peatlands on a **trajectory** towards a naturally functioning peatland system (Renou-Wilson, 2012).

2.6.1.1 Decommissioning and Rehabilitation Access

Access will be through the existing entrances from local roads at the Millford townland. This will allow access to the southernmost section of Bunahinly Bog and the northernmost section of Kilgarvan Bog where existing infrastructure is already in place via access tracks and railway lines to facilitate the previous peat extraction.

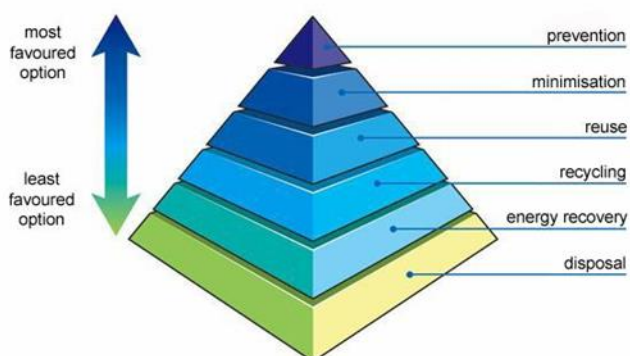
2.6.1.2 Standard Methodology for Decommissioning

Decommissioning at Bunahinly-Kilgarvan Bog will involve the deployment of a work crew to collect and oversee the removal of any remaining plant or potentially contaminating waste left *in situ* in line with Condition 7 of License Ref. P0-502-01. 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 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 Bunahinly-Kilgarvan Bog. 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 Bunahinly-Kilgarvan Bog. As required by the license, these waste items will be removed for recycling or disposal, using external contractors with the required waste collection permits, with waste records maintained as required. Where possible, Bord na Móna will utilize the appropriate waste hierarchy to identify waste that can reused or recycled ahead of disposal.



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

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

Regarding the lifting of rail lines this will be facilitated by a manual work crew either a) loading rail line components onto a trailer and removing a) direct to contractor, b) to a consolidation area via tractor, prior to disposal, or c) utilizing the rail line itself to remove the components in reverse order onto a locomotive

trailer, with again, the parts being delivered up the rail line to be stored and/or disposed of, in line with IPC license conditions.

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

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

2.6.1.3 **Standard Methodology for Rehabilitation Activities**

The proposed Bunahinly-Kilgarvan **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 Bord na Móna cutaway bogs (Clarke, 2010; Bord na Móna, 2016), including examples such as the BnM Raised Bog Restoration Project⁸ -see also **Section 2.8.2** Sources of Information. The development of rehabilitation activities also considered recently published guidance issued by the EPA in 2020 – *Guidance on the process of preparing and implementing a bog rehabilitation plan*.

In terms of rehabilitation the ecological and site information collected during Bord na Móna ecological baseline surveys, additional site visits, stakeholder input, and monitoring and desktop analysis forms the basis for the planning of peatland rehabilitation at Bunahinly-Kilgarvan Bog, along with:

- Experience of 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (Clarke, 2010; Bord na Móna;
- 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; and
- Hydrological modelling.

Bog Rehabilitation Techniques or Methods

The key interventions to be applied to deep peat cutover bog restoration/rehabilitation is re-wetting peat to encourage natural colonisation of typical vegetation and the development of *Sphagnum*-rich peat-forming vegetation communities. The key interventions to be applied to areas of shallow residual peat prone to

⁸ Bord na Móna 2014. Blocking Drains in Irish raised bogs. The Bord na Móna Raised Bog Restoration Project. Cris, R. Buckmaster, S. Bain, C. Reed, M. (Eds) (2014) Global Peatland Restoration demonstrating SUCCESS. IUCN UK National Committee Peatland Programme, Edinburgh. <http://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/IUCNGlobalSuccessApril2014.pdf>

flooding, and areas of exposed marl or underlying substrate are effectively those to target the production of wetlands, or fen forming habitats. Some areas of residual peat, due to modelled water levels will effectively only be subject to water level management. Areas of marginal and higher elevated ground within the former production area, such as headlands will also be subject to drain blocking and fertiliser application. Certain prescriptions will require management to ensure water-levels remain 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 the rehabilitation packages with different rehabilitation/restoration intensities to managing suitable hydrological conditions are proposed (see **Table 6**) with detailed drawings presented in **Appendix D**.

Note the table below excludes constrained areas and rehabilitation categories with no intervention.

Table 6: Rehabilitation Categories

Cutover Bog	
DCT2	Regular drain blocking (3/100m) +blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment
DPT2	More intensive drain blocking (max 7/100), blocking outfalls and Sphagnum inoculation
DPT4	Berms and field re-profiling (45x60m cell), blocking outfalls and managing overflows & drainage channels for excess water & Sphagnum Inoculation
WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes
Silt Ponds	Silt Ponds
AW1	Additional Drain Blocking

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

1. Deep Peat measures including field re-profiling, resulting in bunded areas suitable for Sphagnum inoculation, on deeper peat;
2. Intensive drain blocking around shallow peat areas / modelled depressions on little or no peat to create/promote the spread of fen and Reedbed habitats,
3. Modifying outfalls, and management of water levels with overflow pipes and blocking of internal outfalls;
4. Regular drain blocking (3/100) on dry cutaway along with the blocking of outfalls and management of water levels, along with organic fertiliser application;
5. Intensive drain blocking (up to 7/100m) on targeted Marginal land drains;
6. Intensive blocking of drains in targeted marginal (degraded) raised bog remnants around the margins of Bunahinly-Kilgarvan and re-wetting, where possible, using an excavator to install peat blockages.
7. Outfall management and/or further drain blocking in one area at least which was formerly subject to rehabilitation, as additional works;
8. Targeted fertiliser applications to accelerate vegetation establishment on areas of bare peat on headlands and high fields, and within certain areas of dry cutaway. Areas where vegetation has established do not need fertiliser application.
9. Seeding of vegetation and inoculation of *Sphagnum* will be undertaken where required.
10. Initial hydrological modelling indicates that a part of the site will develop a mosaic of wetland habitats with the potential for some deeper water. Hydrological management will look to optimise summer water levels to maximise the development of wetland vegetation (by looking to set water

depths at < 0.5 m, where possible. It is inevitable that some small sections will naturally have deeper water due to the topography at this site). Water-levels will be adjusted at outfalls and by adjusting piped drainage.

A full set of Detailed Drawings for the Proposed Rehabilitation Works Methodologies are included in **Appendix D. Figure 10 to Figure 13** below illustrates rehabilitation methodologies while **Figure 14 to Figure 15** illustrates the extent of rehabilitation measures at Bunahinly-Kilgarvan Bog sites.

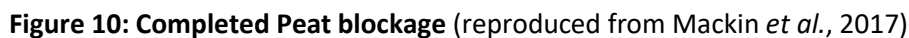
1.Regular Drain Blocking (3/100m)

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

The number of peat blockages per 100m is determined by the topography of the site, but an allowance has been estimated at on average 3 blocks per 100m of field drain. The methodology follows NPWS guidelines published by the National Parks and Wildlife Service (Mackin *et al.*, 2017⁹) and in line with methodologies originally developed by McDonagh (1997).

In all instances peat blockages will be installed using a specially adapted tracked machine. The process involves clearing the drain and creating a 'key' in the drain sides in order to ensure a tight seal is maintained. The drain is subsequently blocked with peat taken from a nearby 'borrow pit' and involves placing layer after layer of peat until it is built up to above the ground surface, after which it is covered with a 'scraw' of vegetation (where available). Each peat blockage takes approximately 5mins to complete. An example of a completed drain block is presented in **Figure 10** below.

⁹ https://www.npws.ie/sites/default/files/publications/pdf/IWM99_RB_Restoration_Best%20Practice%20Guidance.pdf



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 increased number of peat blockages (compared with the standard measures) will benefit re-wetting and trapping silt on cutaway with slightly greater slopes and will further slow the movement of water from these sites. Methods are as per 1 but blockages are at a higher frequency along the length of the drainage feature.

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

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

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

4. Managing water levels with overflow pipes

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

Overflow pipes are installed using an excavator.



Figure 11: Examples of installed overflow pipes

5. Field Reprofiling

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

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

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

An alternative to using a dozer is to use a screw-leveller to create a 'clean cut' into a field of deep peat. Any peat which has been thrown to the side is then used to infill adjacent drains using a dozer. This is combined with drain blockages at set intervals, finger berms to prevent sheet flow of water, and cross berms, possibly keyed across the peat fields.

In general, water will still flow across the surface of the re-profiled peat field depending on the prevailing slope but will be retained for longer in the depressions, encouraging the development of wetland habitats. The increased depression will increase the area of optimal hydrological conditions. On more level ground, it will be more straightforward to re-wet larger areas with a more homogenous topography. Slowing water movement will have additional benefits of reducing fluvial carbon loss (via water) and also improving water quality leaving the site by reducing emissions of silt and ammonia.

6. Berms and field reprofiling (45m x 60m cell)¹⁰

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

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

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

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

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

The exact dimensions of the cells will be dependent upon the topography of the site and the heights of the various peat fields. For example, it may be appropriate to have cells that are only two fields wide where two low fields have higher fields on either side. It may not be appropriate to equalise the levels of two adjacent fields where there is a significant height difference. The length of the cells may be shorter if the fields are on

¹⁰ 45mx60m is the typical design but some cells may be smaller to accommodate 'corners'

Existing Layout

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but linking the re-wetting of the central areas.

**Phase 1
Drain Blocking And Re-Profiling of Fields Surface**

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

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

Area behind the machine is to be used as a borrow pit. Remove top and degraded peat. Place this material down pit to be used as cover later. Only the peat is extracted from pit and compacted to 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 shovelling of the peat as it dries.

The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.

(NOTE: if any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.)

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

**Phase 2
Formation of Surface Berms And Levelling Base of Cells**

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

An excavator is used to form a key(5m long) in the drain's edge where the berm crosses.

A strip of peat(5m wide) is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block.

Next the bull-dozer is used to complete the central cross section of berm by taking part from the centre of the field and pushing it in line with the field to form an approximately 10m Wide x 300mm High Cross Berm.

The peat material in the berms is compacted in layers by the dozer tracking over it.

Berm edge profile is shaped by using the bucket of the excavator.

**Final Profile:
45m x 60m Cell With Berm**

This enhanced measure seeks to create large 45m x 60m flat areas or cells on bare peat, across a field per cell enclosed by shallow berms.

The creation of cells will help retain surface water, keeping peat wet and will further slow water movement through the bog.

Drainage pipes incorporated into the berm where required to manage overflows and prevent berm erosion.

Notes:

- ALL DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
- REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS TO PREVENT ANY FURTHER PEAT ENTERING THE DRAINS.
- REFER TO RELEVANT SITE PLAN FOR LIST OF DRAIN BLOCKS SPECIFIED FOR EACH DRAIN LINE.
- REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED SURFACE LEVELS TO BE ACHIEVED.
- ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
- OPERATIONS TO COMPLY WITH ALL STANDARD OPERATING PROCEDURES.
- THE MATERIAL TO BE LAYED OUT IS ACCORDING WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN AND NATURAL HAZARD STATEMENT RECOMMENDED MEASURES IF APPLICABLE. ENVIRONMENTAL REPORTS AND ASSESSMENTS, ENVIRONMENTAL IMPACT STATEMENTS OR ENVIRONMENTAL REPORTS FOR THIS BOG.

Status Legend:

No.	Description	P.A.	Material
1	Peat	Yes	Local
2	Grass	Yes	Local
3	Soil	Yes	Local
4	Gravel	Yes	Local
5	Concrete	Yes	Local
6	Other	Yes	Local

Project Information:

BORD NA MONA
Naturally Driven
Bord na Mona Engineering Department
LEARNIS, TULLAMORE CO. OFFALY
Tel: 087 3546100
Fax: 087 3546160

PROJECT:
Peatland Climate Action Scheme (PCAS)

TITLE:
Rehabilitation Method DPT 4
45m x 60m Cell With Berms

Scale:
Section A-A
1:100m
100mm dia Pipe Inlet On Upstream Side

7. Drainage channels for excess water

At some Bord na Móna sites, once drains and pipes are blocked water can rise to inappropriate levels due to the localised topography (basins). Permanent deeper water can inhibit the development of wetland or peatland vegetation and large open bodies of water are not encouraged, where possible.

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



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

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

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

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

10. Retention of Hydraulic Breaks

To sustain hydrological continuity through the margins of the proposed rehabilitation and decommissioning site and to avoid flooding of adjacent lands, it is proposed to retain certain key hydraulic breaks (drains) along the margins of the bog site and to regrade some drains along the boundaries of the site. These works will be completed to retain peripheral surface water drainage around the margins of the bog rehabilitation sites allowing hydrological flow from lands upstream of the site to areas downstream of the rehabilitation site. These works may require localised instream excavation, widening and regrading of existing drains with tracked excavators. The retention of boundary drains (peripheral drains) around the margins of the bog site do not require further intervention or excavation, their capacity and condition has been assessed from a desk top study and also through a ground truthing exercise which has verified the drains required to be retained are suitable to continue to conduct flow and act as a hydraulic break to adjoining lands. This hydraulic break essentially cut the hydraulic gradient from the bog to the adjoining lands limiting the rise in ground water. The boundary drains will have a minor impact in terms of drying out peat along the edges of the bog, however it is observed from experience of BnM engineering and drainage specialists that the zone of influence of the drain is limited with positive impacts occurring in very close proximity to the drains. To modify these boundary drains would create the potential for unacceptable negative impact to adjoining lands.

See **Appendix D** for the full suite of Methodology Drawings.

A breakdown of the extent of deep peat rehabilitation packages is provided in **Table 7**, below.

Deep Peat Cutover Bog		Extent (Ha)
DPT 2	More intensive drain blocking (max 7/100), blocking outfalls and Sphagnum inoculation	9.28
DPT 4	Berms and field re-profiling (45x60m cell), blocking outfalls and managing overflows & drainage channels for excess water & Sphagnum Inoculation	264.97

Table 7 Extent of Deep Peat Rehabilitation proposed at Bunahinly-Kilgarvan.

A breakdown of the extent of wetland, dry cutaway rehabilitation types and silt ponds is provided in **Table 8**, below.

Dry Cutaway and Wetland		Extent (Ha)
DCT2	Regular drain blocking (3/100m) +blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	43.21
WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	2.93
MLT1	No work required	42.16
MLT2	More intensive drain blocking (max 7/100 m)	0
Silt pond	Silt ponds	2.41
DCT2	Regular drain blocking (3/100m) +blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	43.21
AW1	More intensive drain blocking and outfall management	25.59
Constraint	Other Constraints	2.57
n/a	Silt ponds	2.41

Table 8 Extent of Dry Cutaway, Wetland and Marginal procedures proposed at Bunahinly-Kilgarvan.



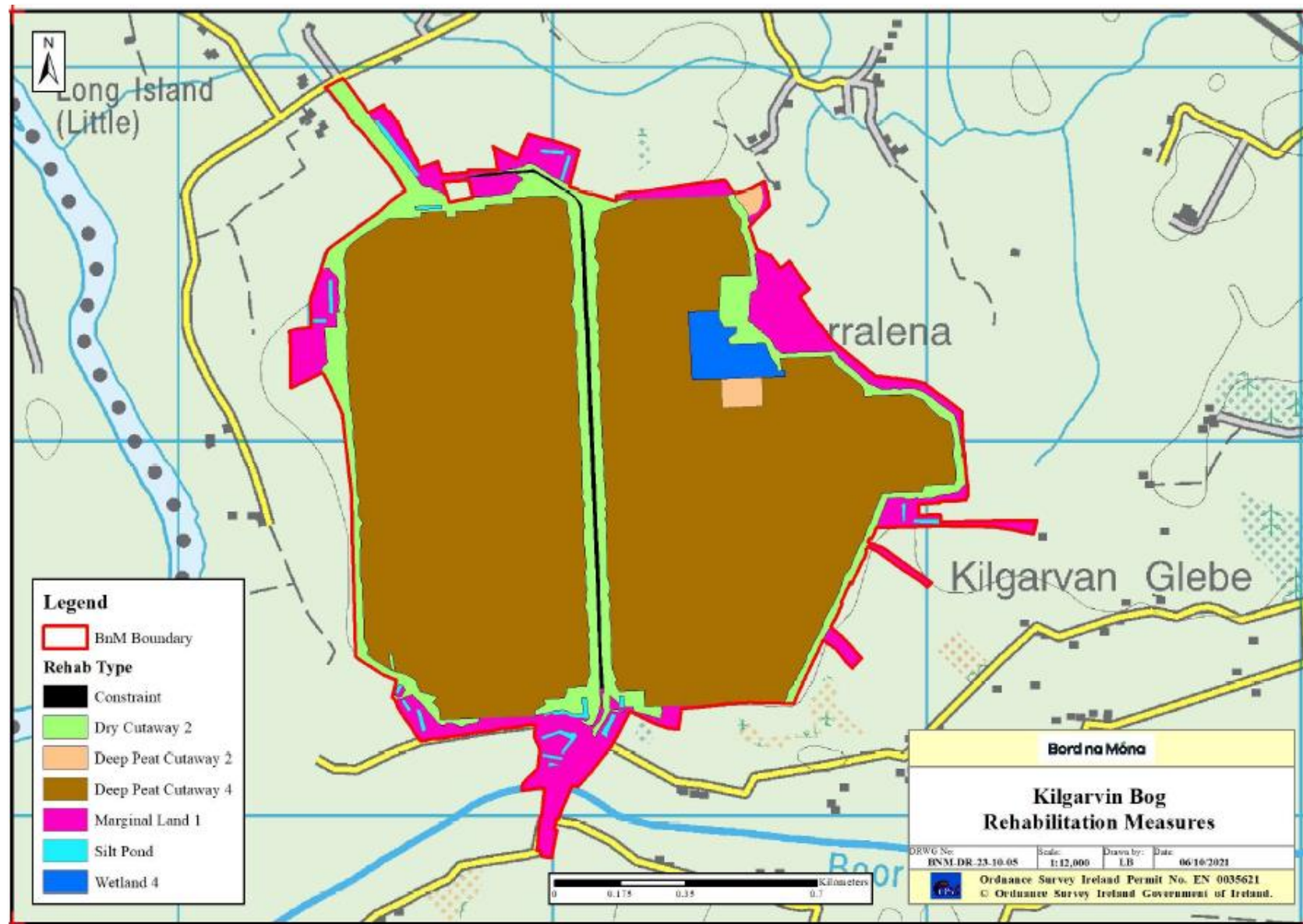


Figure 15: Kilgarvin Rehabilitation Measures

2.6.1.4 Decommissioning and Rehabilitation Timescale and Resource Requirements

Duration

Decommissioning activities will be completed within a period of 12 months and are scheduled to be completed before the end of 2023.

Rehabilitation activities will be completed within a period of approximately 12 months. In general activities proposed for FY22 i.e. 2022 will be carried out between the months of April and October inclusive.

The duration of activities provided are approximate and may be slightly shorter or longer, depending on weather conditions and progress on rehabilitation prescriptions. Activities may cease for the winter months due to rainfall and poor ground conditions, in line with typical BNM work practice and H&S requirements. In any case, the rehabilitation works will take approximately 12 months.

2.6.1.4.1 Hours of Work

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

2.6.1.5 Use of Natural Resources

Land Requirement: There is no land requirement in respect of **decommissioning**. In total **rehabilitation** activities will take place on 393.12 hectares of land. As rehabilitation through stabilisation and land cover change is the primary objective, no 'negative quality' land take is associated with Rehabilitation. No land take is required for e.g. the storage of vehicles – vehicles are typically left in situ at points of work or on 'headlands'.

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

Soils/Peat:

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

During **rehabilitation**, minor quantities of existing peat will be excavated from drainage trenches and/or an immediately adjacent borrow pit at peat dam locations and immediately used to form peat blockages. 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 dependant on location (Insertion of peat blockages/overflow pipes may interact with underlying subsoils where peat depths are shallow). All material used will be from the immediate vicinity and no transport of material will be required.

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

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

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

2.6.1.6 Emissions & Wastes during Rehabilitation

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

Regarding rehabilitation, the extent of dust, noise and localised vibration from individual machines creating peat dams to block drains or blocking outfalls is momentary in duration and therefore considered negligible in magnitude. Reprofilling the surfaces of exposed peat using a ‘dozer’ or ‘screw leveller’ and creating ‘speed bump’ blockages or infilling drains produces a higher potential for the release of dust during drier periods, however the duration of this is expected to be brief (i.e. with effects lasting less than a day). Enhanced measures where bunded cells are created may take longer duration.

Durations overall are expected over a 12 month period at Bunahinly-Kilgarvan Bog or until rehabilitation is complete.

Fuel and drainage pipes will be delivered. No blasting or piling is required.

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

Welfare Facilities: Welfare facilities are available at Bunahinly-Kilgarvan Bog. Where required, Portaloos and additional welfare facilities may be added to the Bunahinly-Kilgarvan site. This may be required to accommodate guests or additional workers during the summer months and to assist with social distancing requirements should they be required.

2.6.2 Operational Stage

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

Operational Activities: Operational activities will mainly comprise non-intrusive environmental & ecological monitoring (including surface water monitoring, vegetation monitoring but also the use of drones to provide catalogues of aerial photography), and may also include minimal works such as repairs to existing peat blockages, adjustment of overflow pipes (where required) and or fertilisation to increase successional rates. Maintenance of existing silt ponds to reduce emissions to local water bodies, as conditioned by the existing IPC license, will still be required. Activities to retain the function of drainage channels operating as hydraulic breaks along the site boundary, to include drainage channel cleaning (removal of instream aquatic vegetation), removal of trees, debris etc.

Operational Access: Operational access will be through the local road network at the Millford townland, where existing infrastructure is already in place via access tracks and railway to facilitate the previous peat extraction.

Timing of Operational Activities: It is expected that scheduled inspection and maintenance activities will be carried out by a 2-4 person team, typically for 1 day per month, for the foreseeable future. Limited access may occur to inspect and manage water levels within the rewetted peatland areas.

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

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

Fugitive emissions to air

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

Carbon Emissions

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

2.7 European Sites under consideration

2.7.1 Distance of the Project to European Sites

For the proposed Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, a limited zone of potential impact is predicted, due to the construction phase duration and localised nature of the activities proposed.

The assessment of connectivity between the European Sites and the proposed works follows the potential Source>>Pathway>>Receptor model, which identifies the source of likely significant impacts, if any, the pathway (land, air, hydrological, hydrogeological pathways, etc) along which those impacts may be transferred from the source to the receiving environmental receptors (i.e. European Sites and/ or features for which the sites are designated). A precautionary 15km distance was chosen to evaluate the potential for effects (alone and in-combination) on European Sites.

The proximity of the proposed Decommissioning and Rehabilitation Plan to European sites, and more importantly QIs/SCIs of European sites, is of importance when identifying potentially likely significant effects. During the initial scoping of this report, a 15km ZoI was applied for impact assessment. A conservative approach has been used, which minimises the risk of overlooking distant or obscure effect pathways, while also avoiding reliance on buffer zones within which all European sites should be considered. This approach assesses the complete list of all QIs/SCIs of European sites in Ireland (i.e. potential receptors), instead of listing European sites within buffer zones. This follows Irish departmental guidance on AA:

“For projects, the distance could be much less than 15km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects” (DoEHLG, 2010; p.32, para 1).

Following the guidance set out by the NRA (2009), the proposed plan has been evaluated based on an identified ZoI with regard to the potential impact pathways to ecological features (e.g. mobile and static). The ZoI of the proposed plan on mobile species (e.g. birds, mammals, and fish), and static species and habitats (e.g. saltmarshes, woodlands, and flora) is considered differently. Mobile species have ‘range’ outside of the European site in which they are QI/SCI. The range of mobile QI/SCI species varies considerably, from several meters (e.g. in the case of whorl snails *Vertigo* spp.), to hundreds of kilometres (in the case of migratory wetland birds). Whilst static species and habitats are generally considered to have ZoI’s within close proximity of the proposed plan, they can be significantly affected at considerable distances from an effect source; for example, where an aquatic QI habitat or plant is located many kilometres downstream from a pollution source.

Hydrological linkages between the proposed Decommissioning and Rehabilitation Plan area and European sites (and their QIs/SCIs) can occur over significant distances; however, any effect will be site specific depending on the receiving water environment and nature of the potential impact. A reasonable worst-case ZoI for water pollution from the proposed Decommissioning and Rehabilitation Plan area is considered to be the hydrological pathway from the proposed plan until it reaches the first lentic water body (e.g. lake), as the depositional nature of these water bodies would limit the transport capacity of any potential influences from the proposed Decommissioning and Rehabilitation Plan to European sites located downstream.

Other European Sites outside of the 15km buffer zone, supporting remote hydrological connectivity with the works, have also been considered as part of this Assessment and includes European Sites downstream along the River Shannon Catchment as follows:

- Lough Derg, North-east Shore SAC (002241) – located 55km downstream;
- Lough Derg SPA (004058) – Located 55km downstream;
- Lower River Shannon SAC (002170) – located 95km downstream; and

- River Shannon and River Fergus Estuaries SPA (004077) - Located 125km downstream.

However, given the nature and scale of the proposed rehabilitation works, likely significant effects to these European Sites are not possible due to the distance downstream to these European Sites (>55km) and the assimilative and dilutional capacity of the River Shannon catchment.

In addition, all other Special Protection Areas outside of the 15km buffer zone are located >25km from the proposed rehabilitation works. These means that the proposed works are not within the core foraging range for Special Conservation Interest species for these European Sites and therefore, there will be no likely significant effects to SPAs outside of the 15km buffer zone.

There are **16 European Sites** - 12 Special Area's of Conservation (SAC) and 4 Special Protection Area (SPA) - **within 15km of Bunahinly-Kilgarvan Bog**. The locations of these European Sites are illustrated in **Figure 17: European Sites within 15km of Bunahinly-Kilgarvan** and **Figure 18: Proximal and adjacent European Sites**.

The distances from the Bunahinly-Kilgarvan bog rehabilitation site and comment on hydrological connectivity provided in **Table 9**.

Table 9: Proximity of the proposed Bunahinly-Kilgarvan Bog to European Sites

European Site (SAC or SPA)	Site Code	Distance from the Development*	Connectivity (Y/N:
River Shannon Callows SAC	000216	The south-western boundary of Kilgarvan Bog overlaps this European Site.	Y:Downstream via the Shannon (Upper)_120 watercourse (Cloonbonny & Boor watercourses).
Mongan Bog SAC	000580	4.3km south/south-west of Bunahinly-Kilgarvan at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Fin Lough SAC	000576	6.1km south/south-west of Bunahinly-Kilgarvan at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Pilgrim's Road Esker SAC	001776	3.9km south/south-west of Bunahinly-Kilgarvan at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Moyclare Bog SAC	000581	9.8km south of Bunahinly-Kilgarvan Bog at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Ferbane Bog SAC	000575	9.2km south/south-east of Bunahinly-Kilgarvan Bog at its closest point..	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Crosswood Bog SAC	002337	1.1km east/north-east of Bunahinly-Kilgarvan Bog at its closest point..	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Carn Park Bog SAC	002336	4.2km east/north-east of Bunahinly-Kilgarvan Bog at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Ballynamona Bog And Corkip Lough SAC	002339	11.3km north/north-west of Bunahinly-Kilgarvan at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Castlesampson Esker SAC	001625	9.8km west of Bunahinly-Kilgarvan Bog at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.

European Site (SAC or SPA)	Site Code	Distance from the Development*	Connectivity (Y/N:
Lough Funshinagh SAC	000611	14.8km north-west of Bunahinly-Kilgarvan Bog at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Lough Ree SAC	000440	3.8km north/north-west of Bunahinly-Kilgarvan at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Middle Shannon Callows SPA	004096	The south-western boundary of Kilgarvan Bog overlaps this European Site.	Y:Downstream via the Shannon (Upper)_120 watercourse (Cloonbonny & Boor). The rehabilitation site adjoins and is within the core foraging range of the SCI species for which this SPA is designated; i.e. Greenland White-fronted Goose.
Mongan Bog SPA	004017	4.6km south/south-west of Bunahinly-Kilgarvan at its closest point.	Y: No hydrological connectivity between the proposed bog rehabilitation site and this European Site. However the rehabilitation site is within the core foraging range of the SCI species for which this SPA is designated; i.e. Greenland White-fronted Goose.
Lough Ree SPA	004064	3.8km north/north-west of Bunahinly-Kilgarvan at its closest point.	Y: No hydrological connectivity between the proposed bog rehabilitation site and this European Site. However the rehabilitation site is within the core foraging range of some SCI species for which this SPA is designated; i.e. Whooper Swan.
River Suck Callows SPA	004097	13.9km south-west of Bunahinly-Kilgarvan at its closest point and >16km downstream via the River Shannon main channel.	Y:Downstream via the Shannon (Upper)_120 watercourse (Cloonbonny & Boor).

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

The Qualifying Interests/Special Conservation Interests and locational context for each of the sixteen European Sites examined in this Screening Report are provided in **Table 10**.

The Site Synopsis and Conservation Objectives for each site are available in full on the National Parks & Wildlife Service website at <https://www.npws.ie/protected-sites> and references including date of access, are included in **Section 4**. Conservation Objectives were reviewed to inform the current appraisal – in particular to identify any possible sensitivities and resultant pathways for likely significant effects.

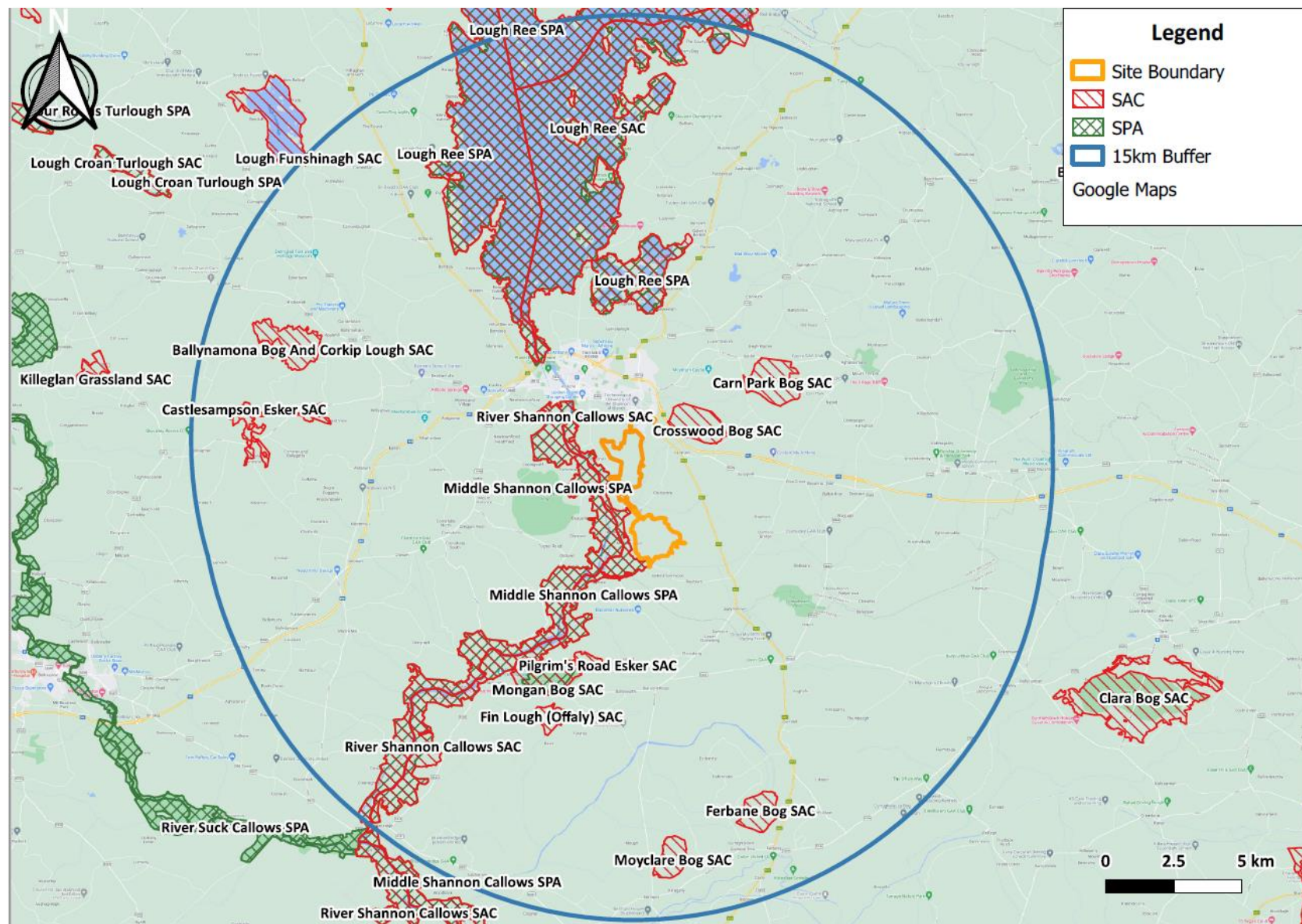


Figure 17: European Sites within 15km of Bunahinly-Kilgarvan Bog

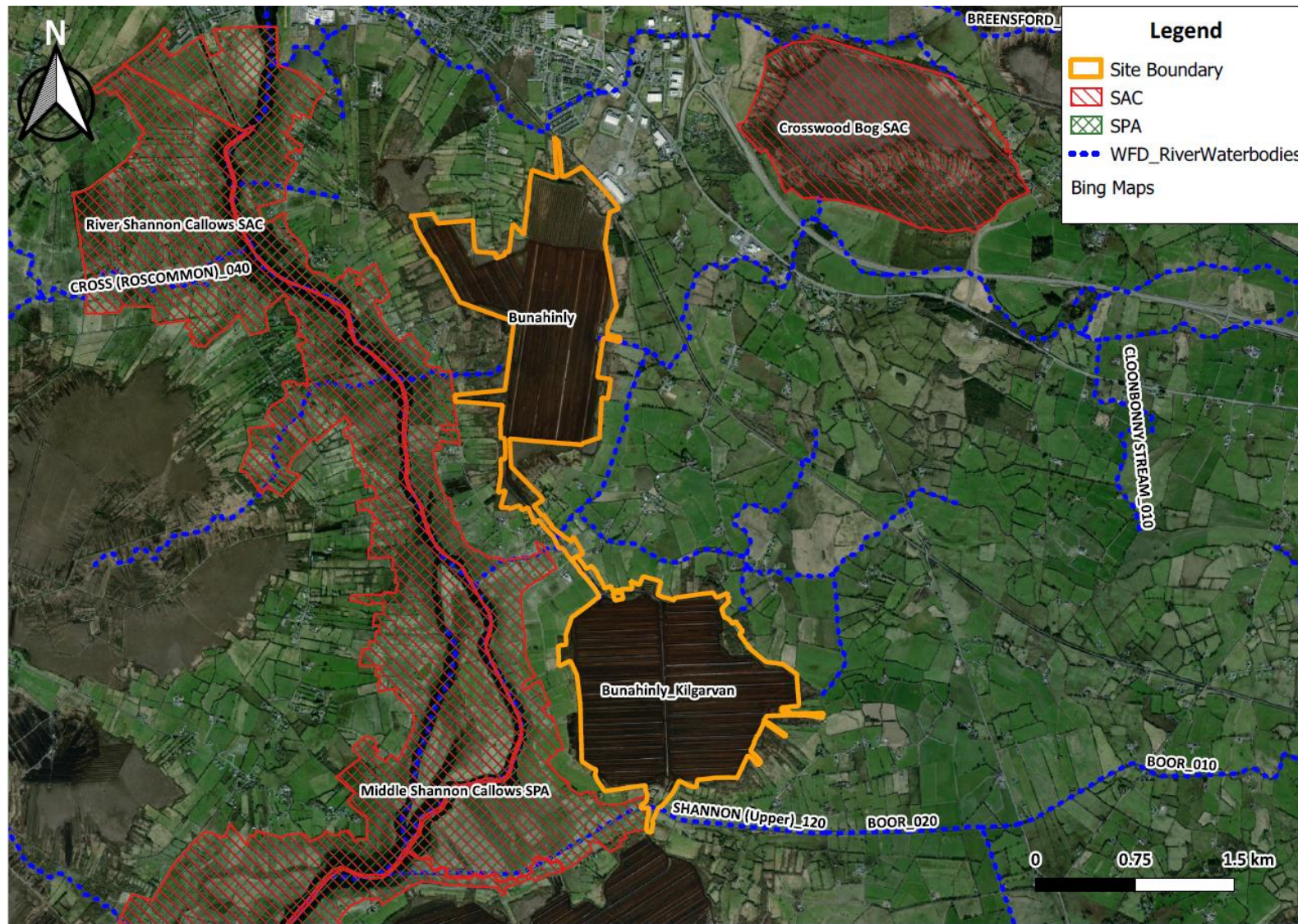


Figure 18: Proximal and adjacent European Sites

Table 10: Description of European Sites within a 15km radius of Bunahinly-Kilgarvan Bog

European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis) ¹¹	Data Source – Conservation Objectives Supporting Form
1 River Shannon Callows SAC (000216)	<p>[6410] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)</p> <p>[6510] Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>)</p> <p>[8240] Limestone pavements*</p> <p>[91E0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*</p>	The River Shannon Callows is a long and diverse site which consists of seasonally flooded, semi-natural, lowland wet grassland, along and beside the river between the towns of Athlone and Portumna. It is approximately 50 km long and averages about 0.75 km wide (reaching 1.5 km wide in places). Along much of its length the site is bordered by raised bogs (many, but not all, of which are subject to large-scale harvesting), esker ridges and limestone-bedrock hills. The soils grade from silty alluvial to peat. This site has a common boundary, and is closely associated, with two other sites with similar habitats, River Suck Callows and Little Brosna Callows (NPWS, 2013a).	NPWS (2022) Conservation Objectives: River Shannon Callows SAC 000216. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Accessed online 14.02.2022
2 Mongan Bog SAC (000580)	<p>[7110] Raised Bog (Active)*</p> <p>[7120] Degraded raised bogs still capable of natural regeneration</p> <p>[7150] Depressions on peat substrates of the Rhynchosporion</p>	Mongan Bog is a midland raised bog of medium size situated immediately east of the monastic site of Clonmacnoise, Co. Offaly, and 12 km south of Athlone. It is situated in a basin, surrounded on 95% of its perimeter by high ground on mineral soil. Mongan Bog is of high conservation importance as it is a good example of a raised bog site which contains examples of the Annex 1 habitats active raised bog, degraded raised bog and depressions on peat substrates (Rhynchosporion). It is mostly intact and has classic hummock and pool formations over a large proportion of the surface. It has several features of special zoological interest. Scenically it is part of an area rich in intact natural features (callows, eskers, limestone pavement) which enhances its importance	NPWS (2016) Conservation Objectives: Mongan Bog SAC 000580. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht Accessed online 14.02.2022

¹¹ Site Synopses for River Shannon Callows SAC, Middle Shannon Callows SPA and River Suck Callows SPA are presented in **Appendix C**.

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis) ¹¹	Data Source – Conservation Objectives Supporting Form
			further. The ongoing intensive research on aspects of bog ecology at the site reinforces its international importance (NPWS, 2013b).	
3	Fin Lough SAC (000576)	[1013] Geyer's Whorl Snail <i>Vertigo geyeri</i> [7230] Alkaline fens	Fin Lough is a shallow limestone lake surrounded by a complex of wetland habitats, 7 km north-east of Shannonbridge in Co. Offaly. The name Fionn Loch, "White Lake", probably derives from the white colour of the lake bottom caused by marl deposits. It is a shallow lake, about 16 ha in extent (in winter) and bounded to the north and east by the Clonfinlough esker ridge, and to the south and west by Blackwater Bog, which is now largely cut-over. The lake and its surrounding wetland communities are arranged in distinct zones reflecting wetness and substrate. They include open water, reedswamp, tall sedge, alkaline fen, fen-bog transition, swamp woodland and bog. The transition from calcium-rich lake to reedbed, to fen, to bog is relatively intact in some areas, which is exceptional for this part of the country (NPWS, 2013c).	NPWS (2019) Conservation Objectives: Fin Lough (Offaly) SAC 000576. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Accessed online 14.02.2022
4	Pilgrim's Road Esker SAC (001776)	[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites)	Pilgrim's Road Esker SAC is a narrow esker ridge extending 2 km east from Clonmacnoise in Co. Offaly. The site is adjacent to the River Shannon Callows, to the north, and Mongan raised bog, to the south. The western area includes Bunthulla Hill (north of the road) and Hanging Hill (south of the road); the central area runs along both sides of the summit ridge before widening out eastwards to include a substantial area of esker grassland centred on the site of an old ring-fort. Pilgrim's Road Esker is the most scenically impressive esker in the midlands and the one best known to the public. Orchid-rich calcareous grassland is a rare habitat in Ireland and is listed as a priority	NPWS (2018) Conservation Objectives: Pilgrim's Road Esker SAC 001776. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Accessed online 14.02.2022

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis) ¹¹	Data Source – Conservation Objectives Supporting Form
			habitat under Annex I of the E.U. Habitats Directive. Furthermore the population of the rare Green-winged Orchid is the largest known in Ireland (NPWS, 2014).	
5	Moyclare Bog SAC (000581)	<p>[7110] Raised Bog (Active)*</p> <p>[7120] Degraded raised bogs still capable of natural regeneration</p> <p>[7150] Depressions on peat substrates of the Rhynchosporion</p>	<p>Moyclare Bog is a small raised bog situated 4 km west of Ferbane in Co. Offaly. Its mean height above sea level is 54 m. On the western edge of the bog, a low peat face with no perimeter drain lies adjacent to wet peaty pasture, which has a spring-line at its junction with mineral soil. The water from this spring disappears under the peat dome of the bog. The site occurs in close proximity to a number of important raised bogs close to the floodplain of the River Shannon. Whilst relatively small, Moyclare bog is a site of high conservation value as it is relatively intact and contains examples of the Annex I habitats active raised bog, degraded raised bog and depressions on peat substrates (Rhynchosporion). The uncut peat dome has an unusually high proportion of active raised bog (NPWS, 2013d).</p>	<p>NPWS (2015) Conservation Objectives: Moyclare Bog SAC 000581. Version 1.</p> <p>National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 14.02.2022</p>
6	Ferbane Bog SAC (000575)	<p>[7110] Raised Bog (Active)*</p> <p>[7120] Degraded raised bogs still capable of natural regeneration</p> <p>[7150] Depressions on peat substrates of the Rhynchosporion</p>	<p>Ferbane Bog is a relatively large, domed, raised bog located about 10 km east of Shannonbridge in Co. Offaly. It is underlain by low permeability Waulsortian limestone and clay-rich tills. Ferbane Bog is a good example of a raised bog and is of considerable conservation significance. Active raised bogs are becoming increasingly rare in Ireland, and Europe, and are listed as a priority habitat on Annex I of the E.U. Habitats Directive (NPWS, 2013e).</p>	<p>NPWS (2015) Conservation Objectives: Ferbane Bog SAC 000575. Version 1.</p> <p>National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 14.02.2022</p>
7	Crosswood Bog SAC (002337)	<p>[7110] Raised Bog (Active)*</p> <p>[7120] Degraded raised bogs still capable of natural regeneration</p>	<p>Crosswood Bog is situated approximately 5 km east of Athlone, Co. Westmeath, mainly in the townlands of Crosswood, Glenaghanvoneen, and Creggan Lower. The site comprises a raised bog that includes both areas of</p>	<p>NPWS (2016) Conservation Objectives: Crosswood Bog SAC 002337. Version 1.</p>

European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis) ¹¹	Data Source – Conservation Objectives Supporting Form
		<p>high bog and cutover bog. The northern margin of the bog lies along the southern side of the Dublin-Galway railway line. Crosswood Bog is a site of considerable conservation significance as it comprises a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. This site supports a good diversity of raised bog microhabitats, including hummock/hollow complexes, pools and wooded flushes. Furthermore, it supports a population of the rare bog moss <i>Sphagnum pulchrum</i>. Active raised bog is listed as a priority habitat on Annex I of the E.U. Habitats Directive. Priority status is given to habitats and species that are threatened throughout the E.U. Ireland has a high proportion of the total E.U. resource of this habitat type (over 60%) and so has a special responsibility for its conservation at an international level (NPWS, 2014b).</p>	<p>National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 14.02.2022</p>
8	Carn Park Bog SAC (0002336)	<p>[7110] Active raised bogs* [7120] Degraded raised bogs still capable of natural regeneration</p>	<p>Carn Park Bog is situated 8 km east of Athlone, in the townlands of Tullywood, Carn Park, Cappaghbrack, Warren High and Moydrum, Co. Westmeath. The site comprises a raised bog that includes both areas of high bog and cutover bog. The margins of the site are bounded by roads on the north, west and southern margins and forestry on the east. Carn Park Bog is a site of considerable conservation significance as it comprises a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. This site supports a good diversity of raised bog microhabitats, including hummock/hollow complexes, pools and <i>Sphagnum</i> lawns, as well as the rare species <i>Sphagnum pulchrum</i>. Active raised bog is listed as a priority habitat on Annex I of the E.U. Habitats Directive.</p> <p>NPWS (2015) Conservation Objectives: Carn Park Bog SAC 002336. Version 1.</p> <p>National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 27.01.2022</p>

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis) ¹¹	Data Source – Conservation Objectives Supporting Form
			<p>Priority status is given to habitats and species that are threatened throughout the E.U. Ireland has a high proportion of</p> <p>the E.U. resource of this habitat type (over 60%) and so has a special responsibility for its conservation at an international level (NPWS, 2014c).</p>	
9	Ballynamona Bog and Corkip Lough SAC (002339)	<p>[3180] Turloughs*</p> <p>[7110] Raised Bog (Active)*</p> <p>[7120] Degraded Raised Bog</p> <p>[7150] Rhynchosporion Vegetation</p> <p>[91D0] Bog Woodland*</p>	<p>Ballynamona Bog and Corkip Lough is a site of considerable conservation significance as it consists of a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. Ireland has a high proportion of the total E.U. resource of raised bog (over 60%) and so has a special responsibility for its conservation at an international level. Active raised bog, bog woodland and turlough are listed as priority habitats on Annex I of the E.U. Habitats Directive (NPWS, 2014d).</p>	<p>NPWS (2016) Conservation Objectives: Ballynamona Bog and Corkip Lough SAC 002339. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. Accessed online 14.02.2022</p>
10	Castlesampson Esker SAC (001625)	<p>[3180] Turloughs*</p> <p>[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) (* important orchid sites)*</p>	<p>Castlesampson Esker is a complex site with esker, turlough and raised bog all found. The esker is the most westerly of an important group of eskers centred on Adrnacloon Hill in south-east Co. Roscommon, 9 km west of Athlone. It forms a steep-sided, crescent-shaped hill composed of glacial gravels, situated on the south side of a metalled road. Although gravel is being quarried all around the esker and gravel pits occur within the site, the esker ridge itself is largely intact and fairly undisturbed. Lying to the east of the esker is a raised bog, whilst to its west is a turlough. The Castlesampson Esker site is of high conservation for the proximity and juxtaposition of esker, raised bog and turlough. The esker itself is of high importance for its almost intact structure (something which is very rare in Irish eskers), its relatively undisturbed state and for the presence of good quality,</p>	<p>NPWS (2021) Conservation Objectives: Castlesampson Esker SAC 001625. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Accessed online 14.02.2022</p>

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis) ¹¹	Data Source – Conservation Objectives Supporting Form
			species-rich dry calcareous grassland, a habitat that is listed with priority status on Annex I of the E.U. Habitats Directive (NPWS, 2013e).	
11	Lough Funshinagh SAC (000611)	[3180] Turloughs [3270] Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidens</i> p.p. vegetation	Lough Funshinagh is located approximately 12 km north-west of Athlone, in Co. Roscommon. The lake, which is underlain by Carboniferous limestone, is classified as a turlough because it fluctuates to a significant extent every year and occasionally dries out entirely (approximately two to three times every ten years). In most years, however, an extensive area of water persists. This is filled with vegetation, providing excellent breeding habitat for wildfowl, and the site is designated a Wildfowl Sanctuary. The lake is fed by springs and a small catchment to the west. It is mesotrophic in quality, with some marl (calcium carbonate) deposition, and is surrounded by pastures. Lough Funshinagh is of major ecological importance, both from a vegetation and ornithological viewpoint. Turloughs are listed as priority habitat on Annex I of the E.U. Habitats Directive. Lough Funshinagh is a unique and atypical example of this habitat, and has a particular value in being relatively unmodified by grazing and modern agriculture (NPWS, 2015).	NPWS (2018) Conservation Objectives: Lough Funshinagh SAC 000611. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Accessed online 14.02.2022
12	Lough Ree SAC (000440)	[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 (<i>Festuco-Brometalia</i>) (* important orchid sites) [7120] Degraded raised bogs still capable of natural regeneration	Lough Ree is the third largest lake in Ireland and is situated in an ice-deepened depression in Carboniferous limestone on the River Shannon system between Lanesborough and Athlone. The site spans Counties Longford, Roscommon and Westmeath. Some of its features (including the islands) are based on glacial drift. It has a very long, indented shoreline and hence has many sheltered bays. Although the main habitat, by area, is the lake itself,	NPWS (2016) Conservation Objectives: Lough Ree SAC 000440. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. Accessed online 14.02.2022.

European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis) ¹¹	Data Source – Conservation Objectives Supporting Form
	[7230] Alkaline fens [8240] Limestone pavements [91A0] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91D0] Bog woodland*	interesting shoreline, terrestrial and semi-aquatic habitats also occur. Lough Ree and its adjacent habitats are of major ecological significance. Some of the woodlands around the lake are of excellent. St John's Wood is particularly important; it is one of the very few remaining ancient woodlands in Ireland. The lake itself is an excellent example of a mesotrophic to moderate-eutrophic system, supporting a rare fish species and a good diversity of breeding and wintering birds (NPWS, 2019).	
13	Middle Shannon Callows SPA (004096)	[A038] Whooper Swan <i>Cygnus cygnus</i> [A050] Wigeon <i>Anas penelope</i> [A122] Corncrake <i>Crex crex</i> [A140] Golden Plover <i>Pluvialis apricaria</i> [A142] Lapwing <i>Vanellus vanellus</i> [A156] Black-tailed Godwit <i>Limosa limosa</i> [A179] Black-headed Gull <i>Chroicocephalus ridibundus</i> [A999] Wetland and Waterbirds	The Middle Shannon Callows SPA is a long and diverse site which extends for approximately 50 km from the town of Athlone to the town of Portumna; it lies within Counties Galway, Roscommon, Westmeath, Offaly and Tipperary. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit and Black-headed Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds (NPWS, 2012). NPWS (2021) Conservation objectives for Middle Shannon Callows SPA [004096]. Generic Version 8.0. Department of Housing, Local Government and Heritage. Accessed online 27.01.2022
14	Mongan Bog SPA (004017)	[A395] Greenland White-fronted Goose <i>Anser albifrons flavirostris</i>	Mongan Bog is a midland raised bog of medium size situated immediately east of the monastic site of Clonmacnoise, Co. Offaly, and 12 km south of Athlone. It is situated in a basin, surrounded on part of its perimeter by high ground on mineral soil. The cutaway area of bog provides habitat for a range of bird species, including birds of prey, thrushes, NPWS (2021) Conservation objectives for Mongan Bog SPA [004017]. Generic Version 8.0. Department of Housing, Local Government and Heritage. Accessed online 27.01.2022.

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis) ¹¹	Data Source – Conservation Objectives Supporting Form
			warblers and finches. A study of the birds of Mongan Bog in 1985 recorded Mallard, Snipe, Skylark and Meadow Pipit breeding on the peat dome. Mongan Bog is owned by An Taisce (the National Trust) and is a Ramsar Convention site, a Biogenetic Reserve and a Statutory Nature Reserve (NPWS 2014).	
15	Lough Ree SPA (004064)	[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> [A053] Mallard <i>Anas platyrhynchos</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> [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	Situated on the River Shannon between Lanesborough and Athlone, Lough Ree is the third largest lake in the Republic of Ireland. It lies in an ice-deepened depression in Carboniferous Limestone. Some of its features (including the islands) are based on glacial drift. The main inflowing rivers are the Shannon, Inny and Hind, and the main outflowing river is the Shannon. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Teal, Mallard, Shoveler, Tufted Duck, Common Scoter, Goldeneye, Little Grebe, Coot, Golden Plover, Lapwing and Common Tern (NPWS, 2015).	NPWS (2021) Conservation objectives for Lough Ree SPA [004064]. Generic Version 8.0. Department of Housing, Local Government and Heritage. Accessed online 14.02.2022
16	River Suck Callows SPA (004097)	[A038] Whooper Swan <i>Cygnus cygnus</i> [A050] Wigeon <i>Anas penelope</i> [A140] Golden Plover <i>Pluvialis apricaria</i> [A142] Lapwing <i>Vanellus vanellus</i> [A395] Greenland White-fronted Goose <i>Anser albifrons flavirostris</i>	The River Suck Callows SPA is a linear, sinuous site comprising a section of the River Suck from Castlecoote, Co. Roscommon to its confluence with the River Shannon close to Shannonbridge, a distance of approximately 70 km along the course of the river. The river forms part of the boundary between Counties Galway and Roscommon. The site includes the River Suck itself and the adjacent areas of seasonally-flooded semi-natural lowland wet callow grassland. The River Suck is the largest tributary of the River Shannon (NPWS, 2014).	NPWS (2021) Conservation objectives for River Suck Callows SPA [004097]. Generic Version 8.0. Department of Housing, Local Government and Heritage. Accessed online 26.01.2021

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

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

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

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

A planning search of the National Planning Database found a number of proposed or consented developments within the vicinity of Bunahinly-Kilgarvan Bog, including private dwellings or amendments to private dwellings and agricultural led planning applications such as for slatted sheds/ amendments to existing farm infrastructure etc.

There are 3 no. local authority jurisdictions within 15km of Bunahinly-Kilgarvan Bog (Westmeath County Council, Roscommon County Council and Offaly County Council). All local authorities have County Development Plans and/or plans relating to Heritage and Biodiversity.

There is a current ongoing NPWS Raised Bog Restoration Project which may include at some date some raised bogs within 15km of Bunahinly-Kilgarvan Bog. Restoration activities at these bogs may have the potential for in combination effects with decommissioning and rehabilitation at Bunahinly-Kilgarvan Bog, however there is no currently known temporal or spatial overlap between any planned restoration activities and the decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog.

Operational phase disturbance or mortality/barrier effect pathways to avifaunal species are not predicted from the proposed rehabilitation works. Therefore there is no source for in-combination effects with other future developments which may themselves result in potential mortality / barrier effects. Other plans and projects within the project Zone of Influence are displayed in **Figure 16** below.

2.7.2.1 Other BnM Bog Group Decommissioning and Rehabilitation

Other BnM bogs within the larger Blackwater group¹² will also be subject to decommissioning and rehabilitation to meet the various, pertinent, IPC license conditions, however, currently, the only known temporal overlap between these proposed activities elsewhere in the Blackwater group is at the following bogs:

- Ballaghurt - Located 5.0km south-of Bunahinly-Kilgarvan Bog. Ballaghurt Bog supports connectivity to the downstream sections of Middle Shannon Callows SPA and River Shannon Callows SAC via Blackwater (Shannonbridge)_020 watercourse and the Shannon (Upper)_130 watercourse.
- Belmont Bog - Located 9km south/south-west of Bunahinly-Kilgarvan Bog. This bog supports connectivity to the downstream sections of Middle Shannon Callows SPA and River Shannon Callows SAC via Blackwater (Shannonbridge)_020 watercourse. Decommissioning of this site is expected to be complete before the end of 2023.

¹² The Blackwater Bog Group IPC Licensed area is made up of three sub-groups (Attymon, Blackwater and Derryfadda). Bunahinly-Kilgarvan Bog is within the Blackwater sub-group.

- Bloomhill – Located immediately south of Bunahinly-Kilgarvan Bog. This bog supports connectivity to the downstream sections of Middle Shannon Callows SPA and River Shannon Callows SAC via Boor and the Shannon (Upper)_120 watercourse.
- Blackwater - Located 5.5km south-of Bunahinly-Kilgarvan Bog. Blackwater Bog supports connectivity to the downstream sections of Middle Shannon Callows SPA and River Shannon Callows SAC via Blackwater (Shannonbridge)_020 watercourse and the Shannon (Lower)_010 watercourse.
- Glebe – Located 6.5km south of Bunahinly-Kilgarvan Bog. Glebe Bog supports connectivity to the downstream sections of Middle Shannon Callows SPA and River Shannon Callows SAC via Blackwater (Shannonbridge)_020 watercourse and the Shannon (Lower)_010 watercourse.
- Clooniff - Located 7.5km south-west/west of Bunahinly-Kilgarvan Bog. Clooniff Bog supports connectivity to the downstream sections of Middle Shannon Callows SPA and River Shannon Callows SAC via Ballydangan_020 watercourse and the Shannon (Upper)_120 watercourse.
- Cornafulla - Located 4.5km south-west/west of Bunahinly-Kilgarvan Bog. Cornafulla Bog supports connectivity to the downstream sections of Middle Shannon Callows SPA and River Shannon Callows SAC via the Shannon (Upper)_120 watercourse.
- Cornaveagh - Located 11.9km south-west of Bunahinly-Kilgarvan Bog. Cornaveagh Bog supports connectivity to the downstream sections of Middle Shannon Callows SPA and River Shannon Callows SAC via the Shannon (Upper)_130 watercourse.
- Cullighmore - Located 17.5km south-west of Bunahinly-Kilgarvan Bog. Adjoins the northern boundary of the River Suck Callows SPA, which in turn provides connectivity to downstream sections of the Middle Shannon Callows SPA and River Shannon Callows SAC. Cullighmore Bog supports connectivity to the downstream sections of Middle Shannon Callows SPA and River Shannon Callows SAC via the River Suck Callows and River Suck catchment.
- Garryduff - Located 14.6km south-west of Bunahinly-Kilgarvan Bog. Adjoins the southern boundary of the River Suck Callows SPA, which in turn provides connectivity to downstream sections of the Middle Shannon Callows SPA and River Shannon Callows SAC. The north-western and south-eastern boundaries of Garryduff Bog Complex adjoin the Middle Shannon Callows SPA and River Shannon Callows SAC.
- Kellysgrove - Located 20.6km south-west of Bunahinly-Kilgarvan Bog. Adjoins south-western boundary of River Suck Callows SPA, which in turn provides connectivity to downstream sections of the Middle Shannon Callows SPA and River Shannon Callows SAC.
- Kilmacshane - Located 15.5km south / south-west of Bunahinly-Kilgarvan Bog. Adjoins south-western boundary of the Middle Shannon Callows SPA and River Shannon Callows SAC.
- Lismanny – Located 17.2km south-west of Bunahinly-Kilgarvan Bog. Adjoins the southern boundary of the River Suck Callows SPA, which in turn provides connectivity to downstream sections of the Middle Shannon Callows SPA and River Shannon Callows SAC.

The proposed rehabilitation works at each of these sites will be subject to Screening for Appropriate Assessment and where required, Appropriate Assessment.

Rehabilitation works will be completed for Garryduff, Kellysgrove and Kilmacshane when works are ready to commence at Bunahinly-Kilgarvan Bogs. The construction phase of decommissioning and rehabilitation at some of the remaining bogs may overlap those proposed for Bunahinly-Kilgarvan Bog. All of the above bog sites within the Blackwater Group support connectivity with the downstream areas of the Middle Shannon Callows SPA and River Shannon Callows SAC.

The Operational stage of Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation will overlap the Rehabilitation stage of other bogs within the Blackwater Bog group however the expected magnitude of any effects from Bunahinly-Kilgarvan Bog at this lifecycle stage are evaluated as insufficient to result in in-

combination effects. The possibility of likely significant in combination effects can reasonably be excluded on this basis.

As outlined, bog sites within the Blackwater Group proposed for decommissioning and rehabilitation in 2022, support connectivity with the downstream areas of the Middle Shannon Callows SPA and the River Shannon Callows SAC. The decommissioning and rehabilitation of any other bogs within the greater Blackwater Group will be subject to Appropriate Assessment and it is considered the requisite mitigation will be in place should the potential for any adverse effects on European site integrity be identified as part of the Appropriate Assessment process. This should also identify the potential for any sequential in-combination pathways, in particular should temporal overlap exist.

2.7.2.2 Turbary

Licensed turbary occurs at various locations within 15km of Bunahinly-Kilgarvan Bog, including several locations where the pathways for downstream in combination effects on European Sites may exist, primarily via drainage to EPA blue line watercourses to facilitate turbary. Unauthorised private turbary also occurs in discrete localised plots within the larger cutover raised bog complexes located to the south of Bunahinly-Kilgarvan Bog.

2.7.2.3 Quarries

There are quarry developments located within 15km of the Bunahinly-Kilgarvan Bog. These are typically localised sand and gravel quarries associated with esker ridges. These quarries have the potential to contribute in-combination effects to European Sites within the project zone of influence through the potential release of unattenuated surface water run-off to the receiving watercourses and surface water catchments.

2.7.2.4 NPWS Raised Bog Restoration

It is proposed to undertake restoration works of the following raised bog sites, designated as SACs or NHAs in 2022:

- Scohaboy Phase 2
- Kilsallagh Phase 2
- Cloncrow Phase 2
- Hawkswood
- Daingain
- Curraghlahanagh and Camderry (will start this FY but extend into FY23)
- Milltownpass
- Mouds Phase 2
- All Saints Phase 3
- Annaghmahera
- Derrinlough

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

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

On this basis, it is assumed that the appropriate level of Appropriate Assessment has or will be carried out in respect of any future proposed restoration activities at the above bogs, and that any required mitigation to avoid adverse effects on European Site integrity will be in place. In addition, none of these sites are located in proximity or within 15km of the proposed rehabilitation and decommissioning works.

2.7.2.5 Agricultural Activity

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

2.7.2.6 Licenced Facilities

The zone of influence of the proposed works supports the following EPA licenced facilities:

- P0611-01 – ESB West Offaly Power, Shannonbridge, Co. Offaly;
- P0110 - Arran Chemical Company Limited, Athlone Co. Roscommon;
- P1094 - Alexion Pharma International Operations Unlimited Company;
- P0100 - Alkermes Pharma Ireland Limited
- W0028-03 – Waste Licenced Facility Ballydonagh Landfill

Activities at these facilities are subject to the licencing conditions, controls and ongoing monitoring.

2.7.2.7 Local Authority Development Plans

The following development plans have been identified:

- Roscommon County Development Plan 2021-2027;
- County Roscommon Heritage Plan 2017-2021;
- Offaly County Development Plan 2014-2020;
- Offaly County Development Plan 2021-2027;
- Offaly Heritage Plan 2017-2021;
- Westmeath Heritage Plan 2018-2023; and
- Roscommon County Development Plan 2021-2027.

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

2.7.2.8 Other Projects or Activities

The likelihood of cumulative interaction with other plans or projects is considered low, due to limited temporal or spatial overlap; the absence of hydrological connectivity or shared hydrological catchment with many of the other plans or projects described, the separation distance or setback buffers between the

described plans or projects and European Sites, and the requirement for Appropriate Assessment for other plans or projects, such as private dwellings, forestry entrances, slatted sheds, masts and amendments to existing planning consents, which can reasonably be assumed to provide mitigation to avoid adverse effects on European Sites. Nonetheless the possibility of secondary effects from activities forming part of decommissioning or rehabilitation at Bunahinly-Kilgarvan Bog cannot be excluded – a precautionary approach is taken.

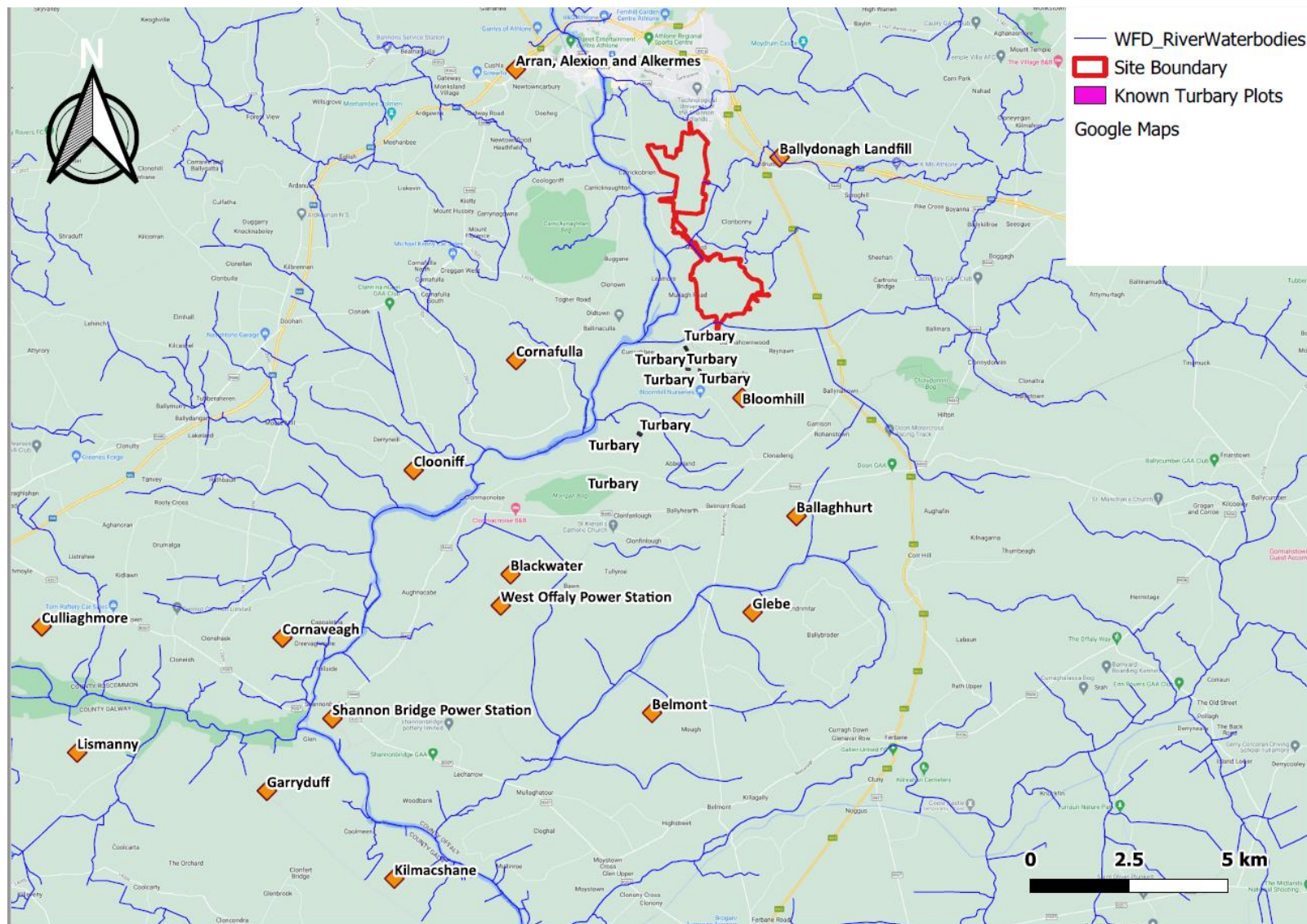


Figure 16: Other Projects and Plans within the Zone of Influence of the proposed Decommissioning and Rehabilitation works

2.8 Sources of Information & Consultation

2.8.1 Consultation

Consultation seeks to engage an audience of relevant stakeholders at both a national and local level.

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

See **Section 4** of the Rehabilitation Plan included as **Appendix B** for a full consultation report.

Formal consultation has been undertaken with NPWS regarding proposed Decommissioning and Rehabilitation Plans, including protected Sites. The findings and feedback from the consultation process have been fed into the final rehabilitation and decommissioning plans and the Appropriate Assessment process. Due cognisance was also given to information available on the NPWS website at:

<https://www.npws.ie/development-consultations#>.

Ministerial consultation in line with Regulation 42 of the European Union (Birds and Natural Habitats) Regulations has been undertaken in respect of the proposed PCAS activities and the current NIS has taken account of submissions made in this regard.

Finally, a public consultation process for the proposed Bunahinly-Kilgarvan PCAS scheme has been undertaken for the Bunahinly-Kilgarvan Bog PCAS project. This process was completed in accordance with the updated European Union (Birds and Natural Habitats) (Amendment) Regulations 2021, once it was determined that an appropriate assessment was required, and the current report has had regard to any submission received, where applicable.

2.8.2 Sources of Information

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

- Review of the Conservation Objectives, Site Synopsis and Site boundary information for the European Sites within with study area;
- Review of OSI Discovery Mapping for the 15km study area around Bunahinly-Kilgarvan Bog;
- Review of EPA online mapping for watercourse features (<https://gis.epa.ie/EPAMaps/>);
- Review of location and layout mapping for proposed Rehab;
- Review of the detailed description of proposed Decommissioning and Rehabilitation measures, including methodologies specific to the main categories of land types under consideration, which occur in cutaway bogs;
- Review of other plans and projects within 15km;
- Review of the results of previous Ecological Surveys of Bunahinly-Kilgarvan Bog, along with recent confirmatory site visits; and

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

- Review of the National Biodiversity Data Centre (NBDC) webmapper;
- Inland Fisheries Ireland (IFI) Reports;
- Environmental Protection Agency database (www.epa.ie);

- EPA Guidance on Requests for Alterations to a Licensed Industrial or Waste Activity;
- BirdWatch Ireland online data (including I-WeBS and CBS datasets; www.birdwatchireland.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive catchments.ie/maps/ Map Viewer (www.catchments.ie);
- OPW Indicative Flood Maps (www.floodmaps.ie),
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie);
- River Basin Management Plan for Ireland 2018 – 2021;
- Bord na Móna Annual Report 2019;
- Spatial data in respect of Article 17 reporting, available online at <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17>.
- Spatial data in respect of Article 12 reporting, available online at <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-12-data>.
- Available data on Greenland White-fronted Geese such as annual reporting by the Greenland White-fronted Goose Study and National Parks and Wildlife Service.

Planning peatland rehabilitation also takes account of research, experience and engagement with other peatland restoration and rehabilitation projects and peatland research including Irish, UK, European and International best-practise guidance (full citations are in the References **Section 4**):

- Bord na Móna Biodiversity Action Plan
- Anderson *et al.* (2017). An overview of the progress and challenges of peatland restoration in Western Europe.
- Bonn *et al.* (2017). Peatland restoration and ecosystem services- science, policy and practice.
- Carroll *et al.* (2009). Sphagnum in the Peak District. Current Status and Potential for Restoration. Moors for the Future Report No 16.
- Clark & Rieley (2010). Strategy for responsible peatland management.
- Eades *et al.* (2003). The Wetland Restoration Manual.
- Farrell & Doyle (2003). Rehabilitation of Industrial Cutaway Atlantic Blanket Bog, NW Mayo, Ireland.
- Gann *et al.* (2019). International Principles and Standards for the practice of Ecological Restoration.
- Hinde *et al.* (2010). Sphagnum re-introduction project: A report on research into the re-introduction of Sphagnum mosses to degraded moorland. Moors for the Future Research Report 18.
- Joosten & Clarke (2002). Wise Use of mires and peatlands – Background and Principles including a framework for Decision-making.
- Lindsay (2010). Peatbogs and Carbon: a Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change.
- Mackin *et al.* (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al.* (2011). The Fen Management Handbook, (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised bog Special Areas of Conservation management plan 2017-2022. Department of Arts, Heritage and the Gaeltacht.
- Quinty & Rochefort (2003). Peatland Restoration Guide, second edition. Canadian Sphagnum Peat Moss Association and New Brunswick Department of Natural Resources and Energy.
- Renou-Wilson *et al.* (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.

- Schouten (2002). Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies. Dúchas - The Heritage Service of the Department of the Environment and Local Government, Ireland;
- Thom (2019). Conserving Bogs – Management Handbook.
- Wheeler & Shaw (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction.
- Wittram *et al.* (2015). A Practitioners Guide to *Sphagnum* Reintroduction. Moors for the Future Partnership.

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

2.9.1 Potential Sources, Pathways and Timing of Impacts to SACs

2.9.1.1 Direct Impact to Habitats within the SAC

There is partial spatial overlap between Bunahinly-Kilgarvan Bog proposed rehabilitation works and River Shannon Callows SAC. Due to the proximity and partial overlap between Bunahinly-Kilgarvan Bog and the River Shannon Callows SAC, **there is potential for loss or fragmentation of habitats or loss of connectivity of habitats within a SAC.** Although habitats where both the SAC and likely rehabilitation measures (all within the category of 'Marginal Lands' or silt ponds) overlap **do not comprise 'callows', rather marginal areas of remnant high bog or cutaway with respective drainage, access tracks and infrastructure, a precautionary approach is taken, and therefore, there is potential for direct impacts to the SAC to occur.** Other SAC's can be excluded from consideration in respect of direct effects. Furthermore, there is the remote potential for direct disturbance, displacement or mortality impacts to otter, should they be utilising silt ponds or works areas within or overlapping the River Shannon callows SAC site boundary; e.g. KG192D.

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

Sources (all outside SAC boundaries): Movement of soil or peat, machinery; earthworks, excavations, installation of pipes/ temporary overburden storage, cleaning of silt ponds, removal of waste and/or raw material, lifting of rail; use of fuels, chemicals or fertiliser.

Working within watercourses and drainage channels along the site boundary / periphery to retain the function of hydraulic barriers between the site and the surrounding environment and to sustain the flow of surface water around the margins of the site. Such works will only involve the removal of instream aquatic vegetation and will not necessitate further excavations or deepening of watercourses or hydraulic breaks.

A water quality map for Bunahinly-Kilgarvan Bog is presented in **Figure 5** and **Figure 6**.

Pathway: Surfacewater runoff flow paths to receiving drainage systems, downstream watercourses

Potential Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity:

The identified impact sources could possibly reduce water quality or aquatic habitat quality in the local context, where all works are located outside of and at a distance from any designated SAC. The closest SAC is the River Shannon Callows SAC, which adjoins the Bunahinly-Kilgarvan Bog to the west. Bunahinly-Kilgarvan Bog also supports hydrological connectivity to this European Site through its drainage channel and water attenuation network.

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

Timing of Impacts: The potential for impact sources arising from the project only relates to the stage (i.e. Decommissioning and Rehabilitation), when groundworks and use of machinery will take place for a limited duration - in this instance expected to be completed over a 2 year period. Once decommissioning and rehabilitation are complete, the decommissioned and rehabilitated Bunahinly-Kilgarvan Bog will require some monitoring, generally involving visual inspections of habitat succession, sometimes using drones, and any ongoing scheduled maintenance such as of silt ponds, or collection of water samples. Due to the negligible (both in terms of source magnitude but also duration) and non-intrusive nature of operational activities, there

is no potential for the operational phase of the proposed decommissioning and rehabilitation to cause effects to European Sites.

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

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

Working within watercourses and drainage channels along the site boundary / periphery to retain the function of hydraulic barriers between the site and the surrounding environment and to sustain the flow of surface water around the margins of the site. Such works associated with hydraulic barriers will only involve the removal of instream aquatic vegetation and will not necessitate further excavations or deepening of the drainage channel.

Pathway: contact (direct contact with BnM personnel or machinery during site works), air (through its ability to transmit noise effects), visibility (on site presence of BnM personnel).

Potential Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity: The impact sources identified above may result in possible localised impacts occurring within the local context of the decommissioning and rehabilitation area during the construction phase. Any such impacts resulting in disturbance or displacement effects on Annex II species listed as Qualifying Interests of SACs (e.g. Otter) would be *ex situ*. Bunahinly-Kilgarvan Bog adjoins the River Shannon Callows SAC in parts. Otters utilising the nearby adjoining floodplains of the River Shannon Callows SAC (and their associated watercourses; e.g. Boor_020 and Shannon Upper_120) may experience ex-situ disturbance effects as a result of the proposed rehabilitation works.

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

2.9.1.4 Indirect or ex-situ mortality of Qualifying Interests

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

Working within watercourses and drainage channels along the site boundary / periphery to retain the function of hydraulic barriers between the site and the surrounding environment and to sustain the flow of surface water around the margins of the site. Such works will only involve the removal of instream aquatic vegetation and will not necessitate further excavations or deepening of the drainage channel.

Pathway: contact (direct contact with BnM personnel or machinery during site works) and berm failure

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

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

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

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

Working within watercourses and drainage channels along the site boundary / periphery to retain the function of hydraulic barriers between the site and the surrounding environment. Such works will only involve the removal of instream aquatic vegetation and will not necessitate further excavations or deepening of the drainage channel.

Pathway: contact (direct contact with BnM personnel or machinery during site works), air (through its ability to transmit noise effects), visibility (on site presence of BnM personnel)

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

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

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

Timing of Impacts: It is considered that during the decommissioning and rehabilitation stages at Bunahinly-Kilgarvan Bog, the possibility exists for any inadvertent release of silt or other degrading materials to possibly combine with downstream effects from other projects. Although expected to be localised and limited in magnitude, disturbance effects on Otter may combine with other localised sources such as related to Turbary and agriculture to result in increased effects on ex-situ populations. Significant effects during operation can be screened out.

2.9.2 Potential Sources, Pathways and Timing of Impacts SPAs

2.9.2.1 Direct Impacts to Habitats within SPAs

Due to the proximity and overlap between Bunahinly-Kilgarvan Bog and the Middle Shannon Callows Special Protection Area, **there is potential for loss or fragmentation of habitats or loss of connectivity of habitats within a Special Protection Area. Although habitats where both the SPA and likely rehabilitation measures (all within the category of 'Marginal Lands or Wetland') overlap do not comprise 'callows', rather marginal areas of remnant high bog or cutaway with respective drainage, access tracks and infrastructure, a precautionary approach is taken, and therefore, there is potential for direct impacts to the SPA to occur.** Other SPA's can be excluded from consideration in respect of direct effects. Furthermore, there is the remote potential for direct disturbance, displacement or mortality impacts to otter, should they be utilising silt ponds or sections works areas within or overlapping the River Shannon callows SAC site boundary; e.g. KG192D.

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

Sources (some but not all inside SPA boundaries): Movement of soil or peat, machinery; earthworks, excavations, temporary overburden storage, cleaning of silt ponds, installation of overflow pipes, removal of waste and/or raw material, lifting of rail; use of fuels, chemicals or fertiliser.

Pathway: Surfacewater runoff flow paths to receiving drainage systems, downstream watercourses

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

The proposed Decommissioning and Rehabilitation at Bunahinly-Kilgarvan Bog adjoins and partially overlaps one SPA boundary which drains to the Shannon (Lower]_SC_020 sub-catchment. Effects on this SPA and, on one hydrologically connected, downstream SPA (River Suck Callows SPA), are evaluated to determine the potential (or not) for significant effects.

Timing of Impacts: The potential for impact sources arising from the PCAS activities only relates to the Decommissioning and Rehabilitation Stage, when groundworks and use of machinery will take place for a limited duration - completed over a 2 year period. Once decommissioning and rehabilitation are complete, the decommissioned and rehabilitated Bunahinly-Kilgarvan Bog will require minimal monitoring, generally involving visual inspections of habitat succession, sometimes using drones, and any ongoing scheduled maintenance such as of silt ponds. Due to the negligible (both in terms of source magnitude but also duration) and non-intrusive nature of operational activities, there is no potential for the operational phase of the proposed decommissioning and rehabilitation to cause significant effects to European Sites.

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

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

Working within watercourses and drainage channels along the site boundary / periphery to retain the function of hydraulic barriers between the site and the surrounding environment. Such works will only involve the removal of instream aquatic vegetation and will not necessitate further excavations or deepening of the drainage channel.

Pathway: contact (direct contact with BnM personnel during site works), air (through its ability to transmit noise effects), visibility (on site presence of BnM personnel)

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

Parts of Bunahinly-Kilgarvan Bog adjoin the Middle Shannon Callows SPA. In addition, the proposed works at Bunahinly-Kilgarvan Bog supports remote potential hydrological connectivity (<16.0km downstream) to the River Suck Callows SPA via the River Shannon catchment and its associated floodplain.

SCI species associated with these European Sites may experience ex-situ disturbance/displacement as a result of the proposed decommissioning and rehabilitation works.

Timing of Impacts: As outlined above, the potential for effects only relates to the decommissioning and rehabilitation Stage as source magnitude during any operational phase activities can be screened out. In terms of Timing of Effects, this is limited to the migratory (September to November for Autumn and March to mid-May for Spring) and winter period (October to March) when most of the SCI species for which these sites are designated are present¹³.

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

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

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

Working within watercourses and drainage channels along the site boundary / periphery to retain the function of hydraulic barriers between the site and the surrounding environment. Such works will only involve the removal of instream aquatic vegetation and will not necessitate further excavations or deepening of the drainage channel.

Pathway: contact (direct contact with BnM personnel during site works), air (through its ability to transmit noise effects), visibility (on site presence of BnM personnel)

Potential Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation Impact/Pathway Connectivity:

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

Timing of Impacts: The potential for in combination impact sources arising from the project only relates to the works stage (i.e. Decommissioning and Rehabilitation), when groundworks and use of machinery will take place for a limited duration -completed over a 2 year period. For disturbance to SCI species, the potential for effects only relates to the works stage of decommissioning and rehabilitation as source magnitude during any operational phase activities can be screened out. In terms of Timing of Effects, this is limited to the migratory (September to November for Autumn and March to mid-May for Spring) and winter period (October to March) or breeding period, as applicable, when most of the SCI species for which these sites are designated are present.

¹³ Periods are as defined in the SNH document 'Survey Methods for use in assessing the impacts of onshore windfarms on bird communities'. (2005). SNH, Battleby, Scotland.

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

The Screening evaluation is based on a conceptual site model which identifies potential impact source-pathways between the described Bunahinly-Kilgarvan Bog decommissioning and rehabilitation and each European Site. This allows for an assessment of any potential for significant effects on the Qualifying Interests / Special Conservation Interests and their respective Conservation Objectives.

The following impact source-pathways for the twelve SAC sites are evaluated in relation to any potential for significant effects (**Table 11** below):

- Indirect loss or degradation of terrestrial or aquatic habitats within SAC sites (during the construction and operational phases), alone and in combination; and
- Indirect or ex-situ disturbance or displacement of species of Qualifying Interest, alone and in combination.

The following impact source-pathways for the four SPA sites are evaluated in relation to any potential for significant effects (**Table 12** below):

- Indirect loss, reduction or degradation of terrestrial or aquatic habitats within SPA sites (during the construction and operational phases), alone and in combination; and
- Indirect or ex-situ disturbance/ displacement of bird species listed as Special Conservation Interests, alone and in combination.

As described in **Section 2.9.1** and **2.9.1**, there is **potential for indirect effects** to features of qualifying Interest associated with European Sites due to the proximity of the Bunahinly-Kilgarvan Bog site with the Middle Shannon Callows SPA and the River Shannon Callows SAC.

The evaluation of potential for in-combination effects with regard to Other Plans or Projects includes the plans or projects described in **Section 2.6.3**.

Table 11: Evaluation of Possibly Significant Effects to the twelve SAC sites

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the twelve SAC Sites:</p> <p>1. Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>2. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site;</p> <p>2. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest.</p> <p>3. Indirect or ex-situ mortality of Qualifying Interests</p>
1	River Shannon Callows SAC (000216)	The south-western corner of this SAC overlaps the Kilgarvan Bog site boundary.	Y:Downstream via the Shannon (Upper)_120 watercourse (Cloonbonny & Boor watercourse).	<p>1: Screened In – Bunahinly-Kilgarvan Bog partially overlaps with this European Site. As a result, there is the possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Notwithstanding the fact that habitats where this SAC overlaps Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation activities do not comprise ‘callows’ or their associated Annex I habitats; i.e. <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinia caerulea</i>) [6410]; Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [6510]; Limestone pavements* [8240]; Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnus incanae, Salix albae)* [91E0], the proximity and the presence of hydrological connectivity between proposed activities and this European Site means possible pathways for effects are identified.</p> <p>2: Screened In - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA</p> <p>Due to proximity and the presence of hydrological connectivity between proposed activities and this European Site possible pathways for effects are identified.</p> <p>3: Screened In - Possibility for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>Due to the proximity and the presence of hydrological connectivity between proposed activities and this European Site, possible pathways for localised effects on (ex-situ) Otter (a species of Qualifying Interest for this European Site) are identified, which cannot be screened out in the absence of measures to avoid harmful effects.</p> <p>4: Screened In - Possibility for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>Due to the presence of hydrological connectivity and proximity between the proposed activities and this European Site, possible pathways for localised effects on (ex-situ) mortality to species of Qualifying Interest (i.e. otter) are identified, which cannot be screened out in the absence of measures to avoid harmful effects such as accidental or inadvertent mortality when carrying out certain works e.g. cleaning of silt ponds.</p>

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the twelve SAC Sites:</p> <p>1. Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>2. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site;</p> <p>2. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest.</p> <p>3. Indirect or ex-situ mortality of Qualifying Interests</p>
2	Mongan Bog SAC (000580)	4.3km south/south-west of Bunahinly-Kilgarvan at its closest point.	N: No, located upstream of the proposed works.	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>The proposed works located 4.3km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ disturbance effects in this regard.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 4.3km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ effects in this regard.</p>
3	Fin Lough SAC (000576)	6.1km south/south-west of Bunahinly-Kilgarvan at its closest point.	N: No, located upstream of the proposed works.	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out – Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p>

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the twelve SAC Sites: <ol style="list-style-type: none"> 1. Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC 2. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site; 2. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest. 3. Indirect or ex-situ mortality of Qualifying Interests
				<p>Due to the separation distance to this SAC, possible pathways for disturbance or displacement effects to associated QI species can be excluded. Furthermore, the QI species for this habitats is Geyer's Whorl Snail <i>Vertigo geyeri</i>, a molluscan species with highly specified habitat requirements (alkaline fens and tufa formations), none of which are present within the proposed works areas.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located are 6.1km from this European Site. The QI species for this habitats is Geyer's Whorl Snail <i>Vertigo geyeri</i>, a molluscan species with highly specified habitat requirements (alkaline fens and tufa formations), none of which are present within the proposed works areas.</p>
4	Pilgrim's Road Esker SAC (001776)	3.9km south/south-west of Bunahinly-Kilgarvan at its closest point.	N: No, located upstream of the proposed works.	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>The proposed works located 3.9km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ disturbance effects in this regard.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 3.9km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ effects in this regard.</p>

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the twelve SAC Sites:</p> <p>1. Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>2. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site;</p> <p>2. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest.</p> <p>3. Indirect or ex-situ mortality of Qualifying Interests</p>
5	Moyclare Bog SAC (000581)	9.8km south of Bunahinly-Kilgarvan Bog at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>The proposed works located 9.8km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ disturbance effects in this regard.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 9.8km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ effects in this regard.</p>
6	Ferbane Bog SAC (000575)	9.2km south/south-east of Bunahinly-Kilgarvan Bog at its	N: No hydrological connectivity between the proposed bog rehabilitation	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p>

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the twelve SAC Sites:</p> <p>1. Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>2. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site;</p> <p>2. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest.</p> <p>3. Indirect or ex-situ mortality of Qualifying Interests</p>
		closest point..	site and this European Site.	<p>The proposed works located 9.2km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ disturbance effects in this regard.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 9.2km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ effects in this regard.</p>
7	Crosswood Bog SAC (002337)	1.1km east/north-east of Bunahinly-Kilgarvan Bog at its closest point..	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>The proposed works located 1.1km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ disturbance effects in this regard.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 1.1km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ effects in this regard.</p>
8	Carn Park Bog SAC (002336)	4.2km east/north-east of Bunahinly-	N: No hydrological connectivity between the	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p>

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the twelve SAC Sites:</p> <p>1. Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>2. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site;</p> <p>2. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest.</p> <p>3. Indirect or ex-situ mortality of Qualifying Interests</p>
		Kilgarvan Bog at its closest point.	proposed bog rehabilitation site and this European Site.	<p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>The proposed works located 4.2km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ disturbance effects in this regard.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 4.2km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ effects in this regard.</p>
9	Ballynamona Bog and Corkip Lough SAC (002339)	11.3km north/north-west of Bunahinly-Kilgarvan Bog at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>The proposed works located 11.3km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ disturbance effects in this regard.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 11.3km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ effects in this regard.</p>

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the twelve SAC Sites:</p> <p>1. Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>2. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site;</p> <p>2. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest.</p> <p>3. Indirect or ex-situ mortality of Qualifying Interests</p>
10	Castlesampson Esker SAC (001625)	8.8km north-west of Bunahinly-Kilgarvan Bog at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>The proposed works located 8.8km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ disturbance effects in this regard.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 8.8km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ effects in this regard.</p>
11	Lough Funshinagh SAC (000611)	14.8km north-west of Bunahinly-Kilgarvan Bog at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>The proposed works located 14.8km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ disturbance effects in this regard.</p>

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the twelve SAC Sites:</p> <p>1. Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>2. Indirect loss or degradation of terrestrial or aquatic habitats within the SAC site;</p> <p>2. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest.</p> <p>3. Indirect or ex-situ mortality of Qualifying Interests</p>
				<p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 14.8km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect or ex-situ effects in this regard.</p>
12	Lough Ree SAC (000440)	3.8km north/north-west of Bunahinly-Kilgarvan at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.	<p>1: Screened Out – No likelihood for direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC</p> <p>The proposed works are not located within or in proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SAC</p> <p>Due to the separation distance to this SAC and the lack of hydrological connectivity, possible pathways for indirect loss, reduction or degradation of terrestrial / aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests</p> <p>The proposed works located 3.8km from this European Site. Disturbance or displacement of QI species associated with Lough Ree SAC will not occur due to the separation distance between Bunahinly-Kilgarvan Bog and this European Site.</p> <p>4: Screened Out - No potential for indirect or ex-situ mortality to species of Qualifying Interests</p> <p>The proposed works located 3.8km from this European Site. Indirect or ex-situ mortality of QI species associated with Lough Ree SAC (Otter) will not occur due to the separation distance between Bunahinly-Kilgarvan Bog and this European Site.</p>

Table 12: Evaluation of Possibly Significant Effects to the four SPA sites

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the four SPA Sites:</p> <p>1. Direct Impacts to Habitats within SPAs (i.e. disturbance, displacement, mortality)</p> <p>2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site; (i.e. through habitat loss, degradation, fragmentation or reduction/loss of connectivity of suitable habitat, or through a reduction in prey item species)</p> <p>3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest (i.e. through disturbance, displacement or mortality of SCI species).</p>
1	Middle Shannon Callows SPA (004096)	The south-western corner of Kilgarvan Bog overlaps this European Site	Yes: Downstream via the Ballydangan_020 and Shannon (Upper)_120 and Shannon (Upper)_130 watercourses.	<p>1: Screened In - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA</p> <p>Notwithstanding the fact that habitats where this SPA overlaps Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation activities do not comprise 'callows', the overlap, proximity and the presence of hydrological connectivity between proposed activities and this European Site means possible pathways for direct effects are identified.</p> <p>2: Screened In - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA</p> <p>Due to proximity and the presence of hydrological connectivity between proposed activities and this European Site possible pathways for effects are identified.</p> <p>3: Screened In - Possibility for indirect or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest</p> <p>Bird species of Special Conservation Interests for the most proximal SPA, the Middle Shannon Callows SPA include (wintering): Whooper Swan (<i>Cygnus cygnus</i>) [A038]; Wigeon (<i>Anas penelope</i>) [A050]; Corncrake (<i>Crex crex</i>) [A122]; Golden Plover (<i>Pluvialis apricaria</i>) [A140]; Lapwing (<i>Vanellus vanellus</i>) [A142]; Black-tailed Godwit (<i>Limosa limosa</i>) [A156] and Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179]; Wetland and Waterbirds [A999].</p> <p>Due to proximity, it is considered that it cannot be ruled out that migratory (in transit) or wintering individuals of the SCI Species may be attracted to wetland habitats (primarily silt ponds on site) at and adjoining Bunahinly-Kilgarvan Bog, and hence be subject to possible disturbance events, dependant on timing. Screening in is on a precautionary basis, in line with the precautionary principle. SCI Species including Corncrake and Black-tailed Godwit are unlikely to utilise the Bunahinly-Kilgarvan Bog site or its environs and therefore are unlikely to be subject to disturbance or displacement effects as a result of the proposed rehabilitation practices</p>

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the four SPA Sites:</p> <p>1. Direct Impacts to Habitats within SPAs (i.e. disturbance, displacement, mortality)</p> <p>2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site; (i.e. through habitat loss, degradation, fragmentation or reduction/loss of connectivity of suitable habitat, or through a reduction in prey item species)</p> <p>3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest (i.e. through disturbance, displacement or mortality of SCI species).</p>
2	Mongan Bog SPA (004017)	4.6km south/south-west of Bunahinly-Kilgarvan at its closest point.	N: No hydrological connectivity between the proposed bog rehabilitation site and this European Site.	<p>1. Screened Out - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within the SPA</p> <p>Due to the separation distance to this SPA, possible pathways for direct effects can be excluded.</p> <p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA</p> <p>Due to the separation distance to this SPA, possible pathways for indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded. There is no hydrological connectivity between Bunahinly-Kilgarvan and Mongan Bog SPA.</p> <p>3: Screened In - Possibility for indirect or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest</p> <p>Mongan SPA is located 4.6km south/south-west of Bunahinly-Kilgarvan Bog. In accordance with Scottish Natural Heritage (SNH) Guidance¹⁴ on assessing connectivity with SPA sites, the proposed rehabilitation works at Bunahinly-Kilgarvan are considered to be within of the core winter foraging range (5-8km) for the SCI species of Mongan Bog SPA; i.e. Greenland White-fronted Goose. Due to the site's proximity with foraging range of the associated SCI species, it cannot be ruled out that migratory (in transit) or wintering individuals of the SCI Species may be attracted to wetland habitats at and adjoining Bunahinly-Kilgarvan Bog, and hence be subject to possible disturbance events, dependant on timing of the rehabilitation and decommissioning works. Screening in is on a precautionary basis, in line with the precautionary principle.</p>
3	Lough Ree SPA (004064)	3.8km north/north-west of	N: No hydrological connectivity	<p>1. Screened Out - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within the SPA</p> <p>Due to the separation distance to this SPA, possible pathways for direct effects can be excluded.</p>

¹⁴ Scottish Natural Heritage (2016) Assessing Connectivity with Special Protection Areas (SPAs) Guidance/

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the four SPA Sites:</p> <p>1. Direct Impacts to Habitats within SPAs (i.e. disturbance, displacement, mortality)</p> <p>2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site; (i.e. through habitat loss, degradation, fragmentation or reduction/loss of connectivity of suitable habitat, or through a reduction in prey item species)</p> <p>3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest (i.e. through disturbance, displacement or mortality of SCI species).</p>
		Bunahinly-Kilgarvan at its closest point.	between the proposed bog rehabilitation site and this European Site.	<p>2: Screened Out - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA</p> <p>Due to the separation distance to this SPA, possible pathways for indirect loss, reduction or degradation of terrestrial habitats within or in close proximity to Bunahinly-Kilgarvan Bog can be excluded.</p> <p>3: Screened In - Possibility for indirect or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest</p> <p>Lough Ree SPA is located 3.8km north/north-west of Bunahinly-Kilgarvan Bog. In accordance with Scottish Natural Heritage (SNH) Guidance¹⁵ on assessing connectivity with SPA sites, the proposed rehabilitation works at Bunahinly-Kilgarvan are considered to be within of the core winter foraging range (5km) for some SCI species of Lough Ree SPA; i.e. Whooper Swan. Due to the site's proximity with foraging range for some SCI species, it cannot be ruled out that migratory (in transit) or wintering individuals of the SCI Species may be attracted to wetland habitats at and adjoining Bunahinly-Kilgarvan Bog, and hence be subject to possible disturbance events, dependant on timing of the rehabilitation and decommissioning works. Screening in is on a precautionary basis, in line with the precautionary principle.</p>
4	River Suck Callows SPA (004097)	13.9km south-west of Bunahinly-Kilgarvan at its closest point.	Yes: Remote downstream connectivity via the River	<p>1: Screened Out - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within the SPA</p> <p>The proposed bog rehabilitation works are not located within the bounds of a SPA. Due to the separation distance to this SPA, possible pathways for direct effects can be excluded.</p> <p>2: Screened In - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within, or in close proximity to, the SPA</p>

¹⁵ Scottish Natural Heritage (2016) Assessing Connectivity with Special Protection Areas (SPAs) Guidance/

	European Site	Separation Distance from Bunahinly-Kilgarvan Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Bunahinly-Kilgarvan Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the four SPA Sites:</p> <p>1. Direct Impacts to Habitats within SPAs (i.e. disturbance, displacement, mortality)</p> <p>2. Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site; (i.e. through habitat loss, degradation, fragmentation or reduction/loss of connectivity of suitable habitat, or through a reduction in prey item species)</p> <p>3. Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest (i.e. through disturbance, displacement or mortality of SCI species).</p>
			Shannon main channel	<p>Due to proximity and the presence of potential downstream hydrological connectivity (via floodwaters) between proposed activities and this European Site possible pathways for effects are identified.</p> <p>3: Screened Out - Possibility for indirect or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest</p> <p>Due to the separation distance to this SPA, possible pathways for disturbance or displacement effects to SCI species of Ballykenney/Fisherstown Bog SPA can be excluded. River Suck Callows SPA is located 13.9km south-west of Bunahinly-Kilgarvan Bog. The SCI species for which this European Site is designated include Whooper Swan, Lapwing, Wigeon, Golden Plover and Greenland White-fronted Goose. In accordance with Scottish Natural Heritage (SNH) Guidance on assessing connectivity with SPA sites, Bunahinly-Kilgarvan Bog is located outside of the core foraging distances for these species. Therefore, there is no risk of the SCI species flocks for the River Suck Callows SPA utilising Bunahinly-Kilgarvan Bog as a core foraging area. Therefore, there will be no risk of significant ex-situ disturbance or displacement effects of SCI species to River Suck Callows SPA as a result of the proposed bog rehabilitation works.</p>

2.11 Screening for Appropriate Assessment: Conclusion Statement

The Screening Evaluation provided herein has examined the potential for any effects arising via source pathway linkages with regard to connectivity to designated European Sites (SACs and SPAs) within the zone of influence of all predicted Project impacts. An extended buffer zone of 15km was further considered, in line with NPWS guidance (DoEHLG, 2009), for evaluation of effects on any European Site which may arise associated with the proposed decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog, as required. There is a total of 16 European sites located within the 15km zone of consideration:

1. River Shannon Callows SAC (000216)
2. Mongan Bog SAC (000580)
3. Fin Lough SAC (000576)
4. Pilgrim's Road Esker SAC (001776)
5. Moyclare Bog SAC (000581)
6. Ferbane Bog SAC (000575)
7. Crosswood Bog SAC (002337)
8. Carn Park Bog SAC (002336)
9. Ballynamona Bog and Corkip Lough SAC (002339)
10. Castlesampson Esker SAC (001625)
11. Lough Funshinagh SAC (000611)
12. Lough Ree SAC (000440)
13. Middle Shannon Callows SPA (004096)
14. Mongan Bog SPA (004017)
15. Lough Ree SPA (004064)
16. River Suck Callows SPA (004097)

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

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

- River Shannon Callows SAC (Site Code: 000216)
- Middle Shannon Callows SPA (Site Code: 004096)
- Mongan Bog SPA (Site Code: 004017)
- Lough Ree SPA (004064)
- River Suck Callows SPA (Site Code: 004097)

A Stage 2 Appropriate Assessment Report follows in respect of these five European Sites.

3 STAGE 2: APPROPRIATE ASSESSMENT

3.1 Introduction to Stage 2

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

- River Shannon Callows SAC (Site Code: 000216);
- Middle Shannon Callows SPA (Site Code: 004096);
- Mongan Bog SPA (Site Code: 004017);
- Lough Ree SPA (004064); and
- River Suck Callows SPA (Site Code: 004097).

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

An overview of Bunahinly-Kilgarvan Bog proposed Decommissioning and Rehabilitation is provided in **Section 2.2** and see also the document included as **Appendix B** of this report. Site synopsis of European Sites considered as part of this Natura Impact Statement are presented in **Appendix C**.

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

3.1.1.1 River Shannon Callows SAC (Site Code 000216)

The site-specific conservation objectives of the River Shannon Callows SAC aim to define favourable conservation condition for the particular habitat or species at that site. These objectives and conditions are considered in **Table 13** below in respect of the Qualifying Interests of River Shannon Callows SAC which were screened in for further evaluation. Further consideration is provided in **Table 13** to each Qualifying Interest and the potential for the proposed project to support connectivity and potentially impact this feature of Qualifying Interest.

The conservation objectives of River Shannon Callows SAC are available in full on the National Parks & Wildlife Service website at <https://www.npws.ie/protected-sites>.

The conservation objectives reproduced in the table below were sourced from NPWS (2021) Conservation objectives for River Shannon Callows SAC [000216]. Generic Version 8.0. Department of Housing, Local Government and Heritage - Version Date 18/01/2022¹⁶. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage and should be read in conjunction with any other supporting documentation on the referenced website as provided above.

¹⁶ https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000216.pdf

Table 13: Conservation Objectives of the River Shannon Callows SAC (Site Code 000216)

Code and Qualifying Interest	Current Article 17 Reporting Status (2019 ¹⁷)	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinia caerulea</i>) (6410)	Overall trend in conservation status deteriorating.	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	None of these Annex I habitats are present within the Bunahinly-Kilgarvan Bog site. However, these Annex I habitats are potentially located in downstream sections of the River Shannon Callows SAC, especially within and along the floodplain areas of the River Shannon main channel. The proposed rehabilitation works support potential connectivity to the River Shannon and the River Shannon Callows SAC via receiving watercourses within the and adjoining the study area; i.e the Shannon (Upper)_120 watercourse (Cloonbonny & Boor watercourses). Therefore, there is a potential source-pathway-receptor link between the proposed rehabilitation works and these habitats of Qualifying Interest for the River Shannon Callows SAC.
Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>) (6510)	Overall trend in conservation status deteriorating.	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	
Alkaline fens (7230)	Overall trend in conservation status deteriorating.	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	
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, <i>Alnus incana</i> , <i>Salix alba</i>)* (91E0)	Overall trend in conservation status deteriorating.	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	

¹⁷ NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

Code and Qualifying Interest	Current Article 17 Reporting Status (2019 ¹⁷)	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
Otter (<i>Lutra lutra</i>) (1355)	Overall trend in conservation status improving.	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	No evidence of otter activity was noted during the January 2022 site walkover survey. However, otter may potentially utilise internal and adjoining drainage network, watercourses and wetlands. Therefore, there is a potential source-pathway-receptor link between the proposed rehabilitation works and these habitats of Qualifying Interest for the River Shannon Callows SAC.
Limestone pavements* (8240)	Overall trend in conservation status stable.	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	Limestone pavements are not water dependent or nutrient sensitive habitats and therefore the potential hydrological connectivity between the rehabilitation works and this Annex I habitat will not contribute to significant negative effects. Therefore, the proposed works will not impact or contribute to significant negative / potentially adverse effects to this Annex I habitat.

3.1.1.2 Middle Shannon Callows SPA (Site Code: 004096)

The Middle Shannon Callows SPA is designated in respect of the following Special Conservation Interests:

- Whooper Swan (*Cygnus cygnus*) [A038]
- Wigeon (*Anas penelope*) [A050]
- Corncrake (*Crex crex*) [A122]
- Golden Plover (*Pluvialis apricaria*) [A140]
- Lapwing (*Vanellus vanellus*) [A142]
- Black-tailed Godwit (*Limosa limosa*) [A156]
- Black-headed Gull (*Chroicocephalus ridibundus*) [A179]
- Wetland and Waterbirds [A999]

Corncrake (*Crex crex*) [A122]

Regarding Corncrake, no breeding has occurred by this species within the Middle Shannon Callows and the former breeding population within the SPA is now considered extinct. In 2002, 2003, 2006, 2007, 2008 and 2012 heavy rainfall led to flooding events during the Corncrake breeding season. This contributed to an acute level of breeding failure, and led to severe declines in Corncrake numbers; from 23 in 2005 to just one in 2011 and 2012. While 2013 saw an increase in the number of calling males to 2 (during the census period), just one calling male was recorded in 2014 and finally in 2015, for the first time no Corncrake was heard on the Shannon Callows¹⁸. The year 2018, was the fourth consecutive year in which no birds were recorded in the Shannon Callows¹⁹. Given the remaining population is focused heavily in two core areas of Donegal and West Connacht, with migration flyways to these likely to be coastal in nature (A. Copland personal communication) it is considered that pathways for effects to this species from any proposed activities at **Bunahinly-Kilgarvan Bog** can reasonably be excluded.

Whooper Swan (*Cygnus cygnus*) [A038]

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

Results of the Irish Wetland Bird Survey (IWeBS²⁰) for the winter period 2009/10 – 2015/16 report a population size (ROI) of 11,852 individuals (from Crowe *et al.*, 2015), of which 4,052 were associated with the SPA network. The peak (2011-2015) population associated with the Shannon Callows was 305 birds. The 2015 swan census recorded a peak of 465 individuals for the River Shannon.

¹⁸ NPWS (2015) A framework for Corncrake Conservation to 2022. National Parks and Wildlife Service, Department of Arts, Heritage & the Gaeltacht. Available online at: <https://www.npws.ie/sites/default/files/publications/pdf/A%20Framework%20for%20Corncrake%20Conservation%20to%202022%20%28Nov2015%29.pdf>

¹⁹ Duffy, M. (2018) The Corncrake Conservation Project Annual Report. 2018. Available online at: <https://www.npws.ie/sites/default/files/general/corncrake-report-2018.pdf>

²⁰ Lewis *et al.* (2019). Irish Wetland Bird Survey: Waterbird Status and Distribution 2009/10-2015/16. Irish Wildlife Manuals, No. 106. National Parks and Wildlife Service, Department of culture, Heritage and the Gaeltacht, Ireland.

Regarding connectivity to Bunahinly-Kilgarvan and potential linkage between the River Suck and the Shannon Callows, Scottish Natural Heritage (SNH)²¹ recommends a core range of 5km from night-time roosts be assumed in respect of foraging Whooper Swan during the winter months when establishing connectivity between a proposed wind farm development and nearby SPA's. However, it is also accepted that the distribution of the Whooper Swan population wintering in Ireland may change over the winter months, possibly due to birds dispersing southwards (as the winter progresses) from their original arrival grounds²².

Suitable habitat (improved grazing fields) for Whooper Swan does occur in the vicinity of the Bunahinly-Kilgarvan Bog, subject to flood levels. Outside of the River Shannon and its associated floodplain, pastoral fields comprise a small patchwork interspersed with areas of degraded bog and poor draining land contributing less than optimal grazing / foraging grounds. Whooper Swan were not identified roosting or foraging within **Bunahinly-Kilgarvan Bog** during the January 2022 site walkover survey, however the nearby areas of the River Shannon Callows support Whooper Swan for foraging and roosting. However, Whooper Swan may overfly the **Bunahinly-Kilgarvan Bog** site when travelling to and from the Shannon Callows and can feed on suitable habitat within proximity of the Bunahinly-Kilgarvan site. The proposed decommissioning and rehabilitation works are located within the Minimum Approach Distance (MAD) for suitable Whooper Swan foraging habitat (123.2m) within areas of river floodplain, west of Bunahinly Bog and west / south-west of Kilgarvan bog's southern boundary. However, the proposed rehabilitation works in these areas will be partially screened by treelines and young birch woodland located along the bog boundary. It is also considered that works in these areas will be temporary and are likely to be completed outside of the over-wintering bird season. Any potential impacts associated with works within the MAD for Whooper Swan will be small scale and temporary and of low magnitude. Therefore, Whooper Swan associated with the Middle Shannon Callows SPA are excluded from potential adverse effects from the proposed decommissioning and rehabilitation works.

Wigeon (*Anas penelope*) [A050]

The latest Article 12 reporting data available from NPWS in respect of Wigeon relates to the period 2006-2011. The wintering population size for this period, based on a five-year mean was 56,350 of which 43,746 occurred within the SPA network. Trends, both short term (1999-2011) and long-term (1987-2011) were all negative and decreasing. The main pressures and threats comprise *outdoor sports and leisure activities, recreational activities, renewable abiotic energy use, marine and freshwater aquaculture, hunting and collection of wild animals* (terrestrial), *pollution to surface waters, marine water pollution, other forms of pollution, invasive non-native species, human induced changes in hydraulic conditions and other ecosystem modifications*.

Results of the Irish Wetland Bird Survey (IWeBS) for the winter period 2009/10 – 2015/16 report a population size (ROI) of 50,452 individuals of which 38,514 were associated with the SPA network, and describes long term declines in the wintering population of Wigeon in Ireland. The peak count in the period 2011-15 for the Shannon Callows was 1,351; whilst for the River Suck in the same period, the peak count was 3385.

No species-specific guidance is available with which to establish connectivity distances to SPA's, however, a foraging distance of up to 16km is stated in Cramp 1977-1993. Wigeon are almost entirely vegetarian feeding on mainly leaves, stems, stolons, bulbils and rhizomes of plants. Wigeon were not identified foraging within the **Bunahinly-Kilgarvan Bog** during January 2022 site walkover survey. Suitable foraging and roosting habitat occurs within the silt pond habitats at Bunahinly-Kilgarvan and on those areas of floodplain areas adjacent to

²¹<https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf>

²² Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A. Sutherland, G.M. & Baillie, S.R. (eds). 2002. *The Migration Atlas; movements of the birds of Britain and Ireland*. T. & A.D. Poyser, London.

Bunahinly-Kilgarvan Bog along the River Shannon. In line with a precautionary approach, potential connectivity to this SCI of the Middle Shannon Callows is assumed.

Golden Plover (*Pluvialis apricaria*) [A140]

The latest Article 12 reporting data available from NPWS in respect of Golden Plover relates to the period 2006-2011. The wintering population size for this period, based on a five-year mean was conservatively 99,870 individuals of which 81,907 occurred within the SPA network. Trends in the short term (1999-2011) were negative in quality and decreasing, however over the long-term (1987-2011) unknown. The main pressures and threats comprise *renewable abiotic energy use, modification of cultivation practices, marine and freshwater aquaculture, outdoor sports and leisure activities, recreational activities, and marine water pollution*.

Results of the Irish Wetland Bird Survey (IWeBS) for the winter period 2009/10 – 2015/16 report a population size (ROI) of 80,707 individuals of which 63,123 were associated with the SPA network, and describes long term declines in the wintering population of Golden Plover in Ireland, possibly due to short-stopping. The peak count in the period 2011-15 for the Shannon Callows was 7,610; no count data has been published for the River Suck in the same period – however a peak of 600 is noted for the River Suck for the period 1994/95 – 2000/01 (Crowe, 2005).

Golden Plover feed on a variety of soil and surface-living invertebrates, principally beetles and earthworms, but also plant material such as berries, seeds and grasses, and in winter are known to be attracted to mown grass or close-grazed pastures, stubbles, fallows, harvest-fields and other farmlands of open character, including flood lands (Cramp 1977-1993). Golden Plover will utilise cutaway bog for diurnal roosting. Suitable habitat is available for this species along the River Shannon adjacent to **Bunahinly-Kilgarvan Bog** (foraging and roosting), and within the bog boundary (for roosting only). Golden Plover were not identified at **Bunahinly-Kilgarvan Bog** during the January 2022 site walkover survey.

No species-specific guidance is available with which to establish connectivity distances to wintering bird-based SPA's, however, a foraging range of up to 11km is cited in respect of breeding season foraging, and it is also known that cold weather can result in movements of Golden Plover during the winter. In line with a precautionary approach potential connectivity is assumed between **Bunahinly-Kilgarvan Bog** and the SPA's identified for which this species is a Special Conservation Interest or SCI; i.e. Middle Shannon Callows SPA and the River Suck Callows SPA.

Lapwing (*Vanellus vanellus*) [A142]

The latest Article 12 reporting data available from NPWS in respect of Lapwing relates to the period 2006-2011. The wintering population size for this period, based on a five-year mean was 88,580 individuals of which 69,488 occurred within the SPA network. Trends in the short term (1999-2011) and long-term (1987-2011) were negative in quality and decreasing. The main pressures and threats comprise *renewable abiotic energy use, modification of cultivation practices, marine and freshwater aquaculture, outdoor sports and leisure activities, recreational activities, and marine water pollution*.

Results of the Irish Wetland Bird Survey (IWeBS) for the winter period 2009/10 – 2015/16 report a population size (ROI) of 69,823 individuals of which 48,232 were associated with the SPA network, and describes long term declines in the wintering population of Lapwing in Ireland. The peak count in the period 2011-15 for the Shannon Callows was 7,672; for the River Suck in the same period – a peak of 1400 is noted however the Suck is classified as no longer supporting numbers of National Importance.

Lapwing feed on chiefly small invertebrates, which live on or in the ground. During the winter, they utilise habitats such as arable fields and pastures in addition to coastal and estuarine habitats. Suitable habitat is

available for this species along the River Shannon and its associated floodplain adjacent to **Bunahinly-Kilgarvan**. No species-specific guidance is available with which to establish connectivity distances to wintering bird-based SPA's, however, it is also known that cold weather can result in movements of Lapwing during the winter. In line with a precautionary approach potential connectivity is assumed between **Bunahinly-Kilgarvan Bog** and the SPA's identified for which this species is a Special Conservation Interest or SCI; i.e. Middle Shannon Callows SPA and the River Suck Callows SPA.

Black-tailed Godwit (*Limosa limosa*) [A156]

The latest Article 12 reporting data available from NPWS in respect of Black-tailed Godwit relates to the period 2006-2011. The wintering population size for this period, based on a five-year mean was 18,080 individuals of which 16,752 occurred within the SPA network. Trends in the short term (1999-2011) and long-term (1987-2011) were positive in quality and increasing. The main pressures and threats comprise marine and freshwater aquaculture, *renewable abiotic energy use, fishing and harvesting aquatic resources, modification of cultivation practices, outdoor sports and leisure activities, recreational activities, human induced changes in hydraulic conditions and marine water pollution*.

Results of the Irish Wetland Bird Survey (IWeBS) for the winter period 2009/10 – 2015/16 report a population size (ROI) of 17,862 individuals of which 16,575 were associated with the SPA network, and describes a sustained population increase and range expansion over the last century in Ireland. The peak count in the period 2011-15 for the Shannon Callows was 220; no count data has been published for the River Suck in the same period – however a peak of 2 is noted for the River Suck for the period 1994/95 – 2000/01 (Crowe, 2005). The Site Synopses for the River Suck SPA cites a figure of 24 as recorded within said SPA. Black-tailed Godwit were not observed using the Bunahinly-Kilgarvan Bog site during the January 2022 walkover survey.

In Ireland, Black-tailed Godwits are known to undertake movements during the winter between sites to feed on freshwater grassland, for example the Blackwater Callows, which is 25km inland from surrounding SPA's such as at Cork Harbour, Ballymacoda and Dungarvan has supported birds which also utilised the aforementioned nearby coastal complexes²³. The proposed decommissioning and rehabilitation works are located within the Minimum Approach Distance (MAD) for suitable Black-tailed Godwit foraging habitat (42m) within areas of river floodplain, west of Bunahinly Bog and west / south-west of Kilgarvan bog's southern boundary. However, the proposed rehabilitation works in these areas will be partially screened by treelines and young birch woodland located along the bog boundary. It is also considered that works in these areas will be temporary and are likely to be completed outside of the over-wintering bird season. Any potential impacts associated with works within the MAD for Black-tailed Godwit will be small scale and temporary and of low magnitude. Therefore, Black-tailed Godwit associated with the Middle Shannon Callows SPA are excluded from potential adverse effects from the proposed decommissioning and rehabilitation works.

Black-headed Gull (*Chroicocephalus ridibundus*) [A179]

Black-headed Gull is a SCI species for the middle Shannon Callows SPA in respect of wintering birds. The latest Article 12 reporting data available from NPWS in respect of Black-headed Gull relates to the period 2006-2011. The wintering population size for this period, based on a five-year mean was 50181 individuals of which 39252 occurred within the SPA network. Trends in the short term (1999-2011) and long-term (1987-2011) were unknown. The main pressures and threats comprise marine and freshwater aquaculture, *Marine water pollution, fishing and harvesting aquatic resources, renewable abiotic energy use, and other ecosystem*

²³ Hayhow, D.B. (2009). *Consequences of winter habitat use in a migratory shorebird. Thesis submitted for the degree of Doctor of Philosophy at the University of East Anglia, Norwich, 2009*. Available at: https://ueaeprints.uea.ac.uk/id/eprint/10607/1/Thesis_hayhow_d_2009.pdf

modifications. The North & West European Population is thought to be stable or declining (Wetlands International, 2018).

Results of the Irish Wetland Bird Survey (IWeBS) for the winter period 2009/10 – 2015/16 are limited in respect of this species insofar as counting of Black-headed Gulls is optional, and no recent counts are available for the Middle Shannon Callows or the River Suck. Crowe, 2015 describes a peak count of 1284 for the Shannon Callows in the period 1994/95 – 2000/01; for the same period the peak count for the River Suck is 240.

Habitats utilised by this species during the winter months include inland, moist grasslands, where food such as insects and earthworms can be collected. Suitable habitat is present west of Bunahinly-Kilgarvan Bog in the form of grazed, callows grassland. Black-headed Gull were identified using the nearby callows lands west of the Bunahinly-Kilgarvan bog in January 2022.

No species-specific guidance is available with which to establish connectivity distances to wintering bird-based SPA's, however, the species has been described as developing seasonal patterns of movements between foraging areas and secure roosts 'many km' distant; and recorded travelling up to 25-30km to a nocturnal, wintertime, roost (Cramp 1977-1993). On this basis, and in line with the natural connectivity via a hydrological corridor, it is considered that's individuals which may occur at **Bunahinly-Kilgarvan Bog** or its environs cannot reasonably be excluded from occurrence within the Middle Shannon Callows SPA. In line with a precautionary approach potential connectivity is assumed between **Bunahinly-Kilgarvan Bog** and the SPA's identified for which this species is a Special Conservation Interest or SCI.

Wetland and Waterbirds [A999]

The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the wetland area contained in the SPA and the waterbirds that utilize this resource are of Special Conservation Interest for 'Wetland & Waterbirds'. In addition to the Special Conservation Interests described above, the Site Synopsis for the Middle Shannon Callows SPA describes a wide range of species as utilizing the site, including Mute Swan, Teal, Tufted Duck, Dunlin, Curlew and Redshank. The callow grasslands present in the SPA provide optimum feeding grounds for these various species of waterfowl, while many of the birds also roost or rest within the (European) site. Other wetland bird species, such as Snipe, Moorhen and Grey Heron utilise or are likely to utilise the Bunahinly-Kilgarvan Bog site, particularly, drainage channels, silt ponds and watercourses.

Wetland habitats do occur outside of the peat extraction areas and adjacent to the River Shannon, and as they occur within the Middle Shannon Callows SPA (also designated for wetland and waterbirds), are assumed to be attractive to a similar assemblage of waterbirds. Mute Swan, Teal, and Curlew are also described in the Site Synopsis for the River Suck Callows SPA for example.

It is assumed that due to connectivity from the individual species described above, potential connectivity between **Bunahinly-Kilgarvan Bog** and the Middle Shannon Callows exists in respect of the 'waterbirds' element of this SCI.

3.1.1.3 River Suck Callows SPA (Site Code 004097)

The River Suck Callows SPA is designated in respect of wintering:

- Whooper Swan (*Cygnus cygnus*) [A038]
- Wigeon (*Anas penelope*) [A050]
- Golden Plover (*Pluvialis apricaria*) [A140]
- Lapwing (*Vanellus vanellus*) [A142]
- Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]
- Wetland and Waterbirds [A999]

Whooper Swan, Wigeon, Golden Plover and Lapwing have already been described. As Bunahinly-Kilgarvan Bog supports remote hydrological connectivity to the River Suck Callows SPA, connectivity between proposed activities and the River Suck SPA in respect of these SCI species is assumed.

Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]

The River Suck Callows SPA is an important site for wintering waterfowl. Of particular note is the nationally important Greenland White-fronted Goose flock (293 – five year mean peak for the period 1994/95 to 1998/99) which congregates mainly in the middle reaches of the river (from Site Synopses).

The latest Article 12 reporting data available from NPWS in respect of (wintering) Greenland White-fronted Geese relates to the period 2012. The wintering population size for this period, based on a complete count was 12173 individuals of which up to 12,140 occurred within the SPA network.

Trends in the short term (1999-2011) are considered to be negative and decreasing; in the long-term (1987-2011) numbers in 2012 represented an increase on those present in 1983. The main pressures and threats are; *changes in biotic conditions, modification of cultivation practices, annual and perennial non-timber crops, renewable abiotic energy use, utility and service lines, improved access to site, marine and freshwater aquaculture, Outdoor sports and leisure activities, recreational activities, hunting and collection of wild animals (terrestrial), Marine water pollution, grazing, agriculture activities not referred to above, forest planting on open ground, interspecific faunal relations, changes in abiotic conditions and other forms of pollution.*

Results of the Irish Wetland Bird Survey (IWeBS) for the winter period 2009/10 – 2015/16 report a current (winter 2017/18) population size (ROI) of 9,500 individuals of which 9,346-9,428 were associated with the SPA network. The report describes acute declines in numbers both nationally and internationally since 1999. The overall population decline in recent years has been attributed to chronic low breeding productivity, which has been particularly evident in the Irish Flocks (Fox et al., 2018, cited in Lewis et al., 2019). IWeBS counts for the period 2009/10-2015/16 recorded Geese at 33 sites included the River Suck which was surveyed aerially, however the mean peak for the River Suck across the period was below the threshold for significance at a National Level (100).

In the winter period 2018/19, the Spring population census (2019) recorded 7,436 birds wintering in Wexford and 1,899 in the rest of Ireland, total 9,335²⁴. Numbers at the River Suck (closest quoted section on the Shannon catchment) on this census were relatively unchanged (109 birds recorded). Lough Croan and Four Roads Turlough are the two main sites for the River Suck flock (around 130+ were present over the winter period 2019/20 – BWI, Personal communication to Bord na Móna). However, it is considered that movements up and down the Suck or to locations in closer proximity to Bunahinly-Kilgarvan Bog cannot be excluded. A record exists of 58 birds in the townland of Dalysgrove, located ca 24km north-west of Clooniff Bog²⁵.

Greenland White-fronted Geese are traditionally associated with peatlands, mires and raised bogs during the winter months, where favored food items such as Common Cotton Grass *Eriophorum angustifolium*, White beaked sedge *Rhynchospora alba* occur (Fox & Stroud, 2002). In Ireland, birds use both raised bogs and river flood plains or 'callows', where most feeding occurs on grasslands. Habitat loss and disturbance pressure are seen as restricting the range of flocks. Birds roost at night on bogs, flooded areas or near lakes, typically up to 100m from water, and occasionally roost in open fields. Feeding can take place at night. However, surveys and usage trends of Greenland White-fronted Goose flocks between Athlone to Shannonbridge and Ballinasloe to Shannonbridge over the past twenty-five years have noted the abandonment of the callows and the adjoining raised bog areas as regular feeding and foraging habitats. This is due to ongoing peat harvesting and turbary which removed important feeding and refuge sites between Athlone and Shannonbridge; flooding and development between Ballinasloe and Shannonbridge as well as various sources of disturbance in and near the

²⁴ Fox, T., Francis, I., Norriss, D., Walsh, A. (2019). Report of the 2018/2019 International Census of Greenland White-fronted Geese. Greenland White-Fronted Goose Study and National Parks and Wildlife Service. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Wexford Wildfowl Reserve, North Slob, Wexford, Ireland.

²⁵ Heery, S. (2018) Birds in Central Ireland. 6th mid Shannon Bird Report. 2012-2016. BirdWatch Ireland, Kilcoole, County Wicklow.

callows area. At present, potential usage of the Bunahinly-Kilgarvan site and its environs by Greenland White-fronted Geese results from overflying birds or temporary staging during seasonal migration.

In terms of establishing connectivity, SNH recommends that usage of suitable foraging habitats may occur up to 8km from known roosts. The River Suck Callows SPA are located 13.9km south-west of the Bunahinly-Kilgarvan Bog site. Therefore, Greenland White-fronted Geese flocks associated with the River Suck Callows SPA are unlikely to utilise the peatland or adjacent habitats associated with Bunahinly-Kilgarvan Bog with any regularity, with the exception of overflying birds of temporary staging. Therefore, Greenland White-fronted Geese associated with the River Suck Callows SPA are excluded from potential adverse effects from the proposed decommissioning and rehabilitation works.

Wetland and Waterbirds [A999]

The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the wetland area contained in the SPA and the waterbirds that utilize this resource are of special conservation interest for 'Wetland & Waterbirds'. In addition to the Special Conservation Interests described above, the Site Synopsis for the River Suck Callows SPA describes a wide range of species as utilizing the site, including Mute Swan, Teal, Mallard, Black-tailed Godwit, Curlew and Black-headed Gull.

It is assumed that due to connectivity from the individual species described above, connectivity exists between wetlands present in or near Bunahinly-Kilgarvan Bog in respect of 'Wetland and Waterbirds' as an SCI.

3.1.1.4 Mongan Bog SPA (Site Code: 004017)

The generic conservation objectives of Mongan Bog SPA are available in full on the National Parks & Wildlife Service website at https://npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004017.pdf. The Generic Conservation Objective for Mongan Bog SPA is as follows: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]

The site synopsis for Mongan Bog SPA describes recent and ongoing usage of the site by Greenland White-fronted Goose as follows:

"Mongan Bog is one of the raised bogs that was traditionally used as a feeding/roosting site by small numbers of the River Suck population of Greenland White-fronted Goose. These birds utilise the callows near the mouth of the Suck to Shannonbridge and as far as Clonmacnoise. The numbers of Greenland White-fronted Goose using this part of the range was always small (peak count of 26 in 1984/85) and geese have not been recorded using the site in recent years - the last record was 11 individuals in 1989/90"²⁶.

The suitability of the proposed decommissioning site and trends for Greenland White-fronted Geese within the Middle Shannon Callows SPA and River Suck Callows SPA has been described in **Section 3.1.1.3** above. At its closest point, Bunahinly-Kilgarvan Bog is located to within 5km of Mongan Bog SPA; i.e. within the core foraging range (8km) for this species. Although, the vast cutover bog habitats and adjoining marginal habitats are unsuitable to sustain ongoing foraging or roosting of Greenland White-fronted Goose flocks, they may interact with the proposed decommissioning site via overflying or temporary staging during migration. Such interactions are unlikely to be frequent, if any and will not result in impacts of such magnitude that would contribute significant negative effects to the Greenland White-fronted Goose population of Mongan Bog SPA. Therefore, Greenland White-fronted Geese associated with the River Suck Callows SPA are excluded from potential adverse effects from the proposed decommissioning and rehabilitation works..

²⁶ <https://npws.ie/sites/default/files/protected-sites/synopsis/SY004017.pdf>

3.1.1.5 Lough Ree SPA (Site Code: 004064)

The generic conservation objectives of Lough Ree SPA are available in full on the National Parks & Wildlife Service website at https://npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004064.pdf. The Generic Conservation Objective for Lough Ree SPA is as follows: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- Little Grebe (*Tachybaptus ruficollis*) [A004]
- Whooper Swan (*Cygnus cygnus*) [A038]
- Wigeon (*Anas penelope*) [A050]
- Teal (*Anas crecca*) [A052]
- Mallard (*Anas platyrhynchos*) [A053]
- Shoveler (*Anas clypeata*) [A056]
- Tufted Duck (*Aythya fuligula*) [A061]
- Common Scoter (*Melanitta nigra*) [A065]
- Goldeneye (*Bucephala clangula*) [A067]
- Coot (*Fulica atra*) [A125]
- Golden Plover (*Pluvialis apricaria*) [A140]
- Lapwing (*Vanellus vanellus*) [A142]
- Common Tern (*Sterna hirundo*) [A193]
- Wetland and Waterbirds [A999]

The suitability of the site to support and interact with Whooper Swan, Wigeon, Golden Plover and Lapwing have been described in the above sections. There is no hydrological connectivity between the Bunahinly-Kilgarvan site and Lough Ree SPA. However, due to the relatively proximity between the proposed rehabilitation and decommissioning site and Lough Ree SPA, this is the potential for some SCI species to interact and utilise the **Bunahinly-Kilgarvan Bog** site, namely Whooper Swan, Mallard, Teal, Shoveler and Coot. All other SCI species associated with Lough Ree SPA (Tufted Duck, Common Scoter, Goldeneye and Common Tern) are highly unlikely to utilise the habitat complexes at the **Bunahinly-Kilgarvan Bog** site with any regularity or with any intrinsic reliance, as they are associated with lacustrine or large and deep waterbody habitats, neither or which are present at the **Bunahinly-Kilgarvan Bog** site.

3.1.1.6 Site Specific Conservation Objectives for SPA sites within the Project Zone of Influence

Site Specific Conservation Objectives (SSCOs) have not been published for the Middle Shannon Callows SPA (Site Code: 004096), River Suck Callows SPA (Site Code 004097), Mongan Bog SPA (004017) and Lough Ree SPA (Site Code: 004064). To that end, the SSCO published for the River Shannon and River Fergus Estuaries SPA, Lough Swilly SPA and Castlemaine Harbour SPA are presented in **Table 14** by proxy.

Table 14: Special Conservation Interest Species for the River Shannon and River Fergus Estuaries SPA (004077)

Attribute	Measure	Target	Potential Connectivity Source-Pathway-Receptor Link and Impacts
A038 Whooper Swan (<i>Cygnus cygnus</i>)			
Population trend	Percentage change	Long term population trend	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for SPAs within the project Zone of Influence.
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by whooper swan other than that occurring from natural patterns of variation	<p>Suitable habitat for this species occurs outside of the proposed works footprint and usage of nearby or adjacent areas cannot be precluded. Whooper Swan identified within lands adjoining and nearby the Bunakinly-Kilgarvan Bog site during the 2022 site walkover survey.</p> <p>Potential works within the proposed rehabilitation site and could lead to temporary, localised disturbance effects to this SCI species. However, such disturbance effects should not contribute toward significant decreases in the range, timing or intensity of use of key feeding, foraging and roosting habitat by this species. Further consideration of disturbance effects to SCI species are provided below.</p>
A050 Wigeon (<i>Anas penelope</i>)			
Population trend	Percentage change	Long term population trend	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for SPAs within the project Zone of Influence.

Attribute	Measure	Target	Potential Connectivity Source- Pathway-Receptor Link and Impacts
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by wigeon other than that occurring from natural patterns of variation	<p>Suitable habitat for this species occurs within the margins of the proposed rehabilitation site, primarily the site's silt ponds. The usage of nearby or adjacent areas also cannot be precluded. Wigeon were not identified within the Bunahinly-Kilgarvan Bog site during the 2022 site walkover survey, although they may utilise the silt pond areas in small number for foraging and refuge.</p> <p>Potential works within the proposed rehabilitation site and could lead to temporary, localised disturbance effects to this SCI species. However, such disturbance effects should not contribute toward significant decreases in the range, timing or intensity of use of key feeding, foraging and roosting habitat by this species. Further consideration of disturbance effects to SCI species are provided below.</p>
A122 Corncrake (<i>Crex crex</i>)			
Site specific Conservation Objectives have not been published for Corncrake for the Middle Shannon Callows SPA or the other European Sites for which this is a Special Conservation Interest species.			
A140 Golden Plover (<i>Pluvialis apricaria</i>)			
Population trend	Percentage change	Long term population trend	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for SPAs within the project Zone of Influence.
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by golden plover other than	Suitable habitat for this species occurs within the open expansive cutover bog areas. Roosting birds which might utilise cutaway peat are excluded as sufficient displacement habitat is available - significant disturbance

Attribute	Measure	Target	Potential Connectivity Source-Pathway-Receptor Link and Impacts
		that occurring from natural patterns of variation	effects are unlikely. Potential disturbance effects to Golden Plover as a result of the proposed works are unlikely to be significant due to the availability of sufficient and widespread displacement habitat within the Bunahinly – Kilgarvan Bog sites.
(A142) Lapwing (<i>Vanellus vanellus</i>)			
Population trend	Percentage change	Long term population trend stable or increasing	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for SPAs within the project Zone of Influence.
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by lapwing other than that occurring from natural patterns of variation	Lapwing were not identified within the Bunahinly-Kilgarvan Bog site during the 2022 site walkover survey or during a follow up walkover survey on May 04 th 2022. The proposed bog rehabilitation site at Bunahinly - Kilgarvan do not provide optimal foraging or roosting habitat or these species. Potential works within the proposed rehabilitation site and could lead to temporary, localised disturbance effects to this SCI species. However, such disturbance effects should not contribute toward significant decreases in the range, timing or intensity of use of key feeding, foraging and roosting habitat by Lapwing.
(A179) Black-headed Gull (<i>Chroicocephalus ridibundus</i>)			
Population trend	Percentage change	Long term population trend in	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for

Attribute	Measure	Target	Potential Connectivity Source-Pathway-Receptor Link and Impacts
			SPAs within the project Zone of Influence.
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by black-headed gull other than that occurring from natural patterns of variation	Black-headed Gull were identified overflying the proposed rehabilitation site. Potential works within the proposed rehabilitation site and could lead to temporary, localised disturbance effects to this SCI species. However, such disturbance effects should not contribute toward significant decreases in the range, timing or intensity of use of key feeding, foraging and roosting habitat by this species. Further consideration of disturbance effects to SCI species are provided below.
(A395) Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>)²⁷			
Population trend	Percentage change	Long term population trend	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for SPAs within the project Zone of Influence.
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Suitable habitat for this species occurs outside of the proposed works footprint and usage of nearby or adjacent areas cannot be precluded. Potential works within the proposed rehabilitation site and could lead to temporary, localised disturbance effects to this SCI species. However, such disturbance effects should not contribute toward significant decreases in the range, timing or intensity of use of key feeding, foraging and roosting habitat by this species. Further consideration of disturbance

²⁷ Attributes, measures and targets for Greenland White-fronted Goose sourced from the Conservation Objectives Supporting Document for Lough Swilly SPA 004075
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004075.pdf

Attribute	Measure	Target	Potential Connectivity Source-Pathway-Receptor Link and Impacts
			effects to SCI species are provided below.
(A053) Mallard (<i>Anas platyrhynchos</i>)²⁸			
Population trend	Percentage change	Long term population trend stable or increasing	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for SPAs within the project Zone of Influence.
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	Potential works within the proposed rehabilitation site and could lead to temporary, localised disturbance effects to this SCI species, particularly within the silt pond sites along the site margins. However, such disturbance effects should not contribute toward significant decreases in the range, timing or intensity of use of key feeding, foraging and roosting habitat by this species. Further consideration of disturbance effects to SCI species are provided below. Further consideration of disturbance effects to SCI species are provided below.
(A052) Teal (<i>Anas crecca</i>)			
Population trend	Percentage change	Long term population trend stable or increasing	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for SPAs within the project Zone of Influence.

²⁸ Attributes, measures and targets for Mallard sourced from the Conservation Objectives Supporting Document for Castlemaine Harbour SPA 004029 https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004029.pdf

Attribute	Measure	Target	Potential Connectivity Source-Pathway-Receptor Link and Impacts
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by teal other than that occurring from natural patterns of variation.	Potential works within the proposed rehabilitation site and could lead to temporary, localised disturbance effects to this SCI species, particularly within the silt pond sites along the site margins. However, such disturbance effects should not contribute toward significant decreases in the range, timing or intensity of use of key feeding, foraging and roosting habitat by this species. Further consideration of disturbance effects to SCI species are provided below.
A056 Shoveler (<i>Anas clypeata</i>)			
Population trend	Percentage change	Long term population trend stable or increasing	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for SPAs within the project Zone of Influence.
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by shoveler other than that occurring from natural patterns of variation.	Potential works within the proposed rehabilitation site and could lead to temporary, localised disturbance effects to this SCI species. However, such disturbance effects should not contribute toward significant decreases in the range, timing or intensity of use of key feeding, foraging and roosting habitat by this species. Further consideration of disturbance effects to SCI species are provided below.

Attribute	Measure	Target	Potential Connectivity Source-Pathway-Receptor Link and Impacts
A125 Coot (<i>Fulica atra</i>)²⁹			
Population trend	Percentage change	Long term population trend stable or increasing	The nature and scale of the proposed works and associated potential impacts (ex-situ disturbance effects, localised deterioration in water quality) are such that they will not impact the long term population trend for this species for SPAs within the project Zone of Influence.
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation As determined by regular low tide and other waterbird surveys.	Potential works within the proposed rehabilitation site and could lead to temporary, localised disturbance effects to this SCI species, particularly within the silt pond sites along the site margins.. However, such disturbance effects should not contribute toward significant decreases in the range, timing or intensity of use of key feeding, foraging and roosting habitat by this species. Further consideration of disturbance effects to SCI species are provided below.

²⁹ Attributes, measures and targets for Coot sourced from the Conservation Objectives Supporting Document for Lough Swilly SPA 004075 https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004075.pdf

3.1.2 Threats and Pressures of European Sites

Threats and pressures published for the screened in European Sites are presented in **Table 15** to **Table 19** below.

Table 15 – Threats and Pressures for River Shannon Callows SAC (000216)

Rank ³⁰	Threat Pressure ³¹	Inside (i) / Outside (o) / Both (b)
L	G01 - Outdoor sports and leisure activities, recreational activities	i
M	J02.11 - Siltation rate changes, dumping, depositing of dredged deposits	i
M	J02.05.02 - Modifying structures of inland water courses	i
L	F03.01 - Hunting	b
M	A04.01 - Intensive grazing	i
L	C01.03.02 - Mechanical removal of peat	i
L	J02.01 - Landfill, land reclamation and drying out, general	i
H	A03.03 - Abandonment / lack of mowing	i
L	G05.01 - Trampling, overuse,	i
M	B02.02 - Forestry clearance	i
L	D01.01 - Paths, tracks, cycling tracks	i
M	K03.04 - Predation	b
H	A04.03 - Abandonment of pastoral systems, lack of grazing	i
H	A07 - Use of biocides, hormones and chemicals	i
L	A04.02.05 - Non intensive mixed animal grazing	i
L	A10.01 - Removal of hedges and copses or scrub	i
L	J02.05 - Modification of hydrographic functioning, general	i
H	J02.04.01- Flooding	i
M	A08 - Fertilisation	i

³⁰ Threat, pressure and impact ranking provided on Natura 2000 data form: H – High, M - Medium, L - Low

³¹ Threat code sourced from Natura 2000 data form and follows reference list provided on threats, pressures and activities for European sites

Rank ³⁰	Threat Pressure ³¹	Inside (i) / Outside (o) / Both (b)
L	B06 - Grazing in forests/ woodland	i

Table 16 – Threats and Pressures for Middle Shannon Callows SPA (004096)

Rank	Threat / Pressure	Inside (i) / Outside (o) / Both (b)
L	A04.03 - Abandonment of pastoral systems, lack of grazing	i
H	E01 - Urbanised areas, human habitation	o
H	G01.01 - Outdoor sports and leisure activities, recreational activities	i
L	F03.01 - Hunting	i
M	G01.02 - Walking, horseriding and non-motorised vehicles	i
H	D01.05 - Bridge, viaduct	i
M	A08 - Fertilisation	o
H	A04 - Grazing	i
L	A08 - Fertilisation	i
M	F02.03 - Leisure fishing	i
L	D01.01 - Paths, tracks, cycling tracks	i

Table 17 – Threats and Pressures for River Suck Callows SPA (004097)

Rank	Threat / Pressure	Inside (i) / Outside (o) / Both (b)
H	A04 - Grazing	o
L	F03.01 - Hunting	i
M	A03 - Mowing / cutting of grassland	i
H	A08 - Fertilisation	o
M	A04 - Grazing	i
M	G01.01 - Outdoor sports and leisure activities, recreational activities	i
L	F02.03 - Leisure fishing	i

Rank	Threat / Pressure	Inside (i) / Outside (o) / Both (b)
M	A08 - Fertilisation	i
L	B - Sylviculture, forestry	o
M	E01.03 - Dispersed habitation	o

Table 18 – Threats and Pressures for Mongan Bog SPA (004017)

Rank	Threat / Pressure	Inside (i) / Outside (o) / Both (b)
L	D05 - Improved access to site	i
M	C01.01 - Sand and gravel extraction	o
L	C01.03 - Peat extraction	i
L	A04 - Grazing	i
M	A04 - Grazing	o
M	C01.03 - Peat extraction	o

Table 19 – Threats and Pressures for Lough Ree SPA

Rank	Threat / Pressure	Inside (i) / Outside (o) / Both (b)
M	A04 - Grazing	o
L	B - Sylviculture, forestry	o
M	I01 - Invasive non-native species	i
M	A08 - Fertilisation	o
H	G01.01 - Nautical sports	i
M	G01.02 - Walking, horseriding and non-motorised vehicles	o
M	F03.01 - Hunting	i
M	F02.03 -Leisure fishing	i

3.1.3 Conservation Objectives for the relevant European Sites

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

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

The impact pathways presented in **Table 20** to Qualifying Interests/Special Conservation Interests are examined in relation to each of the four European Sites under consideration, in order to evaluate the effect of Bunakinly-Kilgarvan Bog Decommissioning and Rehabilitation, if any, on the integrity of each of the four European Sites.

Table 20: Qualifying Interests/Special Conservation Interests and Impact Pathways examined at Stage 2

European Site	Qualifying Interest/Special Conservation Interest for evaluation at Stage 2	Impact examined at Stage 2
River Shannon Callows SAC (Site Code 000216)	<p>[1355] Otter (<i>Lutra lutra</i>)</p> <p>[6410] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinia caerulea</i>)</p> <p>[6510] Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>)</p> <p>[8240] Limestone pavements*</p> <p>[91E0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*</p>	<p>a) Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC;</p> <p>b) Indirect/ex-situ disturbance or displacement of species of Qualifying Interest;</p> <p>c) Indirect loss or degradation of terrestrial</p>

European Site	Qualifying Interest/Special Conservation Interest for evaluation at Stage 2	Impact examined at Stage 2
		or aquatic habitats within the SAC; and d) Indirect/ex-situ mortality to species of Qualifying Interest.
Middle Shannon Callows SPA (004096)	Whooper Swan (<i>Cygnus cygnus</i>) [A038] Wigeon (<i>Anas penelope</i>) [A050] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Lapwing (<i>Vanellus vanellus</i>) [A142] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Wetland and Waterbirds [A999]	a) Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within, or in close proximity to the SAC; b) Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site; and c) Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest.
Mongan Bog SPA (004017)	Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]	c) Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest.
Lough Ree SPA (004064)	Little Grebe (<i>Tachybaptus ruficollis</i>) [A004] Whooper Swan (<i>Cygnus cygnus</i>) [A038] Wigeon (<i>Anas penelope</i>) [A050] Teal (<i>Anas crecca</i>) [A052] Mallard (<i>Anas platyrhynchos</i>) [A053] Shoveler (<i>Anas clypeata</i>) [A056] Tufted Duck (<i>Aythya fuligula</i>) [A061] Common Scoter (<i>Melanitta nigra</i>) [A065] Goldeneye (<i>Bucephala clangula</i>) [A067] Coot (<i>Fulica atra</i>) [A125] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Lapwing (<i>Vanellus vanellus</i>) [A142] Common Tern (<i>Sterna hirundo</i>) [A193] Wetland and Waterbirds [A999]	c) Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest.
River Suck Callows SPA (004097)	Whooper Swan <i>Cygnus cygnus</i> [A038] Wigeon <i>Anas penelope</i> [A050] Golden Plover <i>Pluvialis apricaria</i> [A140] Lapwing <i>Vanellus vanellus</i> [A142]	b) Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site;

European Site	Qualifying Interest/Special Conservation Interest for evaluation at Stage 2	Impact examined at Stage 2
	Greenland White-fronted Goose <i>Anser albifrons flavirostris</i> [A395] Wetland and Waterbirds [A999]	

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

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

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

In combination evaluations are based on the other plans or projects described in **Section 2.6.3**.

3.3.1 Direct effects to Qualifying Interest habitats or species of an SAC Site (i.e. species mortality, habitat loss, fragmentation, degradation, loss/reduction in connectivity) within or ex-situ the SAC

3.3.1.1 Alone or In Combination

As the proposed works are not located within the bounds of a SAC, there will be no potential impact (either alone or in combination with other projects) and consequent pathways for direct effects to habitats with a European Site.

3.3.1.2 Stage 2 Evaluation

Adverse direct effects on the integrity of the SAC/Conservation Objectives (alone or in combination) will not occur.

3.3.2 Indirect/ex-situ disturbance or displacement of species of Qualifying Interest (Otter)

3.3.2.1 Alone

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

The site walkover surveys and mammal survey undertaken in January 2022 did not identify otter (or signs of otter usage) at Bunahinly-Kilgarvan Bog or its environs. The general unsuitability of areas subject to decommissioning and rehabilitation constrains usage. However Otter may utilise existing silt ponds or the

sections of the Shannon (Upper)_120 and Boor_020 watercourses in proximity of Bunahinly-Kilgarvan Bog. The likelihood of otter disturbance and displacement during the proposed works are considered to be low and highly unlikely. Should otter utilise the watercourses at the margins of the site on an occasional or temporary basis, then disturbance effects as a result of the proposed works would be most likely to occur during daylight hours. Such disturbance effects are highly unlikely, however should they occur, they would be considered to be temporary and indirect. Such disturbance and displacement effects, should they occur, will not be adverse. Other potential impacts to otter including direct mortality and displacement as a result of berm failure during the project operational phase.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI Species and Conservation objectives such as a decline in range and/or distribution and numbers of individuals within the SAC catchment.

In instances where this impact occurs outside or ex-situ an SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on connected or supporting populations for downstream but ecologically connected Qualifying Interest (QI) species, thus affecting Site Integrity/Conservation Objectives similarly.

3.3.2.2 In Combination

There is potential for cumulative effects from other plans or projects which may result in similar source-impact-pathways to Otter within other tributaries or within the River Suck/River Shannon complex.

The decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog by BnM, which is also within the River Shannon catchment, may result in likely significant/ potentially adverse effects on Otter; this project may temporally overlap works proposed for other BnM sites proposed for decommissioning.

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

Additional sources of disturbance such as baseline agricultural activities or existing turbary are considered unlikely to result in in combination adverse effects, due to habituation, described tolerance and occurrence during primarily daylight hours.

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

3.3.2.3 Stage 2 Evaluation

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

3.3.3 Indirect/ex-situ mortality to species of Qualifying Interest (Otter)

3.3.3.1 Alone

Otter are rated as a very high sensitivity receptor (based on International importance ratings) and may be sensitive to mortality through inadvertent collision with moving vehicles or machinery, in particular during hours of darkness. There are no known Otter holts at Bunahinly-Kilgarvan Bog, and the general unsuitability of areas subject to decommissioning and rehabilitation no doubt constrains usage, however Otter may utilise

existing silt ponds or open areas of watercourses located upstream and downstream of the site and between the peatland basins; i.e. Shannon (Upper)_120 and Boor_020.

Indirect and ex-situ mortality of otter are more likely in respect of foraging or resting animals, primarily within aquatic habitats but also within adjacent riparian corridors and /or whilst crossing the bog/ utilising drains in close proximity to proposed works. Many of the watercourses (including drainage for historic peat extraction) present whilst not within an SAC boundary, are ultimately hydrologically connected to a downstream SAC which includes Otter as a Qualifying Interest; i.e. River Shannon Callows SAC. Other potential impacts to otter including direct mortality and displacement as a result of berm failure during the project operational phase.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI Species and Conservation objectives such as a decline in range and/or distribution and numbers of individuals within an SAC - however this is not applicable in respect of Bunahinly-Kilgarvan Bog Decommissioning and Rehabilitation.

In instances where this impact occurs outside or *ex-situ* an SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on connected or supporting populations for downstream but ecologically connected Qualifying Interest (QI) species, thus affecting Site Integrity/Conservation Objectives similarly.

3.3.3.2 In combination

There is potential for cumulative effects from other plans or projects which may result in similar source-impact-pathways to Otter within other tributaries or within the River Shannon Callows SPA.

The decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog by BnM, which is also River Shannon catchment, may result in likely significant/potentially adverse effects on Otter; this project may temporally overlap works proposed for other BnM sites proposed for decommissioning.

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

Additional sources of disturbance such as baseline agricultural activities are considered unlikely to result in in-combination adverse effects.

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

3.3.3.3 Stage 2 Evaluation

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

3.3.4 Indirect loss, reduction or degradation of aquatic habitats within the SAC and consequent effects to reliant aquatic species of Qualifying Interest

Aquatic habitats and species in this instance refers to the water dependent and nutrient sensitive habitats and species of Qualifying Interest for the River Shannon Callows SAC downstream of Bunahinly-Kilgarvan Bog; *Molinia* meadows (6410), Lowland hay meadows (6510), Alkaline Fens (7230), Alluvial forests (91E0) and otter (1355).

Deterioration in water quality within Bunahinly-Kilgarvan Bog and the downstream watercourses as a result of the proposed works, could result following the release of sediment or silt laden water from the site to the receiving watercourses; i.e. the Shannon Upper_120 and Boor_020 watercourses and further downstream to the River Shannon main channel. Siltation of the receiving watercourses could effect the in-situ and / or reliant QI species for the River Shannon Callows SAC such as the QI habitats and species listed above.

Decommissioning and Rehabilitation at Bunahinly-Kilgarvan Bog will require direct excavation of the banks and bed of the existing drainage channels (peat production drains, not external hydraulic barriers or drains) to facilitate drain blocking, levelling of existing stock piles, reprofiling areas of cutover peat to remove preferential flowpaths to drainage channels, movement of peat to create various dams/speedbumps and cell bunds, regulate pumping to facilitate creation of wetlands. It will require the use of machinery and involve the removal of waste, including raw material, potentially contaminated soils or peat, railway infrastructure, and fuel.

Potential impacts to downstream connected aquatic ecology receptors could occur in the absence of best practice measures of mitigation being implemented during and following the proposed rehabilitation works.

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

Alone

Erosion and deposition are natural process in watercourses varying naturally throughout the year. However, additional sediment contributions entering the watercourse, such as from Decommissioning and Rehabilitation adjacent to or upstream of individual watercourses, could have negative implications for the receiving aquatic environment and could contribute to nutrient enrichment of the receiving watercourse and habitat degradation. These impacts may be mobilised downstream and affect river reaches at a distance from the physical works. Effects on these receptors may in turn affect downstream aquatic QI habitats and species for the River Shannon Callows SAC. In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events to QI species, or sub-lethal degradation and loss of aquatic habitat quality.

The release of large volumes of sediment and /or deleterious materials to aquatic habitats upstream of an SAC may reduce the quality of aquatic habitat resource for QI species, and/or result in effective habitat loss should QI species cease to utilise degraded habitats.

Overall effects may reduce the suitability of the receiving waters as a resource for QI species and the degrade water dependent and nutrient sensitive QI habitats, thus affecting Site Integrity and/or Conservation Objectives – particularly those which seek to maintain or restore the favourable conservation condition of the QI habitat / species at the River Shannon Callows SAC.

In combination

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

The decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog by BnM, may result in likely significant/potentially adverse effects on water quality.

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

All other plans or projects (including Agricultural activities outside the remit of the ARC process) identified are subject to Appropriate Assessment/and or consented mitigation measures and it is assumed that in-combination effects are therefore unlikely, due to the requirement for mitigation if potentially adverse effects are identified.

Stage 2 Evaluation

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

3.3.4.2 Alteration of flow regimes or changes to watercourse morphology

Alone

Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. In the absence of mitigation there is potential for sediment deposition at a scale which may alter tributary channel morphology within or ex-situ an SAC thus reducing the suitability of receiving (downstream) aquatic habitats and species of Qualifying Interest. Such occurrences could affect Site Integrity and/or Conservation Objectives for a European Site – particularly those which seek to maintain or restore the favourable conservation condition of aquatic habitats and species at the designated SAC.

The following Hydrological effects may occur to the local environment at Bunahinly-Kilgarvan Bog as a result of the proposed works and may influence flow regimes to the receiving environment and receiving watercourses. These include:

- Increases in groundwater levels which may affect neighbouring lands across hydraulic gradients;
- Reductions in conveyance capacity around or through Bunahinly-Kilgarvan Bog, or;
- Marginal alteration of topographical catchments, also resulting in flooding as a result of increased run-off.

Increased flooding and consequent run-off to lands adjacent to and surrounding Bunahinly-Kilgarvan Bog could result in increased run-off of potential pollutants to the receiving watercourses; i.e. the Shannon Upper_120 and Boor_020 watercourses, both of which provide connectivity between the site and the River Shannon Callows SAC. Changes to the hydrological regime (reductions or increases in run-off) could result in consequent effects to ex-situ water dependent species using the downstream areas of the River Shannon main channel. Increased flow volumes / regimes to receiving watercourses may change localised watercourse morphology (as a result of localised erosion / scouring) which could contribute ex-situ effects to QI species using the downstream areas of the River Shannon, particularly otter.

In combination

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

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

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

Stage 2 Evaluation

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

3.3.5 Direct Impacts to Habitats within SPAs

3.3.5.1 Alone or In Combination

As the proposed works footprint are not located within the bounds of a SPA, there will be no potential impact (either alone or in combination with other projects) and consequent pathways for direct effects to habitats with a European Site.

3.3.5.2 Stage 2 Evaluation

Adverse direct effects on the integrity of the SPA/Conservation Objectives (alone or in combination) will not occur.

3.3.6 Indirect loss, reduction or degradation of terrestrial or aquatic habitats within or in close proximity to the SPA site

Terrestrial habitat in this instance refers to the habitats within and adjoining Bunahinly-Kilgarvan bog which may be utilised by SCI species as feeding resources, e.g. Callows grassland, cutover bog and high bog areas used by feeding Swans and waterfowl, or habitats containing invertebrate prey items for which species such as Lapwing or Golden Plover or other waterbirds may forage – both within, in close proximity to, or upstream of the SPA's under consideration. Riparian habitats i.e. the interface between the aquatic habitat, the bankside vegetation and terrestrial environment are also considered here.

Aquatic habitat relates to instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.) both within and in close proximity to an SPA. Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including fisheries, and a diverse macroinvertebrate community which provides feeding resources for various fauna.

Decommissioning and Rehabilitation (hereafter D&R) at Bunahinly-Kilgarvan Bog will require direct excavation of the banks and bed of the existing drainage channels (peat production drains, not external hydraulic barriers or drains) to facilitate drain blocking, levelling of existing stock piles, reprofiling areas of cutover peat to remove preferential flowpaths to drainage channels, movement of peat to create various dams/speedbumps and cell bunds, regulate pumping to facilitate creation of wetlands. It will require the use of machinery and involve the removal of waste, including raw material, potentially contaminated soils or peat, railway infrastructure, and fuel.

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

Alone

Erosion and deposition are natural process in watercourses varying naturally throughout the year. However, additional sediment contributions entering the watercourse, such as from D&R in, adjacent to or upstream of individual watercourses, could have negative implications for fish and invertebrates due to physical damage

and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels by sediment causing mortality impacts for salmonid eggs (affecting recruitment) and interfering with invertebrate life stages within gravel substrates (interstitial spaces). These impacts may be mobilised downstream and affect river reaches at a distance from the physical works. Effects on these receptors may in turn affect SCI species /waterbirds or QI species of mammals (e.g. Otter) which utilise fish and invertebrates as food resources. In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality.

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

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

In combination

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

The decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog by BnM, which is also within the River Shannon but also upstream of the River Suck Callows SPA, may result in likely significant/potentially adverse effects on water quality; this project is known to temporally overlap works proposed for BnM D&R sites located in the downstream catchment of Bunakinly-Kilgarvan Bog.

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

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

Stage 2 Evaluation

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

3.3.6.2 Alteration of flow regimes or changes to watercourse morphology

Alone

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

In combination

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

The decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog by BnM, which is also within the River Shannon catchment and upstream of the River Suck Callows SPA, may result in likely significant/potentially adverse effects on water quality; particularly where the proposed D&R works overlap with other D&R BnM sites, downstream of Bunakinly-Kilgarvan Bog.

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

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

Stage 2 Evaluation

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

3.3.6.3 Spread of invasive species**Alone**

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

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

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

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

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

In combination

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

The decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog by BnM, which is also within the River Shannon catchment and upstream of the River Suck Callows SPA, may result in likely significant/potentially adverse effects on water quality; particularly where the proposed D&R works overlap with other D&R BnM sites, downstream of Bunakinly-Kilgarvan Bog.

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

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

Stage 2 Evaluation

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

3.3.7 Indirect or Ex-Situ disturbance or displacement of bird species of Special Conservation Interest.**3.3.7.1 Alone**

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

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

As the construction phase of decommissioning and rehabilitation will involve the use of heavy machinery, disturbance/displacement effects on waterbirds listed as Special Conservation Interests for the various SPA's to which possible connectivity has been established has been identified as a potential source impact pathway for likely significant effects, and in the absence of protective measures or informed works scheduling, there is the possible disturbance to low numbers of individuals within the MAD as a result of the rehabilitation works.

Seeing as the construction phase is expected to be of a temporary to short-term duration, the disturbance effects are considered similarly temporary to short term in duration. Due however to the proximity of suitable SCI habitat to the proposed works, and the possibility of works taking place during the winter/migration season, the potential for adverse effects through the disturbance/displacement of wintering or passage wildfowl is considered and examined herein.

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

Regarding Greenland White-fronted geese, it is acknowledged that the usage of the River Suck tributary floodplain, despite declines in use of associated bog systems, may be influenced by the absence of major sources of disturbances along the river channel. Surveys and trends of Greenland White-fronted Goose flocks between Athlone to Shannonbridge and Ballinasloe to Shannonbridge over the past twenty-five years have noted the abandonment of the callows and the adjoining raised bog areas as regular feeding and foraging habitats. This is due to ongoing peat harvesting and turbary which removed important feeding and refuge sites between Athlone and Shannonbridge; flooding and development between Ballinasloe and Shannonbridge as well as various sources of disturbance in and near the callows area. At present potential usage of the Bunahinly-Kilgarvan bog site and its environs by Greenland White-fronted Geese results from overflying birds or temporary staging during seasonal migration.

Disturbance in general plays a pronounced role in the winter ecology of Greenland White-fronted Geese because of extensive fragmentation of traditional feeding ranges. Recent changes in individual flock differences in Ireland were correlated with number and size of feeding sites but also disturbance rate, and the use of individual feeding sites may relate to relative levels of disturbance. Detailed studies also showed that wintering Greenland White-Fronted geese tended to avoid strip of grassland within 75m of a busy road but fed right up to sea wall embankment. Effects of such disturbance were detectable up to 150m from field margins (Fox & Stroud, 2002). This figure (i.e 150m) is higher than that cited in Livezey et al. (123.2m in respect of Anseriformes and motorised vehicles) and is considered more suitable as a MAD for this species, in line with species specific information.

An evaluation of the significant effects due to noise and disturbance resulting from the proposed development on SCI species potentially occurring in proximity to Bunahinly-Kilgarvan bog is presented in **Table 21**.

Table 21: SCI Disturbance evaluation

SCI	MAD (m)	Sensitivity	Notes
Greenland White-fronted Goose	150.0	Foraging/ Roosting	Suitable habitat within 150m of activities (but outside of the proposed works footprint) and usage of nearby or adjacent areas cannot be precluded; significant indirect disturbance effect possible. Based on desk based data for Greenland White-fronted Goose trends near the Bunahinly-Kilgarvan Bog site (See Section 3.1.1.3) potential for occurrence and consequent disturbance is considered to be low. Greenland

SCI	MAD (m)	Sensitivity	Notes
			White-fronted Goose not identified within the Bunahinly-Kilgarvan site during the 2022 site walkover surveys.
Whooper Swan	123.2	Foraging/ Roosting	Suitable habitat within 123.2m of works (but outside of the proposed works footprint) and usage of nearby or adjacent areas cannot be precluded; significant indirect disturbance effect possible. Whooper Swan identified within lands adjoining and nearby the Bunahinly-Kilgarvan Bog site during the 2022 site walkover survey.
Shoveler	123.2	Foraging/ Roosting	Suitable habitat within 123.2m of works (but outside of the proposed works footprint) and usage of nearby or adjacent areas cannot be precluded; significant indirect disturbance effect possible. Shoveler were not identified within the Bunahinly-Kilgarvan Bog site during the 2022 site walkover survey.
Wigeon	123.2	Foraging/ Roosting	Suitable habitat within 123.2m of works and usage of nearby or adjacent areas cannot be precluded; significant indirect disturbance effect possible. Wigeon were not identified within the Bunahinly-Kilgarvan Bog site during the 2022 site walkover survey, although they may utilise the silt pond areas in small number for foraging and refuge.
Mallard	123.2	Foraging/roosting	Suitable habitat within 123.2m of works and usage cannot be precluded; significant disturbance effect. Mallard identified within silt ponds at the Bunahinly-Kilgarvan Bog site during the 2022 site walkover survey.
Teal	123.2	n/a	Suitable habitat within 123.2m of works and usage cannot be precluded; significant disturbance effect. Teal not identified within the Bunahinly-Kilgarvan Bog site during the 2022 walkover survey, although they may utilise the silt pond areas in small number for foraging and refuge..
Lapwing	42.2	Foraging/roosting	Suitable habitat within 42.2m of works and usage cannot be precluded; significant disturbance effect. Lapwing were not identified within the Bunahinly-Kilgarvan Bog site during the 2022 site walkover survey or during a follow up walkover survey on May 04 th 2022.
Golden Plover	42.2	Foraging	Suitable habitat within 42.2m of works and usage cannot be precluded; significant disturbance effect. Golden Plover were not identified within the Bunahinly-Kilgarvan Bog site during the 2022 site walkover survey. Roosting birds which might utilise cutaway peat are excluded as sufficient displacement habitat is available - significant effects are unlikely. Potential disturbance effects to Golden

SCI	MAD (m)	Sensitivity	Notes
			Plover as a result of the proposed works are unlikely to be significant due to the availability of sufficient and widespread displacement habitat within the Bunahinly-Kilgarvan Bog sites.
Curlew	42.2	Foraging/ roosting	Suitable habitat within 42.2m of works (but outside of the proposed works footprint) and usage cannot be precluded; significant disturbance effect. Curlew was not identified within the Bunahinly-Kilgarvan Bog site during the site walkover surveys.
Black-tailed Godwit	42.2	Foraging/ roosting	Suitable habitat within 42.2m of works (but outside of the proposed works footprint) and usage cannot be precluded; significant disturbance effect. Black-tailed Godwit was not identified within the Bunahinly-Kilgarvan Bog site or the adjoining wetland / callows areas during the site walkover surveys.
Black-headed Gull	42.2	Foraging/Roosting	Suitable habitat within 42.2m of works and usage cannot be precluded; significant disturbance effect. Black-headed Gull identified foraging over-flying the site and within the adjacent callow areas during the 2022 site walkover survey.
Wetland and waterbirds	123.2*	Foraging/Roosting	Suitable habitat is present within the silt pond habitats located along the margins of the Bunahinly-Kilgarvan Bog sites. These silt ponds may support small numbers of some SCI species, particularly Mallard and Teal and usage cannot be precluded. Proposed works within the silt pond areas, without the implementation of requisite SOPs or mitigation measures could contribute to localised significant disturbance effects to small numbers of these SCI species. The expansive cutover bog areas are unsuitable for the majority of the SCI species within the project Zone of Influence, with the exception of Golden Plover. Potential disturbance effects to Golden Plover as a result of the proposed works are unlikely to be significant due to the availability of sufficient and widespread displacement habitat within the Bunahinly - Kilgarvan Bog sites.

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

3.3.7.2 In combination

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

The decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog by BnM, which adjoins the Middle Shannon Callows and is upstream of the River Suck Callows SPA, may result in likely significant/potentially adverse effects

on water quality; particularly where the proposed D&R works overlap with other D&R BnM sites, downstream of Bunahinly-Kilgarvan Bog.

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

Additional sources of disturbance such as baseline agricultural activities /turbary within or in close proximity to the SPA's under consideration, and in suitable habitat for SCI's, are considered in the large part unlikely to result in in combination adverse effects- primarily due to habituation to these background baseline activities.

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

3.3.7.3 Stage 2 Evaluation

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

It is acknowledged that, following decommissioning and rehabilitation, the presence of an undisturbed wetland habitat the size of **Bunahinly-Kilgarvan 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 / floodplain. These positive quality effects may ultimately positively impact the SCI's and benefit the Conservation Objectives of the adjacent SPA. For the avoidance of doubt however, this is not considered in the evaluation above, nor is any reliance placed on this in the consideration of effects.

3.4 Mitigation Measures

3.4.1 Description of the measure

The below best practice and bespoke mitigation measures have been designed and are prescribed in cognisance of those water dependent and nutrient sensitive features of Qualifying Interest for which the River Shannon Callows SAC and Middle Shannon Callows SPA have been designated. These features of Qualifying Interest and their associated Site Specific Conservation Objectives are presented in **Section 3.1.3** of this document. These measures have been designed and have been prescribed to ensure that all targets and attributes set out for these features of qualifying interest are not compromised or effected by the proposed rehabilitation works at Bunahinly-Kilgarvan Bog.

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

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

- Bog restoration/rehabilitation works will be restricted to within the footprint of the proposed rehabilitation works area.
- The proposed rehabilitation works will have due regard to noise limits and hours of operation (i.e. dusk and dawn) to minimise any potential disturbance on resident and local fauna that utilise the site and immediate environs.
- A standard operating procedure overseen by the Project Ecologist will be in place for all PCAS activities to avoid any significant effects on breeding birds. This will include ground nesting birds and will apply to silt pond cleaning, and cutaway activities. Restriction zones will be in place to avoid effects on any identified ground nesting birds/waterfowl as appropriate.
- There are only sealed/locked and in use portacabins in place at Kilgarvan and Bunahinly bogs. These portacabins don't support optimal bird nesting or bat roosting potential. Should bird nesting activity occur along the portacabin roof edges, the portacabin won't be removed until all works are completed at Bunahinly - Kilgarvan, which will be outside the closed nesting season; i.e. after September 2022.
- Confirmatory surveys will be undertaken by a suitably qualified ecologist to identify the presence of any bird species of conservation concern which may potentially be disturbed. The survey will typically include habitats suitable for ground nesting birds, in particular sensitive species (e.g. Lapwing/Ringed Plover/Curlew/Red Grouse) but also buildings scheduled for decommissioning, potential winter period feeding or roosting areas for Wildfowl, roosting areas for Hen Harrier etc.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- The proposed works will be restricted to daylight hours and there will be no requirement for artificial lighting.
- Silt ponds will be inspected and maintained as per the IPC Licence.
- During periods of heavy precipitation and run-off, works will be halted.
- Works will be carried out using a suitably sized machine and, in all circumstances, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.

- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
- Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- All waste will be sorted by the works crews, managed within the site in designated waste disposal facilities, and removed to a licenced waste facility, in line with BnM Standard operating practice.
- Vehicles will never be left unattended during refuelling.
- No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
- All plant refuelling will take place using mobile fuel bowzers. Only dedicated trained and competent personnel will carry out refuelling operations.
- All fuels required for machinery and equipment will be stored in a designated location, away from main traffic activity, at the nearest BnM Compound. All fuel will be stored in bunded, locked storage containers. Diesel or petrol fuel and mechanical oils will also be used by site vehicles.
- Mobile storage such as fuel bowzers will be bunded to 110% capacity to prevent spills. Tanks for bowzers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked. All pumps using fuel or containing oil will be locally and securely bunded where there is the possibility of discharge to waters.
- Potential impacts caused by spillages etc. during rehabilitation works will be reduced by keeping spill kits and other appropriate equipment on-site.
- Site works will be carried out in accordance with 'best practice'. In order to ensure compliance and implementation of 'best practice', these measures will be communicated to relevant Bord na Móna staff and updated as required.
- All waste water will be removed by a licenced waste contractor to a licenced waste water treatment facility.
- Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
 1. The land is waterlogged;
 2. The land is flooded, or it is likely to flood;
 3. The land is frozen, or covered with snow;
 4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann).
 5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- Fertiliser will not be spread within 25m of a hydraulic break (where slope indicates runoff potential); 25m of an area subject to annual winter inundation, 25m of a natural watercourse, or 25m of any drains where conveyance is to be retained through the proposed rehabilitation extent.

- Fertiliser will be applied to headlands and bare fields where the surface slope indicates runoff is directed away from the above areas, and to within 2m of internal drainage channels within the cutover high field areas. These drainage channels will be blocked in advance of fertiliser application, restricting potential run-off to downstream drainage channels
- Buffer zones in respect of waterbodies, as specified on <https://gis.epa.ie/EPAMaps/>, will be adhered with at all times with regard to fertiliser application. The EMP prepared for this project (**Appendix E**) supports fertiliser application maps for Bunahinly-Kilgarvan.

The below image / flow chart (**Figure 19**) provides Bord na Móna's proposed clean up procedures for fuel/oil and peat.

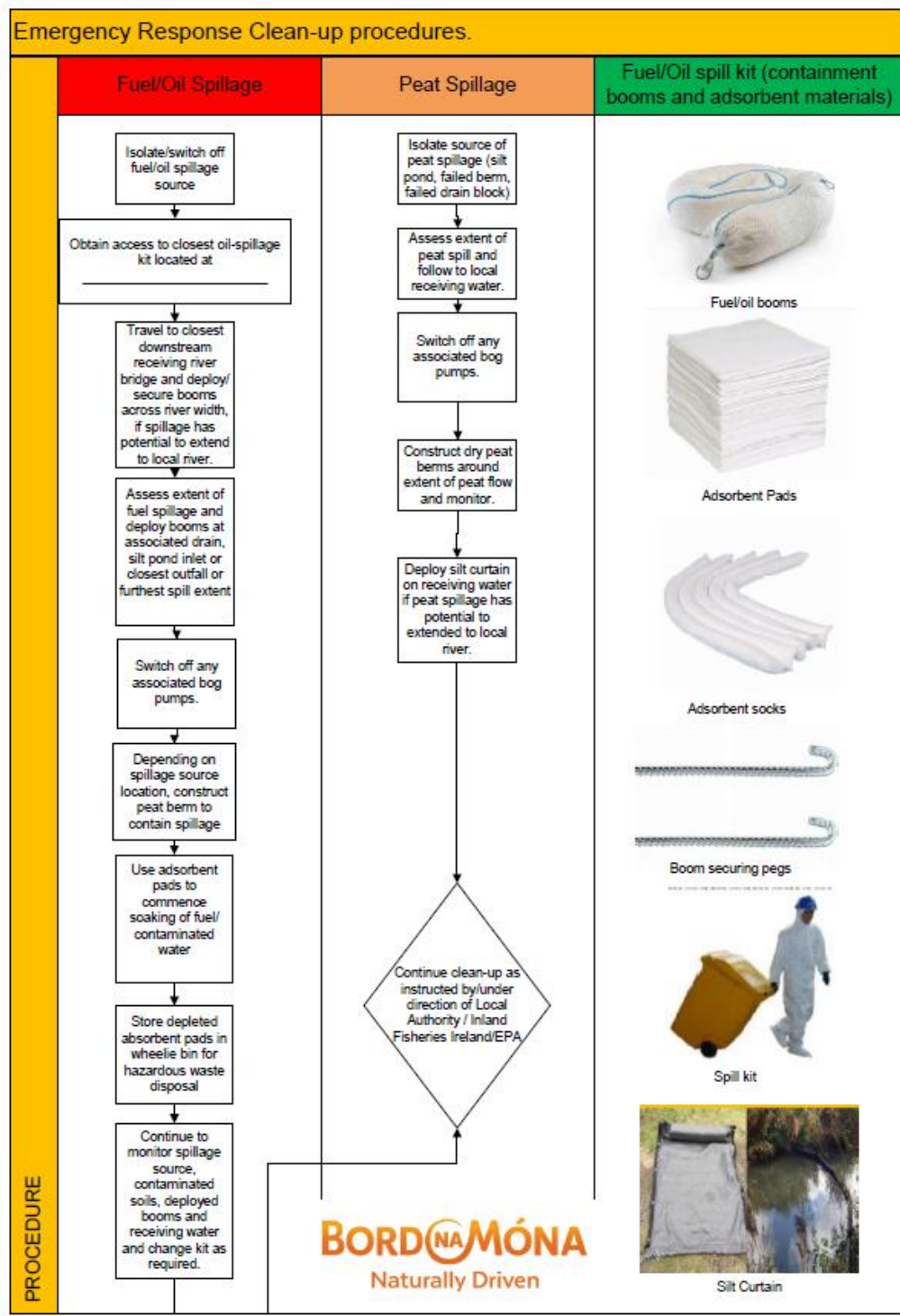
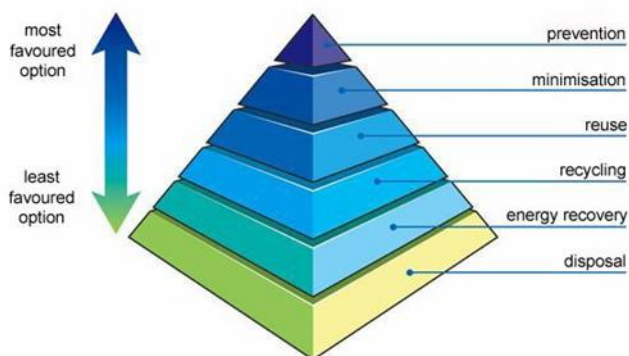


Figure 19: BnM Emergency Response Clean Up Procedures

Best Practice Measures around the treatment of Waste

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

- Disposal or recovery of waste shall take place only as specified in Schedule 2(i) Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery of this licence and in accordance with the appropriate National and European legislation and protocols. No other waste shall be disposed of/recovered either on-site or off-site without prior notice to, and prior written agreement of, the Agency.
- Waste sent off-site for recovery or disposal shall only be conveyed to a waste contractor, as agreed by the Agency, and only transported from the site of the activity to the site of recovery/disposal in a manner which will not adversely affect the environment.
- A full record, which shall be open to inspection by authorized persons of the Agency at all times, shall be kept by the licensee on matters relating to the waste management operations and practices at this site. This record shall as a minimum contain details of the following:
 - The names of the agent and transporter of the waste.
 - The name of the persons responsible for the ultimate disposal/recovery of the waste.
 - The ultimate destination of the waste.
 - Written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site.
 - The tonnages and EWC Code for the waste materials listed in Schedule 2(i) Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery sent off-site for disposal/recovery.
 - Details of any rejected consignments.
- A copy of this Waste Management record shall be submitted to the Agency as part of the AER for the site.
- As required by the licence, these waste items will be removed for recycling or disposal, using external contractors with the required waste collection permits, as agreed by the EPA, with waste records maintained as required for inspection by authorized persons of the EPA at all times.
- Where possible, Bord na Móna will utilize the appropriate waste hierarchy to identify waste that can 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 and EPA Exit Audit (EA) and the eventual partial or full surrender of the licence.

These best practice measures have been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.2 Best Practice & Biosecurity

Invasive alien plant species were not identified on the Bunahinly-Kilgarvan sites during the 2022 site walkover survey. Nonetheless, invasive alien species known to occur at the subject bog (or desktop review suggests presence is likely), and for which reasonably foreseeable source impact pathways for dispersal may result from the proposed PCAS are described here. A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs, and although spatial overlap with the PCAS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during PCAS activities.

The potential for importation or introduction of non-native plant species (such as Japanese Knotweed, Himalayan Balsam, etc.) has been identified. Section 49 of the European Communities (Birds and Natural Habitats) Regulations 2011 prohibits the introduction and dispersal of invasive alien species (particularly plant species) listed on Part 1 (third column) of the 'Third Schedule'.

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

- Records of problematic invasive species within the various bog units will be marked out with signs to highlight areas of infestation to personnel.
- All plant machinery will be restricted from disturbing known colonies of invasive species.
- All plant machinery will avoid unnecessary crossings to adjoining lands.
- For any material entering the site, the supplier must provide an assurance that it is free of invasive species.
- All plant and equipment employed on the proposed works (e.g. diggers, tracked machines, footwear etc.) must be thoroughly cleaned down using a power washer unit, and washed into a dedicated and contained area prior to arrival on site and on leaving site to prevent the spread of invasive aquatic / riparian species such as (but not limited to) Japanese knotweed (*Fallopia japonica*) and Himalayan Balsam (*Impatiens glandulifera*). A sign off sheet must be maintained by the contractor to confirm cleaning;
- Good site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (i.e. Japanese Knotweed (*Fallopia japonica*), Himalayan Balsam (*Impatiens glandulifera*), Himalayan Knotweed (*Persicaria wallichii*), etc.) by thoroughly inspecting and washing vehicles prior to entering the works area.

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

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

- All water quality monitoring equipment which has been used in water will be treated with a disinfectant or a strong saline solution and then thoroughly dried (ideally over 24 hours) BEFORE being used in water again.
- Check, Clean, Dry protocol will be adhered with before and after visiting a river or lake for monitoring, in line with Best Practice³² or for activities such as Sphagnum inoculation.
- Virkon Aquatic will be available as required.

These best practice measures have been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.3 Silt Ponds

Silt Ponds – 27 no. Silt ponds with a total volume of 36058.16823m³ and area of 2.36ha are in place at Bunahinly-Kilgarvan Bog and connected to the existing drainage network. These silt ponds, already stipulated and in use as mitigation measures in respect of Peat Extraction under IPC license, will continue to function as the primary intervention in terms of sediment release to receiving waterbodies. It should be noted, that the silt pond network at Bunahinly-Kilgarvan Bog site will not be the sole mitigation measure to attenuate silt laden waters emanating from the site during the project construction and operational phases. The design of the PCAS scheme requires the creation of internal drain blocking measures (including terminal dams), which will in itself reduce the possibility of surface run-off to the receiving environment during the rehabilitation works. Once rehabilitation works are completed and the bog has been rehabilitated, the bog will act as a natural repository for surface water, regulating and slowing the movement of surface water from Bunahinly-Kilgarvan Bog to the receiving environment. It is considered that the silt pond network will provide further attenuation and regulation to those measures associated with the PCAS measures during the project construction phase and the rewetted peatland habitat during the project's operational phase.

The water quality emission limit values (under condition 6.2 of the Integrated Pollution Control (IPC) licence issued for Bunahinly-Kilgarvan Bog) are unique to the water quality impacts from peat extraction, and as requested by the EPA. These values are not appropriate to use as a measures of success with regard to the expected water quality improvements that will arise from ceasing the annual peat extraction activity, removal of all stock and the associated rehabilitation of this bog. Existing water quality results from Bunahinly - Kilgarvan Bog indicate that suspended solids are well under the ELV that are applied during peat extraction, with ammonia also well under the associate trigger level. Silt ponds are an IPC Licence requirement to manage expected suspended solids that can arise from peat extraction and are not solely relied upon to mitigate impacts from rehabilitation of the peatlands. The silt pond locations are highlighted on (**Figure 20** and **Figure 21**), and all silt ponds are sized as required under condition 6.10 of the associated IPC Licence with regard to expected impact from the activity of milling peat and associated production processes, and maintained as required under condition 6.7 and 6.8. To that end, it is considered that silt ponds within the Bunahinly-Kilgarvan Bog are sufficiently sized to attenuate any silt or particulate matter

Regular cleaning and reporting on same already forms part of annual (AER) reporting submitted to EPA. All Silt Ponds at Bunahinly-Kilgarvan Bog site are currently compliant with EPA requirements. **Table 22** below, and **Figure 20** and **Figure 21** overleaf summarise and illustrate the onsite Silt Pond locations, the figures also illustrates the current flow regime within the main drainage network (into which any other drains also feed). Continued maintenance and reporting on same will be reported on annually until IPC license Surrender.

³² <https://www.biodiversityireland.ie/projects/invasive-species/crayfish-plague/>

Silt pond cleaning is completed using a long reach excavator, at minimum twice per annum, in line with IPC license requirements and an established SOP.

Silt pond is cleaned to the appropriate depth as specified to ensure compliance (25m³ of silt pond capacity is required for every hectare of bare peat in the associated catchment), typically a minimum of 1.5m deep, as compliance is achieved through length rather than depth in most instances. Excavated spoil will be placed adjacent to the silt pond.

Table 22: Silt Ponds in use at Bunahinly-Kilgarvan Bog site

Bog Name	IPC License Reference	Pond No.	Area (m ²)	Volume (m ³)
Kilgarvan	502_01	n/a	515.91297844700	773.86946767100
Kilgarvan	502_01	n/a	381.75049803100	572.62574704700
Kilgarvan	502_01	BH199	653.54426884600	980.31640326900
Kilgarvan	502_01	BH199A	449.22157770900	673.83236656400
Kilgarvan	502_01	BH200A	1314.39472511000	1971.59208766000
Kilgarvan	502_01	BH200B	757.03050148400	1135.54575223000
Kilgarvan	502_01	BH200C	3408.89100392000	5113.33650588000
Kilgarvan	502_01	BH200D	1104.45291146000	1656.67936719000
Kilgarvan	502_01	BH200D	0.84525888389	1.26788832583
Kilgarvan	502_01	BH200E	1628.28773601000	2442.43160402000
Kilgarvan	502_01	KG190	979.57902974300	1469.36854461000
Kilgarvan	502_01	KG191	379.85634220200	569.78451330300
Kilgarvan	502_01	KG192A	1622.11005285000	2433.16507928000
Kilgarvan	502_01	KG192C	1563.15713458000	2344.73570187000
Kilgarvan	502_01	KG192D	476.22538250000	714.33807375000
Kilgarvan	502_01	KG192E	457.90710977500	686.86066466300
Kilgarvan	502_01	KG193A	446.99025701700	670.48538552500
Kilgarvan	502_01	KG193B	844.60796833400	1266.91195250000
Kilgarvan	502_01	KG194	435.55593152400	1266.91195250000
Kilgarvan	502_01	KG195	712.51792932800	1068.77689399000
Kilgarvan	502_01	KG196	288.87551544100	433.31327316200
Kilgarvan	502_01	KG196A	309.50556451100	464.25834676700
Kilgarvan	502_01	KG197	713.54936406000	1070.32404609000
Kilgarvan	502_01	KG201	2222.86471403000	3334.29707105000
Kilgarvan	502_01	KG201	668.43891064500	1002.65836597000
Kilgarvan	502_01	KG202	676.73066653900	1015.09599981000
Kilgarvan	502_01	KG202A	616.92345241200	925.38517861800
		Total	23629.72679	36058.16823

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

The attenuation of silt and particulate matter generated as a result of the proposed works is a key mitigation measure for the proposed rehabilitation and decommissioning works. The main source of potential impact to influence significant adverse effects to the downstream areas of the River Shannon Callows SAC relate to particulate matter run-off from the site, during the rehabilitation works. A key consideration in this regard will be drain blocking as described in **Section 3.4.1.5** below. This methodology relies on the placement of terminal dams at the extremity of the drain; i.e. that closest to watercourse within the receiving environment. The

securing of strategic peat dams will allow the hydraulic separation between the proposed rehabilitation works and the receiving and downstream aquatic environment, and in so doing isolating these works from sensitive ecological and environmental receptors within the project zone of influence and in the case of Bunahinly-Kilgarvan Bog site and European Sites within the project Zone of Influence.

These mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

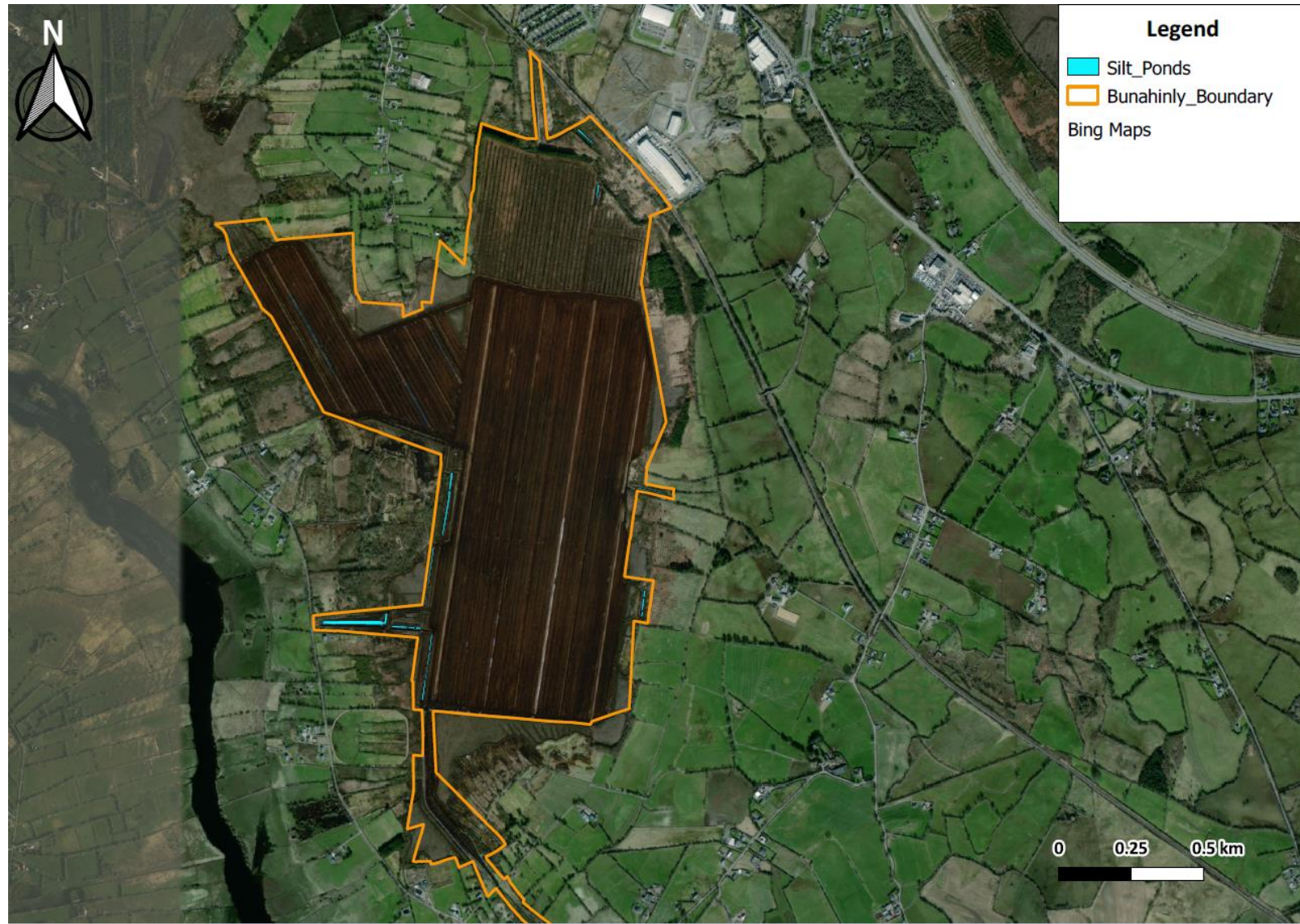


Figure 20: Bunahinly Bog Site Drainage and Silt Ponds



Figure 21: Kilgarvan Bog Site Drainage and Silt Ponds

3.4.1.4 Measures to avoid runoff when carrying out drain blocking

The principal mitigation for proposed rehabilitation works at Bunahinly-Kilgarvan Bog site will involve securing the works area from the receiving environment when rehabilitation works are ongoing. This will include the creation of terminal dams at the margins of the rehabilitation works. These dams will secure the works area from the receiving environment, in particular downstream watercourses and waterbodies. These terminal dams are an integral part of the rehabilitation design works and comprise mitigation by design.

- All Silt ponds will be cleaned prior to the commencement of upstream drain blocking.
- The current EPA Licence requirement for Bunahinly-Kilgarvan Bog specifies the need to clean silt ponds twice per annum, once before production and once before ditching. For the purposes of the rehabilitation works silt pond cleaning will be undertaken before and after the rehabilitation works. These works will be subject to visual inspections and Water Quality monitoring.
- When blocking drains, terminal dams i.e. the dams at the extremity of the drain and closest to any hydrologically connected watercourses, will be blocked first with AT MINIMUM 2 IN SERIES STANDARD DAMS, to prevent sediment release from subsequent dam insertion. This will form a hydraulic barrier between subsequent drain works and other rehabilitation works at the bog and the receiving and surrounding environment.
- The functionality and efficacy of these terminal dams will be monitored by the Project Ecologist/Environmental Supervisor and audited by the project engineering team. If the structural competency of the terminal dams become compromised, additional mitigation will be secured on site, such as silt fencing or additional check dams.
- Dams will be inspected during periods of dry weather to ensure no 'cracking' of peat has occurred which might allow for discharge.
- Discharge from all rehabilitated areas will be directed into silt ponds.
- Outfalls and overflow pipes from e.g. bunded cells will be directed into silt ponds.
- An Emergency Response Plan will be available in the event of any inadvertent release of a large volume of sediment.
- The above will be overseen by a suitably qualified Environmental Supervisor with support from members of the BnM Ecology Team.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.5 Measures for cleaning Silt Ponds within EPA Blue line features

Cleaning of silt ponds integrated adjoining or upstream EPA Blue line features, such as the Shannon Upper_120 watercourse, will follow the below best practice measures.

- Consideration of seasonal restrictions for instream works (works to commence between April / May – October inclusive) and requirement to liaise / notify Inland Fisheries Ireland (IFI) in advance of cleaning works commencing.
- Cleaning works to align with best practice measures, including BnM Standard Operating Procedures (SOPs) for works within and near watercourses, works with hydrocarbons, biosecurity measures when working at and different watercourses and waterbodies.
- Cognisance of capture of non-target aquatic species (Crayfish, lamprey, small fish etc.) within the dredged material and the secure rescue and translocation of these species downstream of the pond cleaning works. Cleaning of silt ponds will be completed under licence (where required) and in accordance with strict biosecurity measures. Silt ponds will be cleaned from the inlet point to the outlet

point allowing fish and aquatic life to migrate downstream as the works progress. The silt pond cleaning works and species translocation efforts will be overseen by a suitably qualified Project Ecologist or Environmental Supervisor and ongoing monitoring undertaken by the project ecologist.

- Excavated silt material will be placed at least 20m away from the blue line feature and will be deposited into corralled berms and thereafter secured into the nearby ground with the back of the machine excavator bucket, to ensure particulate matter is not mobilised during or following rainfall events.

It should be noted, that the silt pond network at Bunahinly-Kilgarvan Bog will not be the sole mitigation measure to attenuate silt laden waters emanating from the site during the project construction and operational phases. The design of the PCAS scheme requires the creation of internal drain blocking measures, which will in itself reduce the possibility of surface run-off to the receiving environment during the rehabilitation works. However, the functionality of a silt pond feature is based on its capacity to assimilate and attenuate ongoing surface water flows. Silt ponds need to be cleaned and emptied regularly to ensure they have sufficient capacity to operate efficiently.

Once rehabilitation works are completed and the bog has been rehabilitated, the bog will act as a natural repository for surface water, regulating and slowing the movement of surface water from Bunahinly-Kilgarvan Bog to the receiving environment. It is considered that the silt pond network will provide further attenuation and regulation to those measures associated with the PCAS measures during the project construction phase and the rewetted peatland habitat during the project's operational phase.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.6 Rehabilitation Design at Bunahinly-Kilgarvan Bog

Further detail is provided in this section on the proposed rehabilitation measures at Bunahinly-Kilgarvan Bog, particularly the provision of measures Deep Peat (DPT2) and Deep Peat 4 (DPT4).

It is proposed to develop these measures across 274.25ha of the Bunahinly-Kilgarvan Bog site (See **Figure 12**, and the accompanying Bog Rehabilitation Plan in **Appendix B**). The development of these measures will involve the construction of berms and field re-profiling, blocking outfalls, managing overflows and drainage channels for excess water and *Sphagnum* inoculation.

Once constructed and fully operational, these rehabilitation features will act in the same way as a series individual silt ponds. The functioning of these features will act as an source of surface water retention and attenuation on site, further mitigating the risk of silt release from this area to the receiving environment. The location of the silt control measures and silt ponds for Bunahinly-Kilgarvan Bog are presented in **Figures 20 and 21**.

In addition to the above design principles and their inherent attenuation capacities, it is considered that the River Shannon catchment affords substantial dilution rates. Given the substantial dilution rates that are achievable, it is not anticipated that the proposed rehabilitation measures will give rise to any perceptible impacts on water quality either alone or in-combination with other activities. Furthermore, the discharge from the bogs will be managed through silt traps which will substantially reduce the quantity of peat silt export from the bog. During low flow conditions when dilution potential will be lowest the silt traps will be most effective, in contrast during large events when silt traps are least effective very substantial dilution will be achievable.

Given the substantial dilution rates achievable within the River Shannon catchment, it is not anticipated that the proposed rehabilitation measures will give rise to any perceptible impacts on water quality either alone or

in-combination. Furthermore, the discharge from the bogs will be managed through silt traps (**Section 3.4.1.5**) which will substantially reduce the quantity of peat silt export from the bog. During low flow conditions when dilution potential will be lowest the silt traps will be most effective, in contrast during large events when silt traps are least effective very substantial dilution will be achievable within the Daingean and Figile watercourses.

3.4.1.7 Mortality or disturbance to Otter

- Confirmatory surveys for active Otter holts and breeding activity will be carried out 150m upstream and downstream of suitable habitat prior to the commencement of works in close proximity.
- Should it be confirmed all works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer and outside of 1 hours after sunrise or before sunset during winter.
- No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work will not take place within 15m of such holts, except under license.
- The prohibited area associated with otter holts, should they be located in confirmatory surveys, will, where appropriate, be protected from any inadvertent disturbance from any works or personnel occurring nearby such as at a silt pond and declared as 'Ecology Restriction Zone' with no mention of otters to any onsite staff.
- Appropriate awareness of the purpose of the excluded area will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each possible access point. All contractors or operators on site will be made fully aware of the procedures pertaining to Ecology Restriction Zones and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
- All PCAS activities will be carried out during daylight hours.
- All works will be carried out and completed in compliance with Bord na Mona's Standard Operating Procedure for otter (**Appendix F**).

This mitigation measure has been included for the avoidance of ex-situ effects to otter, a feature of Qualifying Interest for the River Shannon Callows SAC.

3.4.1.8 Mitigation when undertaking flood avoidance measures and retention of hydraulic barriers

The following mitigation and best practice measures will be undertaken at the Bunahinly-Kilgarvan Bog site. Although drain blocking and consequent and hydrological rewetting of the Bunahinly-Kilgarvan Bog site will occur, it is not intended to rewet or hydrologically alter adjoining lands or those areas surrounding the Bunahinly-Kilgarvan Bog site. To this end, the following mitigation measures will be implemented:

- Maintenance of peripheral drains and where required, to create hydraulic barriers between the site and the receiving environment. This will mean that lands and local drainage patterns associated with the margins of the BnM site will be maintained;
- Maintenance of specified internal drains to avoid flooding where required to maintain existing drainage of adjacent lands. In some instances this may include re-grading or widening of specific existing drains which currently act as preferential flow paths through the bog.
- Monitoring of adjacent lands will also be specified.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (Middle Shannon Callows SPA / River Shannon Callows SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

A map displaying hydraulic breaks is presented in **Figure 22** below.

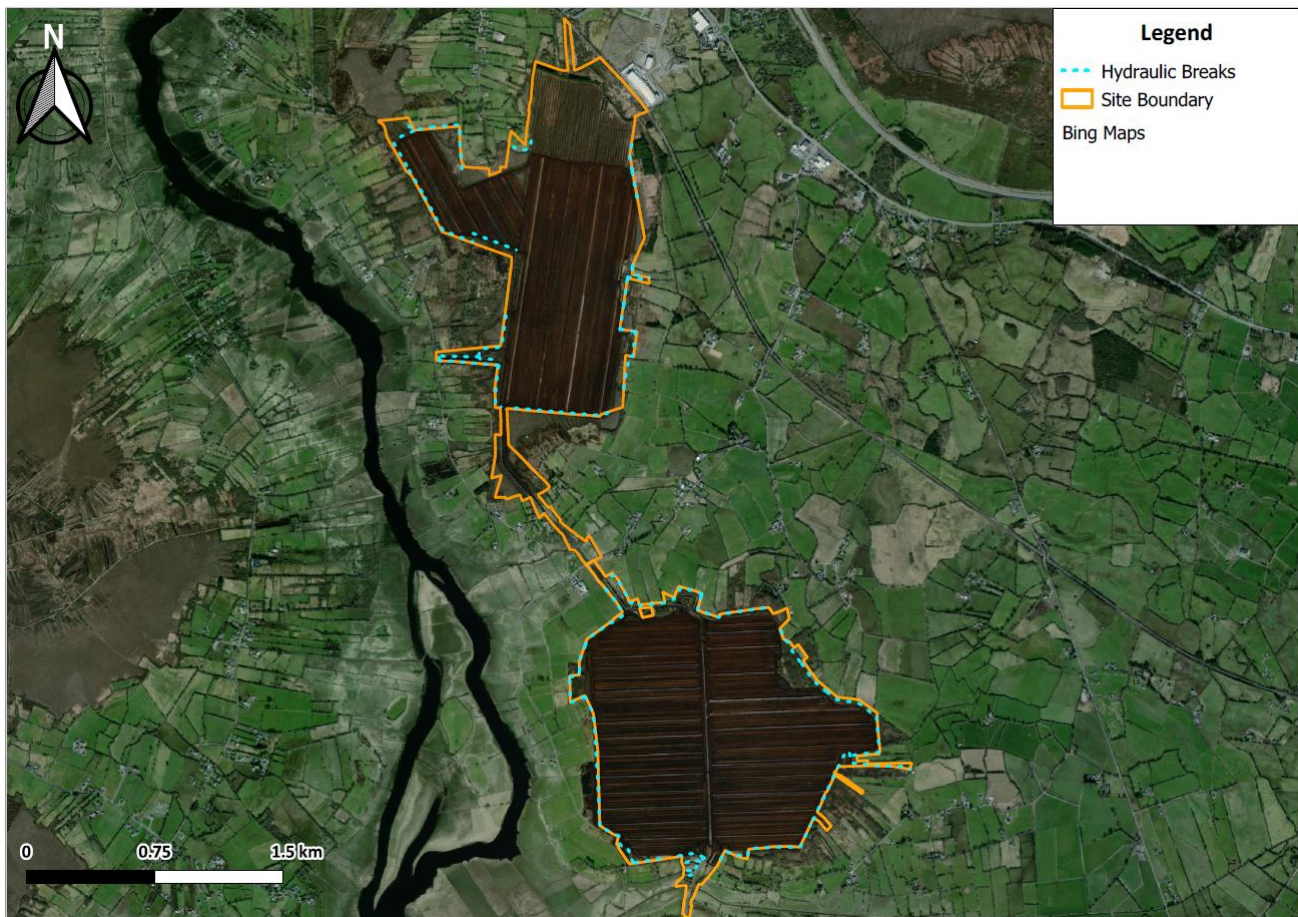


Figure 22: Hydraulic Breaks at Bunahinly-Kilgarvan Bog site

3.4.1.9 Mitigation during upgrade of boundary or peripheral drains outside of the proposed rehabilitation footprint

Boundary drains may require upgrading to retain their functionality as hydraulic breaks between the site and adjoining lands. These works will be completed during periods of low flow and will follow the below sequencing:

- Prior to commencement of channel works, at least 2 no. check dams will be placed at the downstream end of the drainage channel to control the flow of suspended sediment downstream to receiving watercourses.
- The most downstream check dam will comprise locally sourced turves and double bagged sand bags to initially secure and check downstream flow within the channel. At least 10m upstream of this check dam, a peat dam will be created and keyed into the adjoining drainage channel banks following the methodologies presented in **Section 2.6.1.3**.
- The build-up of silt material upstream of the constructed check dams will be monitored during upgrade works and the silt material will be removed from the drainage channel during works as it builds up. The material will be removed from the channel, spread and levelled into the adjacent field, a minimum of 10m from the nearest drain.
- The constructed check dams will be inspected during periods of dry weather to ensure no 'cracking' of peat has occurred which might allow for discharge.
- Upon completion of the upgrade works, all silt will be removed from the drainage channel immediately upstream of the 2 standard drain blocks prior their removal. The 2 standard drain blocks will only be

removed once all upgrade works are completed and once all water within the channel is suitably settled with no evidence of suspended solids within the water column.

- Where a new drain is required, it will be formed and established prior to connecting the drainage channel to wider drainage network. Only once it has formed and become established, with the bed and banks stabilised will it be connected to the wider drainage network. This approach will minimise to a negligible level the potential for suspended solids to be generated in waters within the new drainage channel and conveyed downstream to receiving watercourses and European Sites.
- An Emergency Response Plan will be available in the event of any inadvertent release of a large volume of sediment.

The set up of these features will be overseen by a suitably qualified Ecologist/Ecological Clerk of Works and ongoing monitoring undertaken by the project ecologist.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (Middle Shannon Callows SPA / River Shannon Callows SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.10 Mitigation through Design - Emergency Response Plan for Berm Failure

The below mitigation measures will be put in place when constructing and working with berm features as part of the bog rewetting and rehabilitation process. The berm design adopts an empirical design approach. It is proposed to apply proven sizes, proportions, materials, and assemblies from existing successful rehabilitation measures and flood defense berm features carried out in the past by Bord na Mona. This represents mitigation for the proposed rehabilitation works through design; i.e. integrating key design principles into the rehabilitation efforts to restrict potential berm failure and consequent run-off to the receiving environment. Further to the above, **Figure 19** above presents an Emergency Response procedure to address peat spillage in the unlikely event of berm failure.

- The selection of an appropriate drain block spacing.
- Drain blocks are formed at a minimum of 300mm higher than the adjacent ground level and are relatively wide to create a relatively strong structure out of peat that will mitigate water flow eroding the drain block construction.
- The provision of a key in the drain ensures a tight seal is maintained and a strong structure is developed to mitigate the formation of preferential flow paths around the edges of the drain block.
- Operators assigned to this work element are familiar with the technique and process and provide effective robust drain blocks. The operators are experienced and capable of adapting to the particular conditions encountered within the bog.
- Qualified, experienced Engineers overseeing the works during the installation phase ensure that quality procedures of the various elements are implemented and effectively meet the standards for quality service and performance.

Mitigation through maintenance and avoidance:

- Ongoing monitoring of completed peat drain blocks in the weeks after formation will ensure they have consolidated.
- The risk associated with peat drain block failure from an environmental and rehabilitation measures impact is generally categorised as low as a peat drain block failure will result in an impact that is

localised and silt control measures are provided upstream of all discharge points. There is an allowance for a reactive approach to remediation measures where required.

- A post rehabilitation Lidar and imagery survey will take place which will capture any areas where failures occurred resulting in remediation measures in a particular area if required. The Lidar survey will be implemented when the rehabilitation measures have been in place for a reasonable period of time allowing areas of weakness or potential concern to become apparent.
- In the event of a peat drain block failure, the adjacent peat drain blocks will generally have sufficient capacity to accommodate any additional hydrostatic pressures generated ensuring the negative impact is localised.
- If, after heavy rainfall, significant water flows in the drains cause localised drain block failure, the regular and frequent placing of drain blocks along the drain further downstream will mitigate the impact to the immediate area.
- As peat drain blocks are designed to retain water on the cutover resulting in a reduction in discharge into the boundary drains, preventing any negative impacts on adjacent agricultural land.

Further to the above, **Figure 19** above presents an Emergency Response procedures to address peat spillage in the unlikely event of berm failure.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC and Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.11 Mitigation through maintenance and avoidance:

- Ongoing monitoring of completed peat drain blocks in the weeks after formation will ensure they have consolidated.
- The risk associated with peat drain block failure from an environmental and rehabilitation measures impact is generally categorised as low as a peat drain block failure will result in an impact that is localised and silt control measures are provided upstream of all discharge points. There is an allowance for a reactive approach to remediation measures where required.
- A post rehabilitation LiDAR and imagery survey will take place which will capture any areas where failures occurred resulting in remediation measures in a particular area if required. The LiDAR survey will be implemented when the rehabilitation measures have been in place for a reasonable period of time allowing areas of weakness or potential concern to become apparent.
- In the event of a peat drain block failure, the adjacent peat drain blocks will generally have sufficient capacity to accommodate any additional hydrostatic pressures generated ensuring the negative impact is localised.
- If, after heavy rainfall, significant water flows in the drains cause localised drain block failure, the regular and frequent placing of drain blocks along the drain further downstream will mitigate the impact to the immediate area.
- As peat drain blocks are designed to retain water on the cutover resulting in a reduction in discharge into the boundary drains, preventing any negative impacts on adjacent agricultural land.

Further to the above, **Figure 19** above presents an Emergency Response procedures to address peat spillage in the unlikely event of berm failure.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (Middle Shannon Callows SPA / River Shannon Callows SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.12 Measures to avoid disturbance or displacement to SCI bird species

Birds

- An Ecological Restriction Zone will be adopted as part of the proposed rehabilitation works. This will include a buffered area ca. 150m from silt ponds that supported (or has the capacity to support) feeding over-wintering avifauna within Bunakinly-Kilgarvan Bogs – see **Figure 23** overleaf. Any potential disturbance to SCI birds outside of these Ecological Restriction Zones within Bunakinly-Kilgarvan Bog are considered to be reversible and not significant. The proposed Ecological Restriction Zone comprises a 150m buffer offsetting silt pond areas on site (shown in pink). PCAS activities will be restricted within this zone for the non-breeding period associated with the SCI species for which potentially adverse effect pathways exist. The Ecological Restriction Zone will apply in these areas between October and March inclusive.
- The extent of restriction will be overseen by the Project Ecologist dependant on water levels within the Ecological Restriction Zone and the usage of the site by avifauna. Works restrictions may be required between the months of October to March inclusive. The timing and duration of the restrictions and works practices during this period will be considered through ongoing liaison between the Project Ecologist and the project team.
- Once an Ecological Restriction Zone is operational, no PCAS scheme activities will take place within the prescribed zone. Travel and access within these sections of the site to undertake cleaning or maintenance activities may be permitted as they are likely to be intermittent, short term and of low intensity and duration. General usage will be restricted to use of existing rail and travel passes. All will be overseen by the Project Ecologist
- The timing restrictions associated with the Ecological Restriction Zone will be communicated to staff through toolbox talks, incorporated into the EMP for the project and visual markers will be placed on the peat extraction area to delineate the avoidance zone.
- Locations of these restriction zones will also be presented to the machine drivers via the built-in GPS tablet and ESRI application and the machine drivers will use this technology to avoid entering any restricted areas.
- Conformance will be audited through compliance checks by the Project Ecologist (with 'stop-works' authority).
- A standard operating procedure overseen by the Project Ecologist will be in place for all PCAS activities to avoid any significant effects on breeding birds. This will include ground nesting birds and will apply to silt pond cleaning, and cutaway activities. Restriction zones will be in place to avoid effects on any identified ground nesting birds/waterfowl as appropriate.

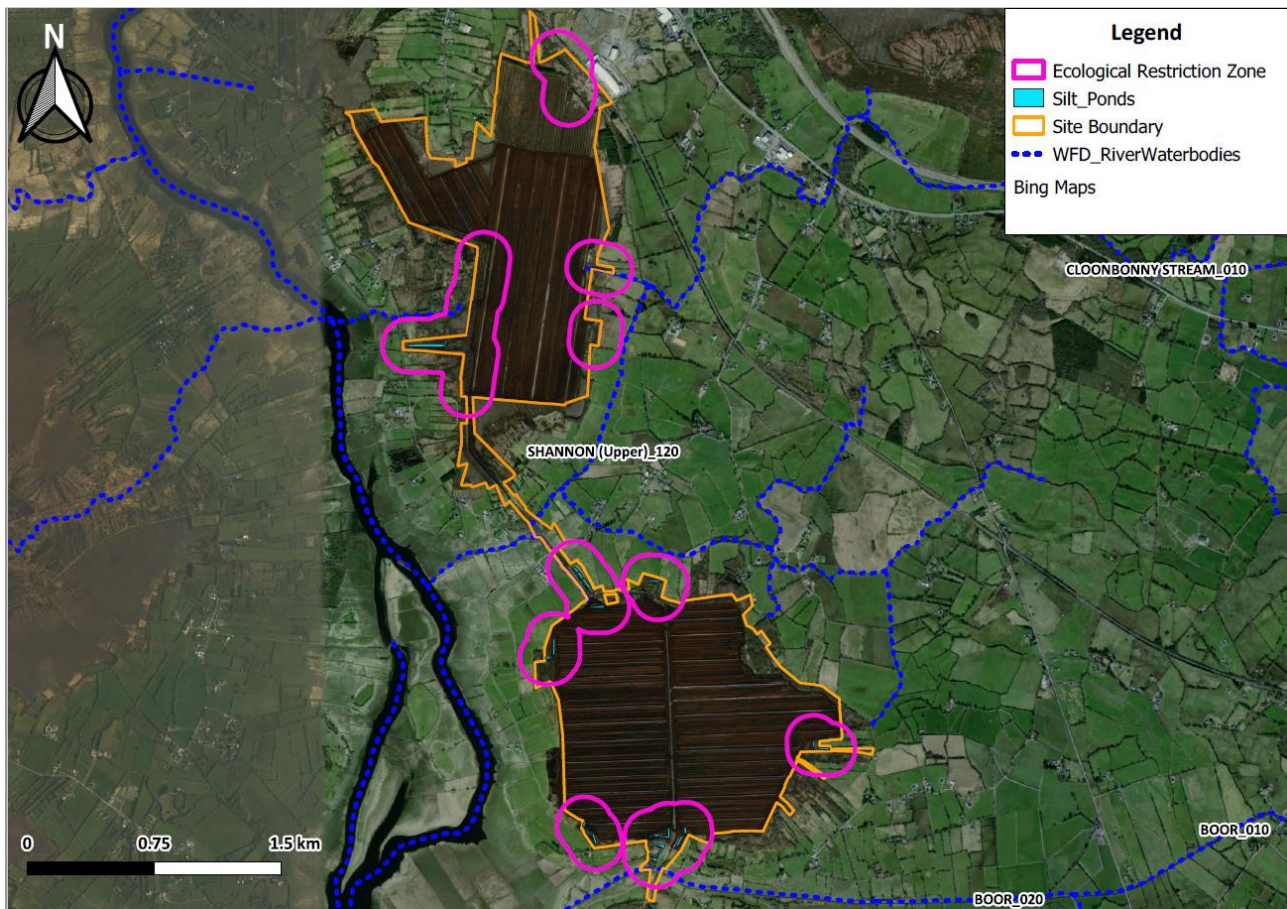


Figure 23: Ecological Restriction Zones in respect of overwintering avifauna

This mitigation measure has been included for the protection (and the avoidance of disturbance and displacement) of SCI species for adjacent and nearby SPA sites (Middle Shannon Callows SPA / Suck River Callows SPA).

3.4.1.13 Standard Operating Procedures for Loading of remaining Peat Stockpiles within Bunahinly-Kilgarvan Bog

The loading and removal of any remaining milled peat stockpiles at Bunahinly-Kilgarvan Bog will follow the below Standard Operating Procedures (SOPs) (See **Figure 24**). The below schematic / flow diagram displays how peat loading and removal will be completed at the Bunahinly-Kilgarvan Bog site. This will ensure that loading and removal of remaining peat stockpiles will be controlled, will follow an agreed protocol and will not result in the release or spread or milled peat to the receiving or surrounding environment and by extension European Sites within the project Zone of Influence.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

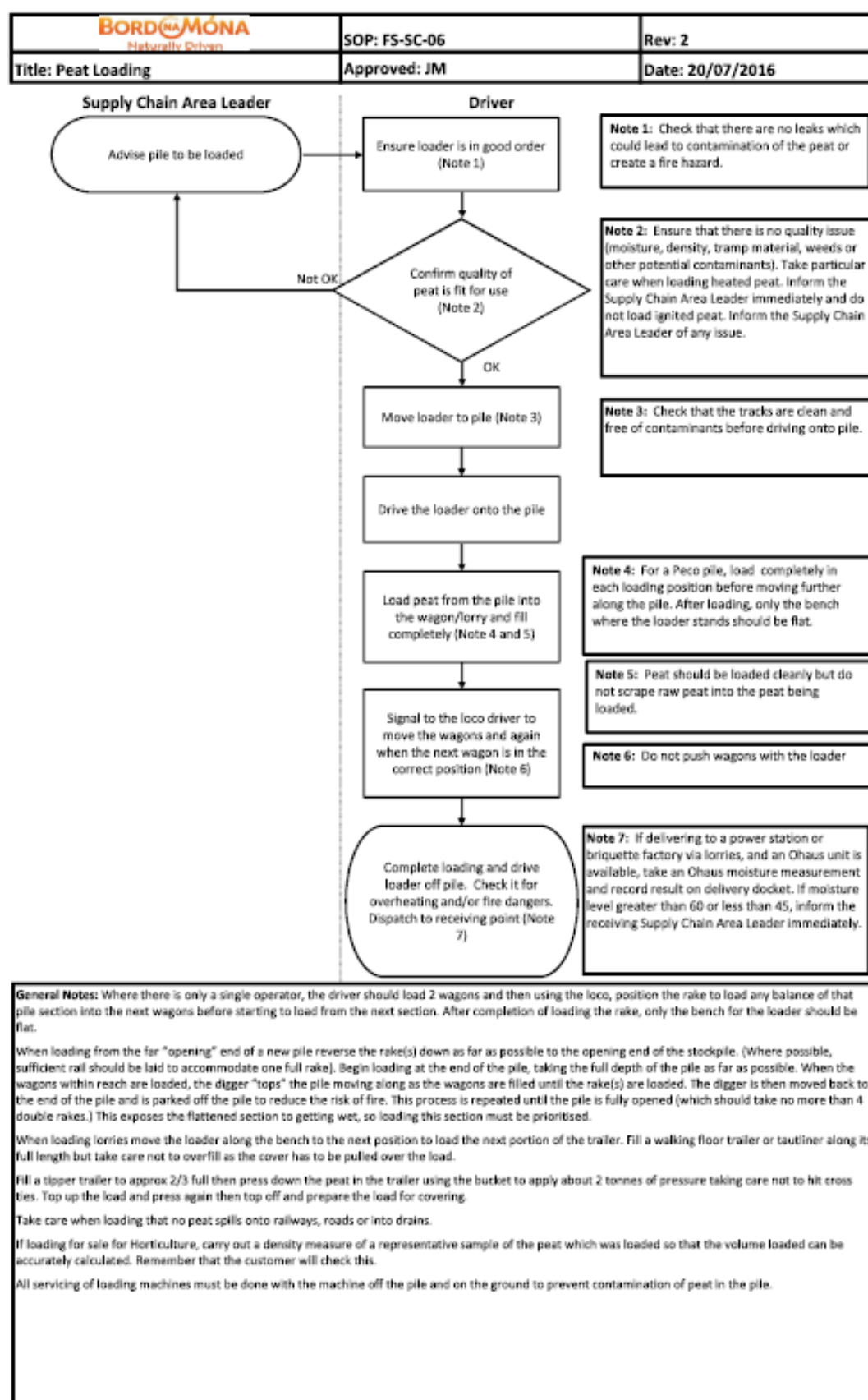


Figure 24: BnM Peat Loading SOPs

General Dust Control Steps:

The following measures will be put in place when loading and removing remaining peat stockpiles from Derrycolumb Bog.

- Wind Socks will be installed at all Bog Areas that have on-going complaints or are classed as Dust Sensitive, so that wind speed and direction can be assessed. BNM Item Number (412958).
- Any dust mitigation measures will be recorded and referenced on the daily return sheet.
- Headland peat collection will be recorded on PQMS form 023.
- Idle travel will be avoided as much as practically possible.
- Use grass paths and far headlands where possible when travelling in dust sensitive areas.
- Avoid travelling near main highways, dwellings and areas deemed as problematic regarding dust impact.
- Keep the headlands continuously ridged.
- Shelter Belts and Wind Breaks are used where feasible.
- Stockpiles are covered as per the Area Polycovering Plan.
- Machinery maintains slow speeds when travelling along headlands.
- All Continuous Improvement initiatives regarding Dust Mitigation will be fully investigated and supported by bog areas.

Headland Harvesting

- Keep the headland continuously ridged.
- Harvest headland peat every third crop, as per FS-PR-13 standard.
 - By Haku trailer where possible or,
 - Harvest to fields, disengage crossing drains and outfalls.
 - By utilising headland harvesters.
- Hydraulic Harrows where available, spoons will be lifted when travelling on a headland.
- Headland peat collection will be fully documented and recorded on PQMS form 023.
- Miller drums will be disengaged and lifted when approaching or travelling on a headland.
- Slow speeds should be maintained on a headland.
- Optimise routes to avoid dust sensitive areas.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (Middle Shannon Callows SPA / River Shannon Callows SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.2 Effectiveness of these measures

The Mitigation Measures (Project Design Measures, Management Plans, Environmental Emergency Response Measures and Best Practice Measures), listed in **Section 3.4.1** above, have been developed by the hydrological/drainage and ecological expert members of the Decommissioning and Rehabilitation project team in Bord na Móna and use best practice water quality protection techniques which are tried and tested regularly across the country. Furthermore, a suitably qualified Environmental Supervisor will be employed during the construction stage to monitor the effectiveness of these measures on a daily basis. The Environmental Supervisor will be supported and assisted by members of the BnM Ecology Team as required. A bespoke, site specific Environmental Management Plan (EMP) has also been prepared for the proposed works (See **Appendix E**).

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

3.4.2.1 Watercourse crossing works and aquatic habitat protection guidance

- Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries during construction works in and Adjacent to Waters;
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes; and,
- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.
- EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems

3.4.2.2 Pollution Prevention Guidance Notes (PPGs) & Guidance for Pollution Prevention (GPP)³³

- PPG 1: Understanding your environmental responsibilities - good environmental practices
- GPP 2: Above ground oil storage tanks
- PPG 3: Use and design of oil separators in surface water drainage systems
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer
- GPP 5: Works and maintenance in or near water
- PPG 6: Working at construction and demolition sites
- PPG 7: Safe storage - The safe operation of refuelling facilities
- GPP 8: Safe storage and disposal of used oils
- GPP 8: Safe storage and disposal of used oils
- GPP 8: Safe storage and disposal of used oils
- GPP 19: Vehicles: Service and Repair
- GPP 21: Pollution incident response planning
- GPP 22: Dealing with spills
- GPP 26 Safe storage - drums and intermediate bulk containers
- PPG 27: Installation, decommissioning and removal of underground storage tanks

³³<https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/>

3.4.2.3 Construction Industry Research and Information Association (CIRIA)³⁴

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

3.4.2.4 Invasive Species Guidance

- Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)³⁵;
- NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2010)³⁶;
- Managing Invasive Non-native Plants in or near Freshwater, Environment Agency (2010)³⁷;
- Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*, Invasive Species Ireland (2015);
- IFI Biosecurity Protocol for Field Survey Work, Inland Fisheries Ireland (2010)³⁸.

3.4.2.5 Guidance relating to Bird Disturbance

- Livesey et al., (2016) Database of bird flight initiation distances to assist in estimating effects from human disturbance and delineating buffer areas. *Journal of Fish and Wildlife Management* 7: 181–191.
- Scottish National Heritage (2009) Monitoring the impact of onshore wind farms on birds - January 2009. Guidance Note.
- Scottish National Heritage (2016) Dealing with Construction and birds. Guidance Version 3.
- Scottish National Heritage (2017) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities. Version 2. <https://www.nature.scot/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms>
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³⁴ Available from <https://www.ciria.org/>

³⁵ <http://cfinns.scrn.co.uk/wp-content/uploads/2014/06/2013-code-of-practice.pdf>

³⁶ <https://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf>

³⁷ <https://www.midsussex.gov.uk/media/1725/managing-invasive-non-native-plants.pdf>

³⁸ <https://www.fisheriesireland.ie/Biosecurity/biosecurity-protocol-for-field-survey-work.html>

3.4.2.6 Guidance relating to Mammal Disturbance

- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts³⁹.
- National Roads Authority. Guidelines for the treatment of Otters prior to the construction of National Road Schemes. <https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf>

3.4.3 Implementation of Mitigation Measures

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

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

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

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

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

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

3.4.5 Monitoring of the Implementation and Effectiveness of the Mitigation Measures

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

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

³⁹<https://www.gov.ie/en/publication/957aa7-consent-requirements-constructionalteration-of-watercourse-infrastru/>

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

3.4.6 How any mitigation failure will be addressed

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

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

Nonetheless contingency measures will be in place for unforeseen events such as oil/fuel spillages, water pollution or any inadvertent release of sediment. This will ensure any unforeseen potentially adverse effects are identified in a timely manner and appropriate remedial action taken immediately. The Ecologist, Environmental Compliance Officer, Engineer, H & S Manager, Site Supervisor and PSCS will have a 'stop-works' authority to temporarily stop works over part of the site to avoid an infringement of the Environmental

Commitments or an unforeseen environmental event. Works will not be allowed to re-commence until the issue is resolved.

3.5 Evaluation of the impact of Bunakinly-Kilgarvan Bog Decommissioning and Rehabilitation on the Integrity of the European Sites under consideration

Using the checklist in the **Table 23** below, the proposed Bunakinly-Kilgarvan Bog Decommissioning and Rehabilitation Plan, as described in **Appendix B**, both alone and in-combination with other projects, for adverse impacts on the integrity of the European Sites under consideration is examined, following the implementation of the measures described herein.

Table 23: Integrity of European Site checklist

<i>Does the project or plan have the potential to: Yes/No</i>	Middle Shannon Callows SPA (Site Code: 004096)	River Shannon Callows SAC (Site Code: 000216)	River Suck Callows SPA (Site Code: 004097)	Lough Ree SPA (Site Code: 004064)	Mongan Bog SPA (Site Code: 004017)
- cause delays in progress towards achieving the conservation objectives of the site?	No	No	No	No	No
- interrupt progress towards achieving the conservation objectives of the site?	No	No	No	No	No
- disrupt those factors that help to maintain the favourable conditions of the site?	No	No	No	No	No
- interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No	No	No	No	No
- change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No	No	No	No	No
- interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No	No	No	No	No
- reduce the area of key habitats?	No	No	No	No	No
- reduce the population of key species?	No	No	No	No	No
- change the balance between key species?	No	No	No	No	No
- reduce diversity of the site?	No	No	No	No	No
- result in disturbance that could affect population size or density or the balance between key species?	No	No	No	No	No

3.6 Conclusion

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

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

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

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

- Disturbance and displacement of SCI waterbird species occurring within the Middle Shannon Callows SPA and River Suck Callows SPA were found not to result in adverse effects due to the protective measures around timing and scheduling of works, such as the implementation of an exclusion zone during the period when SCI's may present (**Section 3.4.1.13**). This exclusion zone (150m) is selected based on the largest Minimum Approach Distance or MAD for the SCI species under consideration and constitutes Best Available Scientific knowledge.
- Impacts to water dependent and nutrient sensitive Annex I habitats and species of River Shannon Callows SAC as a result of deterioration in water quality. These habitats and species are as follows: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caerulea*) (6410), Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) (6510), Alkaline fens (7230), Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* (91E0), Otter (*Lutra lutra*) (1355).
- Disturbance and / or displacement of the otter population associated with the River Shannon Callows SAC.

The key protective measure being retention of silt laden water and potentially deleterious materials associated with the decommissioning and rehabilitation works to the project footprint. The attenuation of silt and particulate matter generated as a result of the proposed works is a key mitigation measure for the proposed rehabilitation and decommissioning works. The main source of potential impact to influence significant adverse effects to the downstream areas of the Middle Shannon Callows SPA and River Shannon Callows SAC relate to particulate matter run-off from the site, during the rehabilitation works. A key consideration in this regard will be drain blocking as described in **Section 3.4.1.5**. This methodology relies on the placement of terminal dams at the extremity of the drain; i.e. that closest to watercourse within the receiving environment. The securing of strategic peat dams will allow the hydraulic separation between the proposed rehabilitation works and the receiving and downstream aquatic environment, and in so doing isolating these works from sensitive ecological and environmental receptors within the project zone of influence and in the case of Bunakinly-Kilgarvan Bog and the Middle Shannon Callows SPA / River Shannon Callows SAC. Other key mitigation measures include the standard best practice environmental control measures, measures to avoid berm failure, the utilisation of existing surface water management infrastructure and the provision of further bespoke surface water management and mitigation measures. Once operational, the rehabilitated bog will provide further attenuation contributing to positive quality trends to the receiving environment, including the downstream areas of the Middle Shannon Callows SPA and River Shannon Callows SAC.

There are no significant effects identified which would adversely affect the Special Conservation Interests or conservation objectives of the various SPA's under consideration with regard to the densities, range or conservation status of the waterbird species and their supporting wetland habitats.

There are no significant effects identified which would adversely affect the Qualifying Interests or conservation objectives of the various SAC's under consideration with regard to the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.

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

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

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

Finding of No Significance Effects Report	
<i>Name and location of the Natura 2000 sites</i>	<p>The Screening Evaluation provided herein has examined the potential for any effects arising via source pathway linkages with regard to connectivity to designated European Sites (SACs and SPAs) within the zone of influence of all predicted Project impacts. An extended buffer zone of 15km was further considered, in line with NPWS guidance (DoEHLG, 2009), for evaluation of effects on any European Site which may arise associated with the proposed decommissioning and rehabilitation of Bunahinly-Kilgarvan Bog, as required. There is a total of 16 European sites located within the 15km zone of consideration:</p> <ul style="list-style-type: none"> - River Shannon Callows SAC (000216) - Mongan Bog SAC (000580) - Fin Lough SAC (000576) - Pilgrim's Road Esker SAC (001776) - Moyclare Bog SAC (000581) - Ferbane Bog SAC (000575) - Crosswood Bog SAC (002337) - Carn Park Bog SAC (002336) - Ballynamona Bog And Corkip Lough SAC (002339) - Castlesampson Esker SAC (001625) - Lough Funshinagh SAC (000611) - Lough Ree SAC (000440) - Middle Shannon Callows SPA (004096) - Mongan Bog SPA (004017) - River Suck Callows SPA (004097) - Lough Ree SPA (004064)
<i>Description of the project or plan</i>	<p>Overview: Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. P0502-01). As part of Conditions 10.1 and 10.2 of this license, respectively, decommissioning and rehabilitation must be undertaken to ensure the permanent rehabilitation of the bog lands within the licensed area. Bunahinly-Kilgarvan Bog is part of the Blackwater bog group. Bunahinly-Kilgarvan Bog is located in Co. Westmeath.</p>

Finding of No Significance Effects Report	
	<p>A document titled 'Bunahinly-Kilgarvan Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2022' has been prepared specifically to describe the proposed decommissioning and rehabilitation measures at Bunahinly-Kilgarvan Bog as appended to this document as Appendix B.</p> <p>Purpose: The decommissioning and Rehabilitation of Bunahinly-Kilgarvan Bog as required under IPC license.</p>
<i>Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?</i>	No
<i>Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?</i>	<p>Yes: In addition to the proposed decommissioning and rehabilitation plan the following projects were considered:</p> <ol style="list-style-type: none"> 1 Other BnM Bog Group Decommissioning and Rehabilitation 2 NPWS Raised Bog Restoration 3 Agricultural Activity 4 Turbary 5 Agriculture 6 Local Authority Development Plans 7 Local and Regional Amenity Developments 8 Local small residential and agricultural developments, extensions, alterations
The Assessment of Significant Effects	
<i>Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site</i>	<p>Disturbance of SCI species using sections of Bunahinly-Kilgarvan Bog and environs, within and ex-situ of the Middle Shannon Callows SPA. Ex-situ disturbance effects to SCI species associated with Mongan Bog SPA and Lough Ree SPA.</p> <p>Disturbance of QI species (otter) using upstream, adjoining and downstream sections of the site and Lough Ree SAC.</p> <p>Indirect effects to downstream sections of the River Shannon Callows SAC and their component water dependent and nutrient sensitive habitats and species as a result of run-off to receiving watercourses during the rehabilitation works (such as siltation, hydrocarbons etc.).</p>
<i>Explain why these effects are not considered significant</i>	<p>Following examination and analysis, and taking account of the protective measures proposed, the potential for disturbance and displacement of SCI waterbird species occurring within Middle Shannon Callows SPA were found not to result in adverse effects due to the protective measures around timing and scheduling of works, such as the implementation of an Ecological Restriction Zone exclusion zone during the period when SCI's may present. This</p>

Finding of No Significance Effects Report			
	<p>exclusion zone is selected based on the largest Minimum Approach Distance or MAD for the SCI species under consideration and constitutes Best Available Scientific knowledge.</p> <p>The key protective measure being retention of silt laden water and potentially deleterious materials associated with the decommissioning and rehabilitation works to the project footprint. The attenuation of silt and particulate matter generated as a result of the proposed works is a key mitigation measure for the proposed rehabilitation and decommissioning works. The main source of potential impact to influence significant adverse effects to the downstream areas of the River Shannon Callows SAC relate to particulate matter run-off from the site, during the rehabilitation works. A key consideration in this regard will be drain blocking. This methodology relies on the placement of terminal dams at the extremity of the drain; i.e. that closest to watercourse within the receiving environment. The securing of strategic peat dams will allow the hydraulic separation between the proposed rehabilitation works and the receiving and downstream aquatic environment, and in so doing isolating these works from sensitive ecological and environmental receptors within the project zone of influence and in the case of Bunahinly-Kilgarvan Bog and the River Shannon Callows SAC and Middle Shannon Callows SPA.</p>		
Name of Agency or Body Consulted	Summary of Response		
NPWS	<p>Formal consultation has been undertaken with NPWS regarding PCAS Decommissioning and Rehabilitation plans in 2021. There has been consultation within the last 2 months in relation to the Decommissioning and Rehabilitation plan</p> <p>Due cognisance was also given to information available on the NPWS website at:</p> <p>https://www.npws.ie/development-consultations#.</p> <p>In addition, two meetings were held with the EAU in 2021 to discuss consultation in general.</p>		
Data Collected to Carry out the Assessment			
Who carried out the assessment	Sources of Data	Level of assessment completed	Where can the full results of the assessment be accessed and viewed
Delichon Ecology	A combination of consultation, desktop studies and field surveys.	Screening for Appropriate Assessment Appropriate Assessment – Natura Impact Statement	Bord na Móna, Leabeg, Blueball, Tullamore, Co. Offaly, R35 P304.

Finding of No Significance Effects Report			

Appendix B Bunakinly-Kilgarvan Bog: Cutaway Bog Decommissioning and Rehabilitation Plan 2022

Bord na Móna

Bunahinly-Kilgarvan Bog

**Cutaway Bog Decommissioning and
Rehabilitation Plan**

2022

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

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

This licence condition requires Bord na Móna agree with the EPA the measures that will provide for rehabilitation, i.e. stabilisation of Bunahinly-Kilgarvan Bog upon cessation of peat production and compliments the licence requirement to decommission the site.

Rehabilitation generally comprises site stabilisation with natural colonisation with or without targeted management.

Industrial peat production has now fully ceased at Bunahinly-Kilgarvan Bog.

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

While this document outlines the enhanced rehabilitation measures planned for Bunahinly-Kilgarvan bog, activities which goes beyond that required by Condition 10 in the Licence, rehabilitation necessary to comply with the ‘standard’ requirement of Condition 10 (in the absence of the Scheme) is also included, to estimate costs. The inclusion of the ‘standard’ rehabilitation together with the enhanced rehabilitation in this document allows the Scheme Regulator to distinguish and objectively determine the specific activities (and their associated costs) eligible for support under the Scheme.

Bord na Móna have defined the key rehabilitation outcome at Bunahinly-Kilgarvan Bog as environmental stabilisation, re-wetting and setting the bog on a trajectory towards development of naturally functioning peatland and wetland habitats.

Any consideration of any other future after-uses for Bunahinly-Kilgarvan Bog, such as amenity, will be conducted in adherence to the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.

Document Control Sheet						
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Document Status:	Final					
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Rev.	1.1	Author(s):		Checked By:		Approved By:
Name(s):						
Date:						

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

Table of Contents

Non-technical summary	1
Summary.....	3
1. Introduction.....	6
1.1 Constraints and Limitations.....	7
2. Methodology	9
2.1 Desk Study	9
2.2 Consultation	11
2.3 Field Surveys	11
3. Site Description.....	12
3.1 Status and Situation.....	12
3.1.1 Site history.....	12
3.1.2 <i>Current land-use</i>	12
3.1.3. Socio-Economic conditions.....	12
3.2 Geology and Peat Depths	13
3.3 Key Biodiversity Features of Interest.....	14
3.3.1 Current habitats.....	14
3.3.2 Species of conservation interest	17
3.3.3 Invasive species	17
3.4 Statutory Nature Conservation Designations.....	17
3.4.1 Other Nature Conservation Designations	18
3.5 Hydrology and Hydrogeology	18
3.6 Emissions to surface-water and water-courses.....	19
3.7 Fugitive Emissions to air	23
3.8 Carbon emissions.....	23
3.9 Current ecological rating	23
4. Consultation	24
4.1 Consultation to date	24
4.2 Issues raised by Consultees	25
4.2.1 Assessments of rehabilitation	25
4.2.2 Assessments of rehabilitation	25
4.2.3 Restoration scope.....	25
4.2.4 Monitoring.....	25

4.2.5	Flooding and drainage	25
4.2.7	Other issues	26
4.3	Bord na Móna response to issues raised during consultation	26
4.3.1	Consultation	26
4.3.2	Assessments of rehabilitation	26
4.3.3	Restoration scope	26
4.3.4	Monitoring	27
4.3.5	Flooding, drainage or other impacts on adjacent land.	27
4.3.6	Amenity	27
4.3.8	Future management	28
4.3.9	Other issues	28
4.3.10	Concluding statement.	28
5.	Rehabilitation Goals and Outcomes	29
6.	Scope of Rehabilitation.....	31
6.1	Key constraints	31
6.2	Key Assumptions	32
6.3	Key Exclusions.....	32
7.	Criteria for successful rehabilitation	33
7.1.	Criteria for successful rehabilitation to meet EPA IPC licence conditions:	33
7.2.	Critical success factors needed to achieve successful rehabilitation as outlined in the plan.....	38
8.	Rehabilitation Actions and Time Frame	39
8.1	Short-term planning actions (0-1 years).....	40
8.2	Short-term practical actions (0-3 years).....	41
8.3	Long-term (>3 years)	42
8.5	Budget and costing.....	42
9.	Aftercare and Maintenance.....	43
9.1	Programme for monitoring, aftercare and maintenance.....	43
9.2	Rehabilitation plan validation and licence surrender – report as required under condition 10.4	44
10.	References.....	45
	Appendix I: A standard peatland rehabilitation plan to meet conditions of the IPC Licence	49
	APPENDIX II: Bog Group Context.....	53
	APPENDIX III: Ecological Survey Report.....	58
	APPENDIX IV. Environmental Control Measures to be applied to bog rehabilitation.....	62
	APPENDIX V. Biosecurity.....	63

Appendix VI. Policy and Regulatory Framework	64
APPENDIX VII. Decommissioning	71
APPENDIX VIII. Glossary	74
APPENDIX IX. Extractive Waste Management Plan	76
APPENDIX X. Mitigation Measures for the Application of Fertiliser	80
APPENDIX XI. Consultation Summaries	81
APPENDIX XII. Archaeology	89
APPENDIX XIII. INITIAL WATER QUALITY DATA FROM BUNAHINLY-KILGARVAN	92

NON-TECHNICAL SUMMARY

- Bord na Móna is planning to rehabilitate Bunahinly-Kilgarvan Bog, south of Athlone town, in Co. Westmeath.
- Bunahinly-Kilgarvan comprises two separate bogs that are connected via a narrow strip of peatland with Bunahinly to the north and Kilgarvan to the south.
- Peat harvesting is now finished at Bunahinly-Kilgarvan Bog.
- This is happening as Bord na Móna are obliged to carry out peatland rehabilitation via an IPC License issued by the Environmental Protection Agency. In addition, the Government has agreed to support peatland rehabilitation via the establishment of the Peatland Climate Action Scheme (PCAS). This is funded via the government and by Bord na Móna.
- The key objective of peatland rehabilitation is environmental stabilisation. This means developing habitats and vegetation back onto the bare peat, and minimising effects to downstream waterbodies. Bunahinly-Kilgarvan was drained in the past to allow peat extraction. Better results for water quality improvements, climate action, the reduction of carbon emissions and biodiversity are achieved when the remaining peat is re-wetted. This means drain-blocking and other measures to raise water levels to the surface of the bog and to encourage the natural colonisation of vegetation.
- Bunahinly-Kilgarvan Bog was utilised for industrial peat production from the 1990's until 2018 and much of the former production area currently comprises of bare peat. There are some already established pioneer peatland habitats. It is a relatively young production bog and it still has relatively deep residual acidic peat remaining.
- In general soggy ground conditions are preferred. This means the remaining peat is wet and that plants that prefer wetter conditions, like Bog Cotton and *Sphagnum* moss, will thrive.
- Many Bord na Móna bogs cannot be restored back to raised bog immediately, as so much peat has been removed and the environmental conditions have been modified. However other peatland habitats with Heather, Bog Cotton, Rushes, Purple Moor-grass, Bog-mosses and scattered trees will develop, and in time a naturalised peatland can be restored.
- The development of a range of habitats in Bunahinly-Kilgarvan Bog will support biodiversity including plants, insects, birds and mammals. This includes some species that are rare and protected in the wider landscape. It will increase the national area of native woodland. Many wetland habitats in the wider landscape have been reclaimed for agriculture and other uses and peatland rehabilitation is an opportunity to create new wetland and peatland habitats.
- Measures proposed for Bunahinly-Kilgarvan Bog include drain blocking, cell bunding and other measures required to raise water levels to the surface of the peat (changing levels of pipes for example). Only internal drains will be blocked. Some fertiliser will be spread on headlands and other areas (a small part of the overall area) to encourage vegetation growth.
- Bord na Móna plan to carry out this work in 2022 and 2023.
- These rehabilitation measures will be planned by a team consisting of expert ecologists, hydrologists and engineers. It is a guiding principle of Bord na Móna rehabilitation planning that no actions or activities will be undertaken that would negatively impact on adjacent land. No boundary drains will be blocked, in general. Water will still leave the bog via the existing outlets.
- It will take some time for vegetation and habitats to fully develop at Bunahinly-Kilgarvan, and a peatland ecosystem to be restored. However, it is expected that most of the bog will be developing pioneer habitats after 5-10 years.

- This is a peatland rehabilitation plan. This plan does not consider future after-use or development. Bord na Móna continually reviews its land-bank to consider future commercial or industrial developments, such as renewable energy. Any other proposed development will be planned in adherence to relevant planning guidelines and will consider the rehabilitation and the condition of the bog.
- Peatland rehabilitation of these bogs will bring a range of benefits to the local community via improvements to the local landscape and is also important for supporting national policies and strategies in relation to reduction of carbon emissions from these peatlands, supporting biodiversity and improvements to water quality.

SUMMARY

Name of bog: Bunahinly-Kilgarvan Bog

Area: 394 ha

Site description:

- Industrial Peat extraction at Bunahinly-Kilgarvan commenced in the 1990's and ceased in 2018. The peat was formerly used as fuel peat in West Offaly Power Station Power in Shannonbridge.
- Bunahinly-Kilgarvan has a gravity drainage regime.
- The majority of the former peat production footprint is bare peat, or pioneering bare peat. Active drainage channels are still present.
- Residual peat depths at Bunahinly are deep (>2m) for the most part but reach depths of >4.5m in places.

Rehabilitation goals and outcomes

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

This is defined as:

- Meeting conditions of the IPC licence;
- Stabilisation or improvement in water quality parameters (e.g. suspended solids);
- Environmental stabilisation.
- Optimising hydrological conditions for the further development of embryonic *Sphagnum*-rich peat forming communities, wetland, Reed swamp, wet woodland and fen habitats on cutaway peats, along with management of existing pioneer habitats.
- Rehabilitation will support the National Policies on Climate Action and GHG mitigation by maintaining and enhancing the current residual peat storage capacity of the bog (locking the carbon into the ground). It is expected that the bog will have reduced emissions (reduced source) as it develops naturally functioning peatland habitats and will have some potential to develop carbon sink function in part. It will also support Ireland's commitments towards Water Framework Directive and the National River Basin Management Plan 2018-2021.
- Optimising hydrological conditions for the protection of any exposed archaeological structures, their retention in situ and preservation into the future, where possible.

Scope of rehabilitation

The principal scope of this rehabilitation plan is defined by:

- The area of Bunahinly-Kilgarvan.
- EPA IPC Licence - Ref. P0502-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The key objective of 'rehabilitation', as required by this licence, is achieved by the **environmental stabilisation** of the bog.
- **The Scheme (PCAS)** includes enhanced measures which are designed to exceed/meet the standard stabilisation requirements as defined by the IPC Licence and to enhance the ecosystem services of Bunahinly-Kilgarvan, in particular, optimising **climate action benefits**.
- The key goals and outcomes of rehabilitation at this bog outlined above.
- To minimise potential impacts on neighbouring land, some boundary drains around Bunahinly-Kilgarvan will be left unblocked, as blocking boundary drains could affect adjacent land.
- Other constraints include Turbary rights and Archaeology.

Criteria for successful rehabilitation:

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

- Rewetting of residual peat in the former area of industrial peat production to slow water movement across the site to retain silt, encouraging development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat, and the creation of embryonic *Sphagnum*-rich peat forming communities along with further wetland or fen habitat (IPC Licence validation). The target will be the delivery of measures and this will be measured by an aerial survey after rehabilitation is completed. (IPC Licence validation).
- Stabilising/improving potential emissions to water (e.g. suspended solids). This will be measured via water quality monitoring (suspended solids and ammonia) for at least 2 years after the rehabilitation has been completed. (IPC Licence validation).
- Reducing pressure from peat production on the local river catchment (WFD) (IPC Licence validation). This will be measured by the EPA WFD monitoring programme.
- Optimising the extent of suitable hydrological conditions for climate action (Climate action verification). This will be measured by an aerial survey after rehabilitation has been completed.
- Reduction in carbon emissions (Climate action verification). Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Setting the site on a trajectory towards establishment of a mosaic of compatible habitats including embryonic *Sphagnum*-rich peat forming communities, heath, wetland, fen, Reed swamp, wet woodland, scrub and Birch woodland communities, where conditions are suitable, and eventually towards a reduced Carbon source/partial carbon sink (Climate action verification). Some areas will naturally be dry and develop Birch woodland and other drier habitats. It will take some time for stable naturally functioning habitats to fully develop at Bunahinly-Kilgarvan Bog.
- Improvement in biodiversity and ecosystem services. (Climate action verification).

Meeting climate action verification criteria and monitoring of these criteria after the Scheme is completed is dependent on support from the Climate Action Fund and Ireland's National Recovery and Resilience Plan or other sources of funding.

Summary of measures:

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

- Planning actions, including developing a detailed site plan and carrying out a hydrology and drainage appraisal.
- Carry out an ecological appraisal of the potential impacts of the planned rehabilitation.
- Carry out proposed measures, which will be a combination of hydrological management, drain blocking, peat field re-profiling, wetland creation and fertiliser applications targeting bare peat sections of headlands, high fields and other areas.
- Silt ponds will continue to be maintained during the rehabilitation and decommissioning phase.
- Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.
- Decommissioning of silt-ponds will be assessed and carried out, where required.

Timeframe:

- 2021-2022: Short-term planning actions.
- 2022: Short-term practical actions.
- 2022-2025: Any Long term practical actions; Evaluate success of short-term rehabilitation measures outlined above and remediate, where necessary.
- 2025: Decommission silt-ponds, if necessary.

Monitoring, after-care and maintenance

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

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

Additional Monitoring:

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

Validation and IPC Licence surrender

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

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

1. INTRODUCTION

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. P0502-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Bunahinly-Kilgarvan bog is part of the Blackwater bog group (see Appendix II for details of the bog areas within the Blackwater Bog Group). Bunahinly-Kilgarvan Bog is located in Co. Westmeath.

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

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

Note: This plan should be read in conjunction with the accompanying Map book.

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme on its peatlands. Note this proposal is also known colloquially as the 'Peatlands Climate Action Scheme' (PCAS). The additional costs of the Scheme will be supported by Government through the Climate Action Fund and Ireland's National Recovery and Resilience Plan, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator. Bord na Móna have previously identified a footprint of 33,000 ha as peatlands suitable for this scheme. This Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations (Appendix VII & IX) under existing EPA IPC licence conditions. Improvements supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. The Scheme commenced in 2021.

Only the costs associated with the additional, enhanced and accelerated rehabilitation, i.e. those measures which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10, will be eligible for support under the Scheme. Bord na Móna have now announced the complete cessation of industrial peat production across its estate (January 2021).

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

It is envisaged that the Enhanced Rehabilitation Scheme will support activities, interventions, or measures across the Bord na Móna cutaway peatlands which accelerate the original timelines. Selected rehabilitation measures

will take account of site environmental conditions, which can vary significantly. These measures potentially include:

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

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

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

Bunahinly-Kilgarvan Bog is proposed to be part of this Scheme (PCAS), which commenced in 2021 and this rehabilitation plan outlines the approach to be taken.

1.1 Constraints and Limitations

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

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

It also seeks to outline measures to optimise climate action and other ecosystem services benefits, mainly through hydrological management.

This document covers the area of **Bunahinly-Kilgarvan Bog**.

Bord na Móna will continue to review the future after-use of its land-bank. Any consideration of any other future after-uses for Bunahinly-Kilgarvan, will be conducted in adherence to the relevant planning legislation and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.

Industrial peat extraction at Bunahinly-Kilgarvan permanently ceased in 2018, although some remaining stock is still being removed. Currently the former peat production areas comprise a mosaic of largely bare peat along

with pioneering cutaway habitats, in addition to marginal¹ habitats. At the northern extreme of Bunahinly a section of previously drained production bog has been subject to some rehabilitation and re-wetting.

It is anticipated that the combination of active enhanced rehabilitation measures and natural colonisation will quickly accelerate environmental stabilisation. Nevertheless, it will still take some time (30-50 years) for naturally functioning peatland ecosystems to fully re-establish.

Parts of Bunahinly-Kilgarvan 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. It is beyond the scope of this rehabilitation plan to address turf cutting issues on Bunahinly-Kilgarvan Bog that are outside of the control of Bord na Móna. Nevertheless, Bord na Móna are aware of such issues which may constrain the proposed rehabilitation actions, and this rehabilitation plan considered potential impacts of these on the delivery of the stated objectives.

Rehabilitation in other areas of the bog may also be constrained due to other property issues or issues such as rights of way. Several Rights of Way exist at Bunahinly-Kilgarvan. There is at least one archaeological feature present in the Kilgarvan portion of Bunahinly-Kilgarvan which may constrain PCAS activities.

Parts of Bunahinly-Kilgarvan may be subject to surface water flooding during the winter months dependant on rainfall levels and levels of flooding along the adjacent River Shannon . Both Bunahinly and Kilgarvan are subject to gravity drainage only, and have never been pumped.

The BnM industrial rail line on site at Bunahinly-Kilgarvan connects to Shannonbridge Power Station which ceased operation in 2020. Some extant peat stock is present at Kilgarvan.

Part of Bunahinly (which was previously subject to rehabilitation) is currently being considered by Bord na Mona for future potential industrial/commercial use, due to its proximity to Athlone.

Note: Two Mapbooks accompany this Rehab Plan and are referenced where applicable.

¹ Marginal land is defined as land around the margin of the industrial peat production area. This margin generally contains a range of habitats including scrub, Birch woodland, cutover bog and raised bog remnants.

2. METHODOLOGY

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

The ecological information and site information collected during the Bord na Móna ecological baseline survey, additional confirmatory site visits (covering the period 2012 to 2021 inclusive) and monitoring and desktop analysis forms the basis for the development of the rehabilitation plan for the bog, along with:

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

2.1 Desk Study

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

- Anderson *et al.* (2017). An overview of the progress and challenges of peatland restoration in Western Europe.
- Barry, T.A. et al (1973). A survey of cutover peats and underlying mineral soils. Soil Survey Bulletin No. 30. Dublin, Bord na Móna and An Foras Taluntais.
- Bonn *et al.* (2017). Peatland restoration and ecosystem services- science, policy and practice.
- Carroll *et al.* (2009). *Sphagnum* in the Peak District. Current Status and Potential for Restoration. Moors for the Future Report No 16.
- Clark & Rieley (2010). Strategy for responsible peatland management.
- Eades *et al.* (2003). The Wetland Restoration Manual.
- Farrell & Doyle (2003). Rehabilitation of Industrial Cutaway Atlantic Blanket Bog, NW Mayo, Ireland.
- Feehan, J. (2004). A long-lived wilderness. The future of the north midlands peatland network. Department of Environmental Resource Management, UCD.

- Gann *et al.* (2019). International Principles and Standards for the practice of Ecological Restoration.
- Hinde *et al.* (2010). *Sphagnum* re-introduction project: A report on research into the re-introduction of *Sphagnum* mosses to degraded moorland. Moors for the Future Research Report 18.
- Joosten & Clarke (2002). Wise Use of mires and peatlands – Background and Principles including a framework for Decision-making.
- Lindsay (2010). Peatbogs and Carbon: a Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change.
- Mackin *et al.* (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al.* (2011). The Fen Management Handbook (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised Bog Special Areas of Conservation management plan. Department of Arts, Heritage and the Gaeltacht.
- Pschenyckyj *et al.*, 2021, Optimising Water Quality Returns from Peatland Management while Delivering Co-Benefits for Climate and Biodiversity. An Fóram Uisce.
- Quinty & Rochefort (2003). Peatland Restoration Guide, second edition. Canadian *Sphagnum* Peat Moss Association and New Brunswick Department of Natural Resources and Energy.
- Regan, *et al.* (2020). Ecohydrology, Greenhouse Gas Dynamics and Restoration Guidelines for Degraded Raised Bogs. EPA Research Report. Prepared for the Environmental Protection Agency by Trinity College Dublin.
- Renou-Wilson *et al.* (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.
- Schouten (2002). Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies. Dúchas - The Heritage Service of the Department of the Environment and Local Government, Ireland;
- Thom (2019). Conserving Bogs – Management Handbook.
- Wheeler & Shaw (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction.
- Wittram *et al.* (2015). A Practitioners Guide to *Sphagnum* Reintroduction. Moors for the Future Partnership.

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

- Blackwater Integrated Pollution Control Licence;
- Blackwater Annual Environmental Reports;
- Review of the National Biodiversity Data Centre (NBDC) webmapper;
- Inland Fisheries Ireland (IFI) Reports;
- Environmental Protection Agency database (www.epa.ie);
- EPA Guidance on Requests for Alterations to a Licensed Industrial or Waste Activity;
- BirdWatch Ireland online data (including I-WeBS and CBS datasets; www.birdwatchireland.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Historic Environment Viewer at <https://webgis.archaeology.ie/historicenvironment/>
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);

- Water Framework Directive catchments.ie/maps/ Map Viewer (www.catchments.ie);
- OPW Indicative Flood Maps (www.floodmaps.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie);
- River Basin Management Plan for Ireland 2018 – 2021;
- Bord na Móna Annual Report 2020.
- Spatial data in respect of Article 17 reporting, available online at <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17>.

2.2 Consultation

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

2.3 Field Surveys

Bord na Móna carried out a baseline ecological survey of all of its properties in 2009-2012 and developed habitat maps. As part of this exercise, Bunahinly-Kilgarvan Bog was surveyed in November of 2010. Additional ecological walk-over surveys and visits have taken place between 2010-2021 (visited during Autumn of 2011 and 2012 and winter of 2013), but also a final confirmatory survey took place in June (Bunahinly) and July (Kilgarvan) of 2021. 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). Map outputs including all habitat maps and target notes were produced using GIS software application packages (ArcGIS). General marginal habitats and other habitats that had not been modified significantly by industrial peat extraction were classified using Fossitt *et al.* (2000). Plant nomenclature for vascular plants follows Stace (2010), while mosses and liverworts nomenclature follows identification keys published by the British Bryological Society (2010). A more detailed Bord na Móna classification system was 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 site visit was used to categorise any changes in habitat extent at Bunahinly-Kilgarvan in June 2021.

A detailed ecological survey report for Bunahinly-Kilgarvan is contained in Appendix II.

3. SITE DESCRIPTION

Bunahinly-Kilgarvan Bog is located 1km south of Athlone in Co. Westmeath. It is also adjacent to the River Shannon, which is located 50-150m away from the western boundary of the site. Bunahinly-Kilgarvan comprises two separate bogs that are connected via a narrow strip of peatland with Bunahinly to the north and Kilgarvan to the south. This site is located in a low-lying area and the adjoining grassland to the west is prone to flooding during winter months.

The main landscape feature in this area is the River Shannon and its associated riparian zone and floodplain.

See Drawing number BNM-DR-23-09-01 titled **Bunahinly Bog: Bog Site Location** and BNM-DR-23-10-01 titled **Kilgarvan Bog: Bog Site Location**, included in the accompanying Mapbooks², which illustrate the location of Bunahinly-Kilgarvan Bog in context to the surrounding area.

3.1 Status and Situation

3.1.1 Site history

Both Bunahinly and Kilgarvan bog came into production relatively recently (1990's), and ceased in 2018. The peat was formerly used as fuel peat in West Offaly Power Station Power in Shannonbridge.

A deep peat cutaway re-wetting rehabilitation trial was previously established in the north of Bunahinly. The aim was to determine the effect of blocking drains and raising the water level in deep peat areas out of production where there was potential to regenerate Sphagnum-rich peat-forming vegetation communities. The drain-blocking was completed in September 2011. Additional drain-blocking and re-wetting work was completed in 2016 in this area comprising an additional bog remnant. Monitoring of this re-wetting indicates that it has been relatively successful. A small area that is subject to water flow from the wider area is now developing *Sphagnum*-rich peat-forming vegetation.

A Sphagnum inoculation trial using Beadamoss was previously established at Bunahinly in 2017, which covers 1 ha. Initial monitoring indicates that Sphagnum colonisation on the inoculated plot has been relatively poor. It is through that this was due to drier ground conditions.

3.1.2 Current land-use

Industrial peat production has now permanently ceased at Bunahinly-Kilgarvan. Some extant stock is still present at Kilgarvan (July 2021). It is expected that this peat stock will be removed during 2022 and 2023.

3.1.3 Socio-Economic conditions

Bord na Móna has historically been a vital employer for the rural community of the Midlands of Ireland. Bord na Móna compiled a report on the role of peat extraction in the midlands historically in which they report that in 1986, by the end of Bord na Móna's Third Development Programme, a total of twenty-three work locations had been established around the country. The company had an average employment of approximately 4,688 in the mid 1980's, with a peak employment of 6,100 during the production season, which placed it among the country's

² Cutaway Bog Decommissioning and Rehabilitation Plan – Bunahinly-Kilgarvan Bog Map Book

largest commercial employers. The importance of such levels of employment were largely due to its regional concentration in the Midlands and the lack of alternative employment opportunities at the time.

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

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

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

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

3.2 Geology and Peat Depths

3.2.1 Sub-soil geology

At Bunahinly, the underlying geology is categorised as 'Waulsortian limestones' comprising massive, unbedded limestone; whilst the underlying geology at Kilgarvan is the 'Ballysteen formation' which comprises dark muddy limestone, shale.

Published bedrock and Quaternary geological maps only present the shallowest deposits encountered, and fail to present in information on the buried peat substrate. Coring carried out by RPS in 2021 across Bunahinly-Kilgarvan provided further insight into the deposits underlying the site, particularly when combined with GPR data concerning the elevation of the peat substrate.

Combining the two datasets reveals the lowest lying areas of the site to be underlain by marl (below c. 36mOD), while a ridge of more elevated material (rising to c.39mOD) occurs below the northern section of the bog. Coring data at BUN_004 indicates that the area is underlain by clayey material, therefore this material has been interpreted as glacial till (based on comparable features present immediately to the north-west); however, as outlined previously there is a gravel aquifer to the north-east of this site and it is possible that these elevated ridges below the base of peat are gravel comprised of gravel. Coring also suggests that the marl is underlain by lacustrine clay which would be expected to limit vertical losses to depth in areas where this occurs.

Basal peat in Bunahinly is largely underlain with shell marl/green clay, and Green Gritty plastic Clay. Basal peat in Kilgarvan is largely underlain with shell marl/green clay, and Green Gritty plastic Clay. These sub-soils are lacustrine (lake-forming) deposits. There is a small mound in Kilgarvan that is likely to be underlain with glacial material (mixed sub-soils with gravel).

The underlying geology and subsoil of Bunahinly-Kilgarvan bog is calcareous.

3.2.2 Peat type and depths

Large sections of Bunahinly-Kilgarvan still contain significant areas of “Sphagnum” peat and are considered deep peat bogs. Peat depths at Bunahinly are ca.5m on average, whilst those at Kilgarvan range in depth from <0.5m to ca.5m.

See Drawing number BNM-DR-23-09-04 titled **Bunahinly Bog: Bog Peat Depths** and BNM-DR-23-10-04 titled **Kilgarvan Bog: Bog Peat depths**, included in the accompanying Mapbooks.

3.3 Key Biodiversity Features of Interest

Habitats at Bunahinly-Kilgarvan are dominated by bare peat, with little or no increase in vegetative cover in the interim period since the recent cessation of peat production (2018). At Bunahinly pioneering open cutaway habitats are developing in the northwest ‘arm’ of the former peat production area, dominated primarily by Rush and Heather. In addition an area in the north of the bog which was subject to some rehabilitation comprises a mosaic of pioneering heath with wetter Bog cotton dominated areas, along with *Sphagnum* mosses (predominantly within blocked drains). Some areas of drier heath are also present, and marginal habitats around the boundary include bog remnants, grassland and further pioneering cutaway habitats.

Bare peat dominates at Kilgarvan, although the margins of the property include some remnant habitats including raised bog, Gorse-dominated scrub along with Birch dominated woodland that acts as a refuge for local wildlife. The majority of the bog whilst not currently in active industrial peat production still has extant stock which is being removed.

The River Shannon and its associated corridor forms the main ecological feature proximal to Bunahinly-Kilgarvan. Part of Bunahinly-Kilgarvan overlaps designated European Sites associated with the Shannon, and the habitat corridor which connects Bunahinly and Kilgarvan is subject to periodic flooding from the Shannon during the winter months. A number of tributary watercourses including the Cloonbonny River and the Boor River (along the southern margin) drain Bunahinly-Kilgarvan.

3.3.1 Current habitats

The most common habitats present include:

- Bare Peat
- Bare peat and dry heath mosaic (establishing on older production bog)
- Bare peat, dry heath and Bog Cotton-dominated vegetation establishing at north of site
- Gorse scrub
- Dry grassland (along bog margin)
- Silt ponds (including ridges of spoil and adjacent land)
- Riparian zones (with scrub along verges)
- Works area

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

- Raised bog (PB1) (several fragments) (Codes refer to Heritage Council habitat classification, Fossitt 2000).
- Scrub (WS1) (Gorse scrub and Birch scrub developing of dry high bog around margins)
- Bog woodland (WN7)
- Conifer plantation (WD4) (minor screen of Pine planted around margin at northern end of site).
- Cutover bog (PB4) (several small fragments)
- Improved grassland (GA1) (several small patches where BnM boundary extends over adjacent fields)
- Wet grassland (GS4) (several small patches where BnM boundary extends over adjacent fields)
- Depositing river (Boor River)
- See Drawing number BNM-DR-23-09-17 titled **Bunahinly Bog: Bog Habitat Map** and BNM-DR-23-10-17 titled **Kilgarvan Bog: Bog Habitat Map** , included in the accompanying Mapbooks.



Pioneering vegetation on Cutover Bog at Bunahinly



Rehabilitated cutover Bog at Bunahinly


	
<p><i>Pioneering Heath along margin of former production area at Kilgarvan</i></p>	<p><i>Bare Peat and extant stock at Kilgarvan</i></p>

Table 1: Photos of Habitats at Bunahinly-Kilgarvan Bog

3.3.2 Species of conservation interest

Bird species previously recorded at Bunahinly Kilgarvan include the Red listed ³Lapwing (*Vanellus vanellus*), which has been recorded onsite during the winter period, when birds from the adjacent SPA may utilise the bog to roost and/or feeding. Lapwing also during the summer months and may breed at Kilgarvan.

Other wintering species of bird include the also Red listed Common Snipe (*Gallinago gallinago*) which likely uses the marginal habitats present to feed and/or roost.

The general assemblage of birds utilising the bog reflects the current extent of largely bare peat with species such as Meadow pipit (*Anthus pratensis*), Pied Wagtail (*Motacilla alba*) and Raven (*Corvus corax*) recorded on recent visits in 2021 to inform Rehab Planning.

Mammal species known to occur include Irish Hare (*Lepus timidus hibernicus*), Badger (*Meles meles*) and Otter (*Lutra lutra*).

In July of 2021, Meadow brown (*Maniola jurtina*) and Red admiral (*Vanessa atalanta*) butterflies were recorded.

Marsh Fritillary (*Euphydryas aurinia*) have been recorded to the north east of Bunahinly at Crosswood Bog but there are no on-site records.

3.3.3 Invasive species

Invasive alien species known to occur at the subject bog (or desktop review suggests presence is likely), and for which reasonably foreseeable source impact pathways for dispersal may result from the proposed PCAS are described here. A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs, and although spatial overlap with the PCAS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during PCAS activities.

3.4 Statutory Nature Conservation Designations

Crosswood Bog SAC (Site Code 002337) and NHA is located 1.4km to the north east of Bunahinly-Kilgarvan and is designated for Active raised Bogs [7110] and Degraded Raised Bogs still capable of natural regeneration [7210].

The River Shannon Callows SAC (Site Code 000216) and NHA is located due west of Bunahinly-Kilgarvan and overlaps the boundary of Kilgarvan at the southern extreme of the bog. This SAC has a number of Qualifying Interests including Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caerulea*) [6410]; Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) [6510]; Alkaline fens [7230]; Limestone pavements [8240]; Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0] and Lutra (Otter) [1355].

The River Shannon Callows SPA (Site Code 004096) SPA is also located due west of Bunahinly-Kilgarvan and overlaps the boundary of Kilgarvan at the southern extreme of the bog. The Special Conservation Interests (SCI's) for this European Site are Whooper Swan (*Cygnus cygnus*) [A038]; Wigeon (*Anas penelope*) [A050]; Corncrake (*Crex crex*) [A122]; Golden Plover (*Pluvialis apricaria*) [A140]; Lapwing (*Vanellus vanellus*) [A142]; Black-tailed Godwit (*Limosa limosa*) [A156]; Black-headed Gull (*Chroicocephalus ridibundus*) [A179] and Wetland and Waterbirds [A999].

³ Gilbert G, Stanbury A and Lewis L (2021), "Birds of Conservation Concern in Ireland 2020 –2026". Irish Birds 9: 523—544

Other NHA's in proximity include Carrickynaghtan Bog NHA (Site Code 001623), located to the west of the River Shannon ca. 2km from Bunahinly and Pilgrims Road Esker NHA (Site Code 001776) located ca.5km south of Kilgarvan. Mongan Bog Nature Reserve is ca.5km south west of Kilgarvan.

See drawings BNM-DR-23-09-23 **Bunahinly Bog: Proximity to Designated Sites** and BNM-DR-23-10-23 **Kilgarvan Bog: Proximity to Designated Sites** for further information.

3.4.1 Other Nature Conservation Designations

The Ramsar Convention entered into force in Ireland on 15th March 1985. Ireland currently has 45 sites/wetlands designated as Wetlands of International Importance (Ramsar Sites). These cover a surface area of 66,994ha. There are no Ramsar Sites in the local vicinity of Bunahinly-Kilgarvan Bog (i.e. within 3km) The closest Ramsar Site is Mongan Bog which is ca.5km south.

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

3.5 Hydrology and Hydrogeology

Bunahinly-Kilgarvan forms part of the Upper Shannon Catchment (Catchment ID : 26G) as defined by the EPA under the Water Framework Directive (WFD) and is situated within the Shannon[Lower]_SC_010 Sub-Catchments. The bog is located along the floodplain of the river Shannon just south of the town of Athlone. Both bogs contain several drainage pathways which primarily drain in a south-westerly direction towards the River Shannon.

Regional hydrological data suggest that Bunahinly-Kilgarvan receives average precipitation of 900mm/yr (1981-2010), with an estimated evapotranspiration rate of c. 500mm/yr. A , leaving an average effective precipitation of 400mm/yr. Assuming no recharge to groundwater and no groundwater contribution to discharge from the bog, the available precipitation that may become runoff (assuming no change in storage) is 400mm/yr, which equates to an annual runoff rate of c. 4,000m³/ha.

Bunahinly-Kilgarvan currently has a gravity drainage regime. Initial hydrological modelling (depression analysis) indicates the bog has a number of basins that will develop a mosaic of peatland and wetland habitats.

GSI data indicates that Waulsortian Limestones underlie Bunahinly, while the Ballysteen Formation underlies Kilgarvan. Both of these units are classified as Locally Important Aquifers (Bedrock which is Moderately Productive only in Local Zones). However, a locally important gravel aquifer is also located along the Eastern/North-eastern margin of Bunahinly Bog. Several bedrock faults can be observed in the surrounding areas including one which crosses through Kilgarvan, trending SE-NW. The locally important aquifer which underlies both bogs is mostly within the Ballysteen Formation. No data exists concerning depth to bedrock, whilst no bedrock outcrop could be identified in close proximity to the bogs.

Quaternary Sediment maps show Bunahinly-Kilgarvan underlain by peat, yet surrounded by inorganic deposits, including Till derived chiefly from Limestone to the east and alluvium to the west, with some glaciofluvial sands and gravels and lacustrine clay to the north of Bunahinly. GSI groundwater vulnerability mapping indicates that there is generally moderate vulnerability in the surrounding areas with higher vulnerability to the north-east of Bunahinly, corresponding to the locally important gravel aquifer. While Groundwater Vulnerability is typically used to indicate the susceptibility to groundwater pollution, it can provide a useful proxy indication of likely groundwater flow rates in the surrounding area.

Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability maps are based on the type and thicknesses of subsoils (sands, gravels, glacial tills (or boulder clays), peat, lake and alluvial silts and clays), and the presence of karst features. Groundwater is most at risk where the subsoils are absent or thin and, in areas of karstic limestone, where surface streams sink underground at swallow holes.

3.6 Emissions to surface-water and water-courses

Drainage is an important feature of industrial peat production and there were extensive field drains maintained throughout bog areas to facilitate industrial peat production annually, each of which eventually drains into a terminal silt pond that allows for settlement of suspended solids before entering the main river systems. In accordance with the existing Integrated Pollution Control licence, all drainage water from boglands in a licensed area is discharged via an appropriately designed silt pond treatment arrangement as required in Condition 6.6. of the licence. Industrial peat production has now permanently ceased at Bunahinly-Kilgarvan Bog.

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

Bunahinly bog has three treated surface water outlets, two to the Shannon Upper tributary IE_SH_26S021800, and one direct to the Shannon (Upper)_ 120. Kilgarvan Bog also has three treated surface water outlets, two to the same Shannon Upper tributary as Bunahinly Bog and the remaining one to the IE_SH_26B071200 BOOR_020 (Boor River).

Both the Shannon Upper tributary and the Boor River body are currently classified as At Risk and listed as being under pressure from peat extraction in the third cycle of the river basin management plan, currently under preparation.

Details of silt ponds, associated surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed on the accompanying structures maps along with water quality maps. See Drawing numbers BNM-DR-23-09-02 titled **Bunahinly Bog: Structures and Sampling** and Drawing number BNM-DR-23-10-02 titled **Kilgarvan Bog: Structures and Sampling**, along with Drawing number BNM-DR-23-09-WQ01 titled **Bunahinly Bog: Water Quality Map** and Drawing number BNM-DR-23-10-WQ01 titled **Kilgarvan Bog: Water Quality Map** within the accompanying Mapbooks, which illustrate the various drainage and water quality infrastructure present at Bunahinly-Kilgarvan.

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

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

Initial monthly results are included in Appendix XIII. These results cover the period from November 2020 to Dec 2021. During this period, sampling regime was changed at three locations, SW 89A, 91 and 96 as these sampling locations did not represent the final treated outlet. These results indicate the baseline water quality from a minimum of 70% of the bog's catchments. Peat extraction ceased in both bogs in 2018 and as expected some of the key water quality parameters, that can impact water quality from peat extraction activities, such as suspended solids, remained relatively static. During this period, ammonia indicating a mixed trend across the two bogs, with Bunahinly indicating a lower Ammonia concentration overall possibly due to less of an area in active production up to 2018. All other parameters fluctuated slightly, most likely influenced by normal weather patterns, especially rainfall.

Monthly ammonia concentrations from November 2020 to December 2021 had a range of 0.017 to 0.83 mg/l with an average of 0.417 mg/l at Bunahinly.

During the same period at Kilgarvan, Ammonia had a higher Ammonia with a range of 0.009 to 2.18 mg/l and an average of 0.825mg/l.

Results for suspended solids for the same period in Bunahinly indicate a range of 2 to 19mg/l with an average of 5.6 mg/l, while Kilgarvan was slightly less with range of 2 to 9mg/l and an average of 5.0 mg/l.

From an analysis of any monitoring over the previous 5 yrs., during such time where peat extraction was undertaken each Summer the IPC licence environmental monitoring of some of the discharges from this bog, indicate that results were under the ELV for SS and broadly under the trigger levels for ammonia and COD (see Table 3.1).

Table 3.1. Water quality data

Bog	SW	Monitoring	pH	SS mg/l	TS mg/l	Ammonia mg/l	TP mg/l	COD mg/l	Colour
Kilgarvin	SW-88	Q2 19	7.1	17	150	1.3	<0.05	80	240
Kilgarvin	SW-89	Q2 19	7.4	<5	196	3.4	<0.05	80	200
Kilgarvin	SW-89A	Q2 19	7.5	12	180	2.5	<0.05	62	146
Kilgarvin	SW-90	Q2 19	7.2	<5	119	1	<0.05	85	262
Kilgarvin	SW-91	Q2 19	7.7	<5	242	2.2	<0.05	59	132
Bunahinly	SW-92	Q2 19	6.6	<5	116	0.42	<0.05	126	248
Bunahinly	SW-93	Q2 19	6.2	<5	88	0.17	<0.05	108	269
Bunahinly	SW-94	Q2 19	7.1	<5	128	0.71	<0.05	129	236
Kilgarvin	SW-95	Q2 19	7.4	<5	130	0.15	<0.05	52	187
Kilgarvin	SW-96	Q2 19	7.4	6	192	0.09	<0.05	102	196
Bunahinly	SW-97	Q2 19	7	<5	134	0.1	<0.05	117	272
Kilgarvin	SW-88	Q1 18	7.2	5	62	1.3	0.05	47	293
Kilgarvin	SW-89	Q1 18	7.7	5	146	4	0.05	43	142
Kilgarvin	SW-89A	Q1 18	7.7	5	182	3.8	0.05	46	132
Kilgarvin	SW-90	Q1 18	7.3	5	108	1.6	0.05	55	189
Kilgarvin	SW-91	Q1 18	7.8	5	396	4.4	0.05	36	211
Bunahinly	SW-92	Q1 18	6.7	5	88	0.17	0.05	52	183
Bunahinly	SW-93	Q1 18	6.2	5	70	0.23	0.05	70	215
Bunahinly	SW-94	Q1 18	7.2	5	106	0.9	0.05	41	167
Kilgarvin	SW-95	Q1 18	7.5	5	132	0.37	0.05	35	64
Kilgarvin	SW-96	Q1 18	7.4	5	153	0.02	0.05	75	220
Bunahinly	SW-97	Q1 18	7.5	5	192	0.15	0.05	69	153
Bunahinly	SW-92	Q1 17	6.5	5	92	0.57	0.05	66	218
Bunahinly	SW-93	Q1 17	6.2	5	196	0.4	0.05	73	262
Kilgarvin	SW-88	Q3 15	7.4	5	152	1.9	0.05	77	207
Kilgarvin	SW-89	Q4 15	7.1	19	94	1.1	0.05	69	238
Kilgarvin	SW-89A	Q4 15	6	5	153	0.18	0.16	91	339
Kilgarvin	SW-90	Q4 15	6	5	92	0.38	0.05	62	466
Kilgarvin	SW-91	Q4 15	7.6	5	300	0.1	0.05	39	114
Bunahinly	SW-94	Q4 15	5.6	13	114	0.73	75	75	133

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

Water quality of water discharges from restored peatlands normally improves as a result of bog restoration measures and the restoration of natural peatland processes (Bonn *et al.*, 20017). Bog restoration is also expected to improve water attenuation of the site as the drains are blocked, slowing water movement and water release from the site. Restored peatlands help slow the release of water and aid the natural regulation of floods downstream (Minayeva *et al.*, 2017). The National River Basin Management Plan (NRBMP) 2018-2021 (DHPCLG, 2017) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD). The

NRBMP outlines how key actions such as the Bord na Móna peatland rehabilitation is expected to have a positive impact on water quality and help the NWBMP deliver its objectives in relation to the WFD.

Water will still discharge from designated emission points when rehabilitation at Bunahinly-Kilgarvan has been completed. This discharge will have improving water quality and there will be increased wetland attenuation, meaning slower release of water. This is expected to have a positive impact on status of the key water body receptor, the Shannon [Lower]__SC_10, and is expected to support the future status of the waterbody as being of Good Status.

Decommissioning and Rehabilitation Programme Water Quality Monitoring.

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

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

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

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

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

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

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

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

LAWPRO, to assist in investigating other changes in water chemistry, the series of parameters can be reviewed and amended.

3.7 Fugitive Emissions to air

The bog is no longer in industrial peat production. Rehabilitation of the cutaway peatland will seek to re-wet the dry peat where possible, and re-vegetate all areas (whether wet or dry).

3.8 Carbon emissions

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

The EPA-funded CarbonRestore Project (Renou-Wilson *et al.* 2012) found that rewetting of drained peatlands can lead to restoration of functional peatland, such as the return of typical plant and animal species, which in turn may lead to the restoration of peat-formation and the C-sink function. The EPA NEROS project carried out GHG flux research at Moyarwood Bog and found that Moyarwood Bog was overall a Carbon sink (sink for CO₂ and a source for Methane) 6 years after bog restoration was carried out (Renou-Wilson *et al.* 2018).

It is expected that Bunahinly-Kilgarvan Bog will become a reduced **Carbon source/partial carbon sink** following rehabilitation. The potential of any cutaway site to develop as a carbon sink in the longer-term depends on the success of the rehabilitation measures, the extent of development of *Sphagnum*-rich or other peat-forming habitats, the balance of carbon fluxes from different cutaway habitats and future climatic conditions. Some *Sphagnum*-rich vegetation has already developed on Bunahinly Bog in suitable hydrological conditions and the key objective will be to expand the footprint of these suitable hydrological conditions. Much of this site is expected to develop *Sphagnum*-rich habitats eventually, in combination with drier heath and Birch woodland. There will also be smaller amounts of Reed Swamp and fen habitats with alkaline emission factors. Birch woodland is expected to develop on the drier mounds and peripheral headlands.

3.9 Current ecological rating

(Following NRA (2009) Evaluation Criteria)

The majority of the terrestrial habitats in isolation are deemed to be of **Local Importance (Lower value)** (dominated by bare peat). A small section of the site partially overlaps with the River Shannon Callows SAC and Middle Shannon Callows SPA (south-western section). Both designated sites are recognised as **Internationally Important**. Some of the small remnant areas of high bog (PB1) are deemed to be of **Local Importance (Higher value)** as this is a habitat of significant ecological importance and they have intact carbon stores, even though the remnant areas are quite small in extent.

4. CONSULTATION

4.1 Consultation to date

Consultation will seek to engage an audience of relevant stakeholders at both a national and local level. National stakeholders have been identified from varied bog restoration and rehabilitation efforts undertaken by Bord na Móna over the past 40 years, with particular emphasis on engagement with stakeholders during their Biodiversity Action Plan programme since 2010. National Stakeholders includes relevant government departments and agencies, relevant semi-state bodies, NGOs and other environmentally-focused groups with a national remit. Stakeholders were notified when the draft plan was finalised internally by Bord na Móna, and invited to make submissions on the objectives and content of this plan in relation to Bunahinly-Kilgarvan Bog. The draft plans and final versions of the rehab plans are available on the Bord na Móna website (www.pcasinfo.ie).

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

- General consultation with range of stakeholders at annual Bord na Móna Biodiversity Action Plan review days 2010-2018.
- Midlands & East Regional WFD Operational Committee (River Basin Management Plans).
- Sub-committee on Shannon Flooding Work Programme and Measures (OPW, Waterways Ireland, ESB, LA's, Fisheries Ireland, NPWs etc.).
- Archaeological Liaison Committee (National Museum of Ireland & Dept of Culture Heritage and the Gaeltacht).
- Feasibility and development of greenway trails on BnM land to create cycling and walking loops, to connect different areas and to support local amenity and tourism (Offaly Leader, Offaly County Council, ORNI and Fáilte Ireland);
- Route selection and development of the Galway-Athlone Greenway (RPS – lead consultants);
- Consultation with Green Offaly regarding a proposed Peatland Biosphere Reserve in Offaly.

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

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

Further to the above, as a means of further notification for those based near to any proposed PCAS activities, a leaflet detailing PCAS plans for Bunahinly-Kilgarvan Bog, contact details and the PCAS website address was delivered to each house within a 1 Km radius of the bog.

4.2 Issues raised by Consultees

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

4.2.1 Assessments of rehabilitation

To date a number of consultees including the Irish Farmer's Association (IFA), the Irish Milk and Suppliers and Creamery Association (IMSCA) and Trinity College Dublin have raised concerns during consultation regarding the duration and scope of PCAS consultation period. Stakeholders suggested that the consultation period should be extended to allow all potential stakeholders to make submissions where required.

4.2.2 Assessments of rehabilitation

Queries on pre-rehabilitation assessments were raised by NPWS and the National Museum of Ireland relating to the finalisation of several bog rehab plans in 2021 in relation to Appropriate Assessment, Environmental Impact Assessment and Strategic Environmental Assessment.

4.2.3 Restoration scope

Restoration/rehabilitation of marginal habitats was raised by IPCC and BCI relating to the finalisation of several bog rehab plans in 2021 as worthy of consideration within the rehabilitation measures to support carbon sequestration and biodiversity objectives.

4.2.4 Monitoring

Further details on monitoring of ecological metrics, and how and where reporting on this monitoring would take place, was raised by the IPCC, University College Dublin and Trinity College researchers in their respective submissions relating to the finalisation of several bog rehab plans in 2021. Butterfly Conservation Ireland also suggested that monitoring of Large Heath butterfly be considered to assess the success of the proposed rehabilitation actions. Irish Water reiterated the requirement of a strong monitoring program with respect to water quality during and post rehabilitation.

4.2.5 Flooding and drainage

The IFA, The Department of Agriculture Food and the Marine, individual local residents and ICMSA queried likely impacts relating to the finalisation of several bog rehab plans in 2021 and the finalisation for this Bunahinly-Kilgarvan Rehabilitation Plan arising from the proposed re-wetting associated with the rehabilitation in relation to flooding on adjoining lands and, specifically, with regards to the maintenance of drains. The IFA also raised the issue of Health and Safety in relation to raising water levels as well as possible impacts on land and property prices.

4.2.6 Future management

The IFA expressed concerns regarding the future ownership of the BnM bogs subject to rehabilitation. They expressed a desire for contingency planning for potential future ownership of designated bogs so as to ensure no negative impacts arise on adjacent properties from any new ownership.

4.2.7 Other issues

Other issues (raised by IPCC) during the finalisation of several bog rehab plans in 2021 included after use of the bog and turf cutting on the margins of the bog (outside of the area owned by Bord na Móna).

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

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

4.3 Bord na Móna response to issues raised during consultation

4.3.1 Consultation

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

4.3.2 Assessments of rehabilitation

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

An Archaeological Impact Assessment (AIA) has been undertaken on all the bogs in PCAS (Appendix XII). The aim for known archaeology on these bogs is to accomplish preservation in situ and we are taking steps to identify and avoid all known archaeology. It is anticipated that any archaeology will benefit from the ultimate remit of the rehabilitation, in that water tables will be raised thereby preserving in-situ. There is also an identified procedure for managing reports of stray finds that may arise during rehabilitation works.

4.3.3 Restoration scope

As part of the PCAS, all restoration/rehabilitation options have been developed to support climate action and biodiversity objectives. Other issues such as existing amenity, social impacts, industrial history, archaeology were not part of the direct scope of PCAS but were considered when developing the rehabilitation plan. After use of the bog is outside the scope of PCAS. Rehabilitation will lead to the development of a stable diverse re-wetted cutaway landscape that will have added benefits for amenity in the future.

4.3.4 *Monitoring*

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

4.3.5 *Flooding, drainage or other impacts on adjacent land.*

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

External consultants have been appointed to carry a hydrological assessment to identify any potential impacts to neighbouring lands and to mitigate against any such impacts. No issues were identified. There is no potential for direct impacts on arterial drainage downstream.

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

4.3.6 *Amenity*

Creating amenity such as walking tracks is not part of the direct scope of PCAS. There is no current amenity planned for Bunahinly-Kilgarvan by BnM. Currently there are several feasibility studies considering potential greenway routes in Offaly and one such potential route would be along the BnM railway from Bunihinly, through Bloomhill and linking to Blackwater. PCAS will enable and support any future amenity development. There can be further opportunities to develop amenity at this site, for example on the decommissioned railways. Any future amenity can be positively aligned and integrated to after-use plans following the completion of the proposed rehabilitation at Bunahinly-Kilgarvan Bog. Rehabilitation measures proposed for Bunahinly-Kilgarvan Bog do not need to be amended to integrate any future amenity projects positioned along the margin of the former production bog or along the former bog railways.

4.3.7 *Water quality*

In general, peatland restoration and rehabilitation has been shown to demonstrate positive impacts on downstream water quality (Minayeva *et al.*, 2017). BnM expect that rehabilitation measures will positively impact the water quality in receiving water bodies through enhancing the water attenuation across rehabilitated sites. The robust water monitoring programme implemented as part of PCAS will be used to assess water quality leaving rehabilitated sites at designated points.

4.3.8 Future management

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

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

4.3.9 Other issues

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

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

4.3.10 Concluding statement.

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

5. REHABILITATION GOALS AND OUTCOMES

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

- Meeting conditions of IPC Licence.
- Stabilisation or reduction in water quality parameters of water discharging from the site (e.g. suspended solids).
- Reducing pressure on receiving water-bodies that have been classified as At Risk from peatlands and from peat extraction, via stabilization or improving water-quality from this bog, and therefore, reducing pressures.
- Optimising hydrological conditions for **climate action benefits as part of PCAS**.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities on deep peat, or reed swamp and fen on shallow more alkaline peat and other subsoils, where present.
- Optimising hydrological conditions on extant high bog.
- Optimising hydrological conditions for the protection of any exposed archaeological structures, their retention in situ and preservation into the future, where possible.
- Supporting any future land-use.
- The main goal and outcome of this plan is the successful rehabilitation (environmental stabilisation) of peatlands used for industrial peat extraction at the bog in a manner that is acceptable to both external stakeholders and to Bord na Móna and which optimise climate action and other ecosystem service benefits.

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

- It will take some time for stable naturally functioning habitats to fully develop at Bunahinly-Kilgarvan. This will happen over a longer time-frame than the implementation of this rehabilitation plan.
- Re-wetting residual peat will initially maintain and enhance the carbon storage capacity of the bog. There is scientific consensus that restoration of hydrology in damaged bog can improve carbon storage, water storage and attenuation and help support biodiversity both on the site and in the catchment (See Section 3.8). This will reduce carbon emissions from the site from a larger carbon source to a smaller carbon source. In time, the site has the capacity to develop in part as a carbon sink. PCAS is expected to deliver significant contributions to Ireland's climate action.
- It is not expected that the site has the potential to develop active raised bog (ARB) analogous to the priority EU Habitats Directive Annex I habitat within the foreseeable future (c.50 years). Furthermore, only a proportion of the bog has potential to develop *Sphagnum*-rich habitats in this timeframe. Nevertheless, re-wetting across the entire bog, as part of the Scheme, will improve habitat conditions of the whole bog. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.
- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as the development of new habitat to support biodiversity and local attenuation of water flows from the bog.
- WFD status in receiving water bodies can be affected by peatlands and peat extraction, but is also affected by other sources such as agriculture. In addition, receiving water bodies that are assessed as At Risk from peatlands and from peat extraction are likely to have several contributory sources of impacts

(private peat extraction and Bord na Mona). Reducing pressures due to former peat extraction activities at Bunahinly-Kilgarvan will contribute to stabilising or improving water quality status of receiving water bodies in general. Ultimately, improving the WFD status of the receiving water-body will depend on reducing pressure from a range of different sources., including peatlands in general (private and Bord na Mona).

- Bord na Móna are also planning rehabilitation measures in some adjacent bogs (e.g. Bloomhill) in 2022. There are expected to be cumulative water quality and other ecosystem service benefits to receiving water bodies such as the River Shannon from rehabilitating more than one bog in the same catchment.
- Re-wetting in general will benefit the future preservation of most known and unknown archaeological features. An Archaeological Impact Assessment (AIA) has been carried out under the PCAS scheme (Appendix XII).

6. SCOPE OF REHABILITATION

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

- The area of Bunahinly-Kilgarvan.
- EPA IPC Licence - Ref. P0502-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Bunahinly-Kilgarvan is part of the Blackwater Bog group.
- The Scheme is designed to exceed the stabilisation requirements as defined by the IPC Licence. This scheme is designed to enhance the ecosystem services of Bunahinly-Kilgarvan, in particular, optimising **climate action benefits**. The proposed interventions will mean that environmental stabilization is achieved (meaning IPC obligations are met) and, in addition, significant other ecosystem service benefits particularly for climate action will be accrued.
- The local environmental conditions of Bunahinly-Kilgarvan mean that deep peat measures along with some wetland creation is the most suitable rehabilitation approach for this site. Bunahinly-Kilgarvan Bog had a gravity drainage regime but does have residual deep peat along with shallower areas.
- The key goals and outcomes of rehabilitation set by Bord na Móna. Bord na Móna have defined the key goal and outcome of rehabilitation at Bunahinly-Kilgarvan as **environmental stabilisation, optimising residual peat re-wetting, and the development of embryonic raised bog on deep peat along with wetlands/Reed Swamp and fen on shallow more alkaline peat and other subsoils and areas where there is likely to be deeper water**.
- Rehabilitation of Bunahinly-Kilgarvan will support multiple national strategies of climate action, biodiversity action and other key environmental strategies such as the Water Framework Directive.
- The time frame for the delivery of the planned rehabilitation will be undertaken according to available resources and appropriate constraints.
- It is proposed to carry out some targeted rehabilitation (drain-blocking) on some extant raised bog remnants around the margins of Bunahinly-Kilgarvan.
- It is not proposed to carry out any rehabilitation in the other marginal or peripheral cutover bog zones. Generally, these remnants are narrow, or are subject to turbary, and do not have positive bog restoration prospects.

6.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, there is potential for raised bog restoration at some sites where there has not been significant industrial peat extraction and the peat body is largely intact (deep peat sites that are drained). At other sites, most of the peat mass has been removed, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status, etc.) and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland).
- Peat Production at Bunahinly-Kilgarvan commenced in the 1990's, and finished in 2018. Remaining peat depths are therefore up to 5m deep for the most part apart from an area in the east of Kilgarvan where depths are less.
- **Surrounding landscape and neighbours.** Another key constraint is the interaction between the Bord na Móna sites and the surrounding landscape. Care has to be taken that no active rehabilitation

management is carried out that could negatively and knowingly impact on surrounding land. This includes any hydrological management on neighbouring farmland. It is anticipated that the work proposed here (blocking drains and re-wetting cutaway peatlands) will not have any flooding impacts on adjacent land.

- **Archaeology.** The discovery of monuments or archaeological objects during peatland rehabilitation may potentially constrain the rehabilitation measures proposed for a particular area. While the rehabilitation will optimise hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future, any new archaeology may require rehabilitation measures will be reviewed and adapted. If this occurs, rehabilitation measures will be reviewed and adapted. An Archaeological Impact Assessment (Appendix XII) has been carried out to mitigate against any impact on found archaeology at Bunahinly-Kilgarvan. The proposed rehabilitation will have no impact on any known archaeological material in the application area or the vicinity. In the worst-case scenario works affecting the surface and sub-surface of the bog might disturb previously unknown archaeological deposits or artefacts without preservation by record taking place. Should any previously unknown archaeological material be uncovered during the rehabilitation works, it should be avoided and reported to Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.
- **Public Rights of Way.** Where a public right of way or similar burden exists on Bord na Móna property, consideration will be given to ensuring that this remain intact where possible. In some instances, depending upon previous land uses and management, alternative solutions may be required. These will be explored in consultation with local communities and statutory bodies during the consultation work associated with the decommissioning and rehabilitation work described here.

6.2 Key Assumptions

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

6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- Constraints such as the gas pipeline and drainage associated with the railway at the NE corner of Bunahinly.
- The longer-term development of stable naturally functioning habitats at Bunahinly-Kilgarvan.
- The plan covers the short-term rehabilitation **actions** and **an additional monitoring and after-care programme** to monitor the rehabilitation and to respond to any needs.
- This plan is not intended to be an after-use or future land-use plan for Bunahinly-Kilgarvan.
- The longer-term management of this site, potentially as a nature conservation site, or for amenity, or for other uses in the future.

7. CRITERIA FOR SUCCESSFUL REHABILITATION

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

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

Rehabilitation is generally defined by Bord na Móna as

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

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

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

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

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

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

Following commencement, and as the monthly monitoring program at Bunahinly-Kilgarvan continues in 2022 during the rehabilitation works, and data from the 2020 monitoring program is compiled, further trending will be produced to verify any ongoing trends.

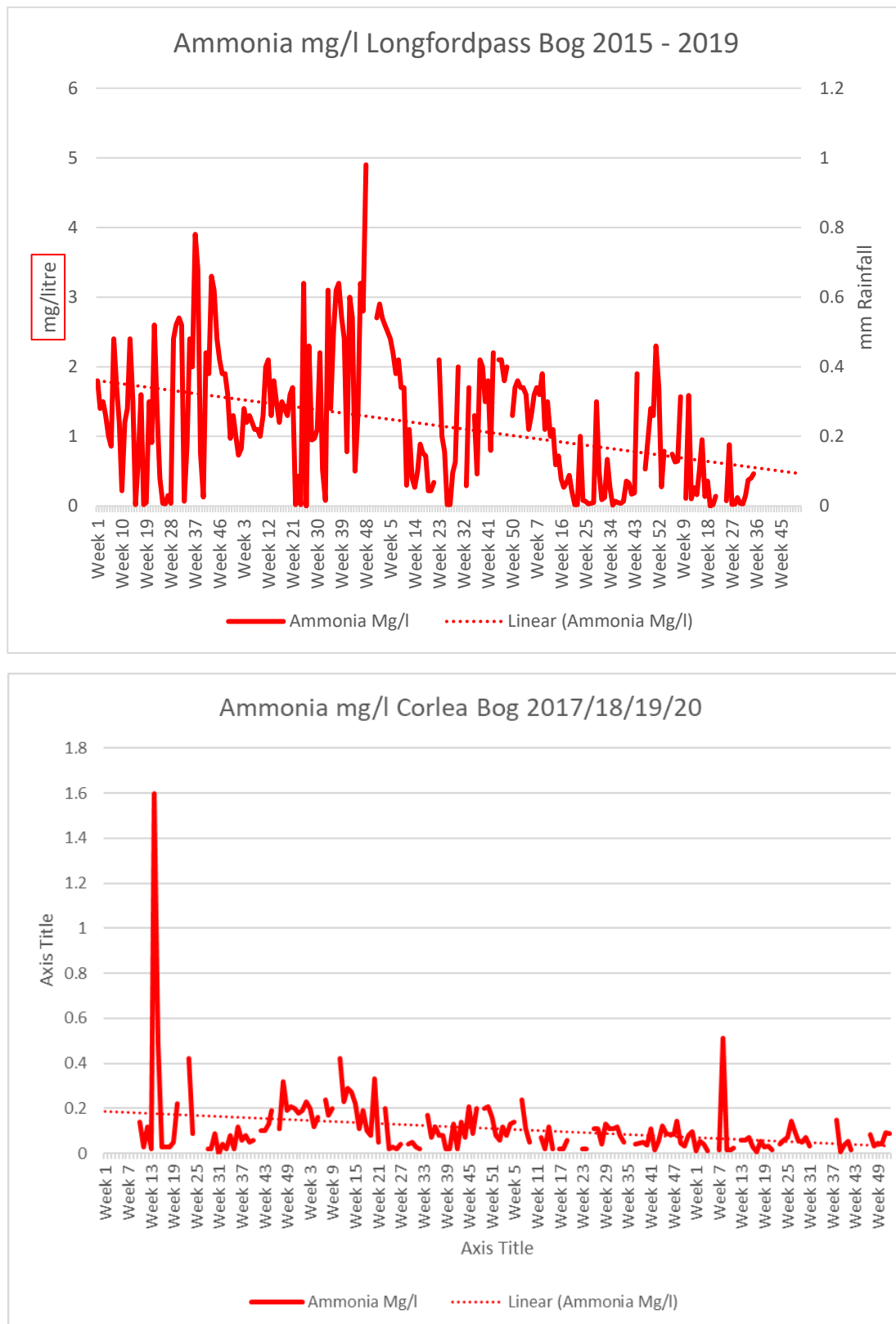


Figure 7.1. Ammonia levels over the period 2015-2020 at Longfordpass and Corlea.

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

- Optimising the extent of suitable hydrological conditions to optimise climate action and other ecosystem service benefits (optimising and maximising residual peat re-wetting). This will be measured by an aerial survey after rehabilitation has been completed.
- Accelerating the trajectory of the bog towards becoming a reduced carbon source/carbon sink. This will be measured through habitat mapping and the development of cutaway bog condition assessment. This cutaway bog condition assessment will include assessment of environmental and ecological indicators such as vegetation cover, vegetation communities, presence of key species, *Sphagnum* cover, bare peat cover and water levels (similar to ecotope mapping). Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Reduction in carbon emissions. This will be estimated via a combination of habitat condition assessment and application of appropriate carbon emission factors derived from other sites. Baseline monitoring (habitat condition) will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Setting the site on a trajectory towards establishment of a mosaic of compatible habitats including wetland, fen, Reed swamp, heath, scrub, poor fen, embryonic *Sphagnum*-rich peatland communities and Birch woodland, where conditions are suitable. Some of these habitats have already in part established as pioneer vegetation. It will take some time for stable naturally functioning habitats to fully develop at Bunahinly-Kilgarvan. This will be demonstrated and measured via aerial photography, habitat mapping and cutaway/habitat condition assessment. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Improvement in biodiversity and ecosystem services. This will be demonstrated by metrics outlined in Section 9.1 that can be used to measure changes in ecosystem services (e.g. water quality parameters, development of pioneer habitats, breeding bird monitoring). This will be measured by collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.

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

Criteria type	Criteria	Target	Measured by	Expected Time-frame
IPC validation	Rewetting in the former area of industrial peat production	Delivery of rehabilitation measures Reduction in bare peat.	Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking) Establishment of a baseline for future monitoring of bare peat, vegetation establishment and habitat condition.	2022-2025
IPC validation	Key water quality parameters Ammonia, Phosphorous, Suspended solids, pH and conductivity	Reduction or stabilisation of key water quality parameters associated with this bog	Water quality monitoring for a period after rehabilitation has been completed	2021-2024
IPC validation	Reducing pressure from peat production on the local water body catchment (WFD)	Where this section of the water body, that this bog drains to, has not been identified as under pressure from peat extraction, that the intervening EPA monitoring programme associated with its Programme of Measures for this water body, confirms that its classification remains at not being at risk from peat extraction associated with activities at this bog.	EPA WFD monitoring programme	WFD schedule

Climate action verification	Optimising the extent of suitable hydrological conditions to optimise climate action	Optimal extent of suitable hydrological conditions	Aerial photography and Habitat mapping to map extent of suitable hydrological conditions. Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	2022-2025
Climate action verification	Reduction in carbon emissions.	Reduction in carbon emissions	Carbon emissions – estimated using a bog condition assessment and appropriate carbon emission factors.	2022-2025
Climate action verification	Setting the site on a trajectory towards establishment of a mosaic of compatible habitats	Establishment of compatible cutaway habitats	Habitat map, Cutaway bog condition map Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	2022-2025
Climate action verification	Biodiversity and ecosystem services. Habitat establishment Presence of key species – Sphagnum	Improvement in biodiversity and ecosystem services.	Metrics that relate to selected biodiversity and ecosystem services Presence of key species – Sphagnum – Walkover survey	2022-2025

Meeting climate action verification criteria and monitoring of these criteria after the scheme has been completed is dependent on support from the Climate Action Fund and Ireland's National Recovery and Resilience Plan or other sources of funding. Note that monitoring and verification of the overall scheme will be stratified – not all these criteria will be measured at each individual site. Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.

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

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

- **Funding to pay for resources required to deliver the planned rehabilitation (Bord na Móna and external).** Bord na Móna maintains a Provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence. It is expected that additional costs of enhanced rehabilitation will be supported by Government.
- **Bord na Móna to have sufficient resources (staff and training) to deliver the planned rehabilitation with required associated skills and competencies.**
- **Bord na Móna to have sufficient resources (suitable machinery) and staff to maintain this machinery.**
- **Weather conditions to be within normal limits over the rehabilitation plan timeframe.** Long periods of wet weather have the capacity to significantly affect ground conditions and constrain the delivery of rehabilitation. The potential impact of wet weather on ground conditions can be reduced by appropriate planning and management. Bord na Móna have significant experience of managing these issues through 70 years of working in these peatland environments.
- **Rehabilitation measures to be effective.** The rehabilitation measures proposed in this plan are based on 40 years of Bord na Móna experience of peatland management and best practise applied internationally in peatland management. Measures proposed in this plan have already been shown to be effective at other sites. Bord na Móna will apply a flexible and adaptable approach to the more innovative rehabilitation measures proposed in this plan. If measures are not initially effective, Bord na Móna will review any requirement for additional practical rehabilitation.
- **Natural colonisation of vegetation to develop semi-natural habitats at a rate within the normal limits.** The development of naturally functioning semi-natural habitats on degraded bog takes time. It may take 30-50 years for active raised bog vegetation to re-develop on suitable cutaway that was previously bare peat. However, Bord na Móna experience has demonstrated the effectiveness of these type of measures for re-wetting bog and creating carbon sinks (Renou-Wilson et al. 2018).
- Rehabilitation measures have been designed to accelerate and work with natural colonisation and other natural processes. Bord na Móna experience of rehabilitation has shown that re-wetting improves conditions for natural colonisation and that natural colonisation is accelerated where the environmental conditions are most suitable. Rehabilitation measures have been designed to modify the conditions of areas within sites where conditions are less suitable for natural colonisation (modifying hydrology, topography, nutrient status or availability of potential seed sources).
- **Monitoring to be robust and effective.** Rehabilitation Monitoring will be established to validate the success of rehabilitation as required by Condition 10 of the IPC Licence and to verify the benefits of the proposed enhanced measures to optimise climate action. This will focus on a collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services.

8. REHABILITATION ACTIONS AND TIME FRAME

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

A number of illustrative figures have been produced to inform Rehab Planning and Design, including Aerial Photography, Peat Depths, LiDar Surface Maps, and Depression Analysis modelling; these are included in the accompanying Mapbook(s) as the drawings referenced below:

BNM-DR-23-09-22 titled **Bunahinly Bog: Aerial Imagery2020**

BNM-DR-23-10-22 titled **Kilgarvan Bog: Aerial Imagery2020**

BNM-DR-23-09-04 titled **Bunahinly Bog: Peat Depths**

BNM-DR-23-10-04 titled **Kilgarvan Bog: Peat Depths**

BNM-DR-23-09-03 titled **Bunahinly Bog: LiDAR Map**

BNM-DR-23-10-03 titled **Kilgarvan Bog: LiDAR Map**

BNM-DR-23-09-09 titled **Bunahinly Bog: Depression Analysis**

BNM-DR-23-10-09 titled **Kilgarvan Bog: Depression Analysis**

The rehabilitation actions themselves will be a combination of PCAS measures to re-wet peat. The distribution of these measures is provisionally outlined in drawing titled **BNM-DR-23-09-05 Bunahinly Bog: Rehabilitation Measures** and **BNM-DR-23-10-05 Kilgarvan Bog: Rehabilitation Measures** in the accompanying Mapbook(s) (Note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.)

These enhanced measures for Bunahinly-Kilgarvan bog will include (see Table 8.1):

- Deep Peat measures including field re-profiling, resulting in bunded areas suitable for Sphagnum inoculation, on deeper peat;
- Intensive drain blocking around shallow peat areas / modelled depressions on little or no peat to create/promote the spread of fen and Reedbed habitats,
- Modifying outfalls, and management of water levels with overflow pipes and blocking of internal outfalls;
- Regular drain blocking (3/100) on dry cutaway along with the blocking of outfalls and management of water levels, along with organic fertiliser application;
- Intensive drain blocking (up to 7/100m) on targeted Marginal land drains;
- Intensive blocking of drains in targeted marginal (degraded) raised bog remnants around the margins of Bunahinly-Kilgarvan and re-wetting, where possible, using an excavator to install peat blockages.
- Outfall management and/or further drain blocking in one area at least which was formerly subject to rehabilitation, as additional works;

- Targeted fertiliser applications to accelerate vegetation establishment on areas of **bare peat** on headlands and high fields, and within certain areas of dry cutaway. Areas where vegetation has established do not need fertiliser application.
- Seeding of vegetation and inoculation of *Sphagnum* will be undertaken where required.
- Initial hydrological modelling indicates that a part of the site will develop a mosaic of wetland habitats with the potential for some deeper water. Hydrological management will look to optimise summer water levels to maximise the development of wetland vegetation (by looking to set water depths at < 0.5 m, where possible. It is inevitable that some small sections will naturally have deeper water due to the topography at this site). Water-levels will be adjusted at outfalls and by adjusting piped drainage.

Table 8.1: *Types of and areas for enhanced rehabilitation measures at Bunahinly-Kilgarvan Bog.* Note that the types of rehab and areas of rehab may change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.

Type		Enhanced Rehabilitation Measure	Extent (Ha)
Deep Peat	DPT 2	More intensive drain blocking (max 7/100), modifying outfalls and Sphagnum inoculation	9.28
Deep Peat	DPT 4	Berms and field re-profiling (45x60m cell), modifying outfalls and managing overflows & drainage channels for excess water & Sphagnum Inoculation	264.97
Wetland	WLT4	More intensive drain blocking (max 7/100 m), + modifying outfalls and managing overflows + transplanting Reeds and other rhizomes	2.93
Marginal land	MLT1	No work required	42.16
Marginal land	MLT2	More intensive drain blocking (max 7/100 m)	0
Silt ponds	Silt pond	Silt ponds	2.41
Dry Cutaway 2	DCT2	Regular drain blocking (3/100m) +modifying outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	43.21
Additional Works	AW1	More intensive drain blocking and outfall management	25.59
Constraint	Constraint	Other Constraints	2.57
Total			393.12

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

- Seek formal approval of the enhanced plan, noting the alternative standard plan should funding from the Scheme not materialise, from the EPA.
- Agree an *ex ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator.
- Develop a detailed site plan with engineering drawings outlining how the various rehabilitation methodologies (The Scheme PCAS) will be applied to Bunahinly-Kilgarvan. This will take account of peat depths, topography, drainage and hydrological modelling. (See map for an indicative view of the application of different rehabilitation methodologies).

- A drainage management assessment of the proposed enhanced rehabilitation measures has been carried out and any issues identified resolved and the rehabilitation plan adapted.
- A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation has been carried out. The results of this assessment has been incorporated into the rehabilitation plan to minimise known archaeological disturbance, where needed.
- A review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements has been carried out.
- A review of remaining milled peat stocks has been carried out. There are peat stocks remaining on Kilgarvan bog that will be removed before rehabilitation commences.
- An ecological appraisal of the potential impacts of the planned rehabilitation on the presence of sensitive ground-nesting bird breeding species (e.g. breeding waders) is to be carried out. The scheduling of rehabilitation operations will be adapted, where required.
- Ensure all activities comply with the environmental protection requirements of the IPC Licence.
- An Appropriate Assessment of the Rehabilitation Plan has been carried out. (Note that an NIS was prepared for this rehabilitation plan.)
- See Bunahinly-Kilgarvan Decommissioning and Rehabilitation Plan – Addendum 1 for more details.
- Track implementation and enforcement of the relevant IPC Licence conditions, the mitigation measures (AA) (where required), and other environmental control measures during the implantation of the rehabilitation plan.

8.2 Short-term practical actions (0-3 years)

- Carry out proposed measures as per the detailed site plan. This will include a combination of drain blocking, and fertiliser applications targeting bare peat areas of headlands, high fields and other areas (where required) in addition to other management prescriptions. All rehabilitation will be carried out with regard to best practice environmental control measures (Appendix IV).
- Some proposed measures will be carried out on a phased basis as stock is removed from the site. It is not expected that the site will be completely cleared of peat stock before rehabilitation begins.
- Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions.
- Carry out the proposed monitoring, as outlined.
- While natural colonisation is expected to commence almost immediately once peat production ceases, Phase 2 actions will be carried out in targeted areas to accelerate re-vegetation and colonisation of target species. Phase 2 actions may include seeding of targeted vegetation and inoculation of *Sphagnum*.
- Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent potential run-off of suspended solids from the site during the rehabilitation phase.
- Submit an *ex post* report to the Scheme regulator to verify the eligible measures to be carried out in year 1 of the Scheme, and an *ex ante* estimate for year 2 of the Scheme; and so on for each year of the Scheme.

8.3 Long-term (>3 years)

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

8.4 Timeframe

- **2021-2022:** Short-term planning actions.
- **2022-2023:** Short-term practical actions.
- **2023-2025:** Long term practical actions. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- **2025:** Decommission silt-ponds, if necessary

8.5 Budget and costing

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

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

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

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

9. AFTERCARE AND MAINTENANCE

9.1 Programme for monitoring, aftercare and maintenance

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

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

rehabilitation measures, but may demonstrate that more time is required before key criteria for rehabilitation has been achieved. Monitoring of water quality will then also continue for another period to be defined.

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

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

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

9.2 Rehabilitation plan validation and licence surrender – report as required under condition 10.4

IPC License Condition 10.4. *A final validation report to include a certificate of completion for the Rehabilitation Plan, for all or part of the site as necessary, shall be submitted to the Agency within six months of execution of the plan. The licensee shall carry out such tests, investigations or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment.*

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

- The planned rehabilitation has been completed.
- The key criteria for successful rehabilitation has been achieved and key targets have been met.
- Water quality monitoring demonstrates that water quality of discharge is stabilising or improving.
- The site has been environmentally stabilised.

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APPENDIX I: A STANDARD PEATLAND REHABILITATION PLAN TO MEET CONDITIONS OF THE IPC LICENCE

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

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

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

Scope of rehabilitation

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

- The area of Bunahinly-Kilgarvan.
- EPA IPC Licence - Ref. P0502-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Bunahinly-Kilgarvan is part of the Blackwater group.
- The current condition of Bunahinly-Kilgarvan. This site has gravity drainage.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog.
- To minimise potential impacts on neighbouring land. Some boundary drains around Bunahinly-Kilgarvan will be left unblocked as blocking boundary drains could affect adjacent land.

Rehabilitation goals and outcomes

The key rehabilitation goal and outcome for Bunahinly-Kilgarvan is environmental stabilisation of the site via re-wetting and establishment of pioneer peatland habitats. This is defined as:

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

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

Criteria for successful rehabilitation:

- Rewetting of residual peat and shallow cutaway in the former area of industrial peat production to offset potential run-off of suspended solids and to encourage development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat.

- That there is a stabilising/improving concentration of suspended solids and ammonia associated with the measures undertaken to stabilise the peat surface by the blocking of the internal drainage system and the maximised rewetting of the peat surface. This will be demonstrated by developing a stable or downward trajectory of water quality indicators (suspended solids and ammonia) towards what would be typical of a re-wetted cutaway bog. This will be measured via water quality monitoring (suspended solids and ammonia).
- Receiving water bodies have been classified under the River Basin Management Plan and this classification includes waters that are At Risk from peatlands and peat extraction. The success criteria will be that the At Risk classification will see improvements in the associated pressures from this peatland or if remaining At Risk, that there is an improving trajectory in the pressure from this peatland.

Rehabilitation targets

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

Rehabilitation measures: (see Figure Ap-1)

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

Timeframe:

- 2022. 1st phase of rehabilitation. Field drain blocking.
- 2022-2024. 2nd phase. Further realignment of piped drainage and other re-wetting measures dependent on success of 1st phase re-wetting, as determined by ongoing monitoring of water levels and re-vegetation.
- Other enhancement measures such as fertiliser treatment will be carried out, if needed. These will be determined by ongoing monitoring.
- 2024-2026. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- 2024-2026. Decommission silt-ponds, if necessary.

Table AP-1. Rehabilitation measures and target area.

Type	Code	Description	Area (Ha)
Dry Cutaway	DCT1	Limited drain blocking, modifying outfalls and managing water levels with overflow pipes	43.21
Deep Peat	DPT1	Regular drain blocking (3/100 m) + modifying outfalls and managing water levels with overflow pipes	274.25
Marginal Lands	MLT1	No work required	42.16
Constraint	Constraint	No work required	2.57
Wetland	WLT1	Modifying outfalls and managing water levels with overflow pipes	2.93
Silt Ponds	Silt Ponds	Silt Ponds	2.41
Additional	AW1	Additional Drain Blocking	25.59
Total			393.12

See Drawing number BNM-DR-23-09-20 titled **Bunahinly Bog: Standard Rehab Measures** and Drawing number BNM-DR-23-10-20 titled **Kilgarvan Bog: Standard Rehab Measures** included in the accompanying Mapbook(s) which illustrate the standard rehab measures to be applied.

Monitoring, after-care and maintenance

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

Validation and IPC Licence surrender

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

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

APPENDIX II: BOG GROUP CONTEXT

The Blackwater Bog Group IPC Licensed area is made up of three sub-groups (Attymon, Blackwater and Derryfadda) and have been in industrial peat production for several decades. The majority of sites are situated alongside the Shannon and Suck Rivers within counties Roscommon, Galway, Westmeath and Offaly and cover an overall area of 15,515 ha. Each bog area further comprises a range of habitats from bare milled peat production areas to re-colonising cutaway to workshops areas and transport infrastructure. Industrial peat extraction from these sites mainly supplied ESB power stations at Shannonbridge (WOP) and Lanesborough (LRP).

Industrial peat extraction in the Blackwater Bog Group ceased in 2019. Remaining milled peat stocks were supplied to Shannonbridge (WOP) and Lanesborough (LRP) during 2020. Both power stations closed at the end of 2020. Decommissioning and rehabilitation for the Blackwater Bog Group at part of PCAS started in 2021. Several bog had been rehabilitated in previous years.

A number (6) of bogs were initially drained but have never been used for industrial peat production (three former development bogs (Kellysgrove, Tirrur-Derrymore and Newtown-Loughgore), Clonboley, Killeglan and Derrydoo-Woodlough). The latter three bogs are classed as restored raised bogs, still contain active bog habitat (that qualifies as the Annex I EU Habitats Directive habitat) and now form the core of the Bord na Móna Raised Bog Restoration Project due to their high biodiversity value and bog restoration potential. NPWS have identified the Clonboley bog cluster as having high ecological value within the recent assessment of raised bog SACs, NHAs and non-designated sites (NPWS 2014⁴).

Several sections of Tirrur-Derrymore bog have been leased to NPWS for domestic turf cutting as part of the SAC turf-cutting compensation scheme. Turf-cutters from neighbouring SACs have been relocated to this site by NPWS. Several other bogs are being assessed for similar use.

The depth of remnant peat within Blackwater bog units will have a very significant impact on the development of these sites, with deeper peat (Derryfadda milled peat production bogs) having potential for the establishment of embryonic peat-forming (*Sphagnum*-rich) vegetation communities. Milled peat cutaway (such as at Blackwater) develops in a somewhat different way as in places the underlying gravel is exposed, there is significant alkaline influence on the water chemistry and in many of these cutaway bogs will develop fen and wetlands due to the local topography, hydrology and water chemistry.

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

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

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Attymon	336	Cutover Bog Industrial peat production commenced at Attymon Bog in 1941 and ceased in 2019. Attymon is a deep peat cutover bog.	Attymon Bog formerly supplied fuel sod peat. Coillte have developed a portion of the former production area for conifer forestry. Rehabilitation ongoing	2109	Finalised 2018

⁴ <http://www.npws.ie/peatlandsturf-cutting/nationalraisedbogsacmanagementplan/>

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

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

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Ballaghurt	597	Cutaway Bog Industrial peat production commenced at Ballaghurt Bog in 1981. The majority of the site is	Ballaghurt Bog formerly supplied a range of commercial functions including horticultural peat and fuel peat. Pioneer cutaway vegetation communities are naturally developing on some cutaway areas.	2020	Draft 2017

		cutaway with some residual deeper peat			
Belmont	316	Cutaway Bog Industrial peat production commenced at Belmont Bog during the 1950's. The majority of the site is cutaway.	There are some areas of pioneer cutaway vegetation communities naturally colonising cutaway sections. Coilte have developed a portion of the bog for forestry. Rehabilitation under the PCAS scheme commenced in 2021.	2020	Finalised 2021
Blackwater	2,303	Cutaway Bog Industrial peat production commenced at Blackwater Bog during the 1950's. The majority of the site is cutaway.	Bloomhill Bog formerly supplied milled horticultural peat and fuel peat. There is extensive development of emergent cutaway vegetation communities across the former production area. The site has been used for experimental forestry (BOGFOR) and other conifer plantations. Part of the site was rehabilitated with lake and wetland creation. An ash facility took ash from Shannonbridge Power station	2020	To be updated 2021
Bloomhill	883	Cutover Bog Industrial peat production commenced at Bloomhill Bog during 1981. The majority of the site still has relatively deep residual peat.	Bloomhill Bog formerly supplied milled horticultural peat and fuel peat. Much of the former peat production area is bare peat.	2020	To be updated 2021
Bunahinly-Kilgarvan	389	Cutover Bog Industrial peat production commenced at Bunahinly-Kilgarvan Bog during the 1990's. Residual Deep peat remains on these bogs.	Bunahinly-Kilgarvan formerly supplied milled horticultural peat and fuel peat. Much of the former production area is bare peat. Part of Bunahinly has been re-wetted.	2020	To be updated 2021
Glebe	132	Cutover Bog Industrial peat production commenced at Glebe Bog during the 1990's. Residual deep peat remains on these bogs.	Glebe Bog formerly supplied milled; horticultural peat and fuel peat. Glebe bog is still listed as a pNHA. Much of the former production area is bare peat.	2020	Draft 2017
Clooniff	523	Cutover & cutaway Bog Industrial peat production commenced at Clooniff Bog during the 1970's. A mosaic of variable peat depths remains on this bog.	Clooniff Bog formerly milled fuel peat. Much of the former production area is bare peat or wetland. Some emergent vegetation communities are naturally colonising cutaway areas. Reduced pumping has created a large wetland in one area. Rehabilitation under the PCAS scheme commenced in 2021.	2020	Finalised 2021
Cornafulla	460	Cutover Bog Industrial peat production commenced at Cornafulla Bog in 1987. This bog still retains relatively deep residual peat.	Cornafulla Bog formerly supplied milled horticultural peat and fuel peat. Much of the former production area or cutaway is bare peat.	2020	Draft 2017
Cornaveagh	492	Cutover Bog Industrial peat production commenced at Cornaveagh Bog in	Cornaveagh Bog formerly supplied milled horticultural peat and fuel peat.	2020	Draft 2017

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

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

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Derryfadda	610	Cutover bog Industrial peat production commenced at Derryfadda Bog in 1980's. This bog still retains residual deep peat.	Derryfadda Bog formerly supplied milled horticultural peat and fuel peat. Much of the former production area is bare peat. Some pioneer cutaway vegetation communities are naturally colonising cutaway areas.	2020	To be updated 2021

Boughill	415	Cutover bog Industrial peat production commenced at Boughill Bog in 2008. This bog still retains residual deep peat.	Boughill Bog formerly supplied milled horticultural peat and fuel peat. Much of the former production area footprint or cutaway is bare peat.	2020	Draft 2017
Castlegar	517	Cutover bog Industrial peat production commenced at Castlegar Bog in 2001. This bog still retains residual deep peat.	Castlegar Bog formerly supplied milled horticultural peat and fuel peat. Much of the former production area is bare peat. The adjacent Annaghbeg Bog NHA is an intact undrained raised bog Rehabilitation measures have commenced at Castlegar in 2021.	2019	Finalised 2021
Gowla	650	Cutover bog Industrial peat production by BnM commenced at Gowla Bog in 1970's. Development for sugar production was in place at Gowla since the 1950's. This bog still retains residual deep peat.	Gowla Bog formerly supplied milled horticultural peat and fuel peat. Much of the former production area footprint is bare peat.	2020	Draft 2017

See Drawing number BNM-DR-23-09-24/BNM-DR-23-10-24 titled **Derryfadda Bog Group**, included in the accompanying Mapbook(s) which illustrates the location of Bunahinly-Kilgarvan and the Blackwater Bog Group in context to the surrounding area.

APPENDIX III: ECOLOGICAL SURVEY REPORT

Ecological Survey Report <i>Note: This report outlines an ecological survey of the bog. This report should not be taken as a management plan for the site as other land-uses may still be considered. Information within this report may inform the development of other land-uses and identify areas with particular biodiversity value.</i>			
Bog Name:	Bunahinly-Kilgarvan	Area (ha):	393.4 ha (972.0 acres)
Works Name:	Blackwater	County:	Westmeath
Recorder(s):	MMC & DF	Survey Date(s):	12/11/2010
Habitats present (in order of dominance) The most common habitats present at this site include: <ul style="list-style-type: none"> • Bare Peat (BP) (production bog and travel paths) (Codes refer BnM classification of pioneer habitats of production bog. See Appendix II). • Bare peat and dry heath mosaic (BP/dHeath) (with or without Purple Moorgrass – gMol) (establishing on older production bog) • Bare peat, dry heath and Bog Cotton-dominated vegetation (BP, dHeath & pEang) establishing at north of site • Gorse scrub (eGor) • Dry grassland (Da-Arr) (along bog margin) • Silt ponds (including ridges of spoil and adjacent land with gMol and dHeath in general) • Riparian zones (with scrub along verges) • Works area The most common habitats present around the margins at this site include: <ul style="list-style-type: none"> • Raised bog (PB1) (several fragments) (Codes refer to Heritage Council habitat classification, Fossitt 2000), See Appendix II.) • Scrub (WS1) (Gorse scrub and Birch scrub developing of dry high bog around margins) • Bog woodland (WN7) • Conifer plantation (WD4) (minor screen of Pine planted around margin at northern end of site). • Cutover bog (PB4) (several small fragments) • Improved grassland (GA1) (several small patches where BnM boundary extends over adjacent fields) • Wet grassland (GS4) (several small patches where BnM boundary extends over adjacent fields) • Depositing river (Boor River) 			
Description of site Bunahinly-Kilgarvan Bog is located 1 km south of Athlone in Co. Westmeath. It is also adjacent to the River Shannon, which is situated between 50-150 m away from the western boundary of the site. The site is actually two separate main bogs that are connected via a narrow strip of peatland with Bunahinly to the north and Kilgarvan to the south. This site is located in a low-lying area and the adjoining grassland to the west is prone to inundation. At the time of the survey, much of this land was experiencing rising water levels and there were groups of wintering waders such as Golden Plover and Lapwing roosting and flying around the general area. Much of the adjacent land to the west of the site is designated as part of the Shannon Callows cSAC and pNHA and Middle Shannon Callows SPA. This area is of ornithological importance for wintering and migratory waterbirds. The two bogs are relatively young in production terms, and only came into production in the 1990s. Both bogs still have deep peat and the surface peat is a red/brown <i>Sphagnum</i> peat and is acidic. This is significantly affecting the type of re-vegetation on parts of the bog where there has been no production for several years with typical raised bog species such as Hare's-tail bog Cotton much more common compared to more typical cutaway bog developing on fen peat. However, <i>Sphagnum</i> spp. regeneration is quite rare in extent in the drains and on the production bog. As production is relatively limited and relatively little peat has been removed so far, both bogs are still quite high. The heavy rainfall levels and accumulation of surface water during the of winter 2009 did not affect the production bog but a significant amount of land between the two bogs and along the Shannon Callows was under water for some time, including some of the works area and the silt pond and grassland areas at the southern end of Kilgarvan.			

Bunahinly

The majority of this bog was mapped as bare peat and is relatively 'clean' with very little recolonisation of vegetation. There are tall stockpiles regularly spaced through the bog and these seem to have been left in-situ for several years as Heather is growing on the peat that covers the plastic. No actual harvesting has been carried out since 2005 but main production area has been kept 'clean' by the miller etc. These stockpiles will be taken off the site in the near future. This area is mapped as being 'available' for production.

There is a small side-arm to this bog along the western side. The bog is generally quite firm and dry and there are deep (1-2 m) active drains with running water. Activity within this area seems to have been less intensive over the past few years and there has been some recolonisation of vegetation on the bog surface. This is mainly represented by small developing Heather bushes and most of the area is mapped as a bare peat and pioneer dry heath mosaic (BP/dheath) (although the vegetation cover is generally about 33%). There are also some patches of *Campylopus introflexus* moss developing on the bare peat. Other common species include Purple Moorgrass, Common Bog Cotton, Bulbous Rush, Soft Rush and Hare's Tail Bog Cotton. Less frequent species include Birch, Bog Asphodel, Deergrass, Tufted Hairgrass, Heath Sorrel, Heath Bed-straw, Male Fern, Star Sedge, Tormentil, Carnation Sedge, Cross-leaved Heath, *Cladonia* spp., *Polytrichum commune* and *Polytrichum juniperum*.

Recolonisation is best-established along the bases of old stockpiles where a strip of Heather-dominated vegetation has established. Birch, Gorse, Bramble and Broad-Buckler Fern have also established along these strips. Several very small patches of *S. papillosum* were noted in these zones. Some sections are dominated by Purple Moorgrass. Further west, Purple Moorgrass becomes much more prevalent in the production files and in the regeneration along the western stockpile. This area was a former flush (PF2) dominated by Purple Moorgrass on the high bog (visible from the 2000 aerial photos). Bog Myrtle is also present in the recolonising vegetation. Some small areas have 100% vegetation cover dominated by Purple Moorgrass and Heather. Several drains close to the western stockpile did have impeded drainage and *S. cuspidatum* did appear in the drains with *S. papillosum* and *S. capillifolium* forming some hummocks along the edges of the drains. Other sections of the drains were lined with Soft Rush and Bulbous Rush with no *Sphagnum* cover. Some parts of the drains were infilling with Heather and Purple Moorgrass.

Further north in the small western side-arm there was a small area that had been ditched but it did not seem to have gone into production. This area has re-vegetated well (perhaps the vegetation was never cleared) with about 10% bare peat and was dominated by Heather and Bog Asphodel. There were hummocks of *S. papillosum*, *S. subnitens* and *S. capillifolium* on the bog and *S. cuspidatum* was present in the drains. The bog was quite firm and Birch and pine saplings were also present on the high bog.

Part of the northern end of the site has now been 'cut off' from the rest of the production bog by a fire-break (drainage ditch). This area has come out of production as there is a recent commercial development adjacent to this area and there were concerns about dust and fire risk from the site affecting this development. The stockpiles were removed from this section or production was never intensive. The former production fields are now re-colonising with a mosaic of bare peat, dry heath (dHeath) and Bog Cotton (pEang). Vegetation cover was > 50% in places and recolonisation was more established compared to the western side-arm. (This vegetation community is classified as pEang due to the dominance of Bog Cotton. However, it is significantly different to the pEang community found on cutaway developing on fen peat and there are no base-rich indicators such as Common Mint and Pointed Spear-moss (*Calliergonella cuspidata*) present.). There are several small patches of Purple Moorgrass-dominated vegetation (gMol) and further east this community is greater in extent. Other common species present include Bog Asphodel, Carnation Sedge (*Carex panicea*) and Hare's-tail Bog Cotton. *Campylopus introflexus* is the main moss coloniser and no *Sphagnum* was noted on the former production fields, which were generally quite dry and firm.

The vegetation regeneration is much more typical of regeneration of cutover bog. Lodgepole Pine saplings are relatively frequent around the margins of this section adjacent to the narrow band of conifers that were planted on the margins and are obviously spreading onto the bog. The bog is quite firm and the drains are active with flowing water and relatively 'clean' of recolonising vegetation. *Sphagnum* regeneration was relatively rare in the drains and appeared at the head of some drains where there was some drainage impedance. Drainage of this area seems to flow north towards a head drain running along the boundary of the site and flowing into a series of old silt ponds.

Several areas have been used for the production of mini-sod peat. These small sods were stored in stockpiles along the southern and eastern sections of the site.

A railway line runs along the boundary of the north eastern corner of the site. Between the railway line and the area of bog that was under industrial peat production until 2005 lies a small valley. This area appears to have been used in the past for turf cutting but it has now revegetated. The lowest lying areas here were waterlogged with Bog Cotton, Reedmace (*Typha latifolia*), *Sphagnum cuspidatum*, *S. capillifolium*, *Aulacomnium palustre* and Bottle Sedge (*Carex rostrata*). The sections alongside the railway line were raised and contained a mixture of Birch woodland and wet grassland. Areas of Birch woodland had also developed in this area where the old

cutaway meets the newer industrial peat areas. A silt trap is also located within this area along with a small area that has been planted with Lodgepole Pine (*Pinus contorta*) over 25 years ago. Within the past 10 years, a tree line has been planted along the boundary of the industrial peat harvesting area. This tree line consisted of a mixture of Scot's Pine and Leylandii and was likely planted in order to reduce dust from peat harvesting operations from blowing across the railway line to some of the commercial areas of Athlone. The vegetation of the marginal areas is quite typical with small patches of remnant raised bog (PB1) being colonised by scrub (Birch and Gorse), with some established Birch woodland (WN7). Some adjacent cutover bog (PB4) is relatively old and has developed Heather-dominated vegetation (typical of face-banks). There is active domestic cutting of peat along the southern side of the western side-arm and this area has some relatively young cutover bog (PB4).

Kilgarvan

There has been ongoing production over nearly all of this bog. The production bog is also quite clean with bare peat and virtually no recolonisation. There is a small area towards the east side where Gorse has been allowed to re-colonise on a small mound. This bog also has deep drains with running water. There is still a definite mound towards the centre of the bog from the margins. A temporary railway divides the bog into two main sections and runs the length of the bog.

The north side and east sides contain some Birch woodland that has developed on old cutover bog. This woodland is dominated by Birch and also contains some Pine. The ground cover is species-poor and dominated by Bramble and Bracken. Gorse is also scattered through the woodland. There are also old dried out remnant patches of high bog along the margins that have tall Heather. The margin of the production bog is also used for drainage and a long drain links several silt ponds.

A narrow access point connects the southern end of Kilgarvan with Bloomhill Bog further south. Four silt ponds are located within this area with mainly wet grassland surrounding the silt ponds. Some scrub is encroaching in some areas. These silt ponds were being cleaned out at the time of the ecological survey. The Woor River flows at the south of the site, this river was in flood at the time of the ecological survey but there were indications that Otter are using it, six Mute Swans were also present on the river. The Woor River is a tributary of the River Shannon.

An important ecological feature of this site was the notable presence of Otter (spraints and footprints). Otter appear to be using the site, particularly along the western edge of the site and along the southern boundary, especially along the Woor River and the nearby silt traps. Otters are present along the nearby River Shannon and are likely to be using the site from time to time to forage for food.

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

River Shannon Callows SAC & pNHA (NPWS site code 000216)

Middle Shannon Callows SPA (NPWS site code: 004096)

The site partially overlaps the River Shannon Callows SAC & pNHA and the Middle Shannon Callows SPA in the south-western section of Kilgarvan.

Adjacent habitats and land-use

The surrounding landscape is typically low-lying and is dominated by farmland with improved grassland. Much of the low-lying grassland adjacent to the Shannon is prone to flooding and flooding was also noted along low-lying land between the two bogs and along the Boor River at the southern end of the site. Adjacent habitats include those of reclaimed cutover bog such as scrub, Birch woodland and wet grassland. There is a commercial site located adjacent to northern end of the bog.

Watercourses (major water features on/off site)

- This site is located in the River Shannon catchment. The main Shannon channel is between 50-100 m away from the west side of the site.
- Drainage on the site links to several small tributary streams flowing west including the Boor River at the southern end of Kilgarvan.

Peat type and sub-soils

The peat is mainly a brown/red *Sphagnum*-peat. The main peat type is acidic or ombrotrophic as this is a relatively young production bog. No sub-soils have been exposed.

The site is likely to be underlain with limestone tills, as these sub-soils are exposed around the margins of the site in some of the silt ponds and underlie some of the adjacent fields with grassland. Shell Marl was exposed in some of the spoil taken from the silt ponds at the west of Bunahinly.

Fauna biodiversity**Birds**

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

- Lapwing (120) loafing around the site and using grassland adjacent to the site for roosting
- Snipe (15) using the revegetating bog at the north of the site.
- Starling (50) over flew the site
- Mute Swan (6)
- Gold Finch (>15)
- Kestrel
- More common birds observed during the survey included Wren, Magpie, Blackbird, Rook (4), Pied Wagtail Blue Tit and Robin
- A Snowy Owl was observed at this site in March 2006.

Mammals

- Signs of Hare and Badger were noted on the site. Badgers seem to forage around the perimeter of the production bog while Hare are using the revegetating bog in Bunahinly.

Signs of Otter using site along the west side adjacent to Shannon. Otter sprits noted along some riparian areas and in some silt ponds.

Fungal biodiversity

Moor Club was relatively abundant on Bunahinly Bog. Other fungal species included Scurfy deceiver and Wax caps.

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

- Bog restoration/rehabilitation measures will be restricted to within the footprint of the proposed rehabilitation area.
- The proposed rehabilitation will have due regard to noise limits and hours of operation (i.e. dusk and dawn) to minimise any potential disturbance on resident and local fauna that utilise the site and immediate environs.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- The proposed activities will be restricted to daylight hours and there will be no requirement for artificial lighting.
- Silt ponds will be inspected and maintained as per the IPC Licence.
- During periods of heavy precipitation and run-off, activities will be halted.
- Measures will be carried out using a suitably sized machine and in all circumstances, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.
- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
- Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Vehicles will never be left unattended during refuelling.
- No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
- All plant refuelling will take place using mobile fuel bowers. Only dedicated trained and competent personnel will carry out refuelling operations.
- Mobile storage such as fuel bowers will be banded to 110% capacity to prevent spills. Tanks for bowers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked. All pumps using fuel or containing oil will be locally and securely banded where there is the possibility of discharge to waters.
- Potential impacts caused by spillages etc. during rehabilitation will be reduced by keeping spill kits and other appropriate equipment on-site.
- Site activities will be carried out in accordance with 'best practice'. In order to ensure compliance and implementation of 'best practice', these measures will be communicated to relevant Bord na Móna staff and updated as required.

APPENDIX V. BIOSECURITY

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

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

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

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

In addition to the above, Best Practise measures around the prevention and spread of Crayfish plague⁵ will be adhered with throughout all rehabilitation measures and activities.

⁵ <https://www.biodiversityireland.ie/projects/invasive-species/crayfish-plague/>

APPENDIX VI. POLICY AND REGULATORY FRAMEWORK

Bord na Móna Plc is a publicly owned company, originally established in 1934 to develop some of Ireland's extensive peat resources for the purposes of economic development and to support energy security. In the decades since its establishment the company has employed tens of thousands of people in its fuel, energy, and horticultural growing media businesses. For much of its history the company's support of important national policy aims has been enabled and encouraged in a variety of ways by Government.

Today, Bord na Móna is undertaking a number of highly significant actions in support of climate policy. These actions involve a radical transformation and decarbonisation of nearly the entire Bord na Móna business. This transformation will be driven by unlocking the full potential of our land and creating significant value for Ireland and the Midlands in particular.

Bord na Móna is an integral part of the economic, social, and environmental fabric of Ireland and Irish life. As a key employer in the Midlands, the company is conscious that its obligations go beyond purely commercial and environmental – there is also a social responsibility to employees and the communities served by Bord na Móna. It is the company's role and absolute priority to ensure that its long-term strategy delivers on all of these important areas in a robust and balanced way.

There are a wide range of policies, plans, legislation and land designations that inform the development of this Bord na Móna peatland rehabilitation plan. Bord na Móna have also developed and operate various policies and strategies that also inform the development of this rehabilitation plan.

1 EPA IPC Licence

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. PO-502-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The bog is part of the Blackwater group. This regulatory requirement is the main driver of the development of this rehabilitation plan.

2 The Peatlands Climate Action Scheme (PCAS)

Bord na Móna (BnM) understand that it is the Minister's (DECC) intention to impose an obligation on Bord na Móna to develop a programme of measures, 'the Scheme', for the enhanced decommissioning, rehabilitation and restoration of boglands previously used to supply peat for electricity generation within the State. The enhanced decommissioning, rehabilitation and restoration of the peatlands funded by the Scheme (PCAS) will deliver benefits across climate action (GHG mitigation through reduced carbon emissions and acceleration towards carbon sequestration), enrich the State's natural capital, increase eco-system services, strengthen biodiversity, improve water quality and storage attenuation as well as developing the amenity potential of the peatlands.

It is envisaged that Bord na Móna carry out an enhanced decommissioning, rehabilitation and restoration, under the Scheme (PCAS), and supported by the Climate Action Fund and Ireland's National Recovery and Resilience Plan across a footprint of 33,000 ha (a subset of the BnM estate that has been used for energy production). This Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Interventions and measures supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. However,

only the additional costs associated with the additional and enhanced rehabilitation, i.e., those activities which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support under the Scheme.

The proposed enhanced rehabilitation detailed in this document, are predicated on the understanding that the element of the activities, over and above the 'standard' rehabilitation necessary to comply with pre-existing Condition 10 IPC Licence requirements, will be deemed eligible costs be the Scheme regulator and funded by the Climate Action Fund and Ireland's National Recovery and Resilience Plan.

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

3 National Climate Policy

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

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

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

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

4 National Peatlands Strategy

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

The strategy recognises that Ireland's peatlands will continue to contribute to a wide variety of human needs and to be put to many uses. It aims to ensure that Ireland's peatlands are sustainably managed so that their benefits can be enjoyed responsibly. It aims to inform appropriate regulatory systems to facilitate good decision making in support of responsible use. It also aims to inform the provision of appropriate incentives, financial supports and disincentives where required. The strategy attempts to strike an appropriate balance between different needs, including local stakeholders like turf-cutters and semi-state bodies such as Bord na Móna.

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

Bord na Móna is a key stakeholder in the National Peatlands Strategy and the Peatlands Strategy Implementation Group. The strategy recognises the potential for some Bord na Móna sites to be restored and to contribute to the national SAC and NHA network of protected raised bog sites. The strategy (agreed in 2015) also recognises the various different values of cutaway bog and developed six key principles (with Bord na Móna) for the after-use of cutaway bog.

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

The National Peatlands Strategy highlights the importance and value of developing peatland rehabilitation plans for Bord na Móna cutaway sites and implementing this peatland rehabilitation. Some of these principles have now been superseded by the company's decision to cease industrial peat extraction. The National Peatlands Strategy is currently being reviewed by Government.

5 Draft National River Basin Management Plan 2022-2027 (Water Framework Directive)

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

The NRBMP 2018-2021 outlined how peat extraction can be a potentially significant pressure on various water quality parameters. Peatland rehabilitation of Bord na Móna cutaway (in addition to other measures) was part of the WFD (2018-2021) programme of measures. The NRBMP 2018-2021 takes account of the fact that Bord na Móna was in the process of phasing out the extraction of peat for energy production, that it set a target to rehabilitate 9,000 ha of cutaway bogs (covering 25 peatlands) by 2021 (in 2018) and will look to implement best-available mitigation measures to further reduce water quality impacts caused by peat extraction while the phasing-out process is taking place. This NRBMP 2018-2021 rehabilitation target was superseded by the acceleration of the Bord na Móna de-carbonisation programme and the Scheme (PCAS).

The development of site rehabilitation plans and the delivery of peatland rehabilitation by Bord na Móna was expected to have a positive impact on water quality and will help the NRBMP 2018-2021 deliver its objectives in relation to the Water Framework Directive and is one of the five key principle actions.

The draft NWBMP 2022-2027 describes how the number of waterbodies impacted by peat, industry and forestry have decreased by 10, 10 and 5 waterbodies, respectively since the second cycle. Impacts on water quality and river habitat arising from peat and peat extraction and associated drainage include the release of ammonium and fine-grained suspended sediments, and physical alteration of aquatic habitats. Drainage of peatlands also results in changes to the hydromorphological condition of rivers.

The draft NWBMP 2022-2027 outlines how maintaining and restoring Irish bogs will lead to a decrease in waterborne carbon leaching to levels comparable with intact bogs as well as reducing losses of peat silt and ammonia. Vegetation on the surface of the peat can also slow the flow of water over the land surface. Based on the EPA's most recent reports, peat extraction and drainage is impacting on 106 water bodies across the country, with peat the single pressure on 28 of these water bodies. However, compared to the data in the second-cycle plan, the number of water bodies impacted by peat has decreased.

The cessation of industrial peat extraction by Bord na Móna in 2021 was expected to have a significant positive impact on water quality of receiving water courses by reducing the impact of peat extraction as a key pressure on particular water courses. This is now being supported by the results and conclusions of the draft NWBMP 2022-2027.

6 National Biodiversity Action Plan 2016-2021

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

The delivery of rehabilitation via PCAS is expected to significantly contribute in the future to actions and targets of the National Biodiversity Action Plan 2016-2021, particularly in relation to peatland restoration and creation of new habitats such as wetlands and woodlands.

7 National conservation designations

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

8 National Raised Bog Special Area of Conservation Management Plan 2017-2022.

The National Raised Bog Special Area of Conservation Management Plan 2017-2022 sets out a roadmap for the long-term management, restoration and conservation of protected raised bogs in Ireland. The Plan strikes an appropriate balance between the need to conserve and restore Ireland's raised bog network as part of Ireland's commitments towards the EU Habitats Directive, and the needs of stakeholders and gives recognition to the important role that communities have to play in the conservation and restoration of raised bogs. The National Raised Bog Special Areas of Conservation (SACs) Management Plan 2017-2022 is part of the measures being implemented in response to the on-going infringement action against Ireland in relation to the implementation of the EU Habitats Directive, with regard to the regulation of turf cutting on the Special Areas of Conservation (SACs). The then Minister for Arts, Heritage and the Gaeltacht, also published a **Review of Raised Bog Natural Heritage Area Network** in 2014.

Bord na Móna has played a key role in the development of the National Raised Bog Special Area of Conservation Management Plan 2017-2022 and the Review of the Raised Bog Natural Heritage Area Network. Several Bord na Móna sites were assessed by the National Parks and Wildlife Service as part of the above Plan and Review and there is an expectation that several Bord na Móna sites will be designated as SACs and NHAs in the future. This will reinforce the network of protected raised bog sites and replace in part sites that will be de-designated as they have been deemed to be significantly damaged and are deemed to have no raised bog restoration prospects. PCAS is expected to restore several sites that will contribute to The National Raised Bog Special Areas of Conservation (SACs) Management Plan 2017-2022 targets in relation to the restoration of raised bog habitat.

Bord na Móna has also responded to the needs of the NRBMP and provided several sites to the government for the relocation of turf-cutters from SACs. This is part of a suite of ongoing bog conservation measures in the NRBMP to manage turf-cutting in protected sites. Bord na Móna and the National Parks and Wildlife Service continues to engage regarding the ongoing relocation of turf-cutters from protected raised bog sites.

9 All-Ireland Pollinator Plan 2021-2025

The All-Ireland Pollinator Plan 2021-2025 outlines key objectives and actions to protect and support pollinating insects and the habitats they rely on. A Bord na Móna specific action in this plan includes the adoption of pollinator-friendly management within the Bord na Móna network of sites. One action to help achieve this objective is habitat rehabilitation and restoration, where possible, of pollinator-friendly habitats, including peatland habitats.

10 Land-use planning policies

As Bord na Móna operates in many counties across Ireland, it is important to note the respective development plans in these counties. Many of the existing development plans recognise the potential that exists in the after-use of cutover/cutaway peatlands. Bord na Móna seeks to work with all of the relevant local authorities to ensure that the most appropriate after-uses are reflected in local planning policy. The following areas of consistent importance are of both direct and indirect relevance to Bord na Móna: heritage, tourism, biodiversity/conservation, landscape, renewable energy, and economy/enterprise.

Begnagh Bog is located in an area zoned by Longford County Council as open countryside.

11 National Archaeology Code of Practise

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

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

- BNM must ensure that any monuments or archaeological objects discovered during peat extraction are protected in an appropriate manner by following the Archaeological Protection Procedures.
- BNM must ensure that any newly discovered monuments on Bord na Móna lands are reported in a timely manner to the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht.
- BNM must ensure that any archaeological objects discovered on Bord na Móna lands are reported immediately to the Duty Officer of the National Museum of Ireland.
- Bord na Móna will adhere to the Archaeology Code of Practise relating to management of any archaeological finds that may arise during cutaway peatland rehabilitation and decommissioning.

12 Bord na Móna Biodiversity Action Plan 2016-2021

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

One example of a key CBD target is:

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

The EUs headline target for progress by 2020 is to:

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

This rehabilitation plan is aligned to the CBD target and the EU Biodiversity Strategy target and will help Ireland meet its commitment to these international Biodiversity policies.

13 Bord na Móna commitments

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

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

In line with Bord na Móna's accelerated decarbonisation programme, the company made a further commitment to a significantly larger rehabilitation target. This was reflected in our plans to rehabilitate a further 20,000 hectares of cutaway and cutover bog to wetland and woodland mosaics by 2025. In addition, we planned to restore a further 1,000 hectares of raised bog habitat by 2025.

The above commitments have now been followed by the decision by the company to cease industrial peat extraction and rehabilitate a target of 33,000 ha between 2021-2025.

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

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

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

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

APPENDIX VII. DECOMMISSIONING

1. Condition 10 Decommissioning

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

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

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

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

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

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

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

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

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

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

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

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

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

7.3.3 The ultimate destination of the waste.

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

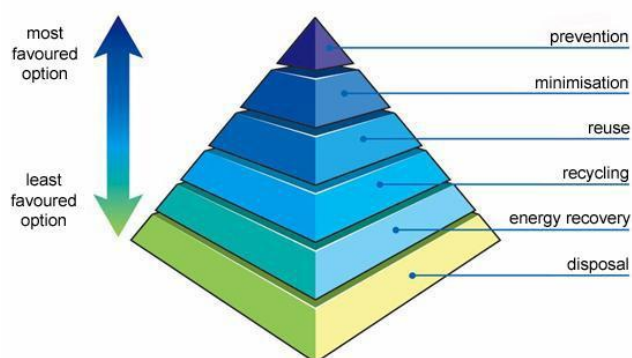
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

7.3.6 Details of any rejected consignments.

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

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

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



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

2. Enhanced Decommissioning.

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

Item	Enhanced Decommissioning Type	Bunahinly-Kilgarvan Decommissioning Plan
1	Removal of Railway Lines	Removal of Railway Lines
2	Decommissioning Bridges and Underpasses	If feasible
3	Decommissioning Railway Level Crossing	Decommissioning Railway Level Crossing
4	Restricting Access (bogs and silt ponds)	Restricting Access to Bog.
5	Removal of High Voltage Power Lines	If feasible

APPENDIX VIII. GLOSSARY

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

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

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

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

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

Environmental stabilisation: The key objective of peatland rehabilitation is environmental stabilisation. This means developing habitats and vegetation back onto the bare peat, slowing water movement across the bog, minimising effects to downstream waterbodies and meeting the conditions of the IPC Licence. This is achieved by a combination of re-wetting, where possible, and natural colonisation of the former cutaway, with or without intervention. Habitats will develop that reflect the underlying environmental conditions. Other after-use development may also serve to act as environmental stabilisation.

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

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

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

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

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

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

APPENDIX IX. EXTRACTIVE WASTE MANAGEMENT PLAN

(Minimisation, treatment, recovery and disposal)

Objective:

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

Scope:

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

1.0 Extractive Waste:

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

1.1 Silt Pond excavations and maintenance.

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

1.2 Power Station screenings:

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

1.3 Bog Timbers:

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

2.0 P0503-01 IPPC Licence Extractive Waste Conditions

2.1 Condition 7.5 Extractive Waste Management

The licensee shall draw up a Waste Management Plan (to be known as an Extractive Waste Management Plan) for the minimisation, treatment, recovery and disposal of extractive waste. This Plan shall meet the requirements of regulation 5 of the Waste Management (Management of Waste from the Extractive Industries) Regulations, 2009. The Plan shall be submitted for agreement by the Agency by the 31st December 2012. The Plan shall be reviewed at least once every five years thereafter in a manner agreeable to the Agency and amended in the event of substantial changes to the operation of a waste facility or to the waste deposited. Any amendments shall be notified to the Agency.

All extractive waste shall be managed in accordance with the Extractive Waste Management Plan. A report on the implementation of the Extractive Waste Management Plan shall be provided in the AER.

2.2 Condition 7.6 Waste Facility

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

2.3 Condition 7.7 Excavation Voids

7.7.1 Unless otherwise agreed by the Agency, only extractive waste shall be placed in excavation voids.

7.7.2 When placing extractive waste into excavation voids for rehabilitation and construction purposes, the licensee shall, in accordance with regulation 10 of the Waste Management (Management of Waste from the Extractive Industries) Regulations, 2009, and the Extractive Waste Management Plan:

- Secure the stability of the waste
- Put in place measures to prevent pollution of soil, surface water and ground water.
- Carry out monitoring of the extractive waste and excavation void.

Condition 7.5. Extractive Waste Management Plan. 5 (1)

3.0 Minimisation.

3.1 Silt pond excavation material and cleanings.

IPPC Licence conditions require all production areas to be serviced by an appropriately designed silt pond based on storage volume and retention time. Condition 6.6 requires all ponds to be cleaned bi-annually and more often if inspections dictate, so the only opportunity for minimisation of same is through Standard Operating Procedures. These are required under condition 2.2.2 (i) regarding minimisation of suspended solids, and are in-place to minimise the generation of silt, which in-turn will minimise the generation of silt pond waste.

3.2 Power Station Screenings.

These screenings cannot be minimised as they are a consequence of peat production, stones, timbers and oversize peat materials are naturally occurring on the bog, and are required to be removed prior to processing.

3.3 Bog Timbers.

Bog timbers are also naturally occurring materials within a bog and are required to be removed prior for production. The volume of these bog timbers varies from bog to bog and as such their minimisation is not controllable or quantifiable.

4.0 Treatment**4.1 Silt pond excavation material and cleanings.**

The silt pond excavation material and silt cleanings do not require any treatment for its end use which will be either backfilling these silt pond voids as per condition 7.7.1 above as part of the Bog Rehabilitation Plan, or reincorporated into the surrounding peatlands.

4.2 Power Station Screenings.

The factory screenings are permitted to be returned to the bog as they were naturally occurring materials from the bog, and as such do not require any treatment to serve this purpose.

4.3 Bog Timbers

As per 1.3 above, these timbers are stockpiled at two locations in each bog, as per the attached list of sites and become habitats for various flora and fauna.

5.0 Recovery**5.1 Silt pond excavation material and cleanings.**

Condition 2.2.2 (vi) requires the reuse of silt pond waste to be examined. This was undertaken in 2006, the outcome of which was that this waste peat silt material, as a fuel, was contaminated with sub-soils, rendering it unsuitable for combustion. In addition, volumes are small compared to overall peat production volumes.

5.2 Power Station Screenings.

Given the nature of these screenings as outlined in 1.2 above, there is no further use identified and they are permitted to be disposed of back to the bog.

5.3 Bog Timbers

Investigations into processing these materials into smaller fractions for potential heating purposes did not yield any viable results. In addition, these older stockpiles are now classified as habitats and as such would not be considered for reuse as a fuel.

6.0 Disposal**6.1 Silt pond excavation material and cleanings.**

Schedule 3 (ii) permits the disposal of silt pond cleanings (Lagoon Sediments) to the bog and these locations, adjacent to the silt pond site, are presented in the attached spreadsheet, with associated grid coordinates.

6.2 Power Station Screenings.

Schedule 3 (ii) permits the disposal of screenings (Peat Screenings) to the bog at designated locations agreed under Condition 7.4, and these locations, are presented in the attached spreadsheet, with associated grid coordinates.

6.3 Bog Timbers

These naturally occurring bog timbers are stockpiled at locations in each bog, grid coordinates attached.

7.0 Extractive Waste Management Plan**5 (2a)(i)**

The vast majority of peat extraction bogs were all designed and drained for production prior to the 1960's and as such the production fields layout cannot be altered. Under our Cleaner Reduction Procedures, various design changes have been implemented to the production machines and process to reduce lost peat which eventually is captured in the silt ponds and requires removal as waste peat silt. This along with training and ongoing research and development will continuously reduce waste peat and subsequently waste silt pond cleanings. Bog timbers are present naturally in various volumes and quantities in different bogs and as peat production involves stripping peat in layers, the exposure, generation and removal of these timbers is unavoidable. Work has been undertaken recently into project looking at grinding of these bog timbers in situ using a timber miller, and if this project becomes viable it will contribute to the reduction of bog timbers.

5 (2a)(ii)

Given the nature and expanse of peat bogs, the stockpiling and storage of these waste materials do not present a visual, storage or stability problem. As required under Condition 10 of the IPPC Licence, the silt pond excavations and screenings will be utilised to backfill the silt pond voids once the bogs have finished and stabilised in accordance with our Bog Rehabilitation Plan. Storage of these wastes in the interim, open to the elements does not present a change on the nature of these wastes that will threaten the environment or prevent their reuse during the bog rehabilitation process.

5 (2a)(iii)

Under Condition 10 of the IPPC Licence, all silt ponds will be decommissioned once the bog surface has stabilised, in agreement with the Agency. This will involve the removal of weirs and flow controls, returning the silt pond back to its original drain or removing the silt pond from the drainage system. Both of these activities will involve placing the silt pond extraction and cleaning material back into the excavation void.

5 (2a)(iv)

The peat bogs do not contain any topsoil, so this is not required.

5 (2a)(v)

Peat mineral resources do not undergo any treatment.

5 (2b)

These three extractive waste are all being reused and recovered back to their original extraction points and have not undergone any physical, chemical, or biological change.

5 (2c)(i, ii & iii)

These three extractive wastes, stored on the bog for reuse or recovery during the bog rehabilitation phase, do not require any management or monitoring during the operation of these bogs. Silt pond excavations and cleanings are stored adjacent to the silt pond and quickly revegetated and stabilise, the screenings are graded back into the bog at the agreed locations upon disposal and the bog timbers do not prevent any water or airborne danger to the environment.

5 (3)

The three extractive wastes arising from peat extraction operations at this site are classified wastes from mineral non-metalliferous excavation, with an EWC code of 0101 02. The materials are not classified as hazardous under Directive 91/689/EEC20, and do not contain substances or preparations classified as dangerous under Directives 67/548/EEC5 or 1999/45/EC6 above a certain threshold.

The peat excavations and cleanings are stored in locations and in a manner that they could not collapse, and are remote in their nature. The stockpiles are located adjacent to silt ponds that are cleaned regularly and as such these stockpiles are managed and levelled to facilitate further cleanings.

Therefore the material stored at these waste facilities would not be considered to be a Category A waste facility.

Classification in accordance Annex II.

Waste Material	Description	Classification	Chemical Process treatment	Deposition description	Transport System
Silt Pond Excavations and cleanings	Peat and mineral soils associated with peatlands. Stored for reuse during bog rehabilitation, with no displacement of overburden	01 01 02	None	Excavated from silt ponds by excavator and deposited adjacent to the silt pond.	Excavator
Peat Screenings	Stones, timbers and oversized peat particles, reincorporated into low areas, agreed with the Agency, and stabilized under normal natural bog conditions	01 01 02	None	Removed by screen at the factory and transported by tractor and trailer to the designated and agreed locations	Tractor and trailer.
Bog Timbers	Pine, Oak and Yew species, stored at locations in each bog. Not subject to any stability issues due to exposure to atmospheric/meteorological conditions.	01 01 02	None	Removed from the bog surface by excavator and transported by tractor and trailer to the agreed locations	Tractor and Trailer

Description of operations.

Silt pond excavations arise from the requirement to have silt ponds treating all peat extraction sites. Silt pond cleanings arise from the removal of peat silt from silt ponds as required under IPPC Licence. Bog timbers arise from preparation of the bogs surface for peat production. Estimated quantities of materials are below:

Closure plan. (Bog Rehabilitation Plan).

Condition 10.1 – 10.3 of the IPPC Licence requires the following:

- 10.1 Following termination of use or involvement of all or part of the site in the licensed activity, the licensee shall:
- 10.1.1 Decommission, render safe or remove for disposal/recovery, any soil, subsoils, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution.
- 10.1.2 Implement the agreed cutaway bog rehabilitation plan (refer Condition 10.2).

10.2 Cutaway Bog Rehabilitation Plan:

- 10.2.1 The licensee shall prepare, to the satisfaction of the Agency, a fully detailed and costed plan for permanent rehabilitation of the cutaway boglands within the licensed area. This plan shall be submitted to the Agency for agreement within eighteen months of the date of grant of this licence.
- 10.2.2 The plan shall be reviewed every two years and proposed amendments thereto notified to the Agency for agreement as part of the AER. No amendments may be implemented without the written agreement of the Agency.

10.3 The Rehabilitation Plan shall include as a minimum, the following:

- 10.3.1 A scope statement for the plan; to include outcome of consultations with relevant Agencies, Authorities and affected parties (to be identified by the licensee).
- 10.3.2 The criteria which define the successful rehabilitation of the activity or part thereof, which ensures minimum impact to the environment.
- 10.3.3 A programme to achieve the stated criteria.
- 10.3.4 Where relevant, a test programme to demonstrate the successful implementation of the rehabilitation plan.
- 10.3.5 A programme for aftercare and maintenance.

10.4 A final validation report to include a certificate of completion for the Rehabilitation Plan, for all or part of the site as necessary, shall be submitted to the Agency within six months of execution of the plan. The licensee shall carry out such tests, investigations or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment. This plan including maps and ecological classifications are available on file at the Blackwater IPPC Licence Coordinators office.

The location in relation to the silt pond excavations and cleanings are adjacent to the silt ponds, which are considered under the Shannon River Basin Management Plan in accordance with the requirements of Directive 2000/60/EC.

Screenings and bog timbers are all naturally occurring elements of peatland and their placement back to the bog in smaller concentrated designated waste facilities does not constitute a risk to the prevention of water compliance.

The lands under where these materials are deposited are peatlands and are un-effected by the placing of this material.

Review.

This plan will be reviewed every five years, the first review to take place in September 2017. This review will entail an inspection of these waste facilities to ensure their placing, management, maintenance and stability comply with the requirements of the Extractive Waste Management requirements and condition 7 of the Blackwater IPPC Licence P0502-01.

APPENDIX X. MITIGATION MEASURES FOR THE APPLICATION OF FERTILISER

- Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
 1. The land is waterlogged;
 2. The land is flooded, or it is likely to flood;
 3. The land is frozen, or covered with snow;
 4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann).
 5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- No fertiliser will be spread on land within 2 metres of a surface watercourse.
- Buffer zones in respect of waterbodies, as specified on <https://www.epa.ie/about/faq/name,57156,en.html>, will be adhered with at all times with regard to fertiliser application. Reproduced as follows:

Water body / Feature	Buffer zone
Any water supply source providing 100m ³ or more of water per day, or serving 500 or more people	200 metres (or as little as 30 metres where a local authority allows)
Any water supply source providing 10m ³ or more of water per day, or serving 50 or more people	100 metres (or as little as 30 metres where a local authority allows)
Any other water supply for human consumption	25 metres (or as little as 30 metres where a local authority allows)
Lake shoreline	20 metres
Exposed cavernous or karstified limestone features (such as swallow holes or collapse features)	15 metres
Any surface watercourse where the slope towards the watercourse exceeds 10%	10 metres
Any other surface waters	5 metres*

APPENDIX XI. CONSULTATION SUMMARIES

Table APX -1 Consultees contacted

Bog Name	Contact Organisation	Contact Name	Date of Issue	Format	Date Response Received	Response Format
Bunahinly-Kilgarvan	Department of Housing, Local Government and Heritage NPWS	Multiple Staff Members	09/11/2021	Email		
Bunahinly-Kilgarvan	National Museum of Ireland	Multiple Staff Members	09/11/2021	Email		
Bunahinly-Kilgarvan	Department of Housing, Local Government and Heritage	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Dept of Agriculture Food & the Marine	General Email Contact	09/11/2021	Email	11/11/2021	Email
Bunahinly-Kilgarvan	Department of Environment, Climate and Communications	Multiple Staff Members	09/11/2021	Email		
Bunahinly-Kilgarvan	Dept of Rural and Community Development	General Email Contact	09/11/2021	Email	09/11/2021	Email
Bunahinly-Kilgarvan	Department of the Housing Local Government and Heritage	General Email Contact	09/11/2021			
Bunahinly-Kilgarvan	Minister for Environment, Climate and Communications	Minister - Eamon Ryan	09/11/2021	Email		
Bunahinly-Kilgarvan	Minister of state for Agriculture with	Pippa Hackett Minister of State for Land	09/11/2021	Email		

	responsibility for Land use and Biodiversity	Use and Biodiversity)				
Bunahinly- Kilgarvan	Oireachtas	Danielle McDonnell (Minister Malcolm Noonan Secretary)	09/11/2021	Email	15/11/2021	Email
Bunahinly- Kilgarvan	An Taisce	General Email Contact	09/11/2021	Email		
Bunahinly- Kilgarvan	Environmental Protection Agency	Multiple Staff Members	09/11/2021	Email		
Bunahinly- Kilgarvan	Inland Fisheries Ireland	General Email Contact	09/11/2021	Email		
Bunahinly- Kilgarvan	Local Authority Waters Programme	Multiple Staff Members	09/11/2021	Email		
Bunahinly- Kilgarvan	NWRA	General Email Contact	09/11/2021	Email		
Bunahinly- Kilgarvan	Teagasc	General Email Contact	09/11/2021	Email		
Bunahinly- Kilgarvan	The Heritage Council	General Email Contact	09/11/2021	Email		
Bunahinly- Kilgarvan	Waterways Ireland	General Email Contact	09/11/2021	Email		
Bunahinly- Kilgarvan	An Forum Uisce (The Water Forum)	General Email Contact	09/11/2021	Email		
Bunahinly- Kilgarvan	Coillte	Multiple Staff Members	09/11/2021	Email		
Bunahinly- Kilgarvan	Irish Water	General Email Contact	09/11/2021	Email		
Bunahinly- Kilgarvan	Office of Public Works	Multiple Staff Members	09/11/2021	Email	19/11/2021	Email
Bunahinly- Kilgarvan	CARO (Climate Action Regional	General Email Contact	09/11/2021	Email		

	Office) Eastern and Midlands					
Bunahinly-Kilgarvan	Bat Conservation Ireland	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Birdwatch Ireland	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Butterfly Conservation Ireland	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Eastern and Midland Regional Assembly	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Fisheries Ireland	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Friends of the Earth	General Email Contact	09/11/2021	Email	09/11/2021	
Bunahinly-Kilgarvan	Friends of the Irish Environment	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	ICMSA (Irish Creamery Milk Suppliers Association)	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	ICSA (Irish Cattle and Sheep Farmers Association)	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Irish Farmers Association	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Irish Peatlands Conservation Council	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Irish Raptor Study Group	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Irish Rural Link (Community	General Email Contact	09/11/2021	Email		

	Wetlands Forum)					
Bunahinly-Kilgarvan	Irish Rural Link	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Irish Wildlife Trust	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	National Association of Regional Game Councils	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	NPWS Rangers North East	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	NUIG Galway	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	PPN Westmeath Public Participation Network	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Ranger Association Committee	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Shannon Flood Risk State Agency Co-ordination Working Group	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Sustainable Water Action Network (SWAN)	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Trinity College Dublin	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Turf Cutters and Contractors Association	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	UCD / Irish Rural Link	General Email Contact	09/11/2021	Email		

Bunahinly-Kilgarvan	University College Dublin	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Waterways Ireland	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	Woodlands of Ireland	General Email Contact	09/11/2021	Email		
Bunahinly-Kilgarvan	TD/Longford	Peter Burke	09/11/2021	Email		
Bunahinly-Kilgarvan	TD/Longford	Sorca Clarke	09/11/2021	Email		
Bunahinly-Kilgarvan	TD/Longford	Joe Flaherty	09/11/2021	Email		
Bunahinly-Kilgarvan	TD/Longford	Robert Troy	09/11/2021	Email		
Bunahinly-Kilgarvan	Westmeath County Councillors - Chief Exec	Pat Gallagher	09/11/2021	Email		
Bunahinly-Kilgarvan	Westmeath County Councillors - Director of Service	Barry Kehoe	09/11/2021	Email		
Bunahinly-Kilgarvan	Westmeath County Councillors - Director of Service	Mark Keaveney	09/11/2021	Email		
Bunahinly-Kilgarvan	Westmeath County Councillors -	Deirdre Reilly	09/11/2021	Email		
Bunahinly-Kilgarvan	Director of Services Planning, Economic and Tourism Development, Trim MD. Meath	Des Foley	09/11/2021			
Bunahinly-Kilgarvan	Westmeath County	John Dolan	09/11/2021			

	Councillors - Athlone - Moate					
Bunahinly-Kilgarvan	Westmeath County Councillors - Athlone - Moate	Tom Farrell	09/11/2021			
Bunahinly-Kilgarvan	Westmeath County Councillors - Athlone - Moate	Frankie Keena	09/11/2021			
Bunahinly-Kilgarvan	Westmeath County Councillors - Athlone - Moate	Johnny Penrose	09/11/2021			
Bunahinly-Kilgarvan	Westmeath County Councillors - Athlone - Moate	Vinny McCormack	09/11/2021			
Bunahinly-Kilgarvan	Westmeath County Councillors - Athlone - Moate	Aengus O'Rourke	09/11/2021			
Bunahinly-Kilgarvan	Westmeath County Councillors - Athlone - Moate	Liam McDaniel	09/11/2021			
Bunahinly-Kilgarvan	Westmeath County Councillors - Athlone - Moate	Jamie Moran	09/11/2021			
Bunahinly-Kilgarvan	Westmeath County Councillors - Athlone - Moate	Louise Heavin	09/11/2021			
Bunahinly-Kilgarvan	Minister of State at the Department of Housing, Local Government and Heritage	Peter Burke (Longford- Westmeath)	09/11/2021			

Bunahinly-Kilgarvan	Longford-Westmeath	Sorca Clarke	09/11/2021			
Bunahinly-Kilgarvan	Longford-Westmeath	Joe Flaherty	09/11/2021			
Bunahinly-Kilgarvan	Minister of State at the Department of Enterprise, Trade and Employment	Robert Troy (Longford-Westmeath)	09/11/2021			
Bunahinly-Kilgarvan	Iarnrod Eireann	Olivia Condrón (Infrastructure)	09/11/2021			
Bunahinly-Kilgarvan	All Land- owners in vicinity of bog	Leaflet Drop	09/11/2021	Leaflet		
Bunahinly-Kilgarvan	All those with turbary rights	Leaflet Drop		Leaflet		

Table APX -2 Response summary from Consultees contacted

Organisation	Summary of Response by Stakeholder	BnM Response
Irish Farmers Association	<p>The IFA made a submission on Bunahinly-Kilgarvan Bog 18/11/2021 raising the following points:</p> <ol style="list-style-type: none"> 1) Acknowledging need to protect the environment and manage national peatlands 2) Expressing concern about possible impact of peatland rehabilitation on surrounding farmlands, specifically around the following: <ol style="list-style-type: none"> (a) Flooding/waterlogging of surrounding areas and development of new flood plains. (b) Health and Safety risks if water levels in drains and depressions rise then these could become a hazard for livestock, machinery operation and farmer access. (c) Negative impact on Property Values due to accumulation of risks outlined above. (d) Contingency Planning for potential future ownership of designated bogs in ensuring no negative impacts on property from any new ownership. (e) Protection of existing Turf Cutting rights and resolution of any issues around same. <p>The IFA made a number of proposals to be considered as potential solutions to queries raised.</p>	<p>BnM responded on 23/11/2021 to address the concerns of raised by the IFA.</p> <p>Dialogue is ongoing between BnM and the IFA.</p>

Office of Public Works	<p>Submission received from OPW on 19/11/2021 that was supportive of the measures being undertaken and the benefits arising but also requested clarification on the following:</p> <p>The Bunahinly and Kilgarvan Bogs, do not overlap with any OPW Arterial Drainage Scheme. The OPW supports the BnM bog decommissioning and rehabilitation as a Nature Based Catchment Management measure in managing flood flows in the Shannon catchment and the many other environmental co-benefits from developing this project.</p>	BnM responded on 15/12/2021 acknowledging the submission by OPW.
National Museum of Ireland	<p>Response received 24/11/2021 acknowledging receipt of email and thanking us for making the opportunity to respond.</p> <p>Responded through e-mail throughout 2020/21 in relation to all PCAS bogs. Issues raised were;</p> <ol style="list-style-type: none"> 1) The request that due diligence be taken during works to protect any archaeologically significant findings or areas 2) The NMI reiterated the importance of peatlands for the preservation of archaeology and requested they be consulted as part of any EIA undertaken 	BnM acknowledged on 25/11/2021. Dialogue is ongoing.
Dept. of Agriculture, Food & the Marine (DAFM)	<p>Submission by e-mail to express support for PCAS in general. Submission recommended;</p> <ol style="list-style-type: none"> 1) That local landowners and stakeholders be considered as part of the consultation process. 2) EIA assessment be carried out prior to PCAS works. 3) Hydrological assessments are carried out with a view to protecting adjoining lands from adverse impacts. 	BnM acknowledged and responded via e-mail on 18/11/2021 to assure that all points raised within the submission will be considered. A virtual meeting/PCAS presentation was held for DAFM on 11/12/2020. Dialogue is ongoing.

APPENDIX XII. ARCHAEOLOGY

Role of the Archaeological Liaison Officer

1. To communicate this Code of Practice and the *Archaeological Protection Procedures* (Appendix IV) to all personnel operating on the bog.
2. To ensure that all notices relating to the *Archaeological Protection Procedures* are posted and maintained at appropriate locations on the bog.
3. To report any stray finds, presented to the Liaison Officer from his/her group of bogs, to the Duty Officer of the National Museum of Ireland.
4. To provide for the appropriate protection of the stray find, whether in-situ or removed from the bog, as directed by the Duty Officer of the National Museum of Ireland.




Code of Practice

22

Code of Practice

5. To arrange for the delivery or collection of the stray find, as directed by the Duty Officer of the National Museum of Ireland.
6. To complete the Report of Discovery of Archaeological Object(s) in Bogs (Appendix V), as directed by the Duty Officer of the National Museum of Ireland.
7. To maintain a file of all stray finds and associated documentation and provide copies to the Project Archaeologist.
8. To provide assistance, where required, to the Department during archaeological surveys.
9. To provide assistance, where required, to Bord na Móna's Consultant Archaeologists, during investigation and mitigation of monuments.
10. To report to the Bord na Móna members on the Archaeology Management Liaison Committee any planned developments or new activities on cutaway peatland areas within his/her group of bogs.



	Procedure: ENV017	Rev: 1
Title: Archaeological Findings	Approved: EM	Date: 13/10/2020

1) Purpose

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

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

2) Procedure

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

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

Your Archaeological Liaison Officer is

3) Records

Revision Index			
Revision	Date	Description of change	Approved
1	13/09/2020	First release	EMcD
2			

APPENDIX XIII. INITIAL WATER QUALITY DATA FROM BUNAHINLY-KILGARVAN

Table AP13.1. Water quality data for 12 months from November 2020 to December 2021 at Bunahinly-Kilgarvan.

PCAS SW Sampling Scheme	Licence No	Bog Name	Unique I.D. No.	SW Code GIS	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l	Suspended Solids mg/l
Blackwater	P0502-01	Bunahinly	127	SW92	4	6	N/S	17	N/S	N/S	<2	5	4	N/S	19	<2	<2	<2
Blackwater	P0502-01	Bunahinly	128	SW93	13	2	N/S	5	N/S	N/S	<2	3	2	N/S	5	<2	<2	<2
Blackwater	P0502-01	Bunahinly	129	SW94	6	3	N/S	2	N/S	N/S	<2	2	5	N/S	2	3	<2	<2
Blackwater	P0502-01	Kilgarvin	182	SW89	N/S	8	N/S	<2	N/S	N/S	<2	9	2	N/S	3	4	<2	<2
Blackwater	P0502-01	Kilgarvin	183	SW89A	N/S	2	N/S	<2	N/S	N/S	<2	5	5	N/S	4	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	185	SW91	9	<2	N/S	3	N/S	N/S	<2	4	5	N/S	3	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	186	SW95	6	9	N/S	2	N/S	N/S	<2	<2	3	N/S	3	<2	<2	<2
Blackwater	P0502-01	Kilgarvin	187	SW96	8	6	N/S	5	N/S	N/S	<2	5	8	N/S	9	Combined outlet from SW89		
				ELV	35	35		35	35	35	35	35	35	35	35	35	35	35
PCAS SW Sampling Scheme	Licence No	Bog Name	Unique I.D. No.	SW Code GIS	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour
Blackwater	P0502-01	Bunahinly	127	SW92	293	284	N/S	289	N/S	N/S	339	347	360	N/S	325	276	327	211
Blackwater	P0502-01	Bunahinly	128	SW93	320	307	N/S	217	N/S	N/S	250	348	358	N/S	361	300	326	212
Blackwater	P0502-01	Bunahinly	129	SW94	255	235	N/S	221	N/S	N/S	265	284	300	N/S	309	316	286	212
Blackwater	P0502-01	Kilgarvin	182	SW89	N/S	245	N/S	201	N/S	N/S	263	199	216	N/S	226	219	203	178
Blackwater	P0502-01	Kilgarvin	183	SW89A	N/S	215	N/S	215	N/S	N/S	256	203	244	N/S	276	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	185	SW91	174	200	N/S	192	N/S	N/S	242	195	168	N/S	153	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	186	SW95	234	234	N/S	215	N/S	N/S	263	295	263	N/S	285	276	252	192
Blackwater	P0502-01	Kilgarvin	187	SW96	400	374	N/S	325	N/S	N/S	368	376	293	N/S	279	Combined outlet from SW89		
PCAS SW Sampling Scheme	Licence No	Bog Name	Unique I.D. No.	SW Code GIS	COO	COO	COO	COO	COO	COO	COO	COO	COO	COO	COO	COO	COO	COO
Blackwater	P0502-01	Bunahinly	127	SW92	66	65	N/S	54	N/S	N/S	78	84	94	N/S	42	81	80	58
Blackwater	P0502-01	Bunahinly	128	SW93	78	76	N/S	25	N/S	N/S	71	97	94	N/S	59	85	78	62
Blackwater	P0502-01	Bunahinly	129	SW94	50	50	N/S	19	N/S	N/S	71	83	83	N/S	44	37	75	61
Blackwater	P0502-01	Kilgarvin	182	SW89	N/S	52	N/S	18	N/S	N/S	64	76	71	N/S	32	67	65	49
Blackwater	P0502-01	Kilgarvin	183	SW89A	N/S	53	N/S	21	N/S	N/S	61	79	81	N/S	43	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	185	SW91	46	41	N/S	16	N/S	N/S	64	73	68	N/S	24	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	186	SW95	50	48	N/S	20	N/S	N/S	64	95	66	N/S	46	66	59	52
Blackwater	P0502-01	Kilgarvin	187	SW96	101	98	N/S	75	N/S	N/S	92	110	106	N/S	74	Combined outlet from SW89		
PCAS SW Sampling Scheme	Licence No	Bog Name	Unique I.D. No.	SW Code GIS	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
Blackwater	P0502-01	Bunahinly	127	SW92	6.1	6	N/S	5.9	N/S	N/S	3.1	6.5	6.6	N/S	6.6	6.5	5.3	5
Blackwater	P0502-01	Bunahinly	128	SW93	5.3	5.2	N/S	5.1	N/S	N/S	4.8	5.9	6	N/S	6	5.4	5.6	4.9
Blackwater	P0502-01	Bunahinly	129	SW94	6.1	6.1	N/S	6.1	N/S	N/S	6.1	7.2	7.7	N/S	7.5	7.5	6.9	6.3
Blackwater	P0502-01	Kilgarvin	182	SW89	N/S	7	N/S	6.7	N/S	N/S	6.7	7.8	7.8	N/S	7.6	7.5	7.4	7
Blackwater	P0502-01	Kilgarvin	183	SW89A	N/S	7.1	N/S	6.8	N/S	N/S	7	7.5	7.7	N/S	7.5	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	185	SW91	7.7	7.2	N/S	7	N/S	N/S	7.2	7.5	7.8	N/S	7.9	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	186	SW95	6.5	6.9	N/S	6.6	N/S	N/S	6.9	7.5	7.3	N/S	7.3	7.1	6.9	6.8
Blackwater	P0502-01	Kilgarvin	187	SW96	6.9	7	N/S	6.9	N/S	N/S	7.1	7	7.2	N/S	7.3	Combined outlet from SW89		
PCAS SW Sampling Scheme	Licence No	Bog Name	Unique I.D. No.	SW Code GIS	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P	TP as P
Blackwater	P0502-01	Bunahinly	127	SW92	<0.05	<0.05	N/S	<0.05	N/S	N/S	<0.05	0.05	0.05	N/S	0.1	<0.05	<0.05	<0.05
Blackwater	P0502-01	Bunahinly	128	SW93	<0.05	<0.05	N/S	<0.05	N/S	N/S	<0.05	<0.05	0.06	N/S	<0.05	<0.05	<0.05	<0.05
Blackwater	P0502-01	Bunahinly	129	SW94	<0.05	<0.05	N/S	<0.05	N/S	N/S	<0.05	<0.05	0.06	N/S	0.1	<0.05	<0.05	<0.05
Blackwater	P0502-01	Kilgarvin	182	SW89	N/S	<0.05	N/S	<0.05	N/S	N/S	<0.05	<0.05	<0.05	N/S	<0.05	<0.05	<0.05	<0.05
Blackwater	P0502-01	Kilgarvin	183	SW89A	N/S	<0.05	N/S	<0.05	N/S	N/S	<0.05	<0.05	<0.05	N/S	<0.05	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	185	SW91	0.05	<0.05	N/S	<0.05	N/S	N/S	<0.05	<0.05	<0.05	N/S	<0.05	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	186	SW95	<0.05	<0.05	N/S	<0.05	N/S	N/S	<0.05	0.14	0.08	N/S	0.11	<0.05	<0.05	<0.05
Blackwater	P0502-01	Kilgarvin	187	SW96	0.13	<0.05	N/S	0.12	N/S	N/S	0.08	0.13	0.13	N/S	0.06	Combined outlet from SW89		
PCAS SW Sampling Scheme	Licence No	Bog Name	Unique I.D. No.	SW Code GIS	p2	p2	p2	p2	p2	p2	p2	p2	p2	p2	p2	p2	p2	p2
Blackwater	P0502-01	Bunahinly	127	SW92	114	129	N/S	73	N/S	N/S	97	157	157		177	63	139	125
Blackwater	P0502-01	Bunahinly	128	SW93	114	63	N/S	56	N/S	N/S	62	117	124		158	101	77	57
Blackwater	P0502-01	Bunahinly	129	SW94	92	72	N/S	43	N/S	N/S	89	169	211		171	124	25	97
Blackwater	P0502-01	Kilgarvin	182	SW89	N/S	97	N/S	73	N/S	N/S	93	234	250		218	193	37	170
Blackwater	P0502-01	Kilgarvin	183	SW89A	N/S	78	N/S	72	N/S	N/S	117	206	228		183	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	185	SW91	391	134	N/S	68	N/S	N/S	142	254	264		224	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	186	SW95	106	107	N/S	67	N/S	N/S	102	278	253		233	149	153	129
Blackwater	P0502-01	Kilgarvin	187	SW96	270	219	N/S	248	N/S	N/S	231	259	282		313	Combined outlet from SW89		
PCAS SW Sampling Scheme	Licence No	Bog Name	Unique I.D. No.	SW Code GIS	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N	Ammonia as N
Blackwater	P0502-01	Bunahinly	127	SW92	0.414	0.412	N/S	0.369	N/S	N/S	0.428	0.525	0.820	N/S	0.833	0.740	0.337	0.299
Blackwater	P0502-01	Bunahinly	128	SW93	0.244	0.334	N/S	0.218	N/S	N/S	0.209	0.017	0.029	N/S	0.090	0.238	0.334	0.301
Blackwater	P0502-01	Bunahinly	129	SW94	0.375	0.415	N/S	0.321	N/S	N/S	0.368	0.730	0.499	N/S	0.704	0.658	0.734	0.511
Blackwater	P0502-01	Kilgarvin	182	SW89	N/S	1.370	N/S	1.140	N/S	N/S	0.929	0.635	0.808	N/S	1.300	1.460	1.620	0.684
Blackwater	P0502-01	Kilgarvin	183	SW89A	N/S	1.440	N/S	0.936	N/S	N/S	1.440	2.180	2.110	N/S	1.910	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	185	SW91	0.269	1.380	N/S	0.945	N/S	N/S	1.380	2.010	1.580	N/S	1.390	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	186	SW95	0.245	0.320	N/S	0.275	N/S	N/S	0.296	0.009	0.477	N/S	0.240	0.161	0.152	0.230
Blackwater	P0502-01	Kilgarvin	187	SW96	0.217	0.198	N/S	0.163	N/S	N/S	0.091	0.013	0.122	N/S	0.034	Combined outlet from SW89		
PCAS SW Sampling Scheme	Licence No	Bog Name	Unique I.D. No.	SW Code GIS	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC
Blackwater	P0502-01	Bunahinly	127	SW92	27.7	23.7	N/S	18.1	N/S	N/S	28.8	31.8	35.8	N/S	33	26.3	29.1	19.9
Blackwater	P0502-01	Bunahinly	128	SW93	30.3	29.5	N/S	16.7	N/S	N/S	24.3	27.9	30.8	N/S	32.5	31.5	28.6	20.5
Blackwater	P0502-01	Bunahinly	129	SW94	21.6	18.7	N/S	14.3	N/S	N/S	24.9	25.3	30.2	N/S	32.1	29.7	27.5	20.1
Blackwater	P0502-01	Kilgarvin	182	SW89	N/S	18.4	N/S	13.4	N/S	N/S	21.8	23.7	26.7	N/S	26.8	23.5	22.8	44.5
Blackwater	P0502-01	Kilgarvin	183	SW89A	N/S	18.5	N/S	14.3	N/S	N/S	23.6	25.7	29.8	N/S	28.2	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	185	SW91	17.3	18	N/S	19	N/S	N/S	23.3	20.7	23.5	N/S	22.2	Combined outlet from SW89		
Blackwater	P0502-01	Kilgarvin	186	SW95	21.3	19.9	N/S	13.7	N/S	N/S	24.6	31.9	32	N/S	30.9	27.6	25.1	20.9
Blackwater	P0502-01	Kilgarvin	187	SW96	48.3	43.3	N/S	38.2	N/S	N/S	40.4	38.9	37.7	N/S	36.6	Combined outlet from SW89		

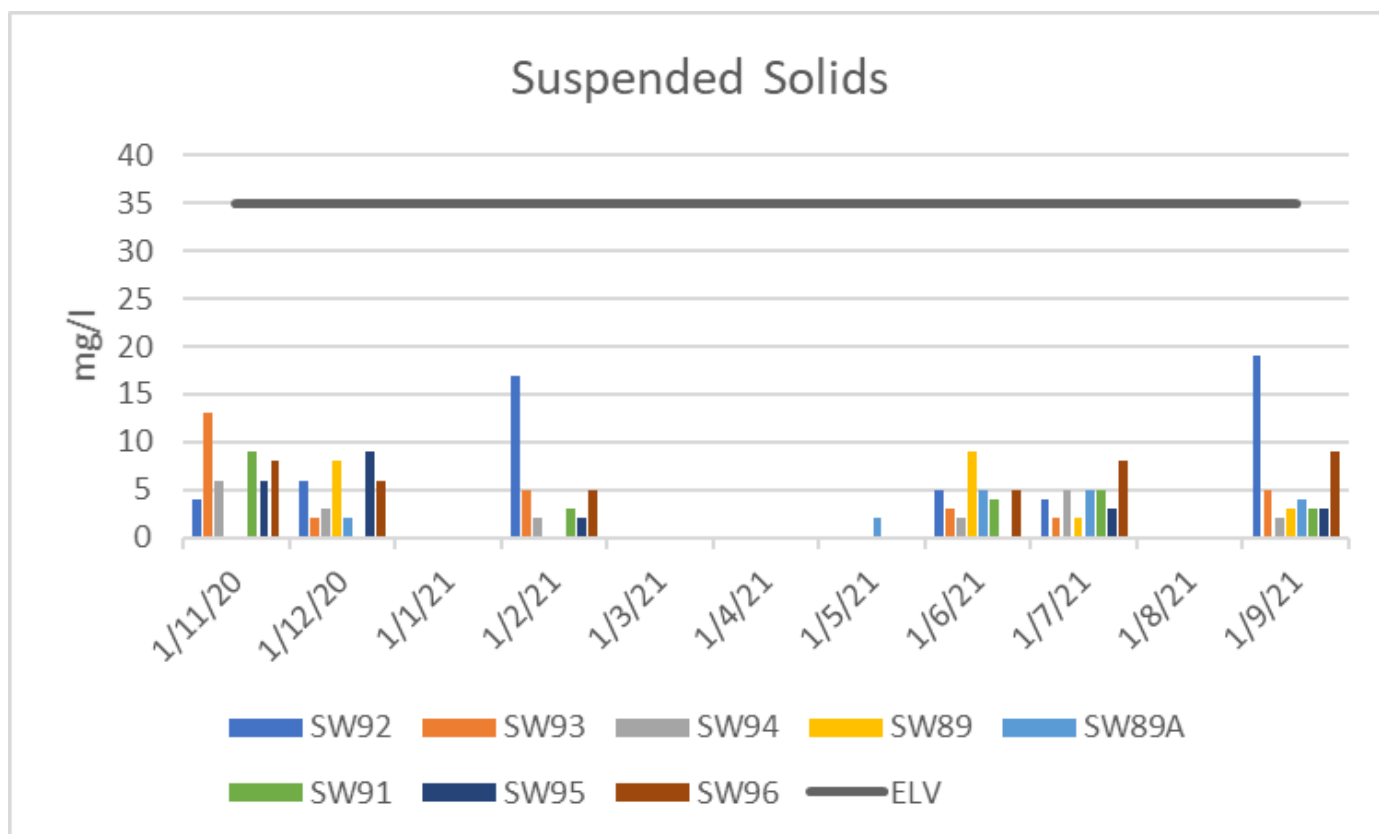


Figure AP13.1. Suspended solids in water sampling at Bunahinly-Kilgarvan from different discharge points. 35 mg/l is the emission limit value.

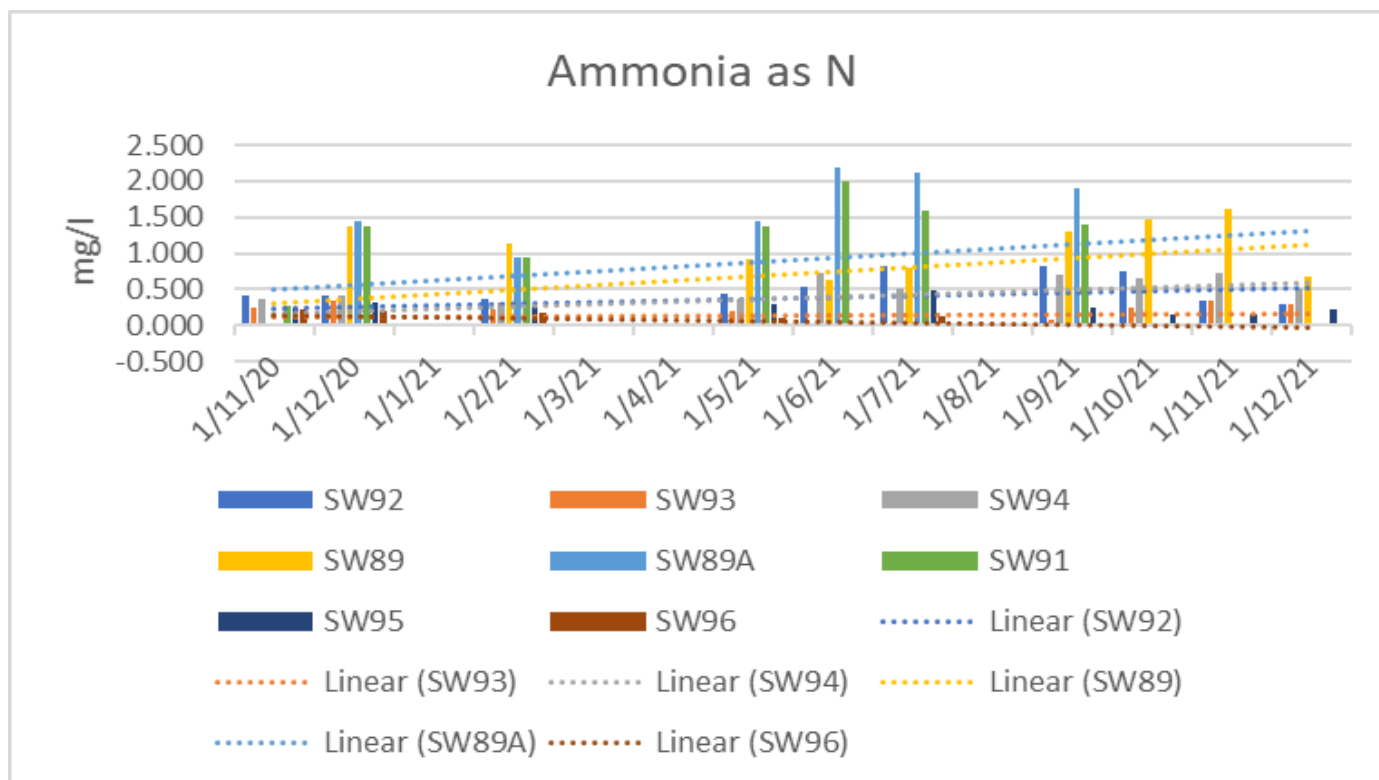


Figure AP13.2. Ammonia concentrations in water sampling from Bunahinly-Kilgarvan from different discharge points. The main trigger level for ammonia is 4.53mg/l for reporting to EPA.

Appendix C Site Synopses



Site Name: River Shannon Callows SAC

Site Code: 000216

The River Shannon Callows is a long and diverse site which consists of seasonally flooded, semi-natural, lowland wet grassland, along and beside the river between the towns of Athlone and Portumna. It is approximately 50 km long and averages about 0.75 km wide (reaching 1.5 km wide in places). Along much of its length the site is bordered by raised bogs (many, but not all, of which are subject to large-scale harvesting), esker ridges and limestone-bedrock hills. The soils grade from silty-alluvial to peat. This site has a common boundary, and is closely associated, with two other sites with similar habitats, River Suck Callows and Little Brosna Callows.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[6410] <i>Molinia</i> Meadows
[6510] Lowland Hay Meadows
[7230] Alkaline Fens
[8240] Limestone Pavement*
[91E0] Alluvial Forests*
[1355] Otter (<i>Lutra lutra</i>)

The River Shannon Callows is mainly composed of lowland wet grassland. Different plant communities occur, depending on elevation, and therefore flooding patterns. Two habitats listed on Annex I of the E.U. Habitats Directive are well-represented within the site – *Molinia* meadows and lowland hay meadows. The former is characterised by the presence of the Meadow Thistle (*Cirsium dissectum*) and Purple Moor-grass (*Molinia caerulea*), while typical species in the latter include Meadow Fescue (*Festuca pratensis*), Rough Meadow-grass (*Poa trivialis*), Downy Oat-grass (*Avenula pubescens*), Common Knapweed (*Centaurea nigra*), Ribwort Plantain (*Plantago lanceolata*) and Common Sorrel (*Rumex acetosa*). In places these two habitats grade into one another.

Low-lying areas of the callows with more prolonged flooding are characterised by Floating Sweet-grass (*Glyceria fluitans*), Marsh Foxtail (*Alopecurus geniculatus*) and wetland herbs such as Yellow-cress (*Rorippa* spp.), Water Forget-me-not (*Myosotis scorpioides*) and Common Spike-rush (*Eleocharis palustris*). Most of the callows consist of a plant community characterised by Creeping Bent (*Agrostis stolonifera*), Brown Sedge (*Carex disticha*), Common Sedge (*Carex nigra*), and herbs such as Marsh-marigold (*Caltha palustris*) and Marsh Bedstraw (*Galium palustre*), while the more

elevated and peaty areas are characterised by low-growing sedges, particularly Yellow Sedge (*Carex flava* agg.) and Star Sedge (*Carex echinata*). All these communities are very diverse in their total number of plant species, and include the scarce species Meadow-rue (*Thalictrum flavum*), Summer Snowflake (*Leucojum aestivum*) and Marsh Stitchwort (*Stellaria palustris*).

A further two Annex I habitats, both listed with priority status, have a minor though important presence within the site. Alluvial forest occurs on a series of alluvial islands just below the ESB weir near Meelick. Several of the islands are dominated by well-grown woodland consisting mainly of Ash (*Fraxinus excelsior*) and Willows (*Salix* spp.). The islands are prone to regular flooding from the river.

At Clorhane, an area of limestone pavement represents the only known example in Co. Offaly. It is predominantly colonised by mature Hazel (*Corylus avellana*) woodland, with areas of open limestone and calcareous grassland interspersed. The open limestone pavement comprises bare or moss-covered rock, or rock with a very thin calcareous soil cover supporting a short grassy turf. The most notable plant in the grassy area is a substantial population of Green-winged Orchid (*Orchis morio*), which occurs with such species as Sweet Vernal-grass (*Anthoxanthum odoratum*), Quaking-grass (*Briza media*), sedges (*Carex caryophyllea*, *C. flacca*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Common Knapweed (*Centaurea nigra*), and Ribwort Plantain (*Plantago lanceolata*). Ferns associated with the cracks in the pavement include *Asplenium trichomanes*, *A. ruta-muraria*, *A. adiantum-nigrum* and *Polypodium australe*. Bryophytes include *Grimmia apocarpa* and *Orthotrichum* cf. *anomalum*. Anthills are common within the open grassland. The Hazel wood is well-developed and has herbaceous species such as Primrose (*Primula vulgaris*), Common Dog-violet (*Viola riviniana*), Wood-sorrel (*Oxalis acetosella*) and Herb-Robert (*Geranium robertianum*). The wood is noted for its luxuriant growth of epiphytic mosses and liverworts, with such species as *Neckera crispa* and *Hylocomium brevirostre*. Yew (*Taxus baccata*) occurs in one area.

Other habitats of smaller area but also of importance within the site are lowland dry grassland, drainage ditches, freshwater marshes and reedbeds. The dry grassland areas, especially where they exist within hay meadows, are species-rich, and of two main types: calcareous grassland on glacial material, and dry grassland on levees of river alluvium. The former can contain many orchid species, Cowslip (*Primula veris*), abundant Adder's-tongue (*Ophioglossum vulgatum*) and Spring-sedge (*Carex caryophyllea*), and both contain an unusually wide variety of grasses, including False Oat-grass (*Arrhenatherum elatius*), Yellow Oat-grass (*Trisetum flavescens*), Meadow Foxtail (*Alopecurus pratense*), and Meadow Brome (*Bromus commutatus*). In places Summer Snowflake also occurs.

Good quality habitats on the edge of the callows included in the site are wet broadleaved semi-natural woodland dominated by both Downy Birch (*Betula pubescens*) and Alder (*Alnus glutinosa*), and dry broadleaved woodland dominated by Hazel. There are also areas of raised bog, fen on old cut-away bog with Black Bog-rush (*Schoenus nigricans*), and a 'petrifying stream' with associated species-rich

calcareous flush which supports Yellow Sedge (*Carex lepidocarpa*), Blunt-flowered Rush (*Juncus subnodulosus*) and Stoneworts (*Chara* spp.).

Immediately south of Portumna Bridge and south east of the town of Portumna the area of low-lying terrestrial land west of the river comprises a large area of the Annex I habitat alkaline fen. The fen comprises a complex of rich-fen plant communities. Sedges (*Carex lasiocarpa*, *Carex acutiformis*) and Bogbean (*Menyanthes trifoliata*) dominate parts of the fens while other small sedges are common throughout. The orchids Early Marsh Orchid (*Dactylorhiza incarnata*), Western Marsh Orchid (*D. majalis*) and Marsh Helleborine (*Epipactis palustris*) and the red-listed plant species Marsh Pea (*Lathyrus palustris*) have been recorded within the fen.

Two species which are legally protected under the Flora (Protection) Order, 2015, occur in the site - Opposite-leaved Pondweed (*Groenlandia densa*) in drainage ditches, and Meadow Barley (*Hordeum secalinum*) on dry alluvial grassland. This is one of only two known inland sites for Meadow Barley in Ireland. The Red Data Book plant Green-winged Orchid is known from dry calcareous grasslands within the site.

The site is of international importance for wintering waterfowl as numbers regularly exceed the 20,000 threshold (mean of 34,985 for five winters 1994/94-1998/99). Of particular note is an internationally important population of Whooper Swans (287). A further five species have populations of national importance (all figures are means for five winters 1995/96-1999/00): Mute Swan (349), Wigeon (2972), Golden Plover (4254), Lapwing (11578) and Black-tailed Godwit (388). Species which occur in numbers of regional or local importance include Bewick's Swan, Tufted Duck, Dunlin, Curlew and Redshank. The population of Dunlin is notable as it is one of the few regular inland flocks in Ireland. Small flocks of Greenland White-fronted Goose use the Shannon Callows; these are generally associated with larger flocks which occur on the adjacent Little Brosna Callows and River Suck Callows.

Shoveler (an estimated 12 pairs in 1987) and Black-tailed Godwit (Icelandic race) (one or two pairs in 1987) breed within this site. These species are listed in the Red Data Book as being threatened in Ireland. The scarce bird Quail is also known to breed within the area. The callows has at times held over 40% of the Irish population of the globally endangered Corncrake, although numbers have declined in recent years. A total of 66 calling birds were recorded in 1999, but numbers have dropped significantly since then. The total population of breeding waders (Lapwing, Redshank, Snipe and Curlew) in 1987 was one of three major concentrations in Ireland and Britain. The population of breeding Redshank in the site was estimated to be 10% of the Irish population, making it nationally significant. Also, the Annex I species Merlin and Hen Harrier are regularly reported hunting over the callows during the breeding season and in autumn and winter.

This site holds a population of Otter, a species listed on Annex II of the E.U. Habitats Directive, while the Irish Hare, which is listed in the Irish Red Data Book, is a common sight on the callows.

The Shannon Callows are used for summer dry-stock grazing (mostly cattle, with some sheep and a few horses), and permanent hay meadow. About 30 ha is a nature reserve owned by voluntary conservation bodies. The River Shannon is used increasingly for recreational purposes with coarse angling and boating accounting for much of the visitor numbers. Intermittent and scattered damage to the habitats has occurred due to over-deepening of drains and peat silt deposition, water-skiing, ploughing and neglect of hay meadow (or reversion to pasture). However, none of these damaging activities can yet be said to be having a serious impact. Threats to the quality of the site may come from the siting of boating marinas in areas away from centres of population, fertilising of botanically-rich fields, the use of herbicides, reversion of hay meadow to pasture, neglect of pasture and hay meadow, disturbance of birds by boaters, anglers, birdwatchers and the general tourist. The maintenance of generally high water levels in winter and spring benefits all aspects of the flora and fauna, but in this regard, summer flooding is a threat to breeding birds, and may cause neglect of farming.

The Shannon Callows has by far the largest area of lowland semi-natural grassland and associated aquatic habitats in Ireland, and one in which there is least disturbance of natural wetland processes. Botanically, it is extremely diverse with two legally protected species of plants and many scarce species. Excellent examples of two habitats listed on Annex I of the E.U. Habitats Directive occur within the site – *Molinia* meadows and lowland hay meadows with good examples of a further three Annex habitats (two with priority status). In winter the site is internationally important for numbers and species of waterfowl. In spring it feeds large numbers of birds on migration, and in summer it holds very large numbers of breeding waders, rare breeding birds and the endangered Corncrake, as well as a very wide variety of more common grassland and wetland birds. The presence of Otter, an Annex II species, adds further importance to the site.

SITE SYNOPSIS

SITE NAME: MIDDLE SHANNON CALLOWS SPA

SITE CODE: 004096

The Middle Shannon Callows SPA is a long and diverse site which extends for approximately 50 km from the town of Athlone to the town of Portumna; it lies within Counties Galway, Roscommon, Westmeath, Offaly and Tipperary. The site averages about 0.75 km in width though in places is up to 1.5 km wide. Water levels on the site are greatly influenced by the very small fall between Athlone and Portumna and by the weir at Meelick. The site has extensive areas of callow, or seasonally flooded, semi-natural, lowland wet grassland, along both sides of the river. The callows are mainly too soft for intensive farming but are used for hay or silage or for summer grazing. Other habitats of smaller area which occur alongside the river include lowland dry grassland, freshwater marshes, reedbeds and wet woodland. The diversity of semi-natural habitats present and the sheer size of the site attract an excellent diversity of bird species, including significant populations of several.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Corncrake, Golden Plover, Lapwing, Black-tailed Godwit and Black-Headed Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The Middle Shannon Callows qualifies as a site of international importance as it regularly supports in excess of 20,000 wintering waterbirds (23,656 – four year mean peak for four of the winters between 1995/96 and 1999/2000). The site also supports internationally important populations of Whooper Swan (305 – five year mean peak for the period 1995/96 to 1999/2000) and Black-tailed Godwit (485 – four year mean peak for four of the winters between 1995/96 and 1999/2000). Four further species of wintering waterbird occur in numbers of national importance, i.e. Wigeon (3,059), Golden Plover (4,133), Lapwing (13,240) and Black-headed Gull (1,209) – all figures are four year mean peaks for four of the winters between 1995/96 and 1999/2000.

The Shannon Callows is the largest site monitored as part of I-WeBS and many parts of it are inaccessible on the ground. Annual monitoring of the wintering waterbirds of the Shannon Callows is undertaken by aerial surveys in January/February with some areas also covered by ground counts. The importance of the site for some species may have been underestimated if count coverage missed the brief spring peaks for these species, e.g. peak counts of Lapwing (23,409) and Black-tailed Godwit (1,096) recorded in the baseline period (1995/96 to 1999/2000) have been considerably higher than the four year means. A wide range of other species occurs within the site, including Mute Swan (407), Teal (88), Tufted Duck (41), Dunlin

(335), Curlew (162) and Redshank (39). Small numbers of Greenland White-fronted Goose use the Shannon Callows (peak 55 in 1998/99) and these are generally associated with larger flocks which occur on the adjacent Little Brosna Callows and River Suck Callows. The callow grasslands provide optimum feeding grounds for these various species of waterfowl, while many of the birds also roost or rest within the site.

The Shannon Callows is also an important site for breeding waders with the total population on the Shannon and Little Brosna Callows being one of three major concentrations in Ireland and Britain in 1987. Numbers of some species have declined since then but a survey of the Shannon Callows in 2002 recorded the following breeding waders - Lapwing (63 pairs), Redshank (116 pairs), Snipe (139 drumming birds) and Curlew (8 pairs). Black-tailed Godwit, a very rare breeding species in Ireland, nests or attempts to nest in small numbers each year within the site. A further scarce breeding species, Shoveler, also nests in small numbers each year (an estimated 12 pairs in 1987).

The Middle Shannon Callows SPA supports a breeding population of Corncrake (19 pairs - five year mean peak between 2003 and 2007, based on records of calling males).

Corncrake winter in southern and eastern Africa, migrating northwards to arrive on their breeding grounds from early April onwards, departing again in August and September. They require the cover of tall vegetation throughout their breeding cycle and are strongly associated with meadows which are harvested annually, where they nest and feed. Annual cutting of these meadows creates a sward which is easy for the birds to move through. Other habitats, which can provide cover for Corncrake in the early and late stages of the breeding season, are also important for this species.

Corncrake is listed on the 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Species. This is due to population and range declines of more than 50% in the last 25 years across significant parts of its range.

Quail, a related, scarce species, is also known to breed within the callow grasslands.

A good variety of other bird species are attracted to the site. Birds of prey, including scarce species such as Merlin and wintering Hen Harrier have been recorded hunting over the callows. A range of passerine species associated with grassland and swamp vegetation breed, including Sedge Warbler, Grasshopper Warbler, Skylark and Reed Bunting. Kingfisher is also known to occur within the site. Whinchat, an uncommon breeding species, occurs in small numbers.

The Middle Shannon Callows SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of two species - Whooper Swan and Black-tailed Godwit. In addition, there are four species that have wintering populations of national importance. The site also supports a nationally important breeding population of Corncrake. Of particular note is that several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Corncrake and Golden Plover.

10.1.2012

SITE SYNOPSIS

SITE NAME: MONGAN BOG SPA

SITE CODE: 004017

Mongan Bog is a midland raised bog of medium size situated immediately east of the monastic site of Clonmacnoise, Co. Offaly, and 12 km south of Athlone. It is situated in a basin, surrounded on part of its perimeter by high ground on mineral soil.

The bog has a well-developed microtopography of hummocks, pools and lawns. Species such as Ling Heather (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*), cottongrasses (*Eriophorum angustifolium*, *E. vaginatum*), Carnation Sedge (*Carex panicea*) and White Beak-sedge (*Rhynchospora alba*) are common. A good variety of bog mosses (*Sphagnum* spp.) and other bryophytes are found. Strips of cut-away bog, part of which is colonised by willows (*Salix* spp.) and birch (*Betula* sp.) scrub, occur along the margins of the peat dome.

At the time this site was identified for Special Protection Area (SPA) designation it was being utilised by Greenland White-fronted Goose from the internationally important River Suck population. Although Greenland White-fronted Goose does not currently utilise the site, this species is regarded as a special conservation interest for this SPA.

Mongan Bog is one of the raised bogs that was traditionally used as a feeding/roosting site by small numbers of the River Suck population of Greenland White-fronted Goose. These birds utilise the callows near the mouth of the Suck to Shannonbridge and as far as Clonmacnoise. The numbers of Greenland White-fronted Goose using this part of the range was always small (peak count of 26 in 1984/85) and geese have not been recorded using the site in recent years - the last record was 11 individuals in 1989/90.

The cutaway area of bog provides habitat for a range of bird species, including birds of prey, thrushes, warblers and finches. A study of the birds of Mongan Bog in 1985 recorded Mallard, Snipe, Skylark and Meadow Pipit breeding on the peat dome.

Mongan Bog is owned by An Taisce (the National Trust) and is a Ramsar Convention site, a Biogenetic Reserve and a Statutory Nature Reserve.

25.3.2014

SITE SYNOPSIS

SITE NAME: LOUGH REE SPA

SITE CODE: 004064

Situated on the River Shannon between Lanesborough and Athlone, Lough Ree is the third largest lake in the Republic of Ireland. It lies in an ice-deepened depression in Carboniferous Limestone. Some of its features (including the islands) are based on glacial drift. The main inflowing rivers are the Shannon, Inny and Hind, and the main outflowing river is the Shannon. The greater part of Lough Ree is less than 10 m in depth, but there are six deep troughs running from north to south, reaching a maximum depth of about 36 m just west of Inchmore. The lake has a very long, indented shoreline and hence has many sheltered bays. It also has a good scattering of islands, most of which are included in the site.

Beds of Common Reed (*Phragmites australis*) are an extensive habitat in a number of the more sheltered places around the lake; monodominant stands of Common Club-rush (*Scirpus lacustris*), Slender Sedge (*Carex lasiocarpa*) and Saw Sedge (*Cladium mariscus*) also occur as swamps in suitable places. Some of these grade into species-rich calcareous fen or freshwater marsh. Lowland wet grassland, some of which floods in winter, occurs frequently around the shore.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Teal, Mallard, Shoveler, Tufted Duck, Common Scoter, Goldeneye, Little Grebe, Coot, Golden Plover, Lapwing and Common Tern. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Lough Ree is one of the most important Midland sites for wintering waterfowl, with nationally important populations of Little Grebe (52), Whooper Swan (139), Wigeon (2,070), Teal (1,474), Mallard (1,087), Shoveler (54), Tufted Duck (1,012), Goldeneye (205), Coot (338), Golden Plover (3,058) and Lapwing (5,793) – all figures are three year mean peaks for the period 1997/98 to 1999/2000. Other species which occur in winter include Great Crested Grebe (29), Cormorant (99), Curlew (254) and Black-headed Gull (307) as well as the resident Mute Swan (85). Greenland White-fronted Goose has been recorded on occasion on the flooded margins of the site.

The site supports a nationally important population of Common Tern (90 pairs in 1995). It is a traditional breeding site for Black-headed Gull and whilst a full survey has not been carried out in recent years, substantial numbers of nesting birds were present on at least one island in 2003. Lesser Black-backed Gull and Common Gull have bred in the past and may still breed. Lough Ree is a noted site for breeding duck and grebes: Tufted Duck (202 pairs) and Great Crested Grebe (32 pairs) – records from 1995. Of particular note is that Lough Ree is one of the two main sites in the

country for breeding Common Scoter, a Red Data Book species. Surveys have recorded 39 pairs and 32 pairs in 1995 and 1999 respectively. Cormorant also breeds on some of the islands within the site – 86 nests were recorded in 2010. The woodland around the lake is a stronghold for Garden Warbler and this scarce species probably occurs on some of the islands within the site.

Lough Ree SPA is of high ornithological importance for both wintering and breeding birds. It supports nationally important populations of eleven wintering waterfowl species. The site has a range of breeding waterfowl species, notably nationally important populations of Common Scoter and Common Tern. Of particular note is the regular presence of three species, Whooper Swan, Golden Plover and Common Tern, which are listed on Annex I of the E.U. Birds Directive. Parts of Lough Ree SPA are Wildfowl Sanctuaries.

SITE SYNOPSIS

SITE NAME: RIVER SUCK CALLOWS SPA

SITE CODE: 004097

The River Suck Callows SPA is a linear, sinuous site comprising a section of the River Suck from Castlecoote, Co. Roscommon to its confluence with the River Shannon close to Shannonbridge, a distance of approximately 70 km along the course of the river. The river forms part of the boundary between Counties Galway and Roscommon. The site includes the River Suck itself and the adjacent areas of seasonally-flooded semi-natural lowland wet callow grassland. The River Suck is the largest tributary of the River Shannon.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Greenland White-fronted Goose, Wigeon, Golden Plover and Lapwing. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

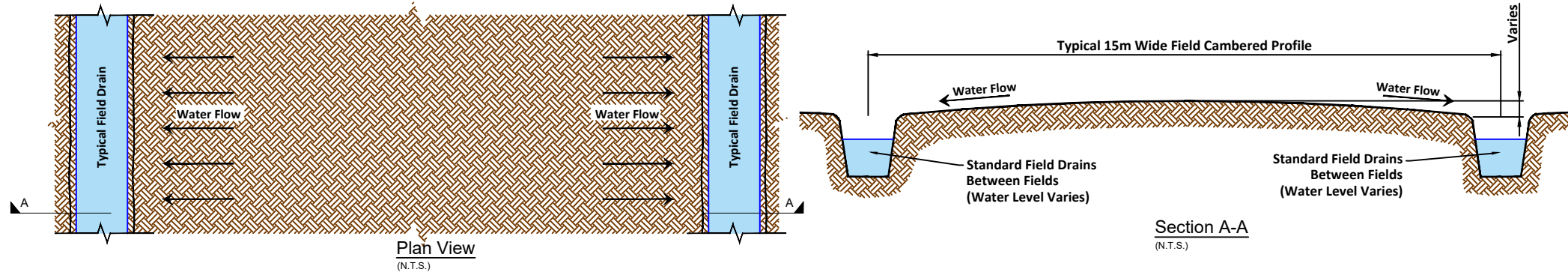
The River Suck Callows SPA is an important site for wintering waterfowl. Of particular note is the nationally important Greenland White-fronted Goose flock (293 – five year mean peak for the period 1994/95 to 1998/99) which congregates mainly in the middle reaches of the river. Four other species occur in populations of national importance, i.e. Whooper Swan (164), Wigeon (3,232), Golden Plover (2,241) and Lapwing (3,906) – all figures are five year mean peaks from aerial surveys between 2001/02 and 2005/06. Other species present include Mute Swan (122), Teal (402), Mallard (70), Black-tailed Godwit (24), Curlew (22) and Black-headed Gull (86).

The River Suck Callows SPA is of considerable ornithological importance, in particular for the presence of nationally important populations of five species. Of note is that three of the species that occur regularly, i.e. Whooper Swan, Greenland White-fronted Goose and Golden Plover, are listed on Annex I of the E.U. Birds Directive. Part of the River Suck Callows SPA is a Wildfowl Sanctuary.

Appendix D Drawings of Proposed Rehabilitation Methodologies

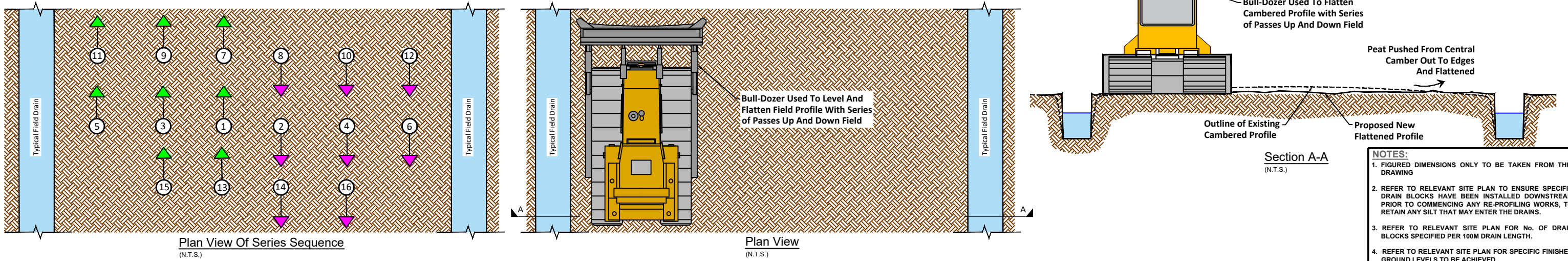
Existing Layout:

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

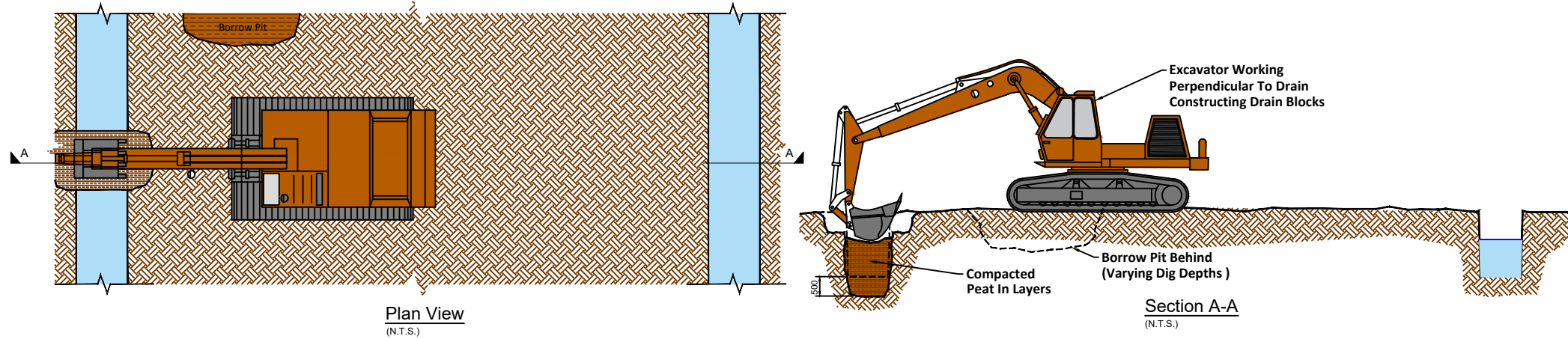
Field to be re-profiled using bull-dozer making a total of 16 passes, 8 passes up and 8 passes down, flattening the camber on the production field. (Sequence of runs shown below)



- NOTES:**
- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 - 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.
 - REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
 - REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
 - ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
 - OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
 - ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

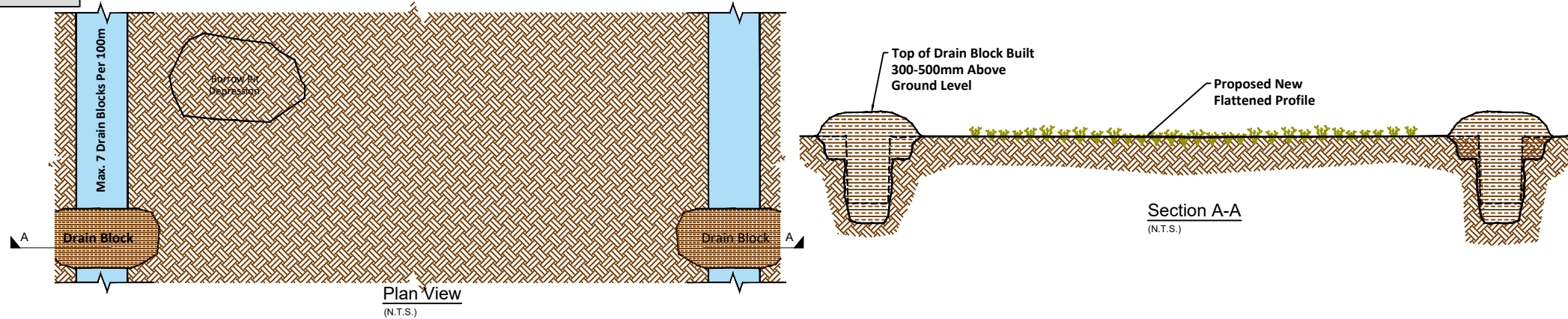
Phase 2 Peat Drain Blocking

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

Bord Na Móna Engineering Department
LEABEG, TULLAMORE CO. OFFALY
Tel. 057 9345900
Fax. 057 9345160

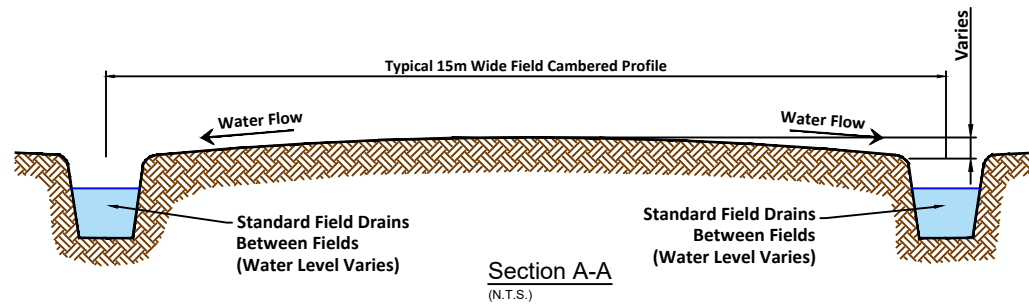
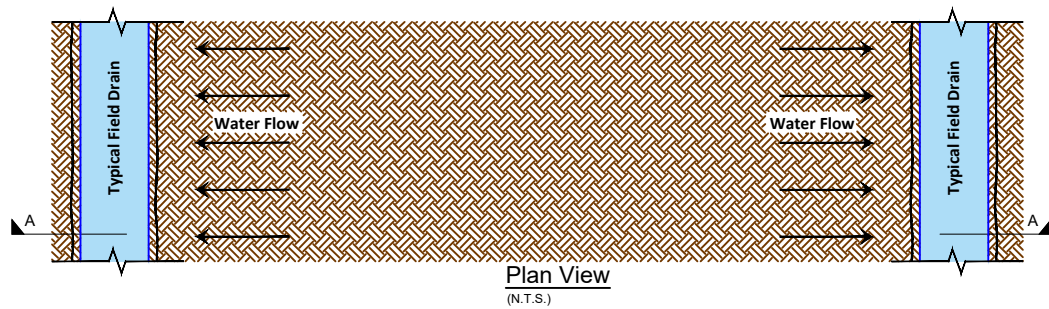
PROJECT:
Peatland Climate Action Scheme
PCAS

TITLE:
Rehabilitation Method DPT 3A
Field Re-profiling

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

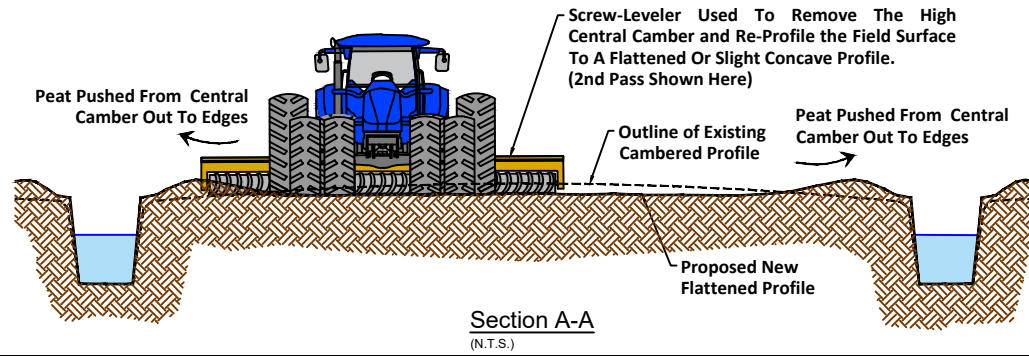
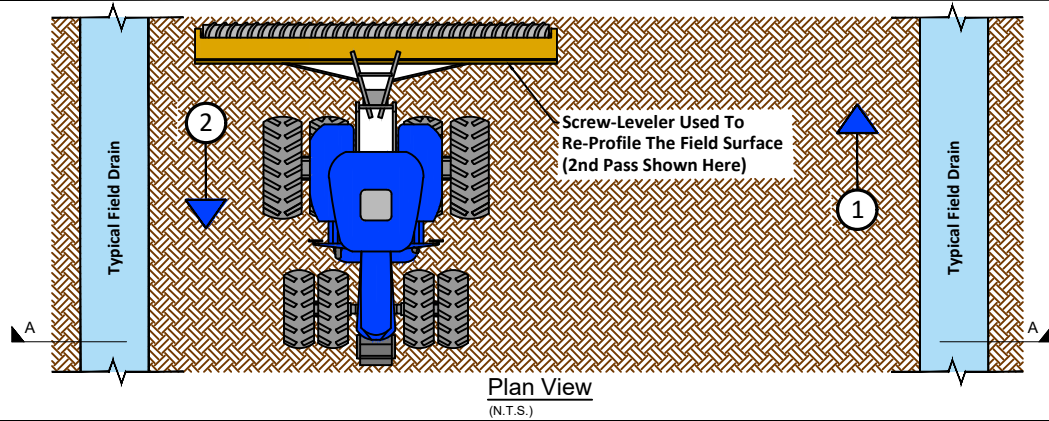
Existing Typical Field Layout:

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.



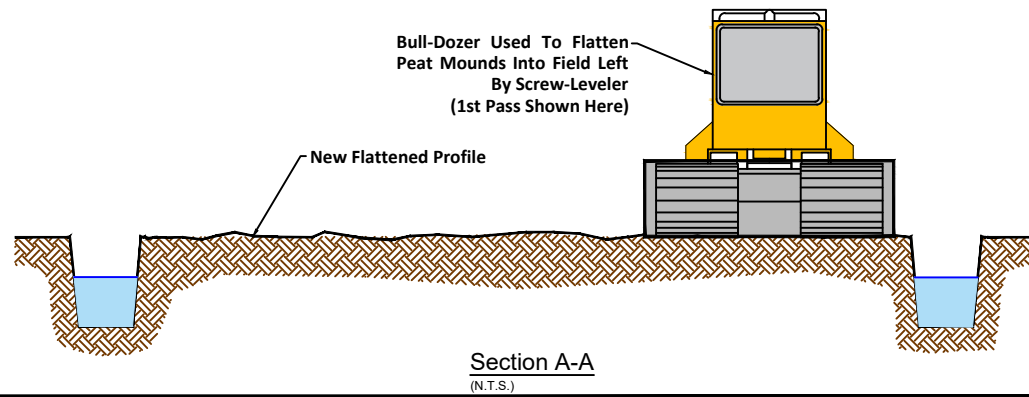
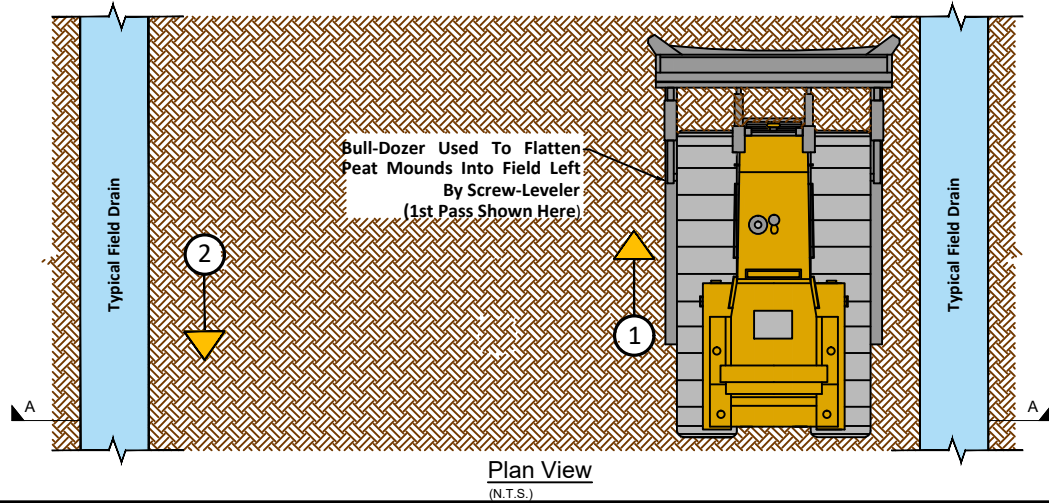
Phase 1 Re-Profiling of Field Surface

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.



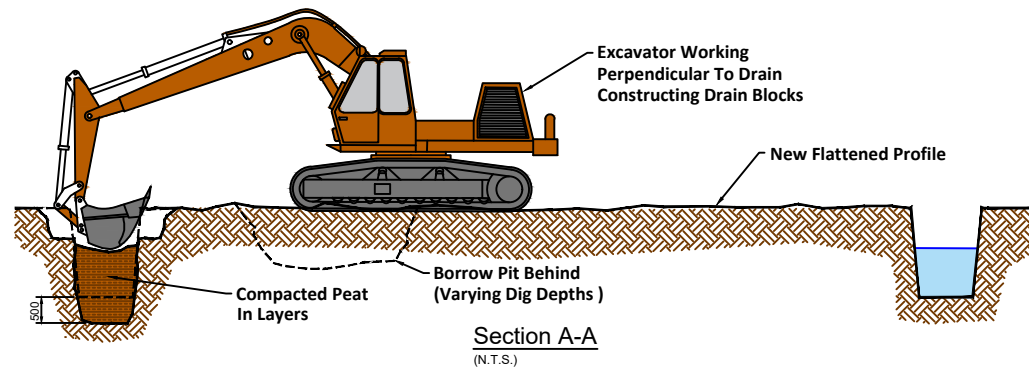
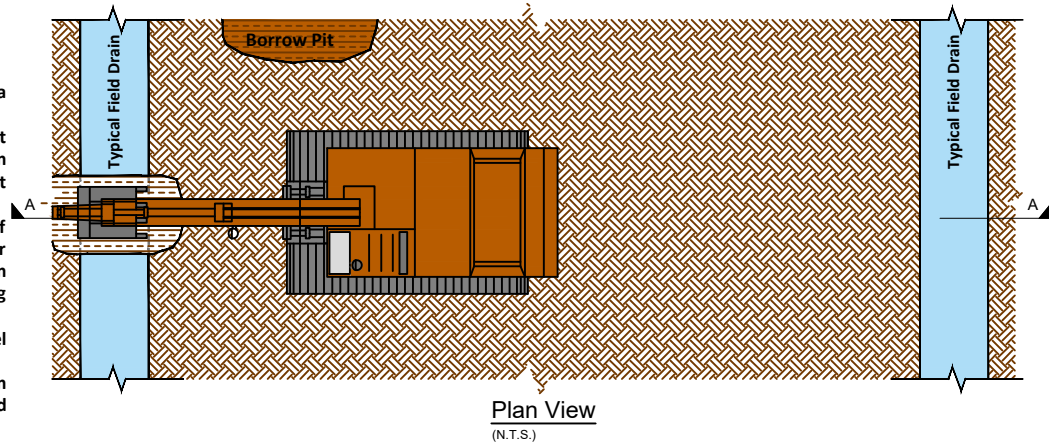
Phase 2 Leveling of Loose Peat

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.



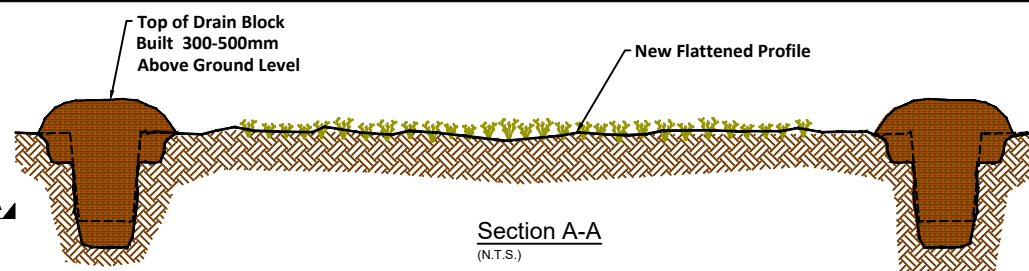
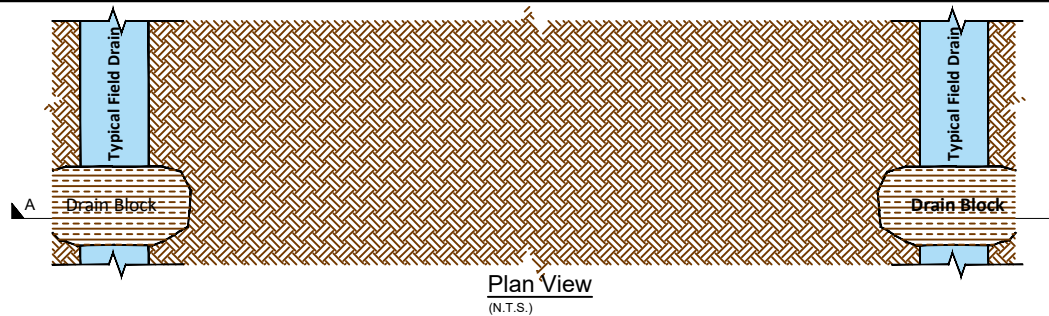
Phase 3 Peat Drain Blocking

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
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

STATUS

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

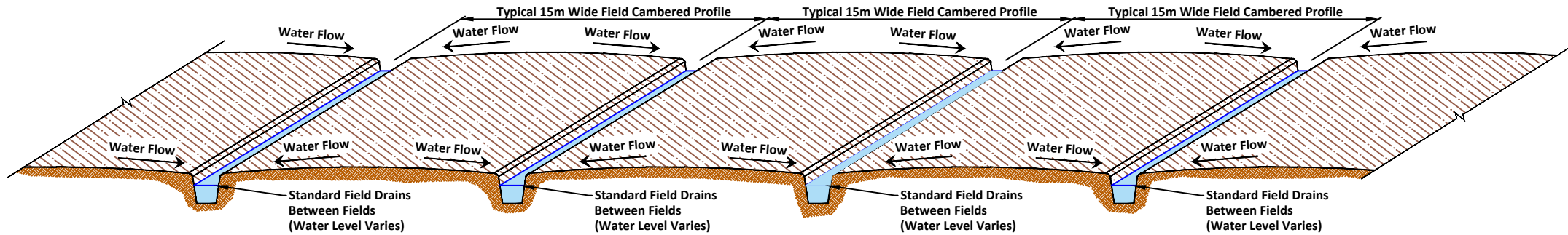
PROJECT:
Peatland Climate Action Scheme
PCAS

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.



NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS.
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Phase 1

Drain Blocking And Re-Profiling of Fields Surface

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

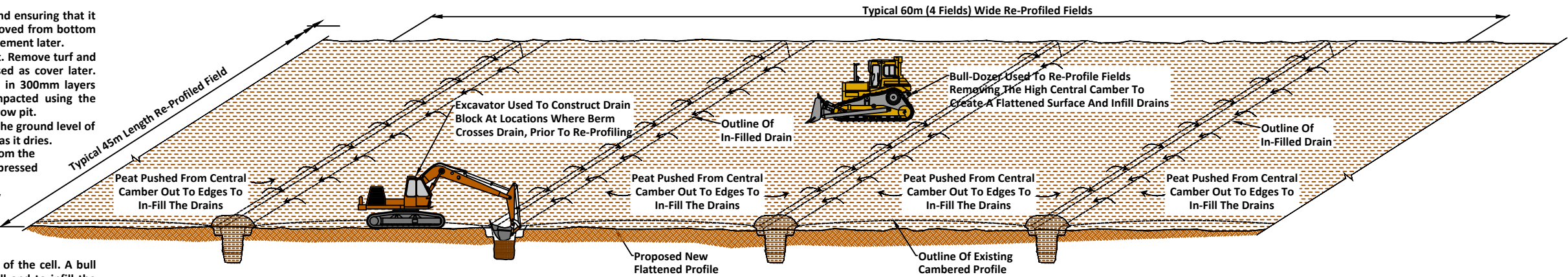
Key is cut in the drain approximately 500mm deep, and ensuring that it is wider than the actual drain. 500mm of peat is removed from bottom of drain also and placed behind the machine for replacement later.

Area behind the machine is to be used as a borrow pit. Remove turf and degraded peat. Place this material close by to be used as cover later. 'Clay' like peat is extracted from pit and compacted in 300mm layers using the excavator bucket. The peat is firmly compacted using the machine bucket before laying more peat from the borrow pit.

The drain block is built up at least 300-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries. The borrow pit is back filled with the peat extracted from the bottom of drain. The sides of the borrow pit are to be pressed down and graded with the excavator bucket.

(NOTE: If any vegetation present, it should be carefully removed at the start and left aside for replacement at the end of the process, to help bind and stabilise the top of the drain block.)

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



Phase 2

Formation of Surface Berms And Levelling Base of Cells

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

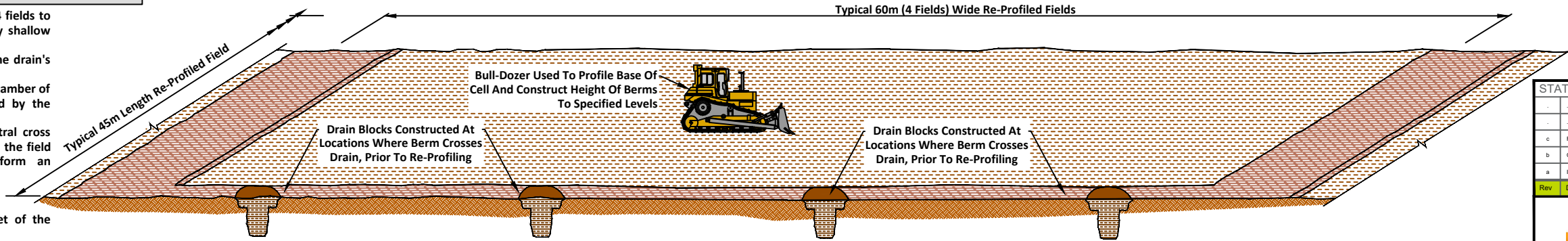
An Excavator is used to form a key(5m long) in the drain's edges where the berm crosses.

A strip of peat(5m wide) is taken from the central camber of the field, pushed into the drain and compacted by the bull-dozer tracking over the drain block.

Next the bull-dozer is used to complete the central cross section of Berm by taking peat from the centre of the field and pushing it in line with the field to form an approximately 5m Wide x 300mm High Cross Berm.

The peat material in the berm is compacted in layers by the dozer tracking over it.

Berm edge profile is shaped by using the bucket of the excavator.



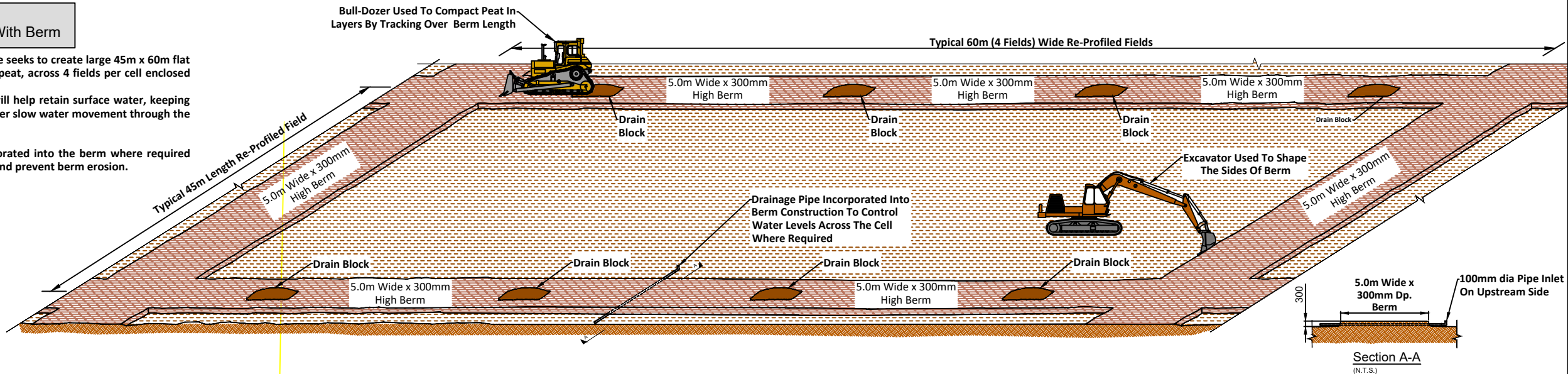
Final Profile:

45m x 60m Cell With Berm

This enhanced measure seeks to create large 45m x 60m flat areas or cells on bare peat, across 4 fields per cell enclosed by shallow berms.

The creation of cells will help retain surface water, keeping peat wet and will further slow water movement through the bog.

Drainage pipes incorporated into the berm where required to manage overflows and prevent berm erosion.



STATUS

Rev	Description	Issued By	Date
c	For Approval	P.K.	24/02/21
b	Cell Size Text Amended	P.K.	28/01/21
a	Issued For Information	P.K.	07/01/21

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PROJECT:

Peatland Climate Action Scheme (PCAS)

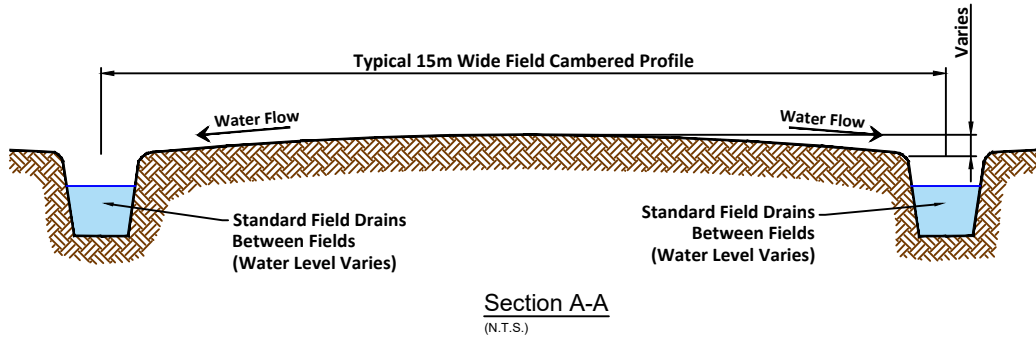
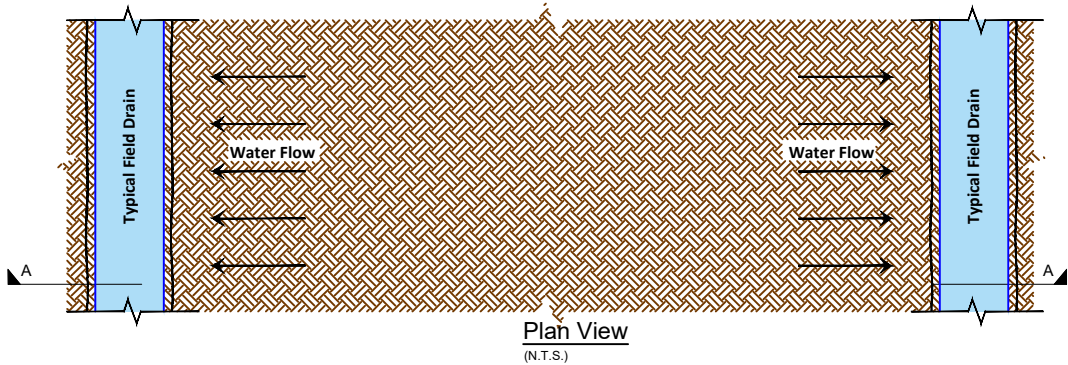
TITLE:

Rehabilitation Method DPT 4
45m x 60m Cell With Berms

Drawn By:	Checked By:	Approved:
CAD Designer	Discp. Lead	Design Lead
P.K.	D.K.	P.N.
Date: 22/12/20	Scale: Not to Scale	A3 Stage: For Approval
Drawing No.: PCAS-0100-006		Rev: c

Existing Layout:

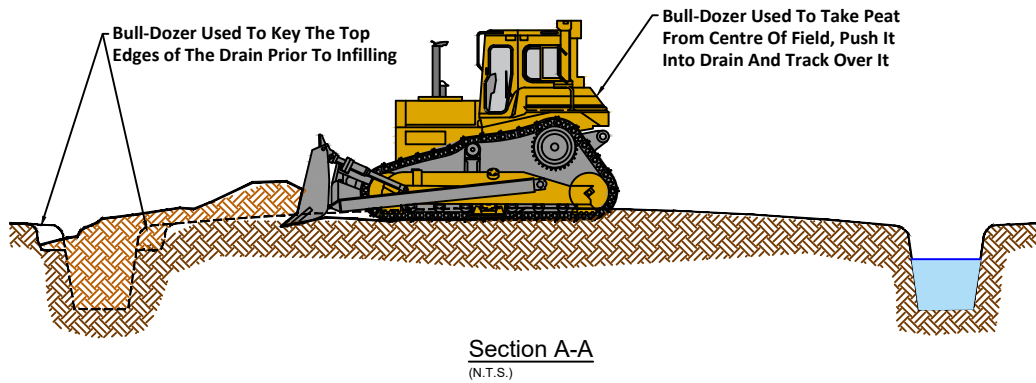
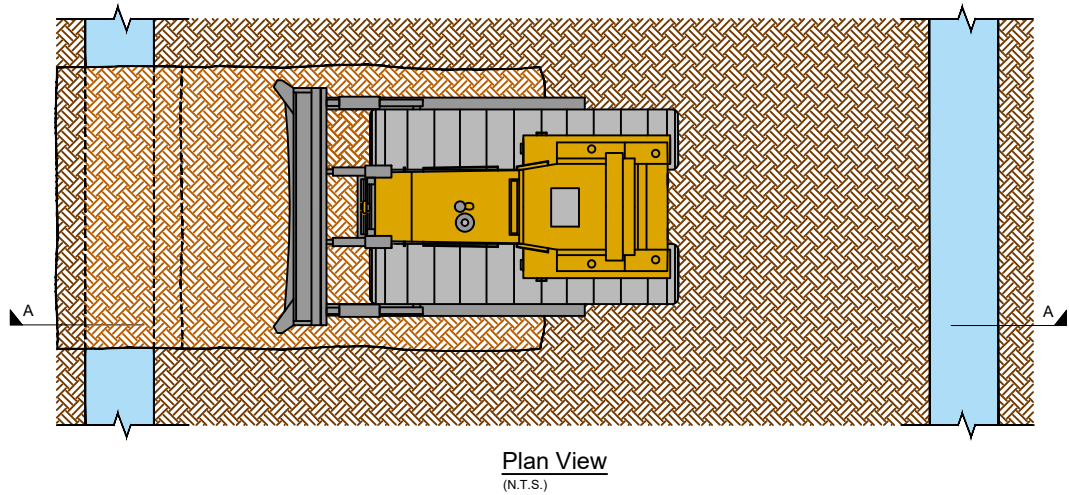
Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of drain blocking is to raise the water levels in the drains to re-wet the cutaway and slow the water movement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



- NOTES:**
- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 - 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.
 - REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
 - REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
 - ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
 - OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
 - ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

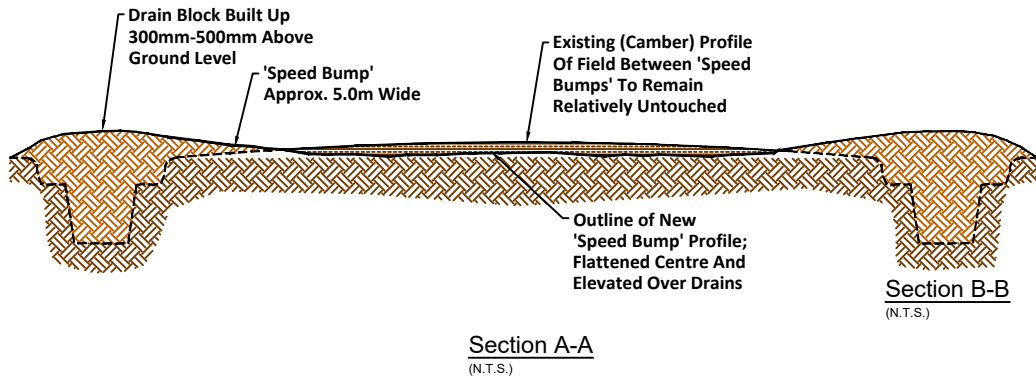
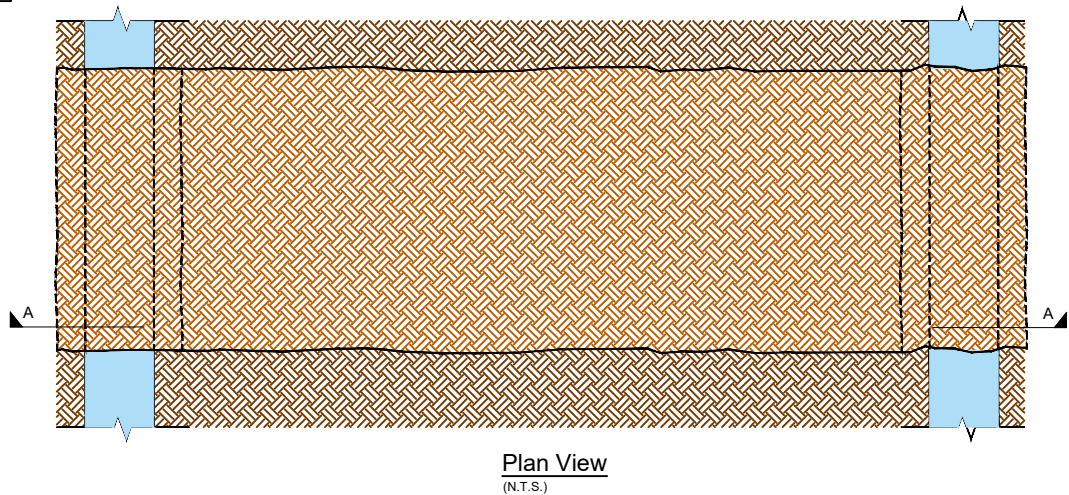
Phase 1 Forming 'Speed Bump'

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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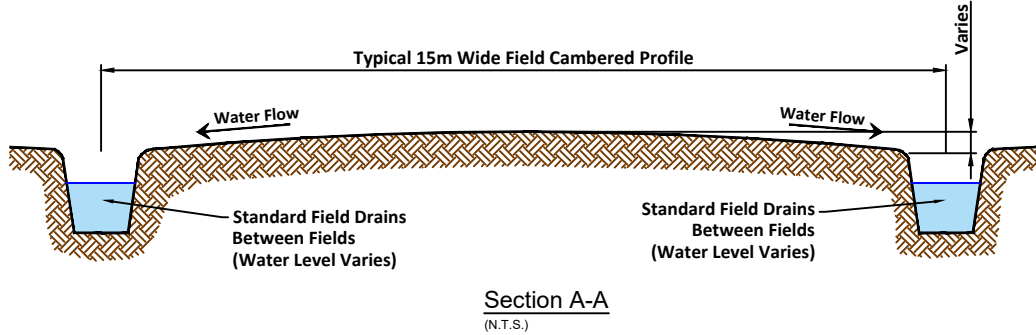
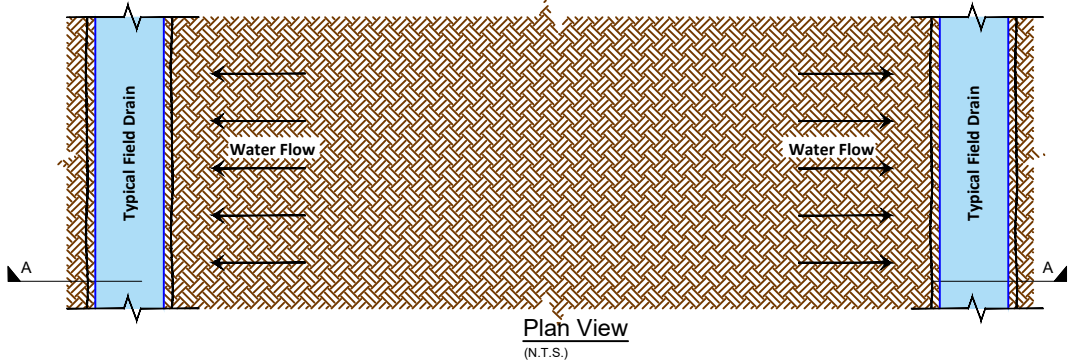
PROJECT:
Peatland Climate Action Scheme
PCAS

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:

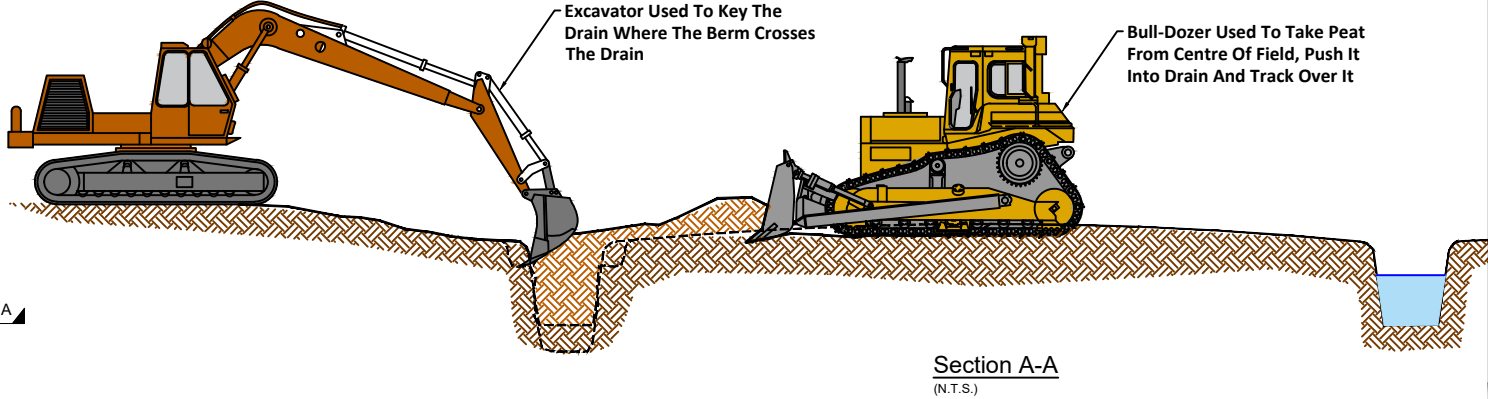
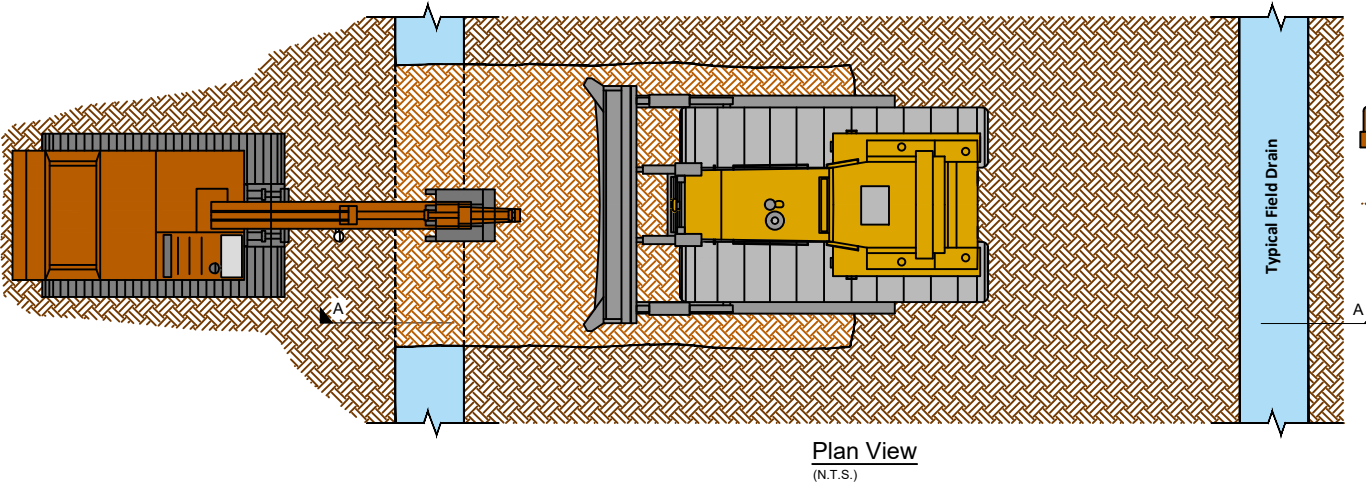
Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of Cross berms is to slow the water movement through the bog.



- NOTES:**
- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 - 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.
 - REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH.
 - REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED.
 - ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION.
 - OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES.
 - ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.

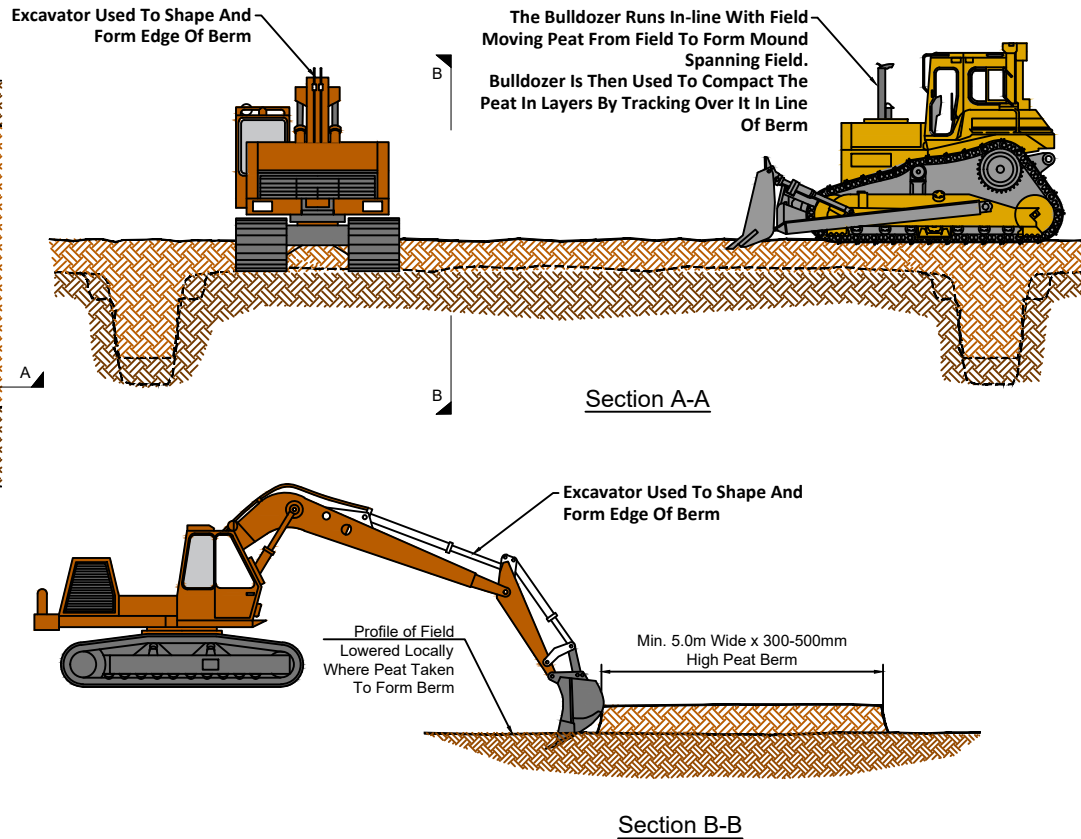
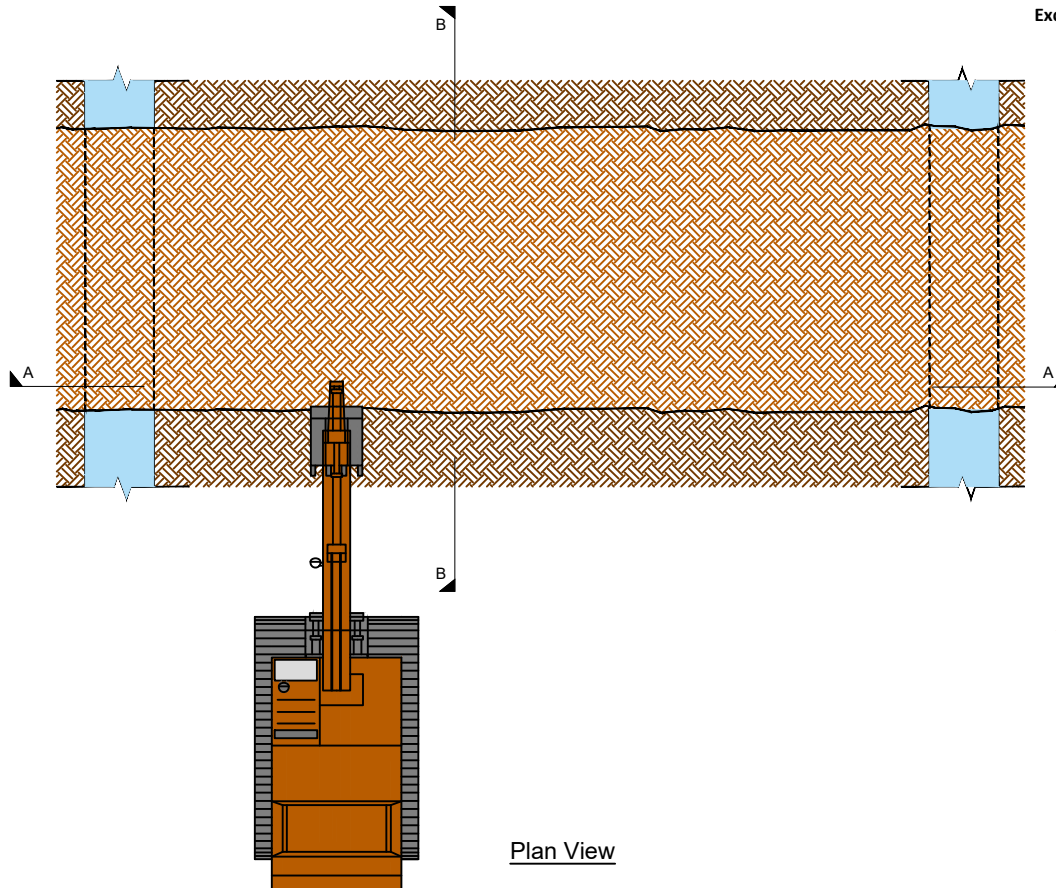
Phase 1 Forming Peat Berm

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



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

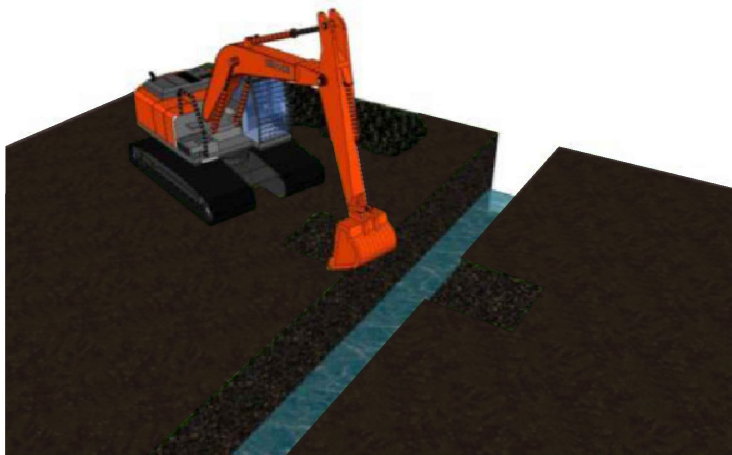
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PROJECT:
Peatland Climate Action Scheme
PCAS

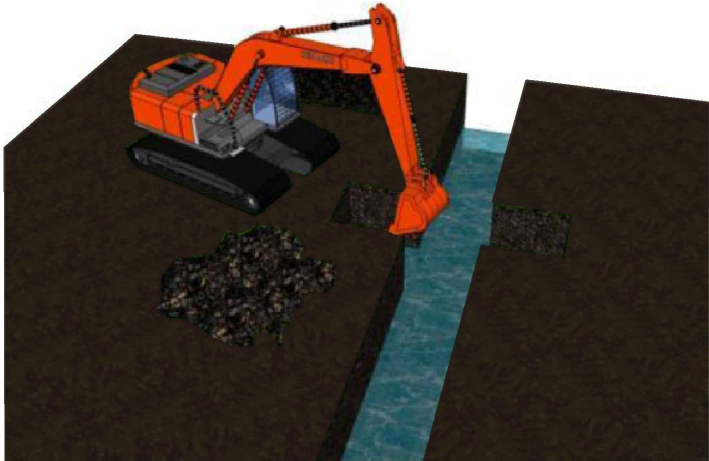
TITLE:
Rehabilitation Method WLT 3
Peat Berm

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

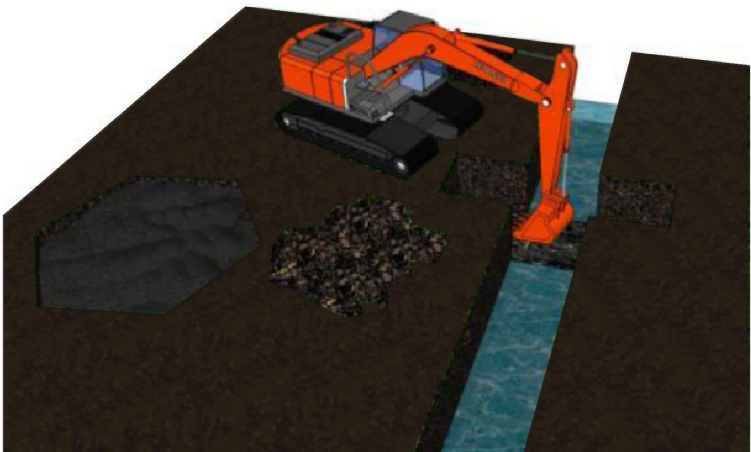
1. Before building of drain blocks, the sides and bottom of the ditch is cleaned using the excavator to remove dry degraded peat, to ensure a good peat-to-peat contact.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)



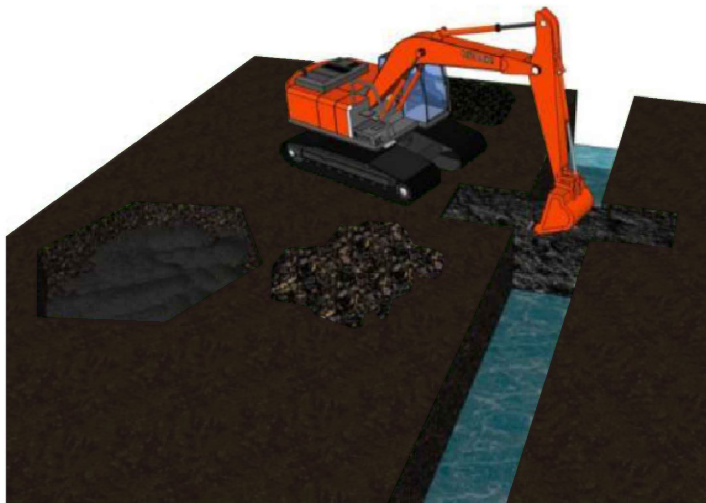
2. Cut key in either side of the drain approximately 500mm deep, and ensure that it is wider than the actual drain. Remove 500mm of peat from bottom of the drain also and place behind the machine for replacement later.



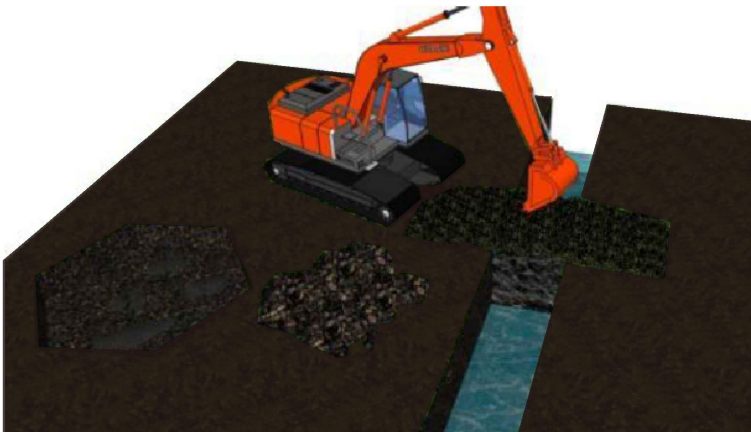
3. Open an area behind machine to be used as a borrow pit. Avoid using the surface layer of peat (top 100-200mm) which is likely to be very permeable. Only use the deeper, more compacted peat to build the drain block.
(If any vegetation present, it should be carefully removed and left aside for replacement at the end of the process.)



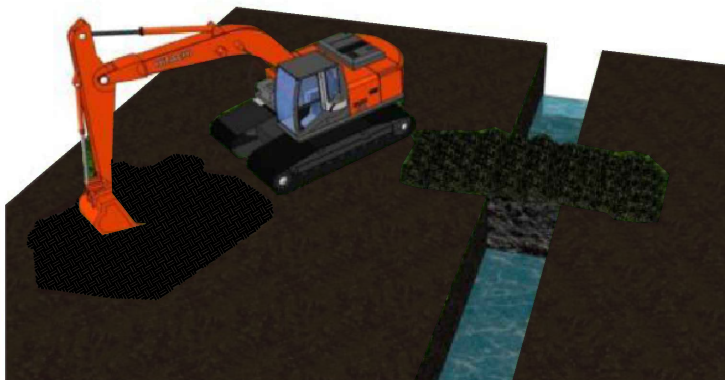
4. Dig out peat from the borrow pit and place into the drain compacting in 300mm layers. Compact the peat firmly using the excavator bucket before laying more peat from the borrow pit.



5. Build the drain block up at least 300mm-500mm above the ground level of the bog to allow for subsequent shrinkage of the peat as it dries.
(Take any vegetation removed in step 1 and step 3 and place on the top of the drain block, to help bind and stabilise the drain block.)



6. Backfill the borrow pit with the peat extracted from the bottom of the drain in step 2. Press down on the sides of the peat borrow hole with the excavator bucket to grade the sides of the borrow pit.



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

NOTES: 1. FIGURED DIMS ONLY TO BE TAKEN FROM THIS DRAWING. 2. REFER TO RELEVANT SITE PLAN TO ENSURE SPECIFIC DRAIN BLOCKS HAVE BEEN INSTALLED DOWNSTREAM PRIOR TO COMMENCING ANY RE-PROFILING WORKS, TO RETAIN ANY SILT THAT MAY ENTER THE DRAINS. 3. REFER TO RELEVANT SITE PLAN FOR No. OF DRAIN BLOCKS SPECIFIED PER 100M DRAIN LENGTH. 4. REFER TO RELEVANT SITE PLAN FOR SPECIFIC FINISHED GROUND LEVELS TO BE ACHIEVED. 5. ALL DETAILS TO BE AGREED WITH BORD NA MONA OPERATIONS PRIOR TO CONSTRUCTION. 6. OPERATORS TO CONFORM WITH ALL STANDARD OPERATING PROCEDURES. 7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR THE PARTICULAR BOG AND WITH THE REQUIREMENTS OF THE REHABILITATION PLAN, ANY NATURA IMPACT STATEMENT RECOMMENDED MEASURES IF APPLICABLE, ARCHAEOLOGY REPORTS AND ANY OTHER SPECIFIC ECOLOGICAL MEASURES OR ENVIRONMENTAL REPORTS FOR THIS BOG.				PROJECT: Peatland Climate Action Scheme PCAS			
				TITLE: Rehabilitation Method WLT 4 Peat Drain Blocking			
				Drawn By:	Checked By:	Approved:	
				CAD	Designer	Discip. Lead	Design Lead
				P.K.		D.K.	P.N.
				Date:	13/01/21	Scale:	N.T.S.
				Drawing No.:	PCAS-0100-011		Rev:
							b

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

Appendix E Environmental Management Plan

Bord na Móna

Peatland Climate Action Scheme

Bunahinly-Kilgarvan Bog Environmental Management Plan

Prepared by

Bord na Móna, Civil Engineering Office

Bord na Móna

DOCUMENT CONTROL SHEET

Client	Bord na Móna					
Project Title	Peatland Climate Action Scheme					
Document Title	Bunahinly-Kilgarvan Bog - Environmental Management Plan					
Document No.	PCAS-RP-23-01-04-EMP					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	19	4	0	2

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
-	Draft	DM	EMcD/MMcC/ DK/CC	PN	BnM Engineering Dept.	28-04-2021
A	Final	DM	EMcD/MMcC/ DK/CC	PN	BnM Engineering Dept.	11-10-2021
A	Final FY23	DM	EMcD/MMcC/ DK/CC	PN	BnM Engineering Dept.	03-11-2021
B	Final	DM	EMcD/MMcC/ DK/CC	PN	BnM Engineering Dept.	18-05-2022

Contents

1.0	Introduction	4
2.0	Proposed Rehabilitation Works	5
3.0	Envisaged Sequence of Works	7
3.1	Site Preparation Works	7
3.2	General Description of Works	7
4.0	Management & Mitigation Measures	7
4.1	Site Management	8
4.2	Health & Safety	8
4.3	Restricted Activities	8
4.4	Archaeology	9
4.5	Ground Water & Surface Water Management	9
4.6	Drainage Management Plan Measures	10
4.7	Traffic & Transport Management	10
4.8	Noise Management	10
4.9	Dust Management	11
4.10	Fuel Management	11
4.11	Waste Management	12
4.12	Soil Management	12
4.13	Fire Safety	13
5.0	Maintenance Access Requirements	15
6.0	Protection of Existing Vegetation	15
7.0	Protected Habitats	15
8.0	Ecology	15
9.0	Peat Dam and Peat Berm Construction	16
10.0	Biosecurity	17
11.0	Emergency Response Procedures	18
12.0	Reporting	18
Appendix A – Standard Operating Procedures (SOP's)		19
Appendix B – Natura Impact Statement (NIS) Mitigation Measures		20
Appendix C – Fertiliser Application Maps		6
Appendix D – Wintering Birds Environmental Restriction Zones		7

1.0 Introduction

Bord na Móna have identified a footprint of 33,000 ha of their estate as peatlands suitable for enhanced rehabilitation. This proposed Peatlands Climate Action Scheme (PCAS) will significantly exceed the requirements of the rehabilitation and decommissioning obligations under existing Environmental Protection Agency (EPA) Integrated Pollution Control (IPC) Licence Conditions. Improvements supported by PCAS will ensure that environmental stabilisation is achieved, and significant additional benefits are realised through optimising climate action benefits. This decommissioning, rehabilitation and restoration process will be referred to in subsequent sections of this report as 'the works'.

The objectives of the Environmental Management Plan (EMP) are to:

- a) Identify management responsibilities and reporting requirements for environmental management;
- b) Identify the relevant Environmental Commitments;
- c) Set out the environmental protection measures to be implemented;
- d) Outline how compliance with the EMP will be achieved; and
- e) Promote best environmental practices for the duration of the development.

This Environmental Management Plan should be read in conjunction with the following site-specific documents for the relevant bog where works are taking place:

- Cutaway Bog Decommissioning and Cutaway Bog Decommissioning and Rehabilitation Plan,
- Site Characterisation Report,
- GIS Map Book,
- Drainage Management Plan,
- Preliminary Health & Safety Plan,
- Engineering Construction Package,
- Environmental File,
- Ecology File,
- Associated IPC Licence,
- Training Pack,

The *Cutaway Bog Decommissioning and Cutaway Bog Decommissioning and Rehabilitation Plan* gives details on the proposed works and outlines control measures and associated monitoring in order to mitigate against any detrimental impacts that may arise on site during the works. It also outlines Bord na Móna's responsibilities under the existing IPC Licence Conditions with respect to peatland rehabilitation.

Bunahinly-Kilgarvan Bog is part of the Blackwater Bog Group and is currently drained via a gravity drainage system. The River Shannon runs along the western boundary of the bog, however the bog is not under the influence of the River Shannon due to the elevated nature of the site with respect to the winter water level of the River Shannon. Further data in relation to location and historical usage is contained within the Bunahinly-Kilgarvan Bog Site Characterisation Report 2022.

Drawings BNM-DR-23-09-01 Bunahinly Bog: Bog Site Location and BNM-DR-23-10-01 Kilgarvan Bog: Bog Site Location, included in the accompanying Bunahinly-Kilgarvan Bog – Rehab Plan GIS Map Book 2022 illustrates the location of Bunahinly-Kilgarvan Bog in context to the surrounding area.

2.0 Proposed Rehabilitation Works

The enhanced rehabilitation measures are outlined and detailed in the site-specific Cutaway Bog Decommissioning and Rehabilitation Plan, Engineering Construction Package, Environmental File & Ecology File. These measures are grouped into rehabilitation packages and their suitability for the deployment in different 'high level' categories of land types are outlined in Table 2-1. The Standard Rehab Methodology Drawings in Table 2-2 should be followed with respect to the execution of the various methodologies on site.

Table 2-1 Rehabilitation Packages

Code	Description
Deep Peat Cutover Bog	
DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes
DPT2	More intensive drain blocking (7/100 m) + blocking outfalls and managing overflows with a controlled weir outfall + Sphagnum inoculation
DPT3	More intensive drain blocking (7/100 m), + field reprofiling + blocking outfalls and managing overflows with a controlled weir outfall + Sphagnum inoculation
DPT4	Berms and field re-profiling (45m x 60m cell) + blocking outfalls and managing overflows with a controlled weir outfall + drainage channels for excess water + Sphagnum inoculation
DPT5	Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows with a controlled weir outfall + drainage channels for excess water + Sphagnum inoculation
Dry Cutaway	
DCT1	Blocking outfalls and managing water levels with overflow pipes
DCT2	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment
DCT3	More intensive drain blocking (7/100 m) + blocking outfalls and managing overflows with a controlled weir outfall + targeted fertiliser treatment
Wetland	
WLT1	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes
WLT2	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site
WLT3	Turn off or reduce pumping to re-wet cutaway + blocking outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site + constructing larger berms to re-wet cutaway + transplanting Reeds and other rhizomes
WLT4	More intensive drain blocking (7/100 m), + blocking outfalls and managing overflows with a controlled weir outfall + transplanting Reeds and other rhizomes

WLT5	More intensive drain blocking (7/100 m), + field reprofiling + blocking outfalls and managing overflows with a controlled weir outfall + transplanting Reeds and other rhizomes
Marginal Land	
MLT1	No work required
MLT2	More intensive drain blocking (7/100 m)

Table 2-2 – Schedule of Standard Rehab Methodology Drawings

Drawing No.	Drawing Title
PCAS-0100-001	Rehabilitation Method DPT1
PCAS-0100-002	Rehabilitation Method DPT2
PCAS-0100-003	Rehabilitation Method DPT3A
PCAS-0100-004	Rehabilitation Method DPT3B
PCAS-0100-005	Rehabilitation Method DPT4A
PCAS-0100-006	Rehabilitation Method DPT4
PCAS-0100-007	Rehabilitation Method DPT5
PCAS-0100-008	Rehabilitation Method DCT2
PCAS-0100-009	Rehabilitation Method DCT3
PCAS-0100-010	Rehabilitation Method WLT3
PCAS-0100-011	Rehabilitation Method WLT4
PCAS-0100-012	Rehabilitation Method WLT5
PCAS-0100-013	Rehabilitation Method MLT2
PCAS-0100-014	Modifying of Outfalls & Managing Water Levels
PCAS-0100-015	Field Re-profiling
PCAS-0100-016	Boundary Berm

3.0 Envisaged Sequence of Works

This section provides an outline of the envisaged sequence of works associated with the project. Bord na Móna Operations Risk Assessment Method Statements (RAMS) should include a detailed description of the works, particularly those works which have the potential to impact public spaces. Mitigation measures for these impacts should also be proposed within the RAMS.

3.1 Site Preparation Works

Bord na Móna Operations will be responsible for security of the site and as such, will be required to carry out, among others, the following tasks:

- Ensure that a relevant and robust site induction process is in place for all site personnel and visitors.
- Ensure that all site personnel have valid Safe Pass card, and valid CSCS card where applicable.
- Ensure that access to the site by unauthorised persons is restricted, by appropriate means.

The site compound may be used as a storage area for various materials throughout the course of the works. Typical materials to be stored include fuels, plant and equipment. Temporary water supply, electricity and sewerage to be satisfied by Bord na Móna Operations as required.

3.2 General Description of Works

The works involves the construction of peat dams, berms and the adoption of various peat bunding techniques in addition to monitoring activities as per the IPC Licence requirements.

The scope of works is described as, but are not limited to, the following:

- Silt pond inspections fortnightly and cleaning bi-annually.
- Sampling of the silt pond outlet every month.
- Refuelling of machines.
- Unloading of fuel from supplier into a double skinned tank onsite.
- Unloading of oil barrels from a pick-up and depositing into the oils store.
- Other materials being delivered to site by BNM and third parties.
- Idle travel out the bog bringing operators to machines to facilitate welfare breaks.
- Collection of loose polythene out the bog and stockpile at the centre.
- Collection of old unused concrete pipes and transport back to centre.
- Remove old machines from bogs, returning to the centre for cutting and collection by a scrap contractor.
- Lifting and collecting unused sections of rail line along mainline.
- Lifting laid permanent rail line and polythene.
- Decommissioning works including, but not limited to plastic clean up, lifting of rail lines etc.
- Provision of temporary welfare facilities for the Bord na Móna staff.
- Construction of peat dams within existing drains.
- Construction of peat bunds and berms.

4.0 Management & Mitigation Measures

4.1 Site Management

The works shall be managed and supervised by competent and qualified personnel and all works shall be carried out under appropriate supervision, best practice, current health and safety measures and also suitable quality control. Facilities for site employees shall be provided within the site compound.

Implementation of the mitigation measures for the works will be the responsibility of Bord na Móna Operations and supervision of the works will be carried out by this Bord na Móna Department incorporating Site Supervisors and the Project Supervisor Construction Stage (PSCS).

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

4.2 Health & Safety

All works shall be carried out so as to comply with all the requirements of the Safety and Health at Work Act 2005 and any subsequent regulations or amendments and with the requirements of the Health and Welfare at Work (Construction) Regulations, (SI 291 of 2013), any subsequent amendments and any other relevant Health and Safety legislation. All construction staff on site shall have a current Safe Pass card and relevant CSCS card. All works shall be carried out in a safe manner and in accordance with the above legislation and any other guidance notes issued by the Health and Safety Authority. In particular, all excavation works shall be carried out in accordance with the *HSA Publication: A Guide to Safety in Excavations*.

The PSCS will provide a site-specific Construction Stage Safety and Health Plan and will provide risk assessments and method statements for the works. On completion of the works the PSCS shall prepare a detailed safety file.

All site personnel/site visitors will be required to wear Personal Protective Equipment (PPE) and undergo the established site induction process prior to entering the site.

Bord Na Móna Operations should ensure that regular audits are carried out at the site, to ensure that measures and process outlined in the site health and safety plan are adhered to. Dangerous occurrences, incidents, near misses and unsafe acts should be recorded, with recorded action taken to prevent all further occurrences.

4.3 Restricted Activities

Species-specific seasonal restrictions on the proposed activities may be required in line with elements highlighted in the site-specific Rehabilitation Measures & Ecology File.

Regarding vegetation clearance, should it be required, all works will comply with Section 40 of the Wildlife Act. Please refer to Vegetation Clearance SOP ECO-004 for specific guidance. For the avoidance of doubt – no felling works will be carried out as part of the proposed works.

There may also be a requirement to protect other ecological receptors such as colonies of breeding Marsh Fritillary (a butterfly species), the breeding or resting places of Otter and possibly amphibians or reptiles which utilise locations such as drains or other water features.

Where clearance is required during the restricted period, the Department of Agriculture, Food and Marine advise that under Section 37 of the Forestry Act, 1946:

It is illegal to uproot any tree over ten years old or to cut down any tress of any age (including trees which form part of a hedgerow) unless a Felling Notice has been lodged at the Garda Station nearest to the trees at least 21 days before felling commences.

The Closed Period “40(1) (a) it shall be an offence for a person to cut, grub, burn or otherwise destroy during the period beginning on the 1st day of March and ending on the 31st day of August in any year, any vegetation growing on any land not then cultivated. (b) it shall be an offence for a person to cut, grub, burn or otherwise destroy any vegetation growing in any hedge or ditch during the period mentioned in paragraph (a) of this subsection”

As per guidance from Inland Fisheries Ireland, any instream works proposed to be undertaken in any rivers streams and watercourses should be undertaken between July and September and in all cases must be agreed in advance with Inland Fisheries Ireland.

Measures to avoid the inadvertent transfer of alien invasive species (aquatic or terrestrial) will be required.

The Project Ecologist or Environmental Manager will advise Bord na Móna Operations on site-specific application of these restrictions to individual sites.

4.4 Archaeology

The discovery of monuments or archaeological objects during the works can constrain the rehabilitation measures proposed for a particular area. If this occurs, rehabilitation measures will be reviewed and adapted where required. An archaeological impact assessment for the site has been carried out and is included in the site-specific Cutaway Bog Decommissioning and Rehabilitation Plan. The recommendations of this assessment have been incorporated into the site-specific Cutaway Bog Decommissioning and Rehabilitation Plan, Engineering Construction Package, Environmental File & Ecology File to minimise impacts on known archaeology.

In addition, Bord na Móna Operations will adhere to the Archaeology Code of Practise relating to management of stray archaeological finds that may arise during the works.

4.5 Ground Water & Surface Water Management

A key component of the works is the potential hydrological impact rehabilitation may have on the bog, surrounding lands and lands downstream which may be hydrologically linked to the bog.

Measures should be taken to protect groundwater and surface water at the site during the works. Drip trays, spill kits and mobile bund systems should be used where required to prevent loss of chemicals/fuels to ground. Plant and equipment should be refilled in a bunded or hardstand area using a drip tray or mobile bund.

Damaged containers should be removed from site and disposed of appropriately to avoid further use. Fuels and oils on site should be stored securely to avoid damage. Relevant staff have received emergency response training for pollution events and be trained in the use of spill kits and handling and refuelling.

Management Activities will comply with Condition 6 of the IPC Licence as follows:

- Intensive sampling of 70% of our bog catchments
- Monthly sampling silt pond outlets
- Fortnightly silt pond inspections
- Bi-annual silt pond maintenance as per procedure

All works should be carried out in line with the site-specific Engineering Construction Package, Environmental File & Ecology File in addition to the *Inland Fisheries "Guidelines on protection of fisheries during construction works in and adjacent to waters"*.

4.6 Drainage Management Plan Measures

Drainage Management Plans (DMP) have been developed for each bog to establish the baseline hydrological performance of the bog and the surrounding drainage network. The plan sets out the characterisation of the bog and surrounding lands, the existing performance of the drainage network and the level of flood risk. The plan identifies the potential hydrological zone of influence of the bog and the objectives, risks and opportunities associated with the rehabilitation of the bog.

The plan assesses the potential impact of the various rehabilitation measures which are proposed on the local drainage network and flood risk. It sets out, where necessary, mitigation measures required to reduce impacts to an acceptable level. The plan sets out the measures which are required to be delivered in parallel with the Cutaway Bog Decommissioning and Rehabilitation Plan as well as the long-term operation and retention of the drainage network and associated infrastructure. The plan assesses the level of residual risk, the potential impact due to climate change and the adaptability of measures in response to these climate change impacts.

The DMP forms the basis of the detailed design drawings, included in the Engineering Construction Package, and should be read in conjunction with this report.

4.7 Traffic & Transport Management

All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage. No direct discharges to waters will be made.

4.8 Noise Management

Notwithstanding that there is little likelihood of a significant adverse impact, noise generation is expected as part of the works. It is envisaged that the main noise sources at the site will include earthworks plant and equipment and associated traffic.

Management Activities will comply with Condition 8 of the IPC Licence as follows:

- Activities on-site shall not give rise to noise levels off site at any noise sensitive location which exceed the following sound pressure limits ($L_{eq,30min}$):
 - Day-time: 55 dB(A)
 - Night-time: 45 dB(A)
- There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location.

The works will be restricted to within the footprint of the proposed rehabilitation area. The works will have due regard to noise limits and hours of operation (i.e. dusk and dawn) to minimise any potential disturbance on

resident and local fauna that utilise the site and immediate environs. The proposed measures will be restricted to daylight hours and there will be no requirement for artificial lighting.

Bord na Móna Operations will be obliged to take specific noise abatement measures as part of the works and in line with the recommendations of BS5228-1 2009. These measures will typically include:

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations.

4.9 Dust Management

Dust generation is not expected as part of the works. The nature of the proposed works will naturally reduce the production of dust on site, as reprofiling site levels encourages settlement of water on the surface of the bog.

Activities that could give rise dust will be managed under the relevant conditions under Condition 5 of the IPC licence as follows:

- The licensee shall ensure that all operations on-site shall be carried out in a manner such that air emissions and/or dust do not result in significant impairment of, or significant interference with amenities or the environment beyond the site boundary.
- Activities on-site shall not give rise to dust levels off site at any Dust Sensitive Location which exceed an emission limit of 350 mg/m²/day. [The sampling method to be in accordance with German TA Luft Immission Standards for Particle Deposition (IW1)].

4.10 Fuel Management

Fuels and oils used for plant and equipment on the site shall be stored in a bunded area within the site compound as required. This area shall be inspected regularly, and the bund shall be adequate to contain a minimum of 110% of the volume of the largest container of oil and fuel stored. Spill protection equipment such as absorbent mats, shall be available on site to contain any oil spill that may occur, and procedures shall be in place to deal with any such spillage. All plant shall be provided with drip trays and spill kits. Plant operators shall carry out a visual inspection of their vehicle daily and shall be trained in how to deal with any uncontrolled spillage of oil.

All plant refuelling will take place using mobile fuel bowsters or fixed bunded tanks. Only dedicated trained and competent personnel will carry out refuelling operations. Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas. Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.

Fuel management to ensure no impact on the environment will be managed in accordance with Condition 9 of the IPC Licence as follows:

- No potentially polluting substance or matter shall be permitted to discharge to off-site surface waters, off site storm drains or groundwaters.
- The loading and unloading of fuel oils shall be carried out in designated areas protected against spillage and leachate run-off. While awaiting disposal, all materials shall be collected and stored in designated areas protected against spillage and leachate run-off.

- The licensee shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage.
- The licensee shall maintain a log of bi-annual inspections of all rail and tractor transported fuelling units. These inspections as a minimum should record any damage or leaks or flaws in rolling stock that could result in accidental spillage.

4.11 Waste Management

All waste arising from the works shall be managed and disposed of in a way that ensures the provisions of the Waste Management Act 1996 and associated amendments and regulations are applied.

Waste Management will be conducted in accordance with Condition 7 of the IPC Licence as follows:

- Disposal or recovery of waste shall take place only as specified in Schedule 2(i) Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery of this licence and in accordance with the appropriate National and European legislation and protocols. No other waste shall be disposed of/recovered either on-site or off-site without prior notice to, and prior written agreement of, the Agency.
- Waste sent off-site for recovery or disposal shall only be conveyed to a waste contractor, as agreed by the Agency, and only transported from the site of the activity to the site of recovery/disposal in a manner which will not adversely affect the environment.
- A full record, which shall be open to inspection by authorised persons of the Agency at all times, shall be kept by the licensee on matters relating to the waste management operations and practices at this site. This record shall as a minimum contain details of the following.
 - The names of the agent and transporter of the waste.
 - The name of the persons responsible for the ultimate disposal/recovery of the waste.
 - The ultimate destination of the waste.
 - Written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site.
 - The tonnages and EWC Code for the waste materials listed in Schedule 2(i), Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery sent off-site for disposal/recovery.
 - Details of any rejected consignments.

4.12 Soil Management

If soil contamination is encountered during the works arising from an accidental fuel spillage, this should be managed in accordance with Conditions 4, 7 & 9 of the IPC Licence as follows:

- The licensee shall notify the Agency by both telephone and email to the Agency's Headquarters, or to such other Agency office as may be specified by the Agency, as soon as practicable after the occurrence of any of the following:
 - Any release to atmosphere resulting in significant impairment of, or significant interference with amenities or the environment.
 - Any emission which does not comply with the requirements of this licence.

- Any incident with the potential for environmental contamination of surface water or groundwater, or posing an environmental threat to air or land, or requiring an emergency response by a Local Authority.
- The licensee shall include as part of the notification, date and time of the incident, details of the occurrence, and the steps taken to minimise the emissions and avoid recurrence.
- The licensee shall make a record of any incident as set out in above. The notification given to the Agency shall include details of the circumstances giving rise to the incident and all actions taken to minimise the effect on the environment and minimise wastes generated.
- A summary report of reported incidents shall be submitted to the Agency as part of the AER. The information contained in this report shall be prepared in accordance with any relevant guidelines issued by the Agency.
- In the case of any incident as set out above which relates to discharges to water, the licensee shall notify the appropriate Regional Fisheries Board, as soon as practicable after such an incident.
- In the event of any incident, as set out above having taken place, the licensee shall notify the appropriate Local Authority as soon as practicable, after such an incident.
- In the case of any incident, as set out above, which has the potential to impact the conservation objectives of the Special Areas of Conservation and Natural Heritage Areas identified in Attachment 10.1 of the IPC application having taken place, the licensee shall notify Dúchas of the Department of Arts, Heritage, Gaeltacht and the Islands as soon as practicable after such an incident.
- The licensee shall as part of their AER, or more frequently as may be necessary, notify and supply maps to the Agency of boglands, and discharges from same, intended to be included in the subsequent years' development and operational programmes.

4.13 Fire Safety

The ***Bord na Móna Fire Prevention & Fire Fighting Procedures*** in addition to the ***Bord na Móna Fire and Environmental Plan*** outline requirements for fire prevention and fighting in peat bogs and works locations.

It is the intention of Bord na Móna to identify the potential for and take all practicable measures to prevent the outbreak of fire by means of ensuring:

- Implementation of the above policy and procedures.
- Activities are risk assessed to identify potential fire hazards and allow for implementation of suitable control measures to eliminate or reduce to a minimum associated risk.
- Selection of suitable equipment and machinery which is used appropriately and adequately inspected and maintained by competent personnel.
- Installation, where appropriate, of fire-fighting equipment.
- Proper use, storage, and disposal of flammable materials.
- Use of permit to work system, as appropriate, where hot works are to be undertaken.

Bord na Móna Operations must ensure that all fire egress and access points are kept clear and free from obstruction. Emergency access to the various works zones shall be provided and maintained for the duration of the project.

- Unobstructed fire egress during the project.

- Adequate fire safety procedures.
- Access/egress for emergency vehicles.

5.0 Maintenance Access Requirements

The site-specific Drainage Management Plan (DMP) indicates that the effectiveness of a hydraulic break depends upon the drain's ability to convey water away.

The hydraulic breaks identified in the site-specific Engineering Construction Package will require routine monitoring by Bord na Móna, following the works, to ensure the drain is functioning as intended.

6.0 Protection of Existing Vegetation

Where peat extraction has ceased on a site several years ago it is typical for pioneer vegetation to have established on site via natural colonisation, which was encouraged by the cessation of disturbance from peat extraction activity. During this period, the field drainage system naturally breaks down in certain areas, accelerating natural colonisation. The development of pioneer habitats reflects the underlying environmental conditions with the key factor being topography and hydrology.

Regarding vegetation clearance, should it be required, all works will comply with Section 40 of the Wildlife Act. Please refer to Vegetation Clearance SOP ECO-004 for specific guidance. For the avoidance of doubt – no felling works will be carried out as part of the proposed works.

The Closed Period “40(1) (a) it shall be an offence for a person to cut, grub, burn or otherwise destroy during the period beginning on the 1st day of March and ending on the 31st day of August in any year, any vegetation growing on any land not then cultivated. (b) it shall be an offence for a person to cut, grub, burn or otherwise destroy any vegetation growing in any hedge or ditch during the period mentioned in paragraph (a) of this subsection”

The site-specific Ecology File will detail the application of these restrictions to individual sites where required.

7.0 Protected Habitats

Bord na Móna is committed to protecting the diverse habitats in proximity to our estate on which a wide range of Ireland's native animals and plants depend. Sites in proximity to SACs and NHAs have been identified in the site-specific Cutaway Bog Decommissioning and Rehabilitation Plan, Engineering Construction Package, Environmental File & Ecology File for the relevant bog where works are taking place.

Bord na Móna Operations shall incorporate appropriate mitigation measures from the NIS into the CEMP as required to mitigate against adverse impacts on these protected habitats where required, in particular any measures stipulated in Appropriate Assessment reporting.

8.0 Ecology

Measures should be taken by Bord na Móna Operations to protect flora and fauna during the works are outlined in the site-specific Ecology File. The works should be limited to daylight hours, in proximity to watercourses, to allow otters, foxes and other wildlife to forage along the watercourses at dawn, dusk and during the night.

Works will take cognisance of any identified Ecological Restriction Zones (ERZ's) to protect sensitive ecological receptors such as birds (breeding or non-breeding), amphibians or reptiles, invertebrates (e.g. Marsh Fritillary) or mammals (such as Otter) and any particularly sensitive habitats.

In advance of works, all site personnel will receive a toolbox talk with regards to the protection of sensitive receptors onsite, and the prevention of the spread of invasive species.

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

In addition, it is the responsibility of Bord na Móna to undertake any or all measures stipulated in Appropriate Assessment Reporting where required. Refer to the site-specific Environmental and/or Ecology File for specific guidance.

9.0 Peat Dam and Peat Berm Construction

Refer to ***Engineering Methods for Peatland Rehabilitation*** in the Engineering Construction Package for specific guidance on Peat Dam and Peat Berm Construction. The main objective of peat dam construction, as a rehabilitation measure, is to block drains with peat to raise water levels, re-wetting peat and slowing water movements through the site. Peat berm construction follows a similar principle to create large (e.g. 45m x 60m) cells to retain shallow surface water. The creation of cells helps retain surface water, keeping peat wet and slows water movement through the bog.

Geotechnical failures of peat embankments and dams can occur by the lateral displacement of an intact block of peat material due to reductions in the embankment self-weight following partial drying of the crest material and an increase in the active hydrostatic pressures following an increase in the depth of retained water after an intense rainfall event. These factors must be considered when carrying out horizontal and vertical stability calculations for peat embankments and dams.

It is important to create a 'key' for the dam / berm to mitigate against local failures of the peat material used in the construction when subject to associated hydraulic forces from the water being retained. This technique also improves the overall strength of the dam by creating a foundation and reduces sub-surface flows through the area.

Risk mitigation against dam and berm failure will be employed initially via design, whereby maximum water levels for each site will be specified in the site-specific Engineering Construction Package. Following construction, regular inspections of berms will be carried out.

If a local failure to a peat dam or berm occurs, the water will follow a pathway towards the nearest silt pond allowing any peat sediment from the local failure to be captured in the silt pond prior to discharging from the bog.

Where the risk cannot be mitigated against (in the case where the bog sits on an existing flood plain for example) emergency measures will be outlined in the Bord na Móna Emergency Response Procedure document.

10.0 Biosecurity

The potential for importation or introduction of non-native plant species (such as Japanese Knotweed, Himalayan Balsam, etc.) during the works has the potential to result in the establishment of invasive species within the site.

Section 49 of the European Communities (Birds and Natural Habitats) Regulations 2011 prohibits the introduction and dispersal of invasive alien species (particularly plant species) listed on Part 1 (third column) of the 'Third Schedule'.

This section aims to reduce the risk from, and impacts of, invasive species and protecting biodiversity on bogs identified under PCAS. The works will have due regard to the relevant biosecurity measures as follows:

- Records of problematic invasive species identified within the bog units will be marked out with signs to highlight areas of infestation to personnel, including a buffer.
- All plant machinery will be restricted from disturbing known colonies of invasive species.
- All plant machinery will avoid unnecessary crossings to adjoining lands.
- Good site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (i.e. Japanese Knotweed (*Fallopia japonica*), Himalayan Balsam (*Impatiens glandulifera*), Himalayan Knotweed (*Persicaria wallichii*), etc.) by thoroughly inspecting and/or washing vehicles prior to entering the work area.
- Plant shall be inspected upon arrival and departure from site.
- All site users shall be made aware of these procedures and appropriate treatment methodologies.

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

In order to prevent the introduction and spread of aquatic invasive species, biosecurity will be required for all PPE, equipment, plant and machinery components before entering (or which are likely to enter) drains and watercourses on the site and again before leaving the site:

- Protective gloves should be worn when using any disinfectant solution in any of the procedures listed below.
- Visually inspect all equipment that has come into contact with the water for evidence of attached plant or animal material, or adherent mud or debris. This should be done before leaving the site.
- Remove any attached or adherent material (vegetation and debris) before leaving the site of operation.

- Ensure that all water is drained from any live wells and other water retaining compartments, tanks and other equipment before transportation elsewhere.
- It is recommended to apply disinfectant to the undercarriage and wheels of the vehicle/machine after steam cleaning or power hosing.
- Wet or live wells and other water retaining compartments in survey boats must be cleaned, rinsed or flushed with a 1% solution of Virkon Aquatic or another proprietary disinfection product. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. Rinse thoroughly with clean water.
- Footwear should be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards.
- All PPE should be visually inspected and any attached vegetation or debris removed. Where appropriate, the gear should be wiped down with a cloth soaked in 1% solution of Virkon Aquatic or another proprietary disinfection product. Alternatively, a 5% solution (100 ml / 20 litre solution) of chlorine bleach should be used. Rubber gloves must be worn when undertaking this procedure.
- Survey equipment should also be sprayed with 1% solution of Virkon Aquatic.

11.0 Emergency Response Procedures

It is the intention of Bord na Móna to identify the potential for and take all practicable measures to prevent the occurrence of an emergency situation. However, in preparation for this possible occurrence, an Emergency Response Procedure will be prepared, implemented, maintained, and periodically reviewed by Bord na Móna Operations to minimise the potential for injury and ensure safe evacuation of persons.

Emergency Response Procedures are outlined in Appendix A

12.0 Reporting

Bord na Móna have a defined methodology for delivering the Peatland Climate Action Scheme. This is facilitated via adherence to our robust quality systems and project execution plans that have been developed to apply LEAN project management processes to our design and documentation. Bord na Móna teams adopt these key tools to the benefit of all projects and will adopt a formal reporting mechanism in line with the requirements of the IPC Licence. These reporting mechanisms are outlined in the site-specific Engineering Construction Package, Environmental File & Ecology File.

It is Bord na Móna policy to report, and where necessary, investigate any environmental incidents.

APPENDIX A – STANDARD OPERATING PROCEDURES (SOP's)

Bord na Móna Standard Operating Procedures with respect to Environmental & Biodiversity activities should be followed including, but not limited to, the documents listed in Table A-1 and Table A-2.

Table A-1 – Schedule of Biodiversity Standard Operating Procedures (SOP)

Code	Description
ECO 0001	Protection of Otter
ECO 0002	Prevention of disturbance (Birds)
ECO 0003	Protection of Marsh Fritillary
ECO 0004	Vegetation Clearance
ECO 0005	Protection of Amphibians and Reptiles
ECO 0006	Invasive Species

Table A-2 – Schedule of Environmental Standard Operating Procedures (SOP)

Code	Description
ENV017	Archaeological Findings
EP 5.0	General Emergency Preparedness & Response
SPIP	Silt Pond Inspection Procedure
SPMP	Silt Pond Maintenance Procedure
	Waste Management Procedure
	Gas Oil Loading Procedure

APPENDIX B – NATURA IMPACT STATEMENT (NIS) MITIGATION MEASURES**Mitigation Measures****Description of the measure**

The below best practice and bespoke mitigation measures have been designed and are prescribed in cognisance of those water dependent and nutrient sensitive features of Qualifying Interest for which the River Shannon Callows SAC and Middle Shannon Callows SPA have been designated.

These measures have been designed and have been prescribed to ensure that all targets and attributes set out for these features of qualifying interest are not compromised or effected by the proposed rehabilitation works at Bunahinly-Kilgarvan Bog.

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

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

- Bog restoration/rehabilitation works will be restricted to within the footprint of the proposed rehabilitation works area.
- The proposed rehabilitation works will have due regard to noise limits and hours of operation (i.e. dusk and dawn) to minimise any potential disturbance on resident and local fauna that utilise the site and immediate environs.
- A standard operating procedure overseen by the Project Ecologist will be in place for all PCAS activities to avoid any significant effects on breeding birds. This will include ground nesting birds and will apply to silt pond cleaning, and cutaway activities. Restriction zones will be in place to avoid effects on any identified ground nesting birds/waterfowl as appropriate.
- There are only sealed/locked and in use portacabins in place at Kilgarvan and Bunahinly bogs. These portacabins don't support optimal bird nesting or bat roosting potential. Should bird nesting activity occur along the portacabin roof edges, the portacabin won't be removed until all works are completed at Bunahinly - Kilgarvan, which will be outside the closed nesting season; i.e. after September 2022.
- Confirmatory surveys will be undertaken by a suitably qualified ecologist to identify the presence of any bird species of conservation concern which may potentially be disturbed. The survey will typically include habitats suitable for ground nesting birds, in particular sensitive species (e.g. Lapwing/Ringed Plover/Curlew/Red Grouse) but also buildings scheduled for decommissioning, potential winter period feeding or roosting areas for Wildfowl, roosting areas for Hen Harrier etc.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- The proposed works will be restricted to daylight hours and there will be no requirement for artificial lighting.
- Silt ponds will be inspected and maintained as per the IPC Licence.
- During periods of heavy precipitation and run-off, works will be halted.
- Works will be carried out using a suitably sized machine and, in all circumstances, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.

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- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
 - Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.
 - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
 - All waste will be sorted by the works crews, managed within the site in designated waste disposal facilities, and removed to a licenced waste facility, in line with BnM Standard operating practice.
 - Vehicles will never be left unattended during refuelling.
 - No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
 - All plant refuelling will take place using mobile fuel bowzers. Only dedicated trained and competent personnel will carry out refuelling operations.
 - All fuels required for machinery and equipment will be stored in a designated location, away from main traffic activity, at the nearest BnM Compound. All fuel will be stored in bunded, locked storage containers. Diesel or petrol fuel and mechanical oils will also be used by site vehicles.
 - Mobile storage such as fuel bowzers will be bunded to 110% capacity to prevent spills. Tanks for bowzers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked. All pumps using fuel or containing oil will be locally and securely bunded where there is the possibility of discharge to waters.
 - Potential impacts caused by spillages etc. during rehabilitation works will be reduced by keeping spill kits and other appropriate equipment on-site.
 - Site works will be carried out in accordance with 'best practice'. In order to ensure compliance and implementation of 'best practice', these measures will be communicated to relevant Bord na Móna staff and updated as required.
 - All waste water will be removed by a licenced waste contractor to a licenced waste water treatment facility.
 - Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
 1. The land is waterlogged;
 2. The land is flooded, or it is likely to flood;
 3. The land is frozen, or covered with snow;
 4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann).
 5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
 - Fertiliser will not be spread within 25m of a hydraulic break (where slope indicates runoff potential); 25m of an area subject to annual winter inundation, 25m of a natural watercourse, or 25m of any drains where conveyance is to be retained through the proposed rehabilitation extent.

- Fertiliser will be applied to headlands and bare fields where the surface slope indicates runoff is directed away from the above areas, and to within 2m of internal drainage channels within the cutover high field areas. These drainage channels will be blocked in advance of fertiliser application, restricting potential run-off to downstream drainage channels
- Buffer zones in respect of waterbodies, as specified on <https://gis.epa.ie/EPAMaps/>, will be adhered with at all times with regard to fertiliser application.

The below image / flow chart (**Figure 19**) provides Bord na Móna's proposed clean up procedures for fuel/oil and peat.

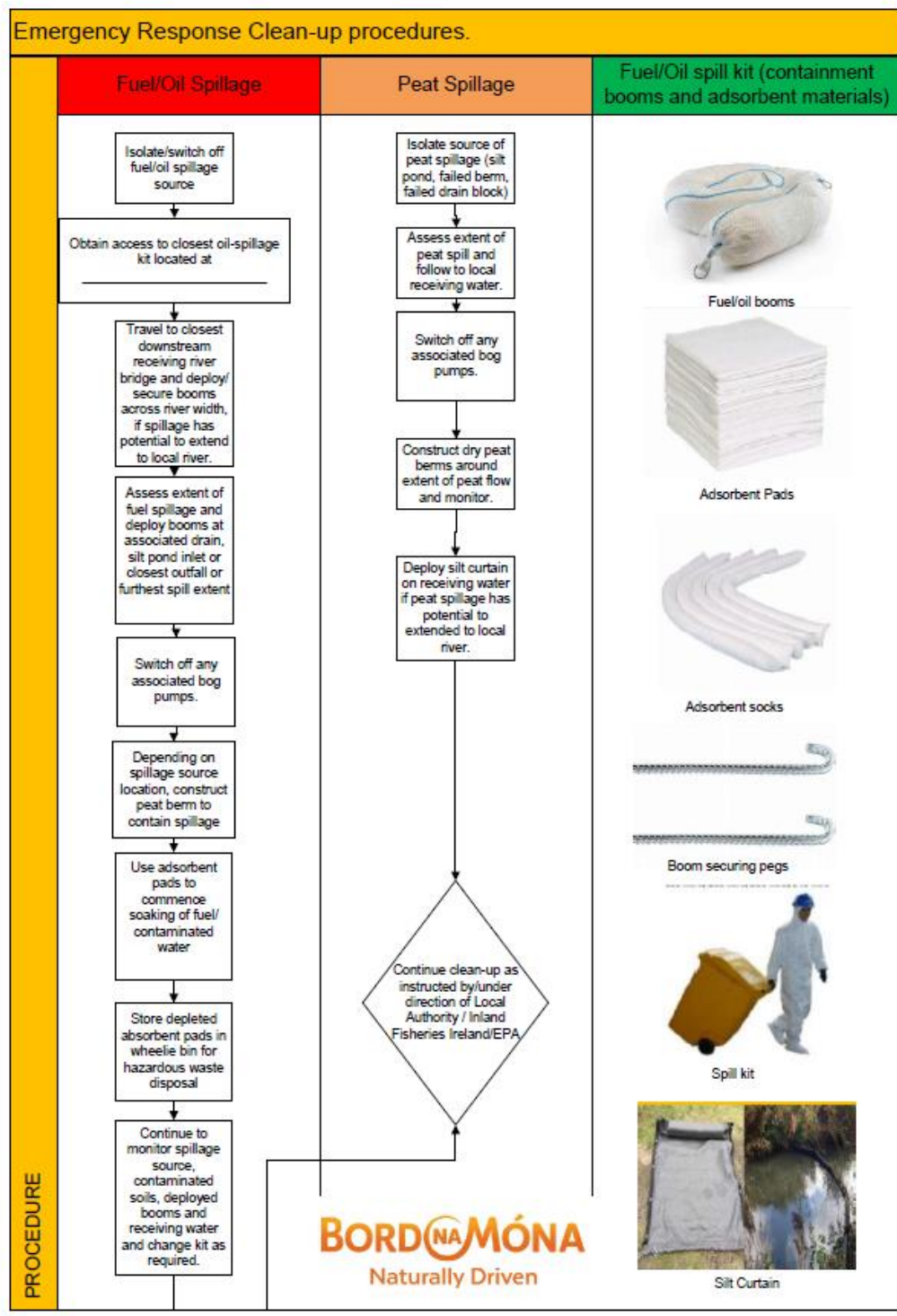
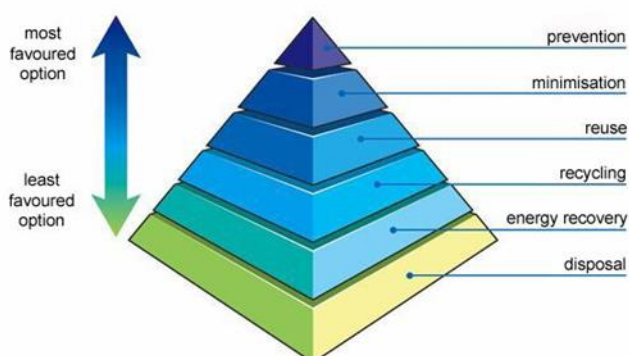


Figure 19: BnM Emergency Response Clean Up Procedures

Best Practice Measures around the treatment of Waste

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

- Disposal or recovery of waste shall take place only as specified in Schedule 2(i) Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery of this licence and in accordance with the appropriate National and European legislation and protocols. No other waste shall be disposed of/recovered either on-site or off-site without prior notice to, and prior written agreement of, the Agency.
- Waste sent off-site for recovery or disposal shall only be conveyed to a waste contractor, as agreed by the Agency, and only transported from the site of the activity to the site of recovery/disposal in a manner which will not adversely affect the environment.
- A full record, which shall be open to inspection by authorized persons of the Agency at all times, shall be kept by the licensee on matters relating to the waste management operations and practices at this site. This record shall as a minimum contain details of the following:
 - The names of the agent and transporter of the waste.
 - The name of the persons responsible for the ultimate disposal/recovery of the waste.
 - The ultimate destination of the waste.
 - Written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site.
 - The tonnages and EWC Code for the waste materials listed in Schedule 2(i) Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery sent off-site for disposal/recovery.
 - Details of any rejected consignments.
- A copy of this Waste Management record shall be submitted to the Agency as part of the AER for the site.
- As required by the licence, these waste items will be removed for recycling or disposal, using external contractors with the required waste collection permits, as agreed by the EPA, with waste records maintained as required for inspection by authorized persons of the EPA at all times.
- Where possible, Bord na Móna will utilize the appropriate waste hierarchy to identify waste that can 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 and EPA Exit Audit (EA) and the eventual partial or full surrender of the licence.

These best practice measures have been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

Best Practice & Biosecurity

Invasive alien plant species were not identified on the Bunahinly-Kilgarvan sites during the 2022 site walkover survey. Nonetheless, invasive alien species known to occur at the subject bog (or desktop review suggests presence is likely), and for which reasonably foreseeable source impact pathways for dispersal may result from the proposed PCAS are described here. A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs, and although spatial overlap with the PCAS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during PCAS activities.

The potential for importation or introduction of non-native plant species (such as Japanese Knotweed, Himalayan Balsam, etc.) has been identified. Section 49 of the European Communities (Birds and Natural Habitats) Regulations 2011 prohibits the introduction and dispersal of invasive alien species (particularly plant species) listed on Part 1 (third column) of the 'Third Schedule'.

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

- Records of problematic invasive species within the various bog units will be marked out with signs to highlight areas of infestation to personnel.
- All plant machinery will be restricted from disturbing known colonies of invasive species.
- All plant machinery will avoid unnecessary crossings to adjoining lands.
- For any material entering the site, the supplier must provide an assurance that it is free of invasive species.
- All plant and equipment employed on the proposed works (e.g. diggers, tracked machines, footwear etc.) must be thoroughly cleaned down using a power washer unit, and washed into a dedicated and contained area prior to arrival on site and on leaving site to prevent the spread of invasive aquatic / riparian species such as (but not limited to) Japanese knotweed (*Fallopia japonica*) and Himalayan Balsam (*Impatiens glandulifera*). A sign off sheet must be maintained by the contractor to confirm cleaning;
- Good site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (i.e. Japanese Knotweed (*Fallopia japonica*), Himalayan Balsam (*Impatiens glandulifera*), Himalayan Knotweed (*Persicaria wallichii*), etc.) by thoroughly inspecting and washing vehicles prior to entering the works area.

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

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

- All water quality monitoring equipment which has been used in water will be treated with a disinfectant or a strong saline solution and then thoroughly dried (ideally over 24 hours) BEFORE being used in water again.
- Check, Clean, Dry protocol will be adhered with before and after visiting a river or lake for monitoring, in line with Best Practice¹ or for activities such as Sphagnum inoculation.
- Virkon Aquatic will be available as required.

These best practice measures have been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

Silt Ponds

Silt Ponds – 27 no. Silt ponds with a total volume of 36058.16823m³ and area of 2.36ha are in place at Bunahinly-Kilgarvan Bog and connected to the existing drainage network. These silt ponds, already stipulated and in use as mitigation measures in respect of Peat Extraction under IPC license, will continue to function as the primary intervention in terms of sediment release to receiving waterbodies. It should be noted, that the silt pond network at Bunahinly-Kilgarvan Bog site will not be the sole mitigation measure to attenuate silt laden waters emanating from the site during the project construction and operational phases. The design of the PCAS scheme requires the creation of internal drain blocking measures (including terminal dams), which will in itself reduce the possibility of surface run-off to the receiving environment during the rehabilitation works. Once rehabilitation works are completed and the bog has been rehabilitated, the bog will act as a natural repository for surface water, regulating and slowing the movement of surface water from Bunahinly-Kilgarvan Bog to the receiving environment. It is considered that the silt pond network will provide further attenuation and regulation to those measures associated with the PCAS measures during the project construction phase and the rewetted peatland habitat during the project's operational phase.

The water quality emission limit values (under condition 6.2 of the Integrated Pollution Control (IPC) licence issued for Bunahinly-Kilgarvan Bog) are unique to the water quality impacts from peat extraction, and as requested by the EPA. These values are not appropriate to use as a measures of success with regard to the expected water quality improvements that will arise from ceasing the annual peat extraction activity, removal of all stock and the associated rehabilitation of this bog. Existing water quality results from Bunahinly - Kilgarvan Bog indicate that suspended solids are well under the ELV that are applied during peat extraction, with ammonia also well under the associate trigger level. Silt ponds are an IPC Licence requirement to manage expected suspended solids that can arise from peat extraction and are not solely relied upon to mitigate impacts from rehabilitation of the peatlands. The silt pond locations are highlighted on (**Figure 20** and **Figure 21**), and all silt ponds are sized as required under condition 6.10 of the associated IPC Licence with regard to expected impact from the activity of milling peat and associated production processes, and maintained as required under condition 6.7 and 6.8. To that end, it is considered that silt ponds within the Bunahinly-Kilgarvan Bog are sufficiently sized to attenuate any silt or particulate matter

Regular cleaning and reporting on same already forms part of annual (AER) reporting submitted to EPA. All Silt Ponds at Bunahinly-Kilgarvan Bog site are currently compliant with EPA requirements. **Table 22** below, and **Figure 20** and **Figure 21** overleaf summarise and illustrate the onsite Silt Pond locations, the figures also illustrates the current flow regime within the main drainage network (into which any other drains also feed). Continued maintenance and reporting on same will be reported on annually until IPC license Surrender.

Silt pond cleaning is completed using a long reach excavator, at minimum twice per annum, in line with IPC license requirements and an established SOP.

¹ <https://www.biodiversityireland.ie/projects/invasive-species/crayfish-plague/>

Silt pond is cleaned to the appropriate depth as specified to ensure compliance (25m³ of silt pond capacity is required for every hectare of bare peat in the associated catchment), typically a minimum of 1.5m deep, as compliance is achieved through length rather than depth in most instances. Excavated spoil will be placed adjacent to the silt pond.

Table 22: Silt Ponds in use at Bunahinly-Kilgarvan Bog site

Bog Name	IPC License Reference	Pond No.	Area (m ²)	Volume (m ³)
Kilgarvan	502_01	n/a	515.91297844700	773.86946767100
Kilgarvan	502_01	n/a	381.75049803100	572.62574704700
Kilgarvan	502_01	BH199	653.54426884600	980.31640326900
Kilgarvan	502_01	BH199A	449.22157770900	673.83236656400
Kilgarvan	502_01	BH200A	1314.39472511000	1971.59208766000
Kilgarvan	502_01	BH200B	757.03050148400	1135.54575223000
Kilgarvan	502_01	BH200C	3408.89100392000	5113.33650588000
Kilgarvan	502_01	BH200D	1104.45291146000	1656.67936719000
Kilgarvan	502_01	BH200D	0.84525888389	1.26788832583
Kilgarvan	502_01	BH200E	1628.28773601000	2442.43160402000
Kilgarvan	502_01	KG190	979.57902974300	1469.36854461000
Kilgarvan	502_01	KG191	379.85634220200	569.78451330300
Kilgarvan	502_01	KG192A	1622.11005285000	2433.16507928000
Kilgarvan	502_01	KG192C	1563.15713458000	2344.73570187000
Kilgarvan	502_01	KG192D	476.22538250000	714.33807375000
Kilgarvan	502_01	KG192E	457.90710977500	686.86066466300
Kilgarvan	502_01	KG193A	446.99025701700	670.48538552500
Kilgarvan	502_01	KG193B	844.60796833400	1266.91195250000
Kilgarvan	502_01	KG194	435.55593152400	1266.91195250000
Kilgarvan	502_01	KG195	712.51792932800	1068.77689399000
Kilgarvan	502_01	KG196	288.87551544100	433.31327316200
Kilgarvan	502_01	KG196A	309.50556451100	464.25834676700
Kilgarvan	502_01	KG197	713.54936406000	1070.32404609000
Kilgarvan	502_01	KG201	2222.86471403000	3334.29707105000
Kilgarvan	502_01	KG201	668.43891064500	1002.65836597000
Kilgarvan	502_01	KG202	676.73066653900	1015.09599981000
Kilgarvan	502_01	KG202A	616.92345241200	925.38517861800
		Total	23629.72679	36058.16823

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

The attenuation of silt and particulate matter generated as a result of the proposed works is a key mitigation measure for the proposed rehabilitation and decommissioning works. The main source of potential impact to influence significant adverse effects to the downstream areas of the River Shannon Callows SAC relate to particulate matter run-off from the site, during the rehabilitation works. A key consideration in this regard will be drain blocking as described below. This methodology relies on the placement of terminal dams at the extremity of the drain; i.e. that closest to watercourse within the receiving environment. The securing of strategic peat dams will allow the hydraulic separation between the proposed rehabilitation works and the receiving and downstream aquatic environment, and in so doing isolating these works from sensitive ecological

and environmental receptors within the project zone of influence and in the case of Bunahinly-Kilgarvan Bog site and European Sites within the project Zone of Influence.

These mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

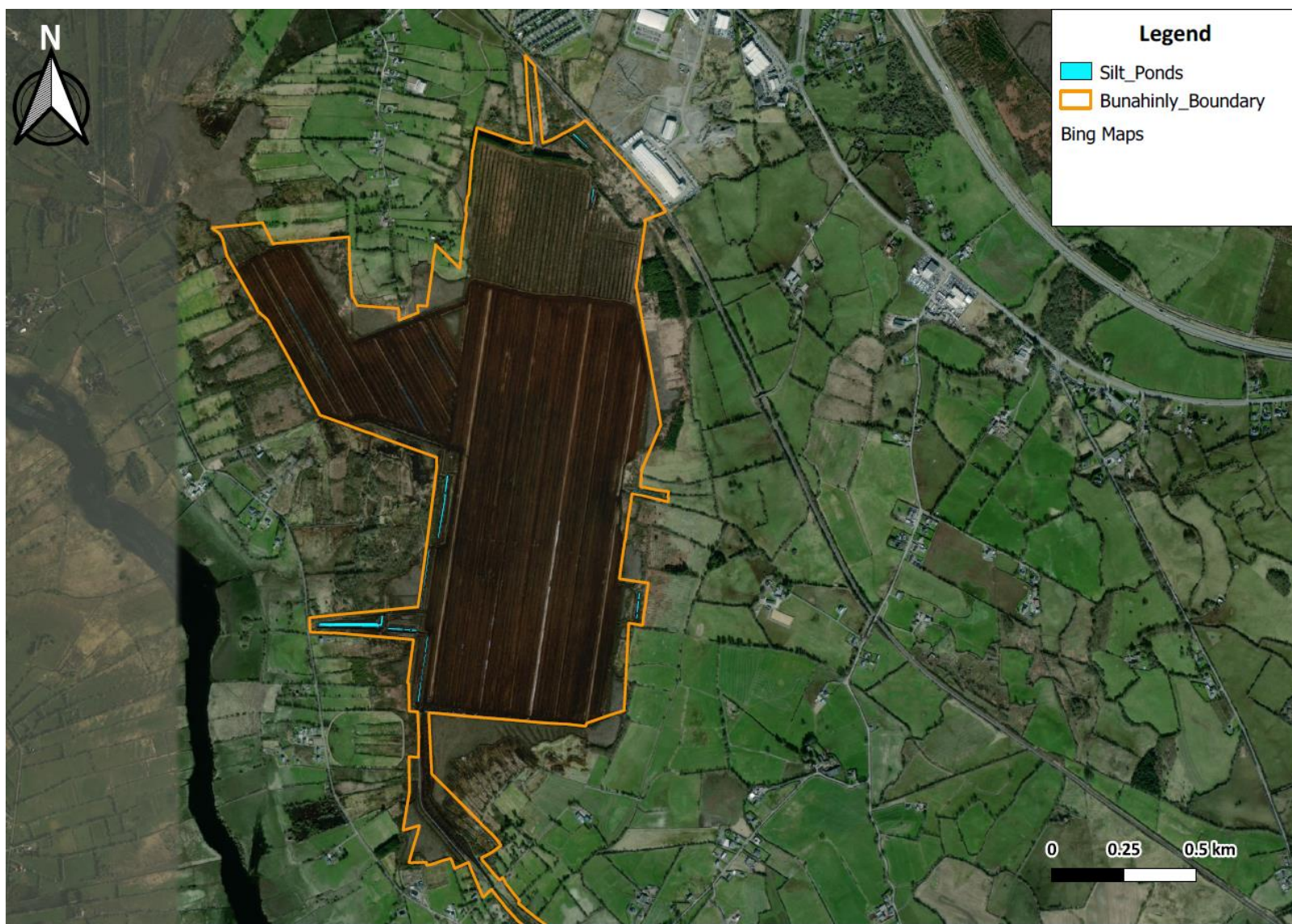


Figure 20: Bunahinly Bog Site Drainage and Silt Ponds



Figure 21: Kilgarvan Bog Site Drainage and Silt Ponds

Measures to avoid runoff when carrying out drain blocking

The principal mitigation for proposed rehabilitation works at Bunahinly-Kilgarvan Bog site will involve securing the works area from the receiving environment when rehabilitation works are ongoing. This will include the creation of terminal dams at the margins of the rehabilitation works. These dams will secure the works area from the receiving environment, in particular downstream watercourses and waterbodies. These terminal dams are an integral part of the rehabilitation design works and comprise mitigation by design.

- All Silt ponds will be cleaned prior to the commencement of upstream drain blocking.
- The current EPA Licence requirement for Bunahinly-Kilgarvan Bog specifies the need to clean silt ponds twice per annum, once before production and once before ditching. For the purposes of the rehabilitation works silt pond cleaning will be undertaken before and after the rehabilitation works. These works will be subject to visual inspections and Water Quality monitoring.
- When blocking drains, terminal dams i.e. the dams at the extremity of the drain and closest to any hydrologically connected watercourses, will be blocked first with AT MINIMUM 2 IN SERIES STANDARD DAMS, to prevent sediment release from subsequent dam insertion. This will form a hydraulic barrier between subsequent drain works and other rehabilitation works at the bog and the receiving and surrounding environment.
- The functionality and efficacy of these terminal dams will be monitored by the Project Ecologist/Environmental Supervisor and audited by the project engineering team. If the structural competency of the terminal dams become compromised, additional mitigation will be secured on site, such as silt fencing or additional check dams.
- Dams will be inspected during periods of dry weather to ensure no 'cracking' of peat has occurred which might allow for discharge.
- Discharge from all rehabilitated areas will be directed into silt ponds.
- Outfalls and overflow pipes from e.g. bunded cells will be directed into silt ponds.
- An Emergency Response Plan will be available in the event of any inadvertent release of a large volume of sediment.
- The above will be overseen by a suitably qualified Environmental Supervisor with support from members of the BnM Ecology Team.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

Measures for cleaning Silt Ponds within EPA Blue line features

Cleaning of silt ponds integrated adjoining or upstream EPA Blue line features, such as the Shannon Upper_120 watercourse, will follow the below best practice measures.

- Consideration of seasonal restrictions for instream works (works to commence between April / May – October inclusive) and requirement to liaise / notify Inland Fisheries Ireland (IFI) in advance of cleaning works commencing.
- Cleaning works to align with best practice measures, including BnM Standard Operating Procedures (SOPs) for works within and near watercourses, works with hydrocarbons, biosecurity measures when working at and different watercourses and waterbodies.
- Cognisance of capture of non-target aquatic species (Crayfish, lamprey, small fish etc.) within the dredged material and the secure rescue and translocation of these species downstream of the pond cleaning works. Cleaning of silt ponds will be completed under licence (where required) and in accordance with strict biosecurity measures. Silt ponds will be cleaned from the inlet point to the outlet

point allowing fish and aquatic life to migrate downstream as the works progress. The silt pond cleaning works and species translocation efforts will be overseen by a suitably qualified Project Ecologist or Environmental Supervisor and ongoing monitoring undertaken by the project ecologist.

- Excavated silt material will be placed at least 20m away from the blue line feature and will be deposited into corralled berms and thereafter secured into the nearby ground with the back of the machine excavator bucket, to ensure particulate matter is not mobilised during or following rainfall events.

It should be noted, that the silt pond network at Bunahinly-Kilgarvan Bog will not be the sole mitigation measure to attenuate silt laden waters emanating from the site during the project construction and operational phases. The design of the PCAS scheme requires the creation of internal drain blocking measures, which will in itself reduce the possibility of surface run-off to the receiving environment during the rehabilitation works. However, the functionality of a silt pond feature is based on its capacity to assimilate and attenuate ongoing surface water flows. Silt ponds need to be cleaned and emptied regularly to ensure they have sufficient capacity to operate efficiently.

Once rehabilitation works are completed and the bog has been rehabilitated, the bog will act as a natural repository for surface water, regulating and slowing the movement of surface water from Bunahinly-Kilgarvan Bog to the receiving environment. It is considered that the silt pond network will provide further attenuation and regulation to those measures associated with the PCAS measures during the project construction phase and the rewetted peatland habitat during the project's operational phase.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

Rehabilitation Design at Bunahinly-Kilgarvan Bog

Further detail is provided in this section on the proposed rehabilitation measures at Bunahinly-Kilgarvan Bog, particularly the provision of measures Deep Peat (DPT2) and Deep Peat 4 (DPT4).

It is proposed to develop these measures across 274.25ha of the Bunahinly-Kilgarvan Bog site. The development of these measures will involve the construction of berms and field re-profiling, blocking outfalls, managing overflows and drainage channels for excess water and *Sphagnum* inoculation.

Once constructed and fully operational, these rehabilitation features will act in the same way as a series individual silt ponds. The functioning of these features will act as an source of surface water retention and attenuation on site, further mitigating the risk of silt release from this area to the receiving environment. The location of the silt control measures and silt ponds for Bunahinly-Kilgarvan Bog are presented in **Figures 20 and 21**, above, as reproduced from the NIS.

In addition to the above design principles and their inherent attenuation capacities, it is considered that the River Shannon catchment affords substantial dilution rates. Given the substantial dilution rates that are achievable, it is not anticipated that the proposed rehabilitation measures will give rise to any perceptible impacts on water quality either alone or in-combination with other activities. Furthermore, the discharge from the bogs will be managed through silt traps which will substantially reduce the quantity of peat silt export from the bog. During low flow conditions when dilution potential will be lowest the silt traps will be most effective, in contrast during large events when silt traps are least effective very substantial dilution will be achievable.

Given the substantial dilution rates achievable within the River Shannon catchment, it is not anticipated that the proposed rehabilitation measures will give rise to any perceptible impacts on water quality either alone or in-combination. Furthermore, the discharge from the bogs will be managed through silt traps which will

substantially reduce the quantity of peat silt export from the bog. During low flow conditions when dilution potential will be lowest the silt traps will be most effective, in contrast during large events when silt traps are least effective very substantial dilution will be achievable within the Daingean and Figile watercourses.

Mortality or disturbance to Otter

- Confirmatory surveys for active Otter holts and breeding activity will be carried out 150m upstream and downstream of suitable habitat prior to the commencement of works in close proximity.
- Should it be confirmed all works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer and outside of 1 hours after sunrise or before sunset during winter.
- No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work will not take place within 15m of such holts, except under license.
- The prohibited area associated with otter holts, should they be located in confirmatory surveys, will, where appropriate, be protected from any inadvertent disturbance from any works or personnel occurring nearby such as at a silt pond and declared as 'Ecology Restriction Zone' with no mention of otters to any onsite staff.
- Appropriate awareness of the purpose of the excluded area will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each possible access point. All contractors or operators on site will be made fully aware of the procedures pertaining to Ecology Restriction Zones and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
- All PCAS activities will be carried out during daylight hours.
- All works will be carried out and completed in compliance with Bord na Mona's Standard Operating Procedure for otter.

This mitigation measure has been included for the avoidance of ex-situ effects to otter, a feature of Qualifying Interest for the River Shannon Callows SAC.

1.1.1.1 Mitigation when undertaking flood avoidance measures and retention of hydraulic barriers

The following mitigation and best practice measures will be undertaken at the Bunahinly-Kilgarvan Bog site. Although drain blocking and consequent and hydrological rewetting of the Bunahinly-Kilgarvan Bog site will occur, it is not intended to rewet or hydrologically alter adjoining lands or those areas surrounding the Bunahinly-Kilgarvan Bog site. To this end, the following mitigation measures will be implemented:

- Maintenance of peripheral drains and where required, to create hydraulic barriers between the site and the receiving environment. This will mean that lands and local drainage patterns associated with the margins of the BnM site will be maintained;
- Maintenance of specified internal drains to avoid flooding where required to maintain existing drainage of adjacent lands. In some instances this may include re-grading or widening of specific existing drains which currently act as preferential flow paths through the bog.
- Monitoring of adjacent lands will also be specified.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (Middle Shannon Callows SPA / River Shannon Callows SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

A map displaying hydraulic breaks is presented in **Figure 22** below.

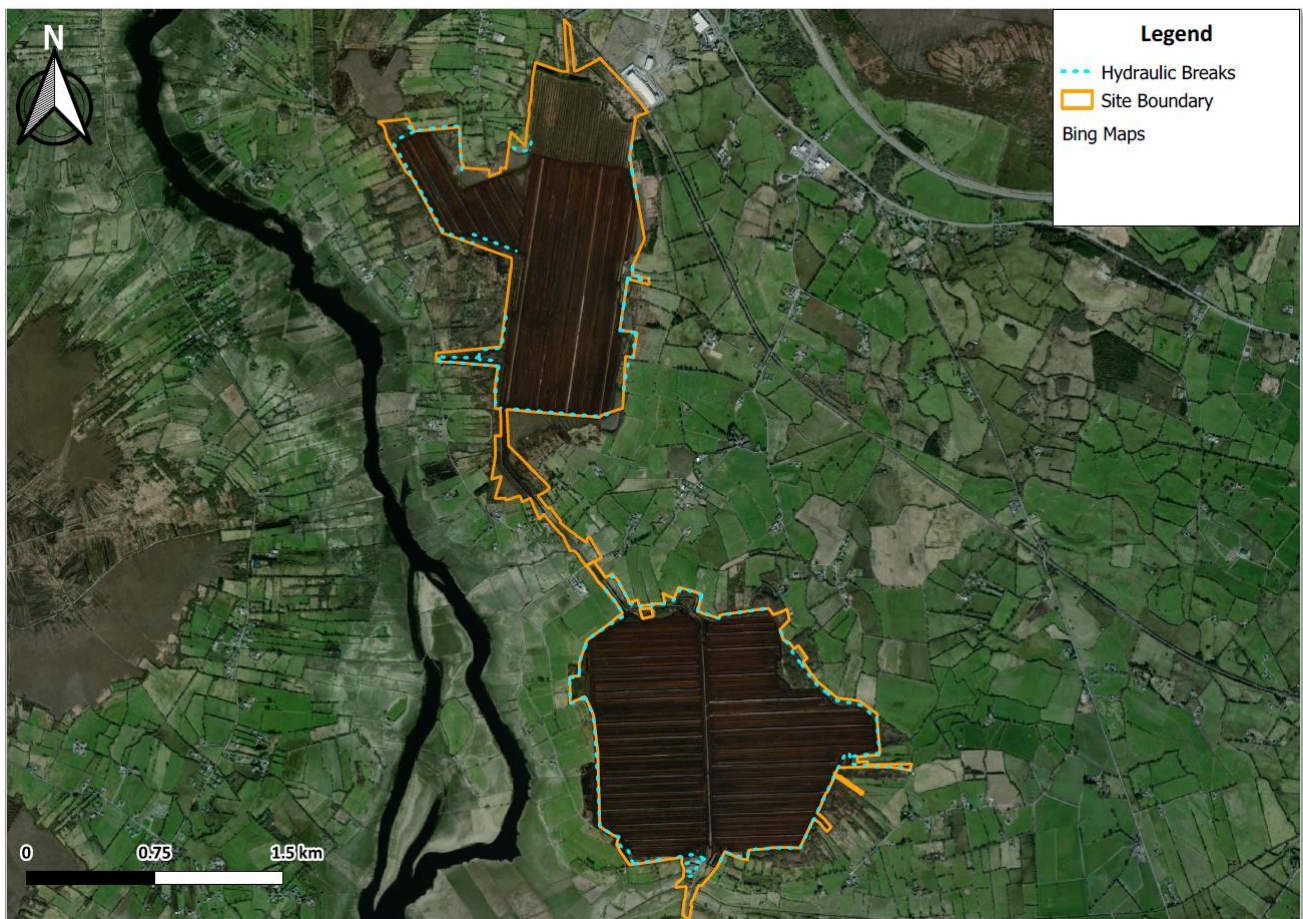


Figure 22: Hydraulic Breaks at Bunahinly-Kilgarvan Bog site

Mitigation during upgrade of boundary or peripheral drains outside of the proposed rehabilitation footprint

Boundary drains may require upgrading to retain their functionality as hydraulic breaks between the site and adjoining lands. These works will be completed during periods of low flow and will follow the below sequencing:

- Prior to commencement of channel works, at least 2 no. check dams will be placed at the downstream end of the drainage channel to control the flow of suspended sediment downstream to receiving watercourses.
- The most downstream check dam will comprise locally sourced turves and double bagged sand bags to initially secure and check downstream flow within the channel. At least 10m upstream of this check dam, a peat dam will be created and keyed into the adjoining drainage channel banks.
- The build-up of silt material upstream of the constructed check dams will be monitored during upgrade works and the silt material will be removed from the drainage channel during works as it builds up. The material will be removed from the channel, spread and levelled into the adjacent field, a minimum of 10m from the nearest drain.
- The constructed check dams will be inspected during periods of dry weather to ensure no 'cracking' of peat has occurred which might allow for discharge.
- Upon completion of the upgrade works, all silt will be removed from the drainage channel immediately upstream of the 2 standard drain blocks prior their removal. The 2 standard drain blocks will only be removed once all upgrade works are completed and once all water within the channel is suitably settled with no evidence of suspended solids within the water column.

- Where a new drain is required, it will be formed and established prior to connecting the drainage channel to wider drainage network. Only once it has formed and become established, with the bed and banks stabilised will it be connected to the wider drainage network. This approach will minimise to a negligible level the potential for suspended solids to be generated in waters within the new drainage channel and conveyed downstream to receiving watercourses and European Sites.
- An Emergency Response Plan will be available in the event of any inadvertent release of a large volume of sediment.

The set up of these features will be overseen by a suitably qualified Ecologist/Ecological Clerk of Works and ongoing monitoring undertaken by the project ecologist.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (Middle Shannon Callows SPA / River Shannon Callows SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

Mitigation through Design - Emergency Response Plan for Berm Failure

The below mitigation measures will be put in place when constructing and working with berm features as part of the bog rewetting and rehabilitation process. The berm design adopts an empirical design approach. It is proposed to apply proven sizes, proportions, materials, and assemblies from existing successful rehabilitation measures and flood defense berm features carried out in the past by Bord na Mona. This represents mitigation for the proposed rehabilitation works through design; i.e. integrating key design principles into the rehabilitation efforts to restrict potential berm failure and consequent run-off to the receiving environment. Further to the above, **Figure 19** above presents an Emergency Response procedure to address peat spillage in the unlikely event of berm failure.

- The selection of an appropriate drain block spacing.
- Drain blocks are formed at a minimum of 300mm higher than the adjacent ground level and are relatively wide to create a relatively strong structure out of peat that will mitigate water flow eroding the drain block construction.
- The provision of a key in the drain ensures a tight seal is maintained and a strong structure is developed to mitigate the formation of preferential flow paths around the edges of the drain block.
- Operators assigned to this work element are familiar with the technique and process and provide effective robust drain blocks. The operators are experienced and capable of adapting to the particular conditions encountered within the bog.
- Qualified, experienced Engineers overseeing the works during the installation phase ensure that quality procedures of the various elements are implemented and effectively meet the standards for quality service and performance.

Mitigation through maintenance and avoidance:

- Ongoing monitoring of completed peat drain blocks in the weeks after formation will ensure they have consolidated.
- The risk associated with peat drain block failure from an environmental and rehabilitation measures impact is generally categorised as low as a peat drain block failure will result in an impact that is localised and silt control measures are provided upstream of all discharge points. There is an allowance for a reactive approach to remediation measures where required.

- A post rehabilitation Lidar and imagery survey will take place which will capture any areas where failures occurred resulting in remediation measures in a particular area if required. The Lidar survey will be implemented when the rehabilitation measures have been in place for a reasonable period of time allowing areas of weakness or potential concern to become apparent.
- In the event of a peat drain block failure, the adjacent peat drain blocks will generally have sufficient capacity to accommodate any additional hydrostatic pressures generated ensuring the negative impact is localised.
- If, after heavy rainfall, significant water flows in the drains cause localised drain block failure, the regular and frequent placing of drain blocks along the drain further downstream will mitigate the impact to the immediate area.
- As peat drain blocks are designed to retain water on the cutover resulting in a reduction in discharge into the boundary drains, preventing any negative impacts on adjacent agricultural land.

Further to the above, **Figure 19** above presents an Emergency Response procedures to address peat spillage in the unlikely event of berm failure.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC and Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

Mitigation through maintenance and avoidance:
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- | |
|--|
| <ul style="list-style-type: none"> • Ongoing monitoring of completed peat drain blocks in the weeks after formation will ensure they have consolidated. • The risk associated with peat drain block failure from an environmental and rehabilitation measures impact is generally categorised as low as a peat drain block failure will result in an impact that is localised and silt control measures are provided upstream of all discharge points. There is an allowance for a reactive approach to remediation measures where required. • A post rehabilitation LiDAR and imagery survey will take place which will capture any areas where failures occurred resulting in remediation measures in a particular area if required. The LiDAR survey will be implemented when the rehabilitation measures have been in place for a reasonable period of time allowing areas of weakness or potential concern to become apparent. • In the event of a peat drain block failure, the adjacent peat drain blocks will generally have sufficient capacity to accommodate any additional hydrostatic pressures generated ensuring the negative impact is localised. • If, after heavy rainfall, significant water flows in the drains cause localised drain block failure, the regular and frequent placing of drain blocks along the drain further downstream will mitigate the impact to the immediate area. • As peat drain blocks are designed to retain water on the cutover resulting in a reduction in discharge into the boundary drains, preventing any negative impacts on adjacent agricultural land. |
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Further to the above, **Figure 19** above presents an Emergency Response procedures to address peat spillage in the unlikely event of berm failure.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (Middle Shannon Callows SPA / River Shannon Callows SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

Measures to avoid disturbance or displacement to SCI bird species

Birds

- An Ecological Restriction Zone will be adopted as part of the proposed rehabilitation works. This will include a buffered area ca. 150m from silt ponds that supported (or has the capacity to support) feeding over-wintering avifauna within Bunakinly-Kilgarvan Bogs – see **Figure 23** overleaf. Any potential disturbance to SCI birds outside of these Ecological Restriction Zones within Bunakinly-Kilgarvan Bog are considered to be reversible and not significant. The proposed Ecological Restriction Zone comprises a 150m buffer offsetting silt pond areas on site (shown in pink). PCAS activities will be restricted within this zone for the non-breeding period associated with the SCI species for which potentially adverse effect pathways exist. The Ecological Restriction Zone will apply in these areas between October and March inclusive.
- The extent of restriction will be overseen by the Project Ecologist dependant on water levels within the Ecological Restriction Zone and the usage of the site by avifauna. Works restrictions may be required between the months of October to March inclusive. The timing and duration of the restrictions and works practices during this period will be considered through ongoing liaison between the Project Ecologist and the project team.
- Once an Ecological Restriction Zone is operational, no PCAS scheme activities will take place within the prescribed zone. Travel and access within these sections of the site to undertake cleaning or maintenance activities may be permitted as they are likely to be intermittent, short term and of low intensity and duration. General usage will be restricted to use of existing rail and travel passes. All will be overseen by the Project Ecologist
- The timing restrictions associated with the Ecological Restriction Zone will be communicated to staff through toolbox talks, incorporated into the EMP for the project and visual markers will be placed on the peat extraction area to delineate the avoidance zone.
- Locations of these restriction zones will also be presented to the machine drivers via the built-in GPS tablet and ESRI application and the machine drivers will use this technology to avoid entering any restricted areas.
- Conformance will be audited through compliance checks by the Project Ecologist (with 'stop-works' authority).
- A standard operating procedure overseen by the Project Ecologist will be in place for all PCAS activities to avoid any significant effects on breeding birds. This will include ground nesting birds and will apply to silt pond cleaning, and cutaway activities. Restriction zones will be in place to avoid effects on any identified ground nesting birds/waterfowl as appropriate.

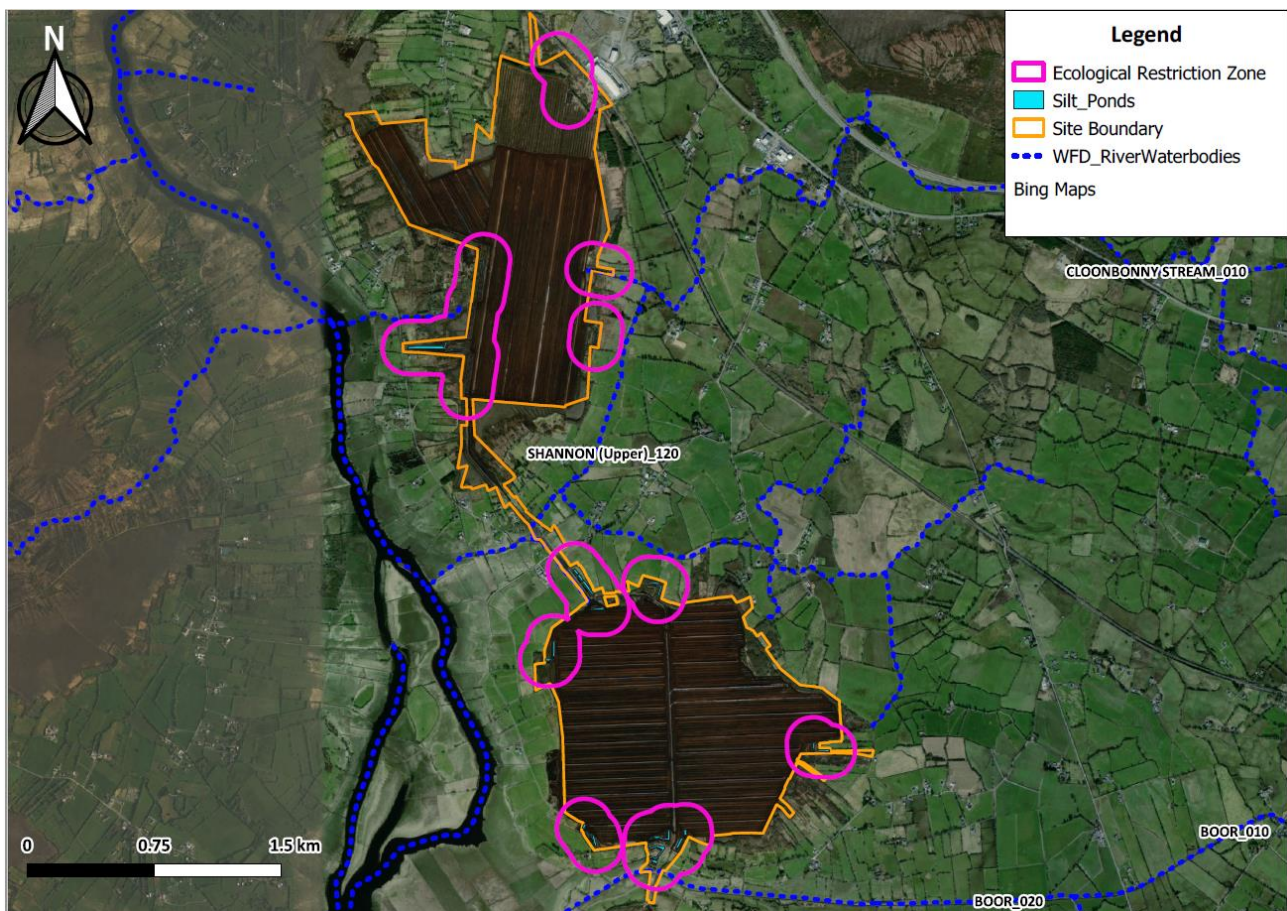


Figure 23: Ecological Restriction Zones in respect of overwintering avifauna

This mitigation measure has been included for the protection (and the avoidance of disturbance and displacement) of SCI species for adjacent and nearby SPA sites (Middle Shannon Callows SPA / Suck River Callows SPA).

The above figure is also reproduced as Appendix D of this document.

Standard Operating Procedures for Loading of remaining Peat Stockpiles within Bunahinly-Kilgarvan Bog

The loading and removal of any remaining milled peat stockpiles at Bunahinly-Kilgarvan Bog will follow the below Standard Operating Procedures (SOPs) (See **Figure 24**). The below schematic / flow diagram displays how peat loading and removal will be completed at the Bunahinly-Kilgarvan Bog site. This will ensure that loading and removal of remaining peat stockpiles will be controlled, will follow an agreed protocol and will not result in the release or spread or milled peat to the receiving or surrounding environment and by extension European Sites within the project Zone of Influence.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (River Shannon Callows SAC / Middle Shannon Callows SPA) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

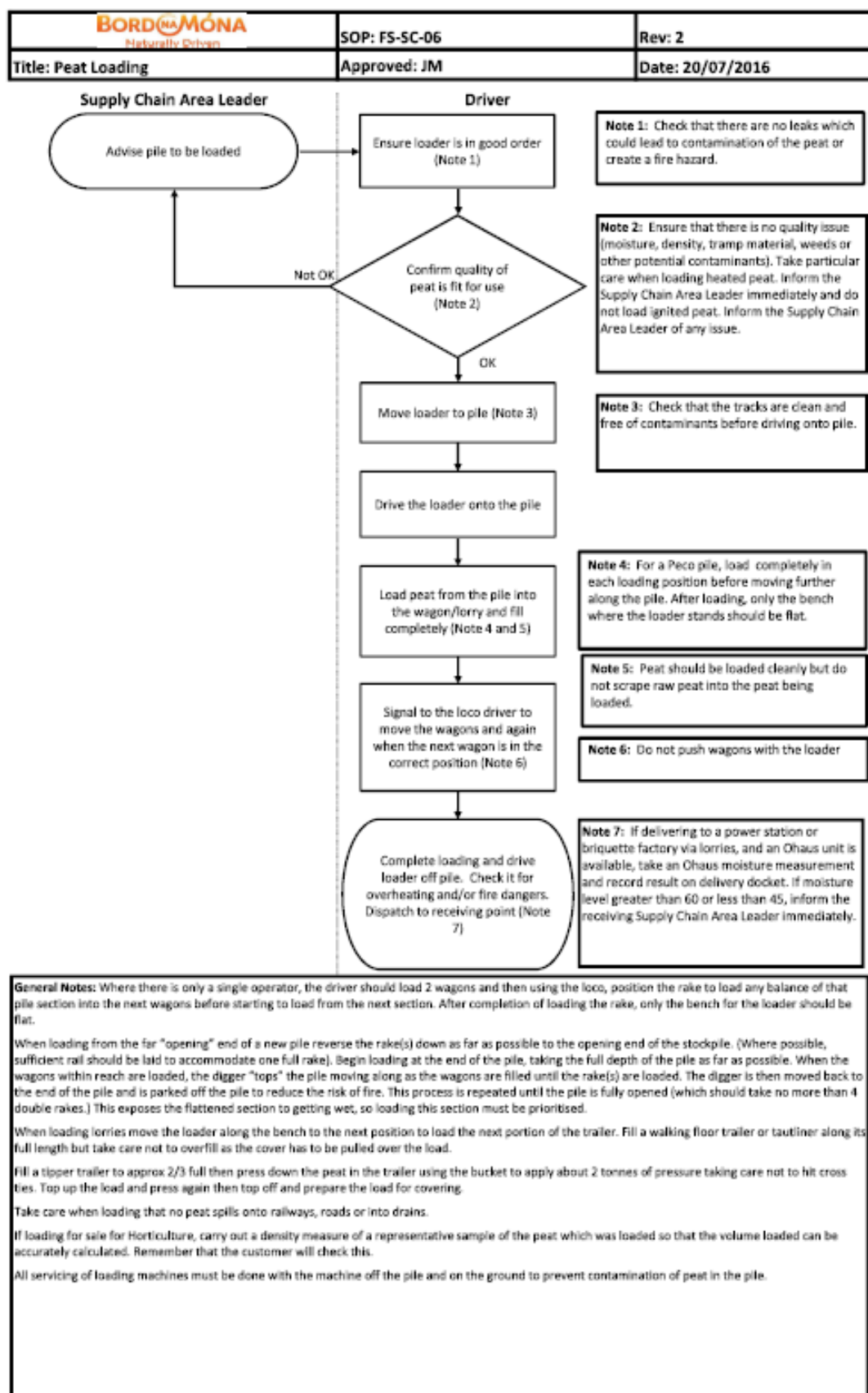


Figure 24: BnM Peat Loading SOPs

General Dust Control Steps:

The following measures will be put in place when loading and removing remaining peat stockpiles from Bunahinly Kilgarvan Bog.

- Wind Socks will be installed at all Bog Areas that have on-going complaints or are classed as Dust Sensitive, so that wind speed and direction can be assessed. BNM Item Number (412958).
- Any dust mitigation measures will be recorded and referenced on the daily return sheet.
- Headland peat collection will be recorded on PQMS form 023.
- Idle travel will be avoided as much as practically possible.
- Use grass paths and far headlands where possible when travelling in dust sensitive areas.
- Avoid travelling near main highways, dwellings and areas deemed as problematic regarding dust impact.
- Keep the headlands continuously ridged.
- Shelter Belts and Wind Breaks are used where feasible.
- Stockpiles are covered as per the Area Polycovering Plan.
- Machinery maintains slow speeds when travelling along headlands.
- All Continuous Improvement initiatives regarding Dust Mitigation will be fully investigated and supported by bog areas.

Headland Harvesting

- Keep the headland continuously ridged.
- Harvest headland peat every third crop, as per FS-PR-13 standard.
 - By Haku trailer where possible or,
 - Harvest to fields, disengage crossing drains and outfalls.
 - By utilising headland harvesters.
- Hydraulic Harrows where available, spoons will be lifted when travelling on a headland.
- Headland peat collection will be fully documented and recorded on PQMS form 023.
- Miller drums will be disengaged and lifted when approaching or travelling on a headland.
- Slow speeds should be maintained on a headland.
- Optimise routes to avoid dust sensitive areas.

This mitigation measure has been included for the protection of watercourses in the receiving environment, downstream connected European Sites (Middle Shannon Callows SPA / River Shannon Callows SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

Effectiveness of these measures

The Mitigation Measures (Project Design Measures, Management Plans, Environmental Emergency Response Measures and Best Practice Measures), listed above, have been developed by the hydrological/drainage and ecological expert members of the Decommissioning and Rehabilitation project team in Bord na Móna and use best practice water quality protection techniques which are tried and tested regularly across the country. Furthermore, a suitably qualified Environmental Supervisor will be employed during the construction stage to monitor the effectiveness of these measures on a daily basis. The Environmental Supervisor will be supported and assisted by members of the BnM Ecology Team as required.

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

Watercourse crossing works and aquatic habitat protection guidance

- Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries during construction works in and Adjacent to Waters;
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes; and,
- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.
- EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems

Pollution Prevention Guidance Notes (PPGs) & Guidance for Pollution Prevention (GPP)²

- PPG 1: Understanding your environmental responsibilities - good environmental practices
- GPP 2: Above ground oil storage tanks
- PPG 3: Use and design of oil separators in surface water drainage systems
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer
- GPP 5: Works and maintenance in or near water
- PPG 6: Working at construction and demolition sites
- PPG 7: Safe storage - The safe operation of refuelling facilities
- GPP 8: Safe storage and disposal of used oils
- GPP 8: Safe storage and disposal of used oils
- GPP 8: Safe storage and disposal of used oils
- GPP 19: Vehicles: Service and Repair
- GPP 21: Pollution incident response planning
- GPP 22: Dealing with spills
- GPP 26 Safe storage - drums and intermediate bulk containers
- PPG 27: Installation, decommissioning and removal of underground storage tanks

Construction Industry Research and Information Association (CIRIA)³

- CIRIA Report C502 Environmental Good Practice on Site;

²<https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/>

³ Available from <https://www.ciria.org/>

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

Invasive Species Guidance

- Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)⁴;
- NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2010)⁵;
- Managing Invasive Non-native Plants in or near Freshwater, Environment Agency (2010)⁶;
- Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*, Invasive Species Ireland (2015);
- IFI Biosecurity Protocol for Field Survey Work, Inland Fisheries Ireland (2010)⁷.

Guidance relating to Bird Disturbance

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

Guidance relating to Mammal Disturbance

- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts⁸.

⁴ <http://cfins.scrt.co.uk/wp-content/uploads/2014/06/2013-code-of-practice.pdf>

⁵ <https://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf>

⁶ <https://www.midsussex.gov.uk/media/1725/managing-invasive-non-native-plants.pdf>

⁷ <https://www.fisheriesireland.ie/Biosecurity/biosecurity-protocol-for-field-survey-work.html>

⁸ <https://www.gov.ie/en/publication/957aa7-consent-requirements-constructionalteration-of-watercourse-infrastru/>

- National Roads Authority. Guidelines for the treatment of Otters prior to the construction of National Road Schemes. <https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf>

Implementation of Mitigation Measures

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

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

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

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

Degree of confidence in the likely success of the mitigation measure

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

Monitoring of the Implementation and Effectiveness of the Mitigation Measures

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

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

- There will be **initial quarterly monitoring assessments** of the site to determine the general status of the site, the condition of the silt-ponds, assess the condition of the rehabilitation work, monitoring of any potential impacts on neighbour's land, general land security, boundary management, dumping and littering.

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

How any mitigation failure will be addressed

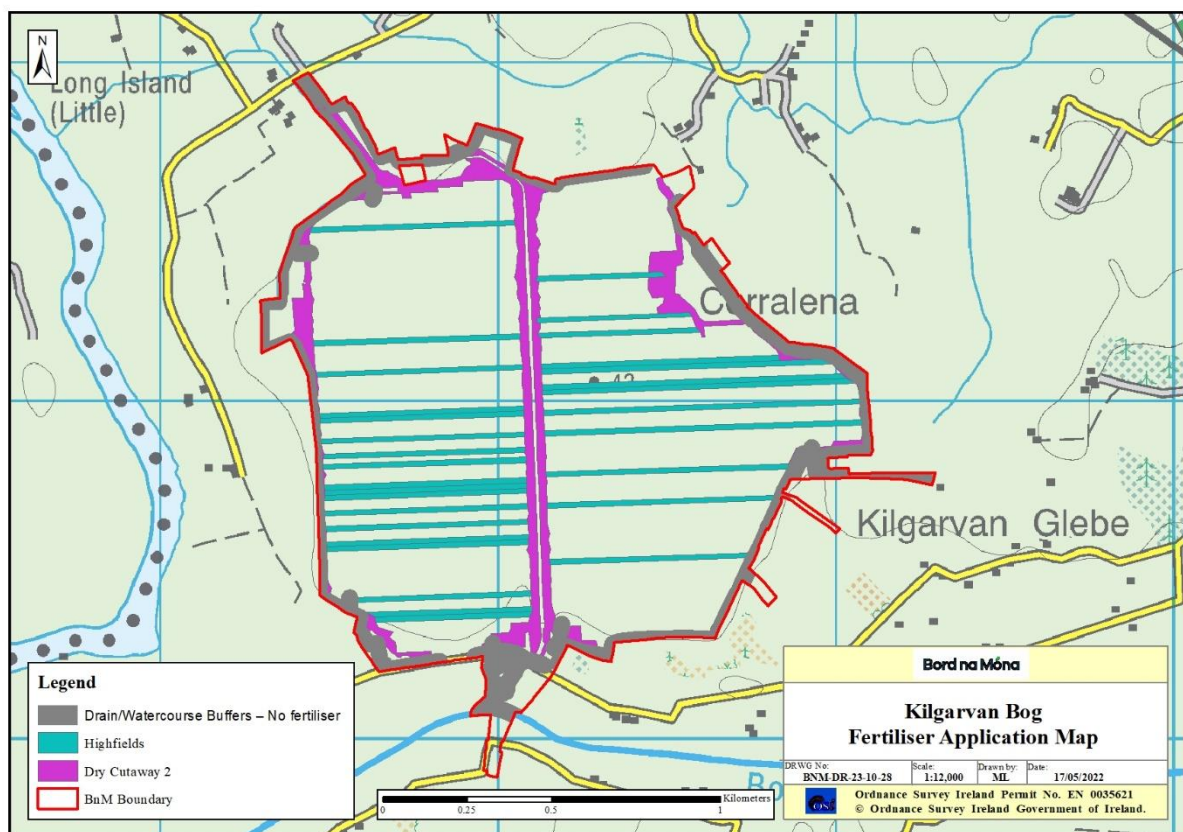
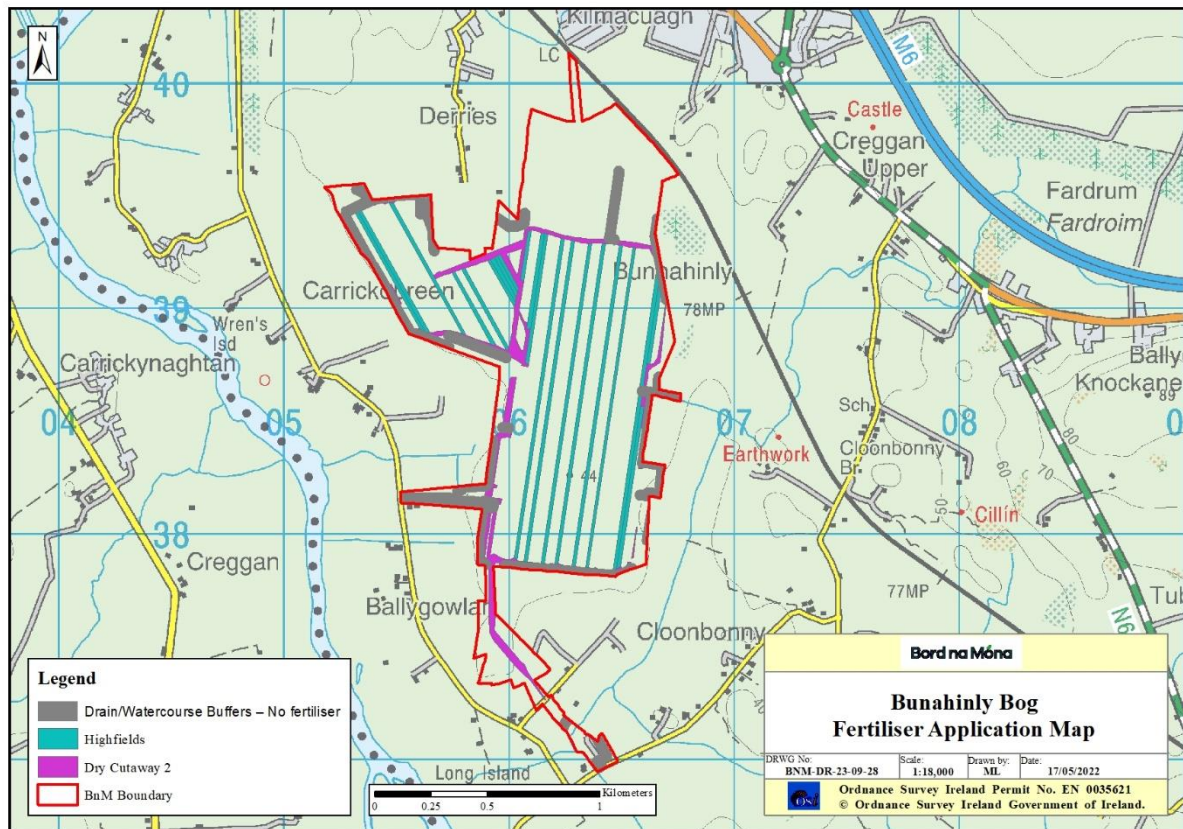
The Mitigation measures prepared specifically for this project have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and Best Practice. The Mitigation Measures are considered to be robust and proven measures which will avoid adverse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

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

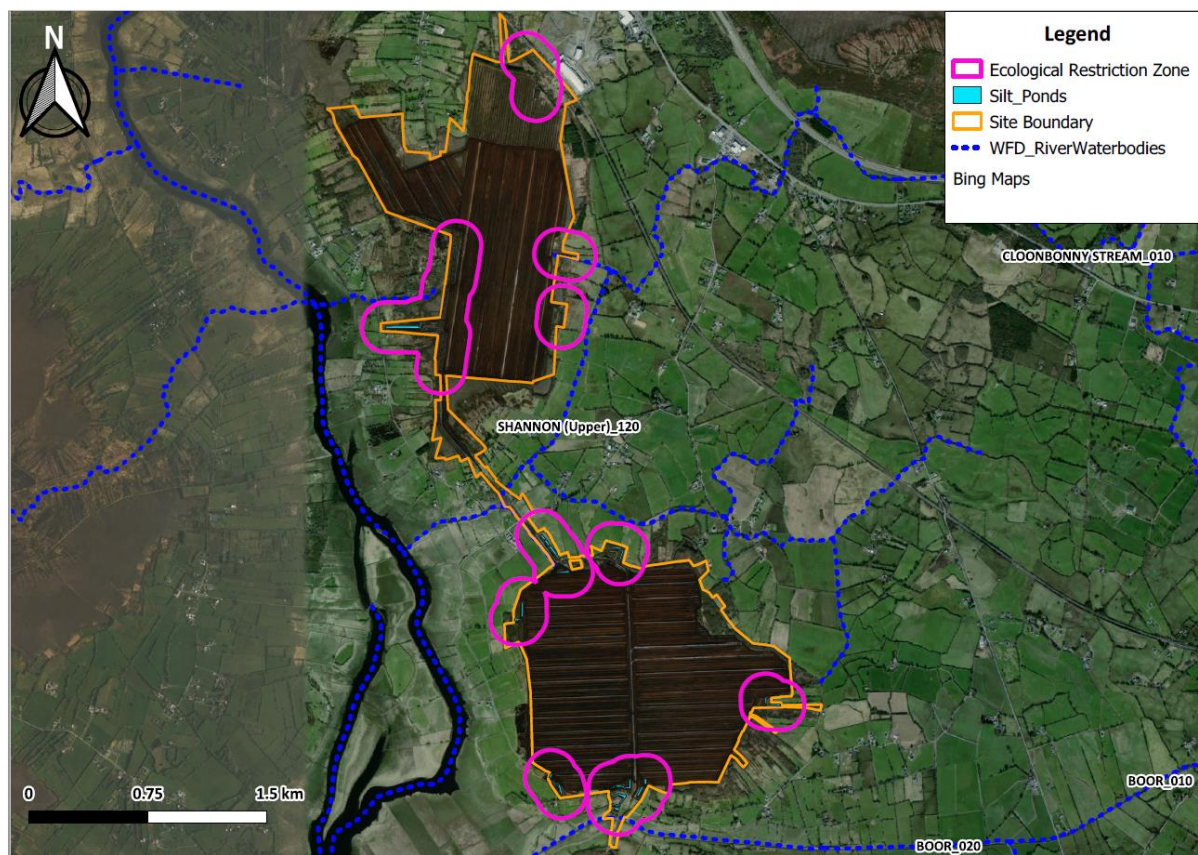
Nonetheless contingency measures will be in place for unforeseen events such as oil/fuel spillages, water pollution or any inadvertent release of sediment. This will ensure any unforeseen potentially adverse effects are identified in a timely manner and appropriate remedial action taken immediately. The Ecologist, Environmental Compliance Officer, Engineer, H & S Manager, Site Supervisor and PSCS

will have a 'stop-works' authority to temporarily stop works over part of the site to avoid an infringement of the Environmental Commitments or an unforeseen environmental event. Works will not be allowed to re-commence until the issue is resolved.


APPENDIX C – FERTILISER APPLICATION MAPS



APPENDIX D – WINTERING BIRDS ENVIRONMENTAL RESTRICTION ZONES



Appendix F Protection of Otter Standard Operating Procedures

	Procedure: ECO-001	Rev: 1
Title: Protection of Otter	Approved:	Date: 16/03/21

1) Purpose

To describe the environmental measures required to protect Otter across all Bord na Móna activities.

2) Scope

To avoid likely significant effects of disturbance, displacement or physical injury to Otter which occur or are likely to occur at any locations where Bord na Móna may be carrying out activities with the potential for effects.

The potential for negative effects will be avoided through adherence to Best Practice measures and the use of confirmatory surveys to establish any requirements such as derogations and/or restriction zones around confirmed breeding or resting sites as appropriate.

This Procedure should be read in association with any other pertinent procedures, in particular around vegetation clearance and working near water.

3) Related Documents

Bord na Mona Silt Pond Maintenance Procedure

Bord na Mona Silt Pond Inspection Procedure

National Roads Authority (2006). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. The National Roads Authority, Dublin.

National Roads Authority (2008.) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. The National Roads Authority, Dublin.


Highways Agency (1999). Design Manual for Roads and Bridges - Nature Conservation Advice in Relation to Otters HA81/99. The Highways Agency, London.

4) Procedure

Environmental Controls

1. Each project, scheduled activity or proposed works will liaise with the Bord na Móna ecology team who will approve and provide guidance on all on site activities which could have an ecological impact.
2. All staff will receive environmental training and/or an Environmental site induction/Toolbox talk before being allowed to work on a Bord na Móna bog.
3. Work will only be able to take place once the Bord na Móna ecology team has signed off on the installation of any required mitigation measures.
4. Adherence to any specified mitigation measures are to be subject to audit by the Bord na Móna ecology team and/or Site Supervisor/Environmental Officer or PSCS as appropriate.
5. Where non-compliance is detected, a system of follow up and corrective action will be implemented.

Preparation

 BORD NA MÓNA Naturally Driven	Procedure: ECO-001	Rev: 1
Title: Protection of Otter	Approved:	Date: 16/03/21

1. Confirmatory surveys will be carried out 150m upstream and downstream of suitable Otter habitat where relevant activities are programmed to occur. This will include silt ponds (cleaning and maintenance), channelized sections of watercourses and bog drainage channels with connectivity to suitable habitat. These confirmatory Otter surveys will be undertaken no more than 12 months in advance of proposed activities, during the period November and April when vegetation cover is reduced. For silt ponds surveys will include an area comprising the pond plus a 50m buffer.
2. Confirmatory surveys will be undertaken by a suitably qualified ecologist.
3. The results of surveys will be communicated to the site manager responsible for scheduling activities on a need to know basis.
4. Zones or locations containing confirmed breeding or resting locations (holts/couches) are to be delineated with signage at an appropriate distance (150m) to prevent disturbance.
5. In addition, any restriction zones are to be digitised and provided in shapefile format for upload to machine PDA's where this facility is available.
6. These Ecological Restriction Zones will be marked out at regular intervals using a combination of appropriate signage or visual markers as appropriate, prior to works or activities commencing during the identified sensitive period.
7. The above will be carried out by a suitably qualified Ecologist/ Bord na Móna ecology team.
8. Surveys results will be confirmed no less than 3 days prior to scheduled activities commencing.
9. If required any derogation applications will be made by the Bord na Móna ecology team/designated project manager.

Operator Training

1. All operators will receive a toolbox talk by a suitably qualified Ecologist/ Bord na Móna ecology team, to educate them on any relevant restrictions prior to the commencement of activities.
2. This will include any restricted areas, the requirement for same, the location of reference documentation such as the schedule of mitigation measures, and the procedure to follow if in doubt as to the locations of activities in respect of any restricted areas.
3. A copy or map illustrating the restriction zones's per bog, and periods wherein activities can be undertaken will be available at all times at the site office.
4. Where pertinent, a schedule of Mitigation Measures per bog will also be available at all times in the site office.

Responsibilities

1. The appointed site manager/PSCS as appropriate will be responsible for recording attendance at toolbox talks and making sure all operators have access to the required reference material, including drawings of restricted areas/ ERZ's.
2. The appointed site manager/PSCS as appropriate as will be responsible for the scheduling of activities
3. The appointed site manager/PSCS as appropriate must be aware of any other site specific mitigation around Otter
4. The Bord na Móna ecology team or Project Ecologist is responsible for conformance auditing

BORD NA MÓNA Naturally Driven	Procedure: ECO-001	Rev: 1
Title: Protection of Otter	Approved:	Date: 16/03/21

5. If a derogation is required, any activities under same will be overseen by the Bord na Móna ecology team or appointed Project Ecologist.
6. Local NPWS will be made aware of any derogated works/activities before commencement.

Carrying out Activities

1. No works or activities are to be carried out in restricted areas or identified ERZ's during the relevant period as specified by the project ecologist. No works will be carried out within 150m of an active holt.
2. NPWS will be notified of any confirmed active holts.
3. As per NRA (2006) guidelines, following consultation with NPWS, works or activities closer to such breeding holts may take place – provided appropriate mitigation measures are in place, e.g. screening and/or restricted working hours on site;
4. No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under licence (NRA, 2006);
5. Where holts are present in close proximity to invasive activities, but are determined not to require destruction, such activities may commence once recommended alternative mitigation measures to address otters have been complied with (NRA, 2006);
6. Only operators who have received the required training and toolbox talks are to be assigned duties within the above period.
7. Conformance will be audited through compliance checks by the Bord na Móna ecology team /Project Ecologist with 'stop-works' authority.
8. Activities will only be carried out between 08.00 and 17.30 to minimise the potential for disturbance.

5) Records

Evidence of approval (electronic)
Archive files

Revision Index			
Revision	Date	Description of change	Approved

