



Delichon Ecology

Cutaway Bog Decommissioning and Rehabilitation Plan

Natura Impact Statement

Clonad Bog, Co. Offaly

Prepared For:



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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 Allen Bog Group (Ref. P0503-01). 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. Clonad bog is part of the Allen Bog Group (see Appendix II for details of the bog areas within the Allen Bog Group). Clonad Bog is located in Co. Offaly.

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme (PCAS) on peatlands previously used for energy production. Note this proposal is also known colloquially as the 'Peatlands Climate Action Scheme'. The additional costs of the proposed Scheme will be supported by Government through the Climate Action Fund, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator.

Bord na Móna have identified a footprint of 33,000 ha as peatlands suitable for enhanced rehabilitation. This proposed Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations (Appendix VII & IX) under existing EPA IPC licence conditions. Interventions supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. However, it is important for all stakeholders to understand that only the costs associated with the additional, enhanced and accelerated rehabilitation, i.e. those measures which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10, will be eligible for support under the proposed Scheme. Bord na Móna have now announced the complete cessation of industrial peat production across its estate (January 2021).

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

It is envisaged that the PCAS will support activities, 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 pump management, 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, which will develop other habitats. Other areas will naturally have deeper water). 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.

Clonad Bog is proposed to be part of this this proposed Scheme (PCAS) and this rehabilitation plan outlines the approach 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 the Public Authority/the “Minister” 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.

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

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

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

1.1 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 and Natura Impact Statement. 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.

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**.

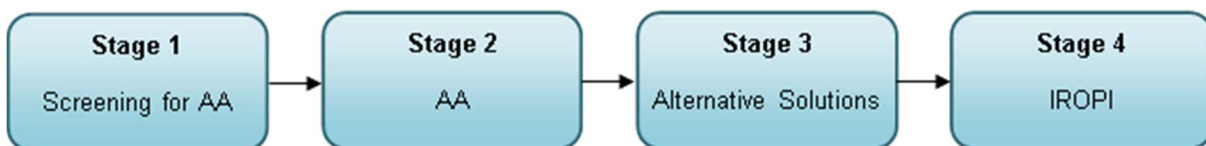


Image 1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DEHLG, 2009).

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.

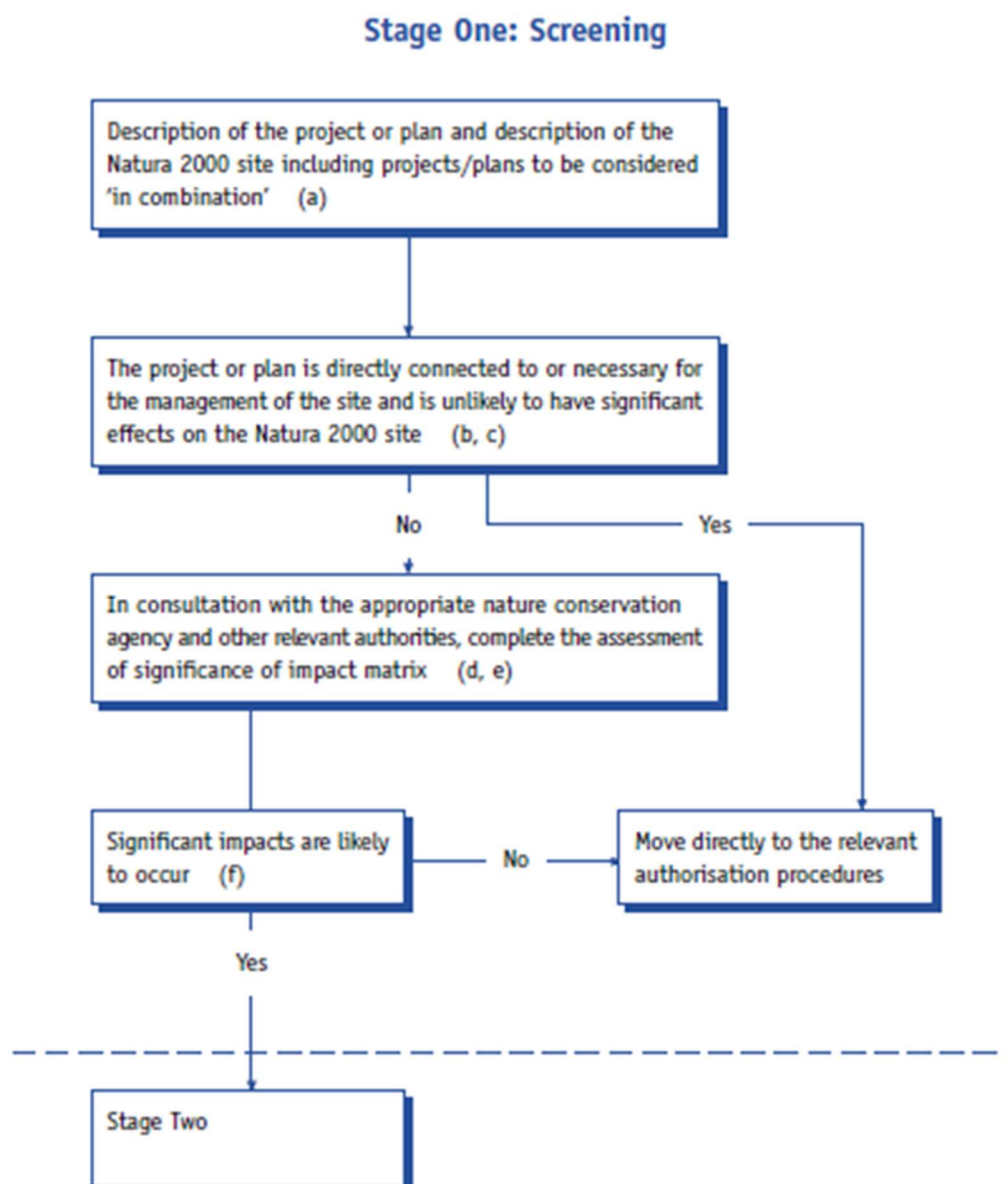
1.1.2 Statement of Authority

Eamonn Delaney BSc, MSc, MCIEEM, CECOL prepared this Natura Impact Statement. Eamonn has fourteen 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 Clonad site in January 2020 and April 2021.

2 Stage 1: Screening

2.1 Screening Evaluation Process

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



2.1.1 Application of Protective Measures in the Screening Evaluation

The Screening evaluation to inform the AA process, presented in **Section 2.10** below, has been carried out in the absence of any best practice measures, protective measures or mitigation measures considered to avoid harmful effects on European Sites.

2.2 Overview of Clonad Bog Decommissioning and Rehabilitation

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Allen bog group (Ref. PO503-01). As part of Conditions 10.1 and 10.2 of this license, respectively, decommissioning and rehabilitation must be undertaken to ensure the permanent rehabilitation of the cutaway bog lands within the licensed area. Clonad bog is part of the Allen bog group. Clonad Bog is located between Daingean and Geashill in Co. Offaly.

A document titled 'Clonad Bog Cutaway Bog Decommissioning and Rehabilitation 2021' has been prepared specifically to describe the proposed decommissioning and rehabilitation measures at Clonad 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 Clonad 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. PO503-01, 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. PO503-01, 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. PO503-01:

"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."

Clonad Bog has been in active peat production since the 1970s. Industrial peat production ceased in 2019. The primary rehabilitation goal and outcome for Clonad 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 Clonad 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

Clonad Bog is located in Co. Offaly, approximately 2km south of Daingean and c.2.5km north of Geashill (See **Figure 1**). Clonad Bog is comprised of two lobes; the larger area in the west that is dominated by bare peat and a smaller lobe in the east including; areas of former production bog, cutover bog used for domestic turf cutting and an area of degraded high bog. The surrounding landscape is dominated by a mosaic of farmland, largely consisting of improved grassland, and other bogs, many owned and managed by Bord na Móna.

The watershed between the Lower Shannon catchment and the Barrow catchment runs through the south-west corner of the Clonad Bog. However, most of the gravity drainage system for Clonad Bog takes water in an easterly direction towards the Philipstown River which flows either side of the eastern part of the bog and is within the Barrow catchment.

The eastern side of Clonad Bog is immediately adjacent to Mount Lucas Bog, with a local road forming the common boundary of these two Bord na Móna properties. Clonad Bog is also connected via a Bord na Móna rail link to Daingean Townparks (Daingean Bog NHA) to the west and Mountlucas Bog to the east..

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

Figure 2: Aerial Imagery of Clonad Bog (over).

Figure 3: Current habitats at Clonad Bog (over).

2.4.1.2 Size, Scale, Landcover

Size and Scale: Clonad Bog comprises 447.5 Ha in total.

Clonad Bog was in industrial (milled) peat production since the early 1970s, with the peat used as fuel peat in Edenderry Power. Industrial peat extraction completely ceased at Clonad Bog in 2019.

There is a large area in the north-east part of Clonad Bog that was not developed for peat production and is used for private sod turf cutting. Private sod-peat cutting is being carried out in the north-west part of the site as well, along a narrow band of remnant high bog. There is also some sod-peat production in SW part of the site.

Industrial peat production has now completely ceased at Clonad Bog. Private sod turf cutting is being carried out in the north-east part of the site, the north-west part of the site (along a narrow band of remnant high bog) and there is also turf-cutting in SW part of the site. There is a small length of bog railway and some other infrastructure on this site.

Future land-use at Clonad has not been defined by Bord na Móna. The proposed Irish Water pipe-line, which will connect Lough Derg to Dublin, is proposed to cross part of Clonad Bog. This project is in its pre-planning stage.

The majority of Clonad Bog is underlain by a dark limestone and shale bedrock. However, there is a small area in the south-east corner that is underlain by oolitic limestones with a thin extrusion of thick-bedded limestone between the other two bedrocks. The underlying soils and sub-soils are classed as 'Raised Bog Cutover Peat'. Clonad Bog has a variable topography and there are glacial ridges and mounds underlying the peat that are visible in the overlying peat. The peat soils are likely to be underlain with limestone tills, as these sub-soils are exposed around the margins of the site. Clonad Bog was in industrial peat production since the early 1970s. The main exposed peat type at Clonad Bog is black fen peat. Where the peat depths are greater, towards the southwest corner of the site, some of the peat is redder and may be somewhat more acidic or younger. Within the production footprint of Clonad Bog, the majority of the remnant peat is shallow,

with less than 1m of peat remaining and much of the eastern production area would be considered to be cutaway. However, deeper peats remain in the south-west corner of the site, where peat depths may exceed 2.5m

The peat was formerly used as fuel peat in Edenderry Power. Industrial peat extraction completely ceased at Clonad Bog in 2019.

In terms of size and scale, **decommissioning** at Clonad 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; and
- Decommissioning or Removal of Septic Tanks.

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

The total area of Clonad Bog is 447.5Ha; 75.3% of the present Landcover (2021) will be subject to **rehabilitation** measures/activities.

Landcover

Existing:

There is an undeveloped section of raised bog (PB1) and associated habitats in the north-east part of the site. This section is being actively cut for sod-turf and has been degraded, although it still retains some features of interest (See **Figure 4**). The high bog contains typical raised bog characteristics (that qualifies as the Annex I EU Habitats Directive habitat – ‘degraded raised bogs still capable of regeneration’), although it is a poor example, and has been degraded by recent burning. The proposed rehabilitation works will not contribute to further degradation of this Annex I habitat.

The majority of the bog is only recently out of production and therefore has no significant features of biodiversity interest. There is some typical cutaway developing towards the centre of the site, which is dominated by Birch scrub. There are some remnant and secondary habitats of some interest around the margins including scrub, some fragments of high bog and Birch woodland.

A habitat map of Clonad Bog is shown in **Figure 3**.

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

Extent of Landcover requiring Rehabilitation: The total area of Clonad Bog is 447.3Ha; 75.3% of the present Landcover (2021) will be subject to **rehabilitation** measures/activities.

Future Landcover: Following decommissioning and rehab, future landcover of habitats currently evaluated as not requiring Rehab (i.e. Access Tracks and rights of way, marginal lands such as agricultural land, and marginal areas (e.g. high bog) around the edges of Clonad 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 Scrub, Bog Woodland (or various mosaics of Birch Woodland, such as with Willow, or Pine); Regenerating Degraded Raised bog communities; Wetland habitats and communities of varying depths and extent; Poor fen, Oak-ash-hazel Woodland; Raised Bog; Riparian areas and also riparian woodland. 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).

Enhanced rehabilitation measures will look to optimise hydrological conditions for re-wetting peat in other areas. This planning is also essential for matching the most sustainable rehabilitation methodology to the

most suitable cutaway environment to maximise the benefits of the resource outlay (maximising cost/benefit).

The rehabilitation actions will be a combination of PCAS measures to re-wet peat. (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 Clonad Bog will include:

- Re-wetting the deep peat areas of the bog using berms and field re-profiling. This enhanced measure seeks to create large (c. 45m x 60m) flat areas or cells of shallow (< 10 cm) water conditions on bare peat, across multiple fields that are enclosed by shallow berms to retain shallow surface water;
- Inoculation of *Sphagnum* on compatible residual deep peat areas;
- Re-wetting some deep peat areas of the bog through regular field drain blocking using a dozer to create three peat blockages every 100 m along each field drain;
- Re-wetting some deep peat areas of the bog through more intensive field drain blocking using a dozer to create seven peat blockages every 100 m along each field drain;
- Management of water levels with overflow pipes;
- Re-alignment of piped drainage;
- The construction of berms to create wetlands;
- Intensive drain blocking to create wetlands, and the introduction of Reeds and other Rhizomes;
- Optimising water retention in wetland areas, including placement of berms where required;
- Targeted fertiliser applications on bare peat areas to accelerate vegetation establishment on headlands and high fields. (It is noted that the application of fertiliser may need additional assessment and approval as per the IPC Licence),
- Regular drain blocking (3/100) on dry cutaway adjacent to wetland mosaics, along with the blocking of outfalls and management of water levels;
- Silt ponds will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase silt ponds will be continually inspected and maintained, where appropriate. When it is deemed that silt ponds are not required, as the bog has been successfully stabilised and there is no silt run-off, the condition of the silt ponds will be reviewed. Silt ponds will either be de-watered (water levels lowered to a level where the silt pond will naturally develop as a small wetland feature), left in situ, or infilled (where discharges do not require silt control).

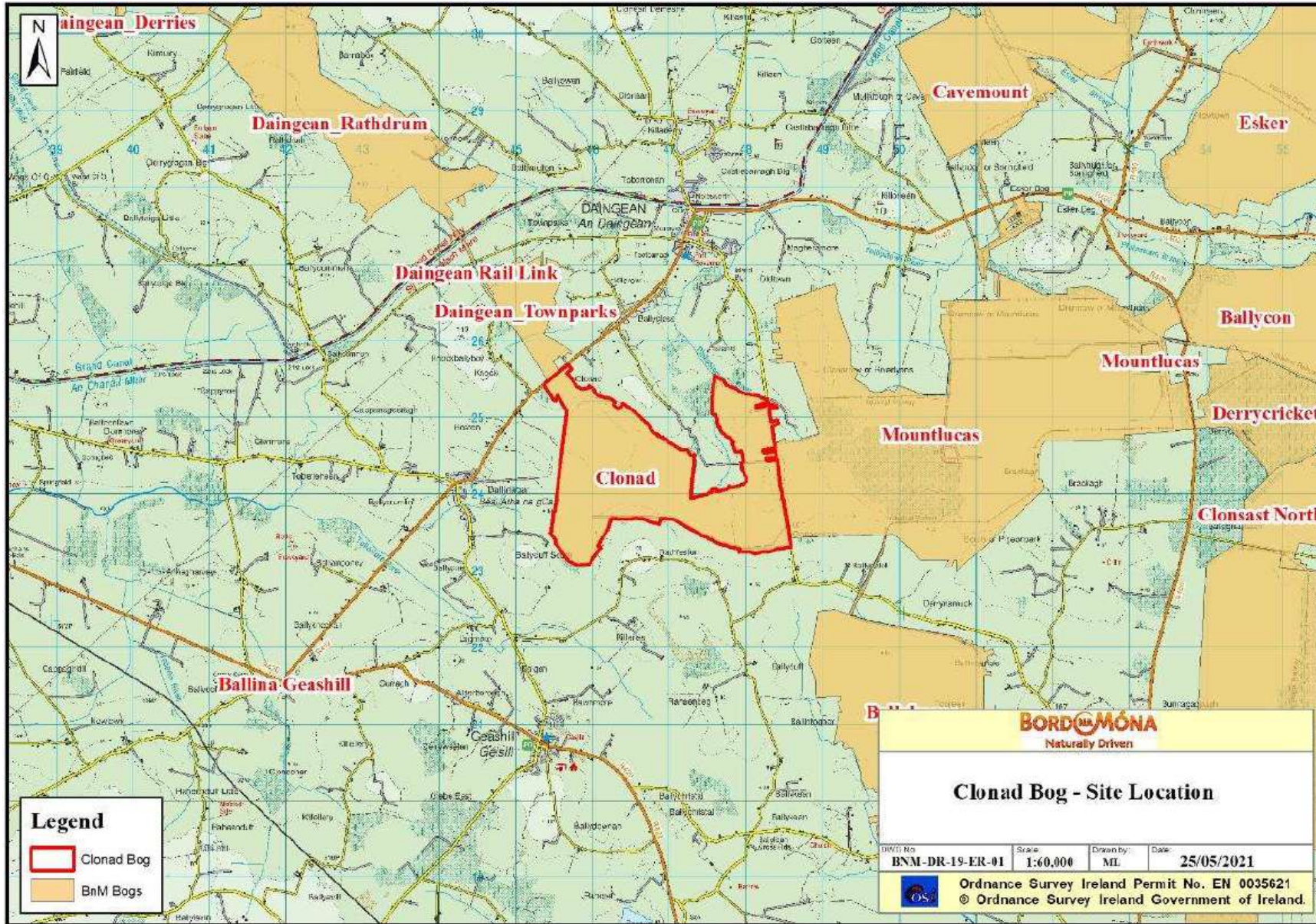


Figure 1: Site Location of Clonad Bog

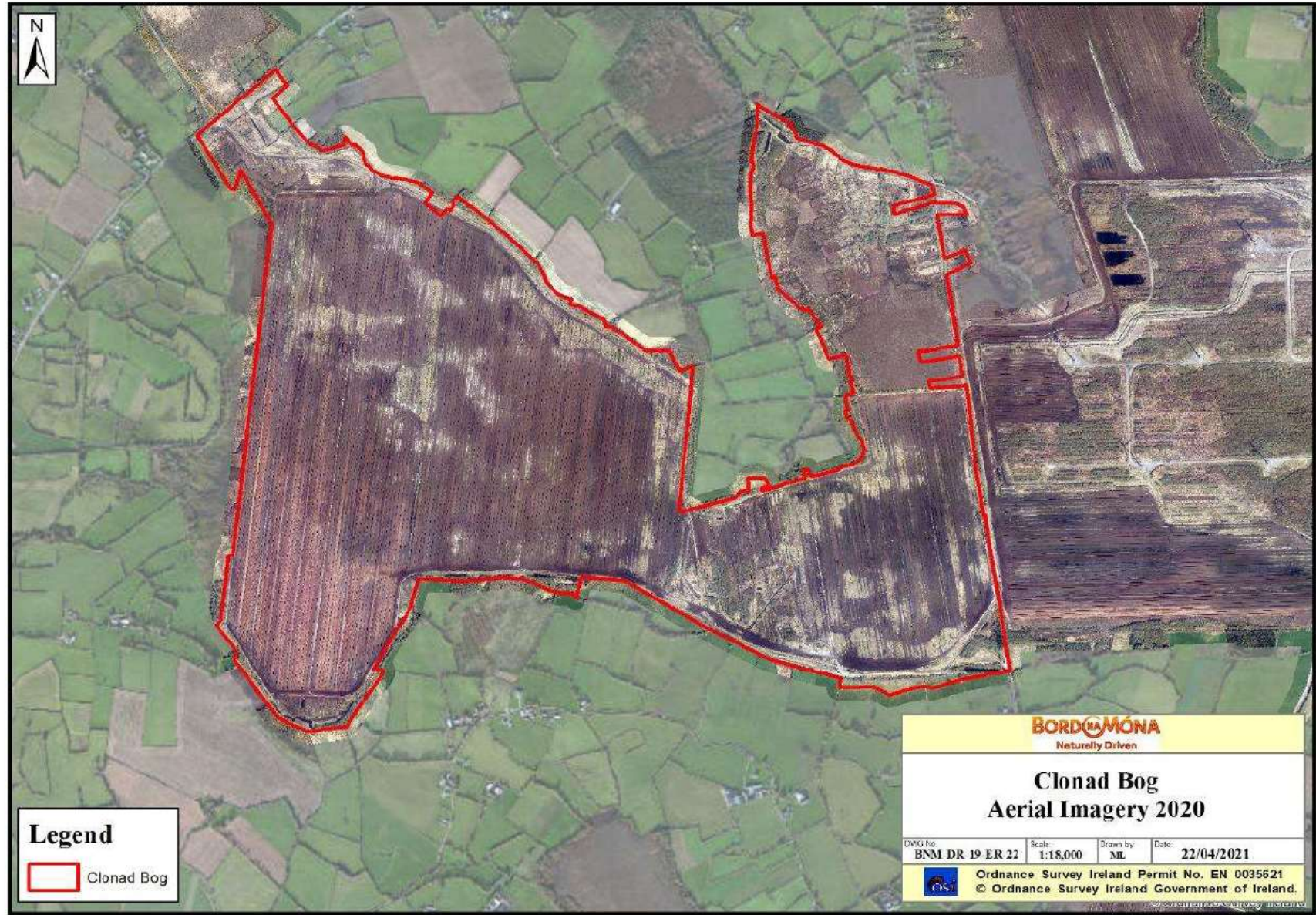


Figure 2: Aerial photo of Clonad Bog

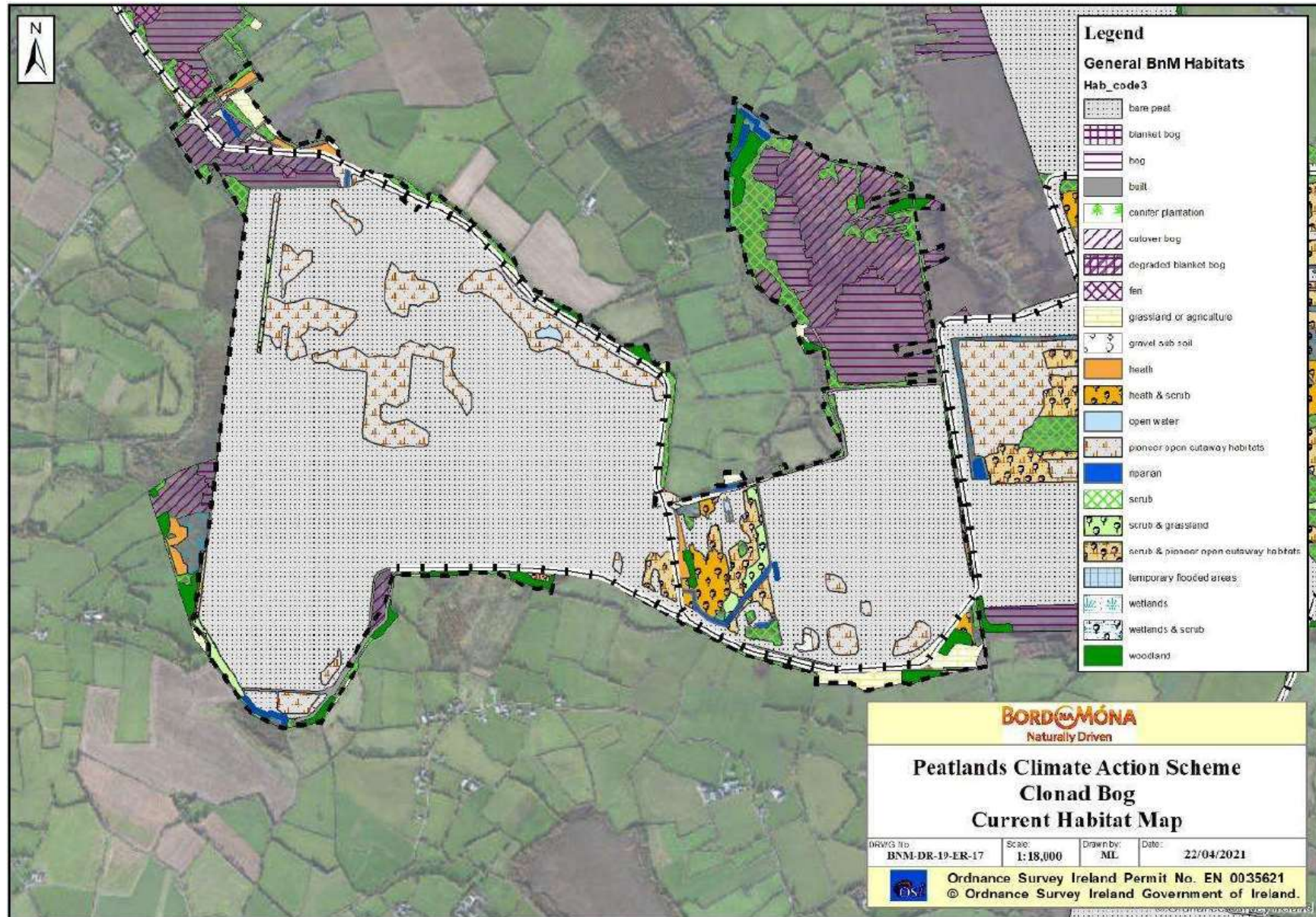


Figure 3: Current Habitats at Clonad Bog

2.5 Description of Receiving Environment

The majority of Clonad Bog within the Bord na Móna boundary is bare peat as this site was in production until 2019 (see Image 1 and Image 2). The watershed between the Lower Shannon catchment and the Barrow catchment runs through the south-west corner of the Clonad Bog. However, most of the gravity drainage system for Clonad Bog takes water in an easterly direction towards the Philipstown River (or its tributaries) which is within the Barrow catchment. There is a small part of Clonad Bog that is drains into the Lower Shannon catchment with a drainage outflow, through a silt pond, at the very south-east corner of the bog.

2.5.1 Desk Based Assessment

2.5.1.1 National Biodiversity Data Centre – Data Request

A search was undertaken on the National Biodiversity Data Centre¹ for Protected and Invasive Species presence in the vicinity of the proposed development. Clonad Bog is located within hectad N42². The protected and invasive species records available for these hectads are shown in **Table 1**.

Table 1: NBDC records of protected and invasive species in N42 10km grid square (hectad)

Common Name (Species Name)	Date of Record	Designation
Common Frog (<i>Rana temporaria</i>)	01/06/2019	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
Smooth Newt (<i>Lissotriton vulgaris</i>)	31/03/2020	Protected Species: Wildlife Acts
Barn Owl (<i>Tyto alba</i>)	31/07/1972	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>)	30/06/2012	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>)	31/07/1991	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Common Grasshopper Warbler (<i>Locustella naevia</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern

¹ Available at <https://www.biodiversityireland.ie/>. Accessed in May 2021

² 10x10km Irish Grid Square

Common Name (Species Name)	Date of Record	Designation
		Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Kestrel (<i>Falco tinnunculus</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 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 Snipe (<i>Gallinago gallinago</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 - Amber List
Common Starling (<i>Sturnus vulgaris</i>)	28/11/2017	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>)	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 Wood Pigeon (<i>Columba palumbus</i>)	30/06/2012	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU

Common Name (Species Name)	Date of Record	Designation
		Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
Corn Crake (<i>Crex crex</i>)	31/07/1972	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
Eurasian Curlew (<i>Numenius arquata</i>)	31/12/2011	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
Eurasian Teal (<i>Anas crecca</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
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 Woodcock (<i>Scolopax rusticola</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 - Amber List
European Golden Plover (<i>Pluvialis apricaria</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

Common Name	Name (Species)	Date of Record	Designation
			Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
	Grey Partridge (<i>Perdix perdix</i>)	31/07/1972	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
	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>)	30/11/2017	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
	Lesser Black-backed Gull (<i>Larus fuscus</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
	Mallard (<i>Anas platyrhynchos</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
	Mute Swan (<i>Cygnus olor</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
	Northern Lapwing (<i>Vanellus vanellus</i>)	31/12/2011	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

Common Name (Species)	Date of Record	Designation
		Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Northern Wheatear (<i>Oenanthe oenanthe</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
Rock Pigeon (<i>Columba livia</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
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>)	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
Spotted Flycatcher (<i>Muscicapa striata</i>)	25/05/2017	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>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Whooper Swan (<i>Cygnus cygnus</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
Yellowhammer (<i>Emberiza citrinella</i>)	30/06/2012	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Freshwater White-clawed Crayfish (<i>Austropotamobius pallipes</i>)	08/09/2015	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex II

Common Name (Species)	Date of Record	Designation
		Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
Alder Buckthorn (<i>Frangula alnus</i>)	30/03/2019	Threatened Species: Vulnerable
Blue Fleabane (<i>Erigeron acer</i>)	22/09/2011	Threatened Species: Endangered
Dropwort (<i>Filipendula vulgaris</i>)	30/05/2019	Threatened Species: Vulnerable
Dingy Skipper (<i>Erynnis tages</i>)	08/05/2020	Threatened Species: Near threatened
Large Heath (<i>Coenonympha tullia</i>)	07/06/2020	Threatened Species: Vulnerable
Marsh Fritillary (<i>Euphydryas aurinia</i>)	27/05/2020	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex II Threatened Species: Vulnerable
Small Heath (<i>Coenonympha pamphilus</i>)	01/06/2020	Threatened Species: Near threatened
Wall (<i>Lasiommata megera</i>)	09/05/2020	Threatened Species: Endangered
Scarce Blue-tailed Damselfly (<i>Ischnura pumilio</i>)	01/06/2020	Threatened Species: Vulnerable
Large Red Tailed Bumble Bee (<i>Bombus (Melanobombus) lapidarius</i>)	07/08/2020	Threatened Species: Near threatened
Moss Carder-bee (<i>Bombus (Thoracomus) muscorum</i>)	13/07/2018	Threatened Species: Near threatened
Blind Snail (<i>Cecilioides (Cecilioides) acicula</i>)	16/09/1977	Threatened Species: Vulnerable
Heath Snail (<i>Helicella itala</i>)	16/09/1977	Threatened Species: Vulnerable
Moss Bladder Snail (<i>Aplexa hypnorum</i>)	24/03/2003	Threatened Species: Vulnerable
Swan Mussel (<i>Anodonta (Anodonta) cygnea</i>)	16/09/1977	Threatened Species: Vulnerable
Ceruous Thread-moss (<i>Bryum uliginosum</i>)	31/12/1915	Protected Species: Flora Protection Order Protected Species: Flora Protection Order >> Flora Protection Order 2015 Schedule B (Mosses) Threatened Species: Endangered

Common Name (Species Name)	Date of Record	Designation
Common Extinguisher-moss (<i>Encalypta vulgaris</i>)	31/12/1915	Threatened Species: Near threatened
Large White-moss (<i>Leucobryum glaucum</i>)	18/12/2012	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Threatened Species: Least concern
Upright Brown Grimmia (<i>Schistidium strictum</i>)	31/12/1907	Threatened Species: Near threatened
Brown Long-eared Bat (<i>Plecotus auritus</i>)	08/08/1999	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Daubenton's Bat (<i>Myotis daubentonii</i>)	28/08/2014	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Eurasian Badger (<i>Meles meles</i>)	30/01/2015	Protected Species: Wildlife Acts
Eurasian Pygmy Shrew (<i>Sorex minutus</i>)	25/08/2018	Protected Species: Wildlife Acts
Eurasian Red Squirrel (<i>Sciurus vulgaris</i>)	31/12/2018	Protected Species: Wildlife Acts
European Otter (<i>Lutra lutra</i>)	24/03/2015	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex II Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Lesser Noctule (<i>Nyctalus leisleri</i>)	25/04/2009	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Pine Marten (<i>Martes martes</i>)	10/07/2017	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
Pipistrelle (<i>Pipistrellus pipistrellus sensu lato</i>)	25/04/2009	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	30/09/2013	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
West European Hedgehog (<i>Erinaceus europaeus</i>)	24/04/2016	Protected Species: Wildlife Acts

2.5.1.2 National Parks and Wildlife Service Data Request

Table 2 presents protected species records held for hectad N42 by the National Parks and Wildlife Service.

Table 2: NPWS records of protected and invasive species in N42 10km grid squares (hectads)

Common Name	Species Name	Record Date	Location(s)	Hectad
White-clawed Crayfish	<i>Autropotamobius pallipes</i>	1984, 2006, 2009, 2010	Brosna, Tullamore	N42
<i>Cladonia arbuscula s. str.</i>	<i>Cladonia arbuscula s. str.</i>	1983	Barnaboy Bog	N42
Reindeer Moss	<i>Cladonia portentosa</i>	1983	Barnaboy Bog	N42
Irish Hare	<i>Lepus timidus subsp. hibernicus</i>	1990	Ballycollin, Killeigh	N42
Otter	<i>Lutra lutra</i>	1980 & 2010	Stream near Barnabiy, Stream near Ballycollin, Grand Canal west of Daingean, Philipstown River south of Daingean, Stream near Ballymooney House	N42
Eurasian Badger	<i>Meles meles</i>	1990	Ballycollin, Killeigh	N42
Green-winged Orchid	<i>Anacamptis morio</i>	1900 & 1991	Ballychristal, Geashill, Co. Offaly	N42
Common Frog	<i>Rana temporaria</i>	1997	Daingean	N42
Sphagnum denticulatum	<i>Sphagnum denticulatum</i>	1983	Barnaboy Bog	N42

2.5.1.3 Baseline Water Quality Data for Clonad Bog

Table 3 below provides baseline water quality data captured by Bord na Mona following sampling and monitoring efforts between November 2020 and May 2021. The results of these sampling events displays that suspended solids and ammonia levels are in compliance with IPC licence targets. Target water quality parameters and constraints for ammonia and phosphorus are not identified for water dependent or nutrient sensitive features of Qualifying Interest in the accompanying Site Specific Conservation Objectives for the River Barrow and River Nore SAC, located downstream but supporting remote and tenuous connectivity to the Clonad Bog site.

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

Table 3: Baseline water quality information for Clonad Bog

Emission Point	IPC Licence ELV	River Barrow and River Nore SAC Target SSCO parameter ³	01/11/2020	01/12/2020	01/01/2021	01/02/2021	01/03/2021	01/04/2021	01/05/2021
Suspended solids (mg/l)									
SW24	35	n/a	2	2	2	2	3	2	7
Ammonia (mg/l)									
SW24	4.530	n/a	0.44	0.462	0.358	0.297	0.288	0.193	0.088
Total Phosphorous (mg/l)									
SW24	n/a	n/a	7.7	7.8	7.8	7.9	7.9	8	8.2

³ Target water quality parameters for nutrients such as ammonia and phosphorus are not provided for water dependent or nutrient sensitive features of Qualifying Interest in the accompanying Site Specific Conservation Objectives for the River Barrow and River Nore SAC.

Clonad Bog Water Quality Management

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

Clonad bog has 3 treated surface water outlets, 2 to the Daingean IE_SE_14D060200 and 1 south to the Tullamore River IE_SH_25T030100. Peat extraction was identified as a pressure in both rivers in the second cycle of the river basin management plan and is indicated as remaining so in the third cycle, currently under preparation.

Details of silt ponds, associated surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed in the below water quality map (**Figure 4**).

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 3.00mg/l and COD 100mg/l.

Initial monthly ammonia concentrations from November to May 2021 have a range of 0.08 to 0.36mg/l with an average of 0.303mg/l.

From an analysis of any available monitoring over the past 5 yrs. of the IPC licence environmental monitoring programme, indicate that results were under the ELV for SS and the trigger level for Ammonia, and within the trigger level for COD.

Bog	SW	Monitoring	Sample Date	pH	SS	TS	Ammonia	TP	COD	Colour
Clonad	SW-12	Q3 19	29/07/2019	7.8	5	382	0.88	0.07	51	87
Clonad	SW-12A	Q3 19	29/07/2019	8.1	5	322	0.05	0.05	41	83
Clonad	SW-13	Q3 19	29/07/2019	7.7	5	274	0.6	0.07	49	114
Clonad	SW-12	Q1 18	21/03/2018	7.4	5	230	0.54	0.08	69	163
Clonad	SW-12A	Q1 18	21/03/2018	7.8	5	330	0.85	0.05	37	66
Clonad	SW-13	Q1 18	21/03/2018	7.3	5	174	1	0.05	40	88
Clonad	SW-13	Q2 16	12/05/2016	7.9	5	248	1.3	0.05	43	114
Clonad	SW-12A	Q2 16	12/05/2016	7.9	20	324	0.7	0.05	44	66
Clonad	SW-12	Q4 16	13/10/2016	8	6	348	0.29	0.05	57	37

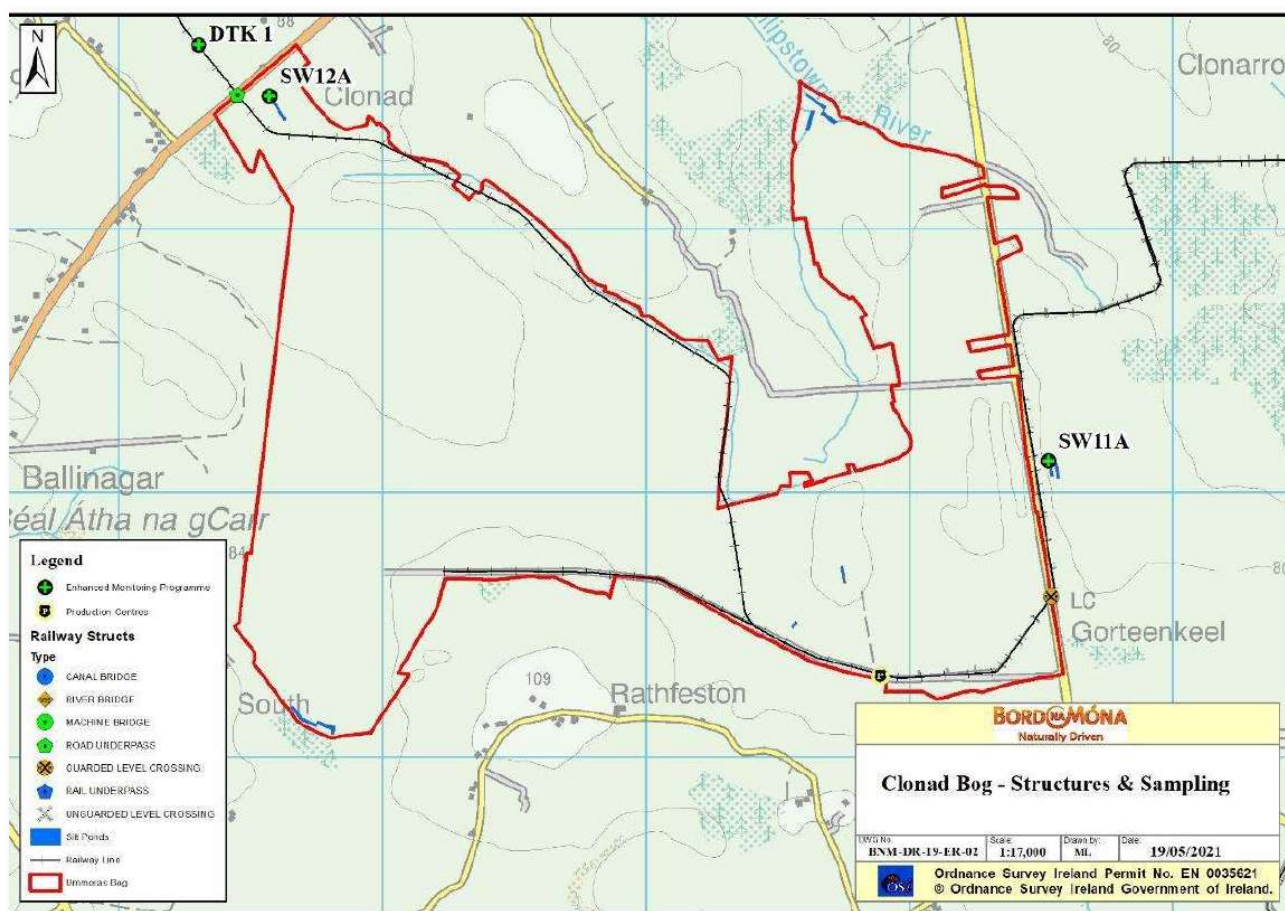


Figure 4 – Map of Clonad Bog showing structures and designated emission points.

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 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 Clonad Bog has been completed.

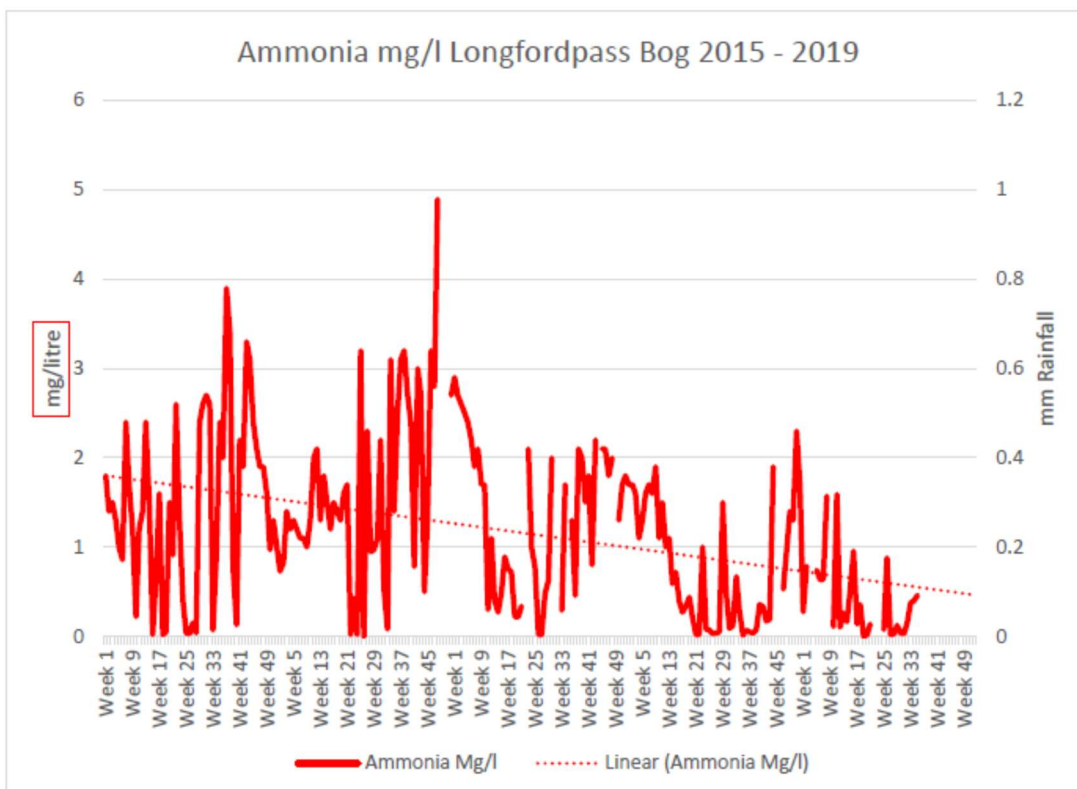
This discharge will have improving water quality and there will be increased wetland attenuation, meaning slower release of water. This is expected to have a positive impact on status of downstream watercourses.

It is expected that following the implementation of the PCAS at Clonad 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 and Graph 2 below shows the downward trend for ammonia at Longfordpass Bog and Corlea Bog respectively.

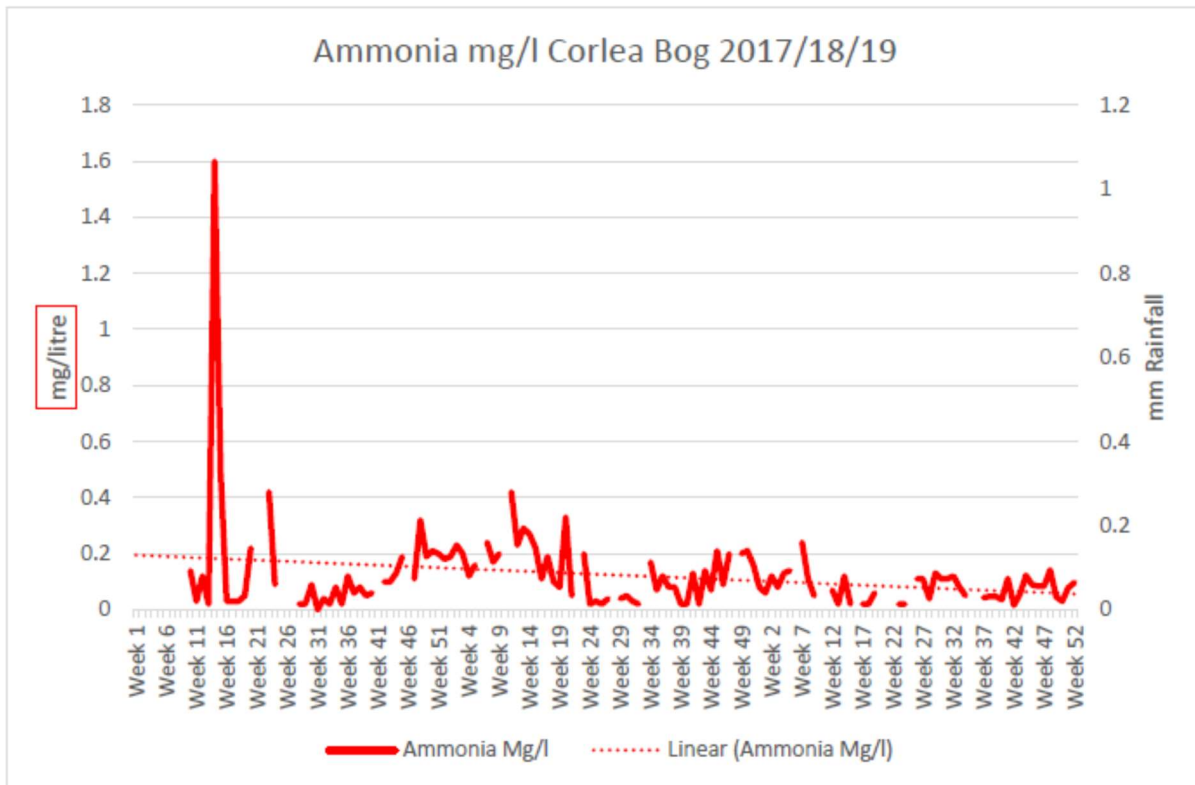
Graph 3 shows a consistent low level of TP recorded for Corlea Bog. The laboratory detection limit for TP is 0.05mg/l and Graph 2 shows that concentrations for TP are below the laboratory limits of detection, indicating very low levels. Similarly, the laboratory detection limits for SS was 5ml/l up until 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 the receiving and downstream environment. It is also reasonable to predict a downward trend for SS and TP as the rehabilitation measures become established.

It is further noted that the concentrations of TP, SS and ammonia reported in the above table are from onsite sampling ponds which discharge into the receiving watercourses; i.e. the Daingean_010 and more remotely the Tullamore_020. River waterbody risk status in the receiving Daingean_010 watercourse is classified as At Risk on the EPA mapviewer⁴ while the downstream areas of the Figile_040 are also classified as At Risk. Q values for the Daingean watercourse at the nearest downstream sampling point (Daingean_Island Bridge) is evaluated as Q3, indicating Poor Water Quality Status. Q values for the Daingean watercourse at the nearest downstream sampling point (Daingean_Island Bridge) are evaluated as Q3, indicating Poor Water Quality Status while those on the nearest downstream sampling point on the Tullamore_020 watercourse (bridge south of Cappincur) are also evaluated as Q3, again indicating Poor Water Quality. Nonetheless, the waters discharging from silt ponds at Clonad are diluted within the receiving watercourses and their downstream sections.

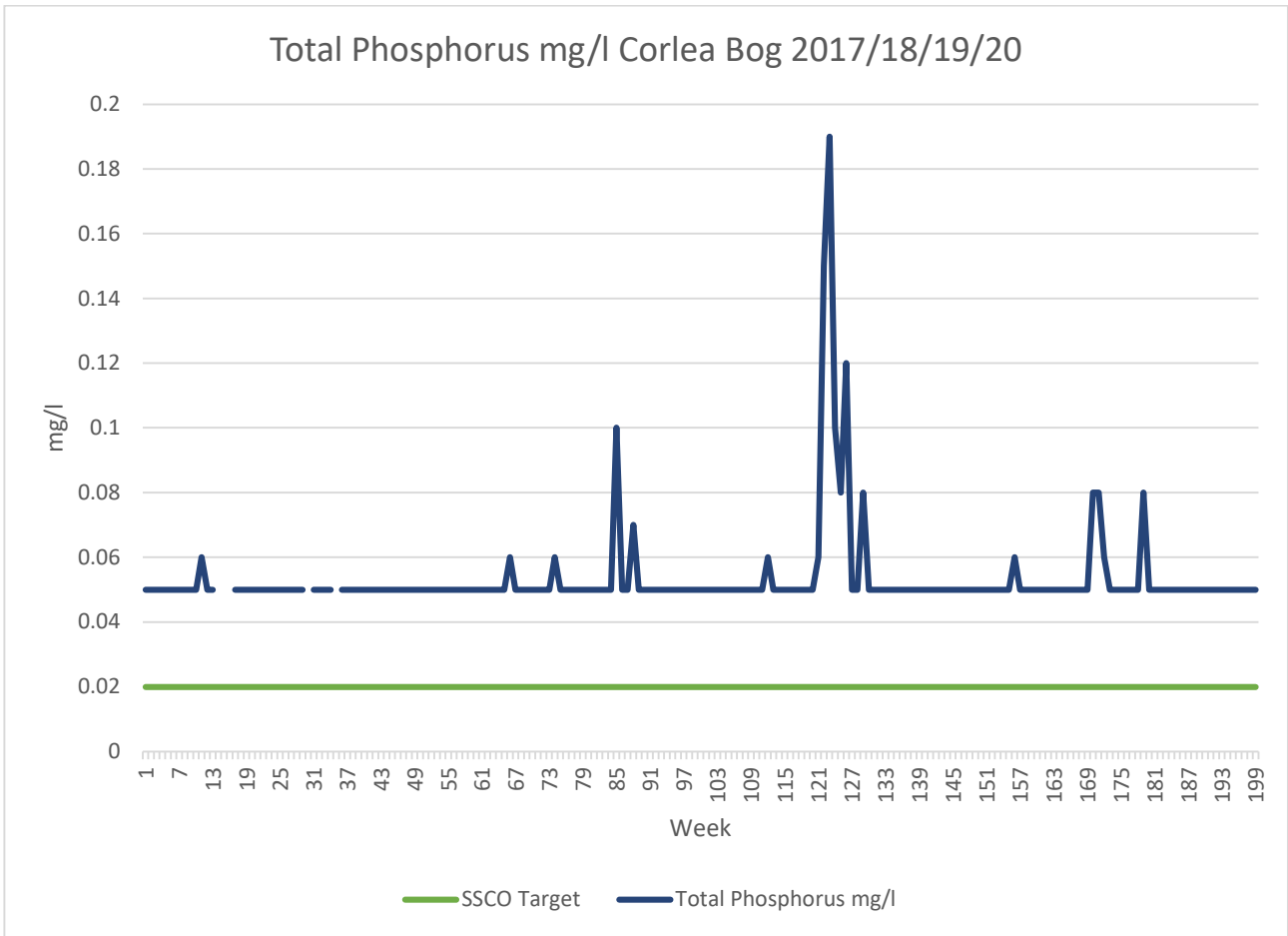


Graph 1: Ammonia Concentrations and Trend at Longfordpass Bog 2015-2019

⁴ <https://gis.epa.ie/EPAMaps/>



Graph 2: Ammonia Levels at Corlea Bog 2017-2019



Graph 3: 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

There is an undeveloped section of raised bog (PB1) and associated habitats in the north-east part of the site (See **Figure 5**). This section is being actively cut for sod-turf and has been degraded, although it still retains some features of interest. The high bog contains typical raised bog characteristics (that qualifies as the Annex I EU Habitats Directive habitat – ‘degraded raised bogs still capable of regeneration’), although it is a poor example, and has been degraded by recent burning. The proposed rehabilitation works at Clonad Bog will not contribute to further degradation of this Annex I habitat.

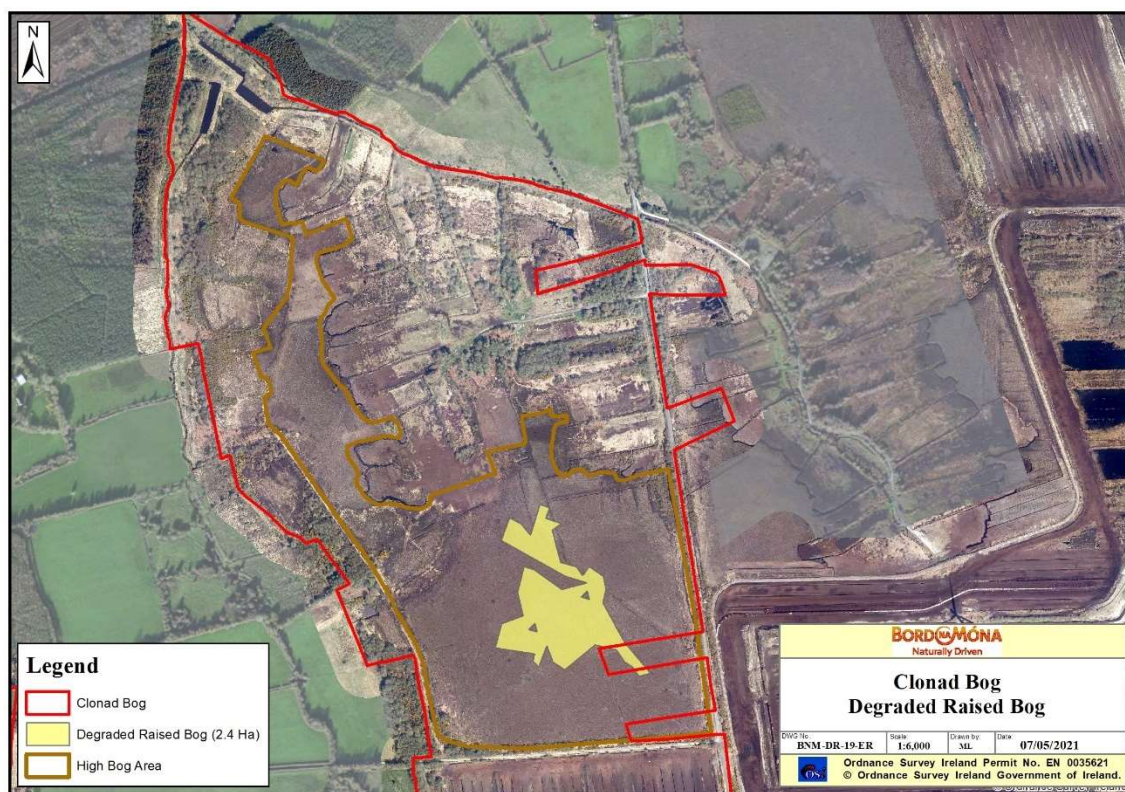


Figure 5: Degraded Raised Bog habitat at Clonad Bog

The majority of the remaining bog is only recently out of production and therefore has no significant features of biodiversity interest. There is some typical cutaway developing towards the centre of the site, which is dominated by Birch scrub. There are some remnant and secondary habitats of some interest around the margins including scrub, some fragments of high bog and Birch woodland.

A habitat map of the site is shown in **Figure 3**.



Image 1 – Silt pond 2_20 located near the northern boundary of Clonad Bog



Image 2 – The Daingean_010 watercourse south of silt pond 2_20



Image 3 – Cutover bog on the western lobe of Clonad Bog



Image 4 – Railway line and cutaway raised bog near the southern boundary of Clonad



Image 5 – Silt pond 28_18\19 located along the northern boundary of the site

Image 6 – In-situ railway line and recolonising ground near the north-western boundary of Clonad Bog

2.5.2.2 Bird Surveys

The Clonad Bog site was visited on two occasions; i.e. January 28th 2021 and April 01st, 2021.

The site walkover surveys completed in Clonad Bog during the winter and spring of 2021 did not identify large numbers of waterbirds or wildfowl using this area for roosting or foraging purposes. Bird species identified during the 2021 site walkover surveys are presented in **Table 4**.

Table 4: Bird Species Identified during the site walkover surveys in 2020/2021

Common Name	Species Name	Activity within site
Blackbird	<i>Turdus merula</i>	Foraging along scrub and woodland at the site margins.
Blue Tit	<i>Cyanistes caeruleus</i>	Foraging along scrub and woodland at the site margins.
Chiffchaff	<i>Phylloscopus collybita</i>	Singing within woodland near the western boundary of the site.
Dunnock	<i>Prunella modularis</i>	Foraging along scrub and woodland at the site margins.
Grey Heron	<i>Ardea cinerea</i>	Flushed from southern silt ponds
Hooded Crow	<i>Corvus cornix</i>	Foraging and flying through the site.
Kestrel	<i>Falco tinnunculus</i>	Hunting and moving through the northern section of the site
Long-tailed Tit	<i>Aegithalus caudatus</i>	Foraging within adjacent scrub cover
Mallard	<i>Anas platyrhynchos</i>	Two Mallard flushed from southernmost silt ponds 3_21_22.
Robin	<i>Erithacus rubecula</i>	Foraging and singing along scrub and woodland at the site margins.
Rook	<i>Corvus frugilegus</i>	Foraging and flying through the site.
Song Thrush	<i>Turdus philomelos</i>	Calling from nearby conifer woodland habitat
Wood Pigeon	<i>Columba palumbus</i>	Flushed from woodland habitats adjoining the site.
Wren	<i>Troglodytes troglodytes</i>	Foraging along scrub and woodland at the site margins.

2.5.2.3 Mammal Surveys

Mammal surveys of the Clonad bog site were undertaken on January 28th and April 01st, 2021. An otter survey was completed along silt ponds and drainage channels (and watercourses forming connectivity with the Daingean_010 and Tullamore_020 streams) within and adjoining the Clonad site. In addition, the Clonad Bog site and its 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).

Signs of otter or mink (such as scats, prints, holts, couches or slides) were not recorded within the drainage channels, silt ponds and ephemeral watercourses within the Clonad Bog site. The sections of the Daingean_010 watercourses near the northern boundary of the Clonad Bog site are narrow, slow moving and filled with dense macrophyte growth. The section of the Daingean_010 watercourse within the site are of little suitability to support fish. Navigability to this section of the Daingean_010 watercourse from silt ponds located to the north is through a narrow culvert which is likely to deter frequent movements by otter to the Daingean_010 watercourse on this. To this end, the sections of the Daingean_010 watercourse on site provides little suitability for otter.

All silt ponds within the Clonad Bog site were surveyed for signs of otter usage. There were no signs of ongoing or recent usage of these silt pond features during the January and April walkover surveys. These silt ponds are large waterbodies and could provide suitable refugia for otter during or following times of flood, within the downstream sections of the Daingean_010 and Figile_040 (Philipstown River) watercourses. The silt ponds located near the southern boundary of Clonad Bog are located within the Tullamore_020 catchment. There is poor connectivity between these silt ponds (and their associated outfall) and the downstream sections of the Tullamore_020 watercourse. This poor connectivity doesn't preclude the likelihood of otter using these silt ponds, however it does reduce their suitability to support regularly occurring or breeding otter.

No evidence of other mammals such as fox, Irish hare, badger or pine marten were identified during the site walkover surveys. With the exception of Irish hare, these mammals are highly unlikely to utilise the expansive cutover bog areas. However, there is suitable habitat for these mammals adjoining 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.

2.5.3 Species of Conservation Interest

Clonad Bog is used occasionally by several species of conservation interest including Snipe and small flocks of wintering Golden Plover (*Pluvialis apricaria*) and Whooper Swans (*Cygnus cygnus*) rest/forage occasionally on the production bog. A Badger (*Meles meles*) sett has been recorded onsite at Clonad Bog and evidence of Otters using some of the drainage channels has also been

2.5.1 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. There are no IAS in this context recorded from Clonad Bog. Invasive plant species were not identified within the Clonad bog site or its environs during the January and April 2021 site visits.

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. 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 habitat map of the site is shown in **Figure 3**.

2.5.2 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 facility, specifically with regards to records of sensitive species; and, to BirdWatch Ireland in respect of the results of IWeBS surveys, which are available upon request.

Further sources of data 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 Clonad 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 2019 at Clonad, 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.

2.6 Decommissioning and Rehabilitation Stage

The proposed **decommissioning** at Clonad 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 and De-Gassing Mobile Fuel Tanks; and
- Desludging 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.

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 Clonad Bog **rehabilitation** comprises a series of bespoke (to Clonad 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 for Clonad Bog comprises 5 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, along with outfall blocking and management of overflows.
- 4) those associated with remnant high bog namely drain blocking.
- 5) those associated with marginal lands (MLT2).

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 local road networks and railway line at the Clonad, Gorteenkeel and Rathfeston townlands, in addition to existing internal access tracks which facilitated the previous peat extraction. No change to baseline conditions to facilitate access for either decommissioning or rehabilitation is required.

2.6.1.2 Standard Methodology for Decommissioning

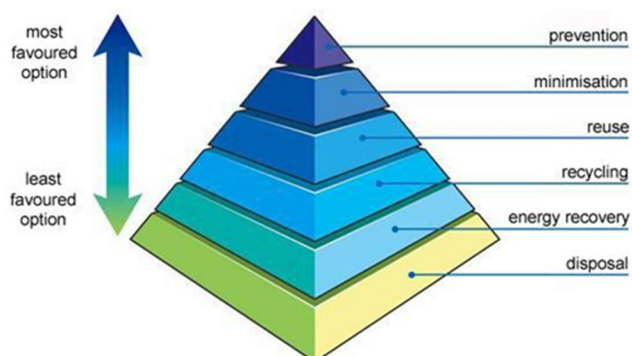
Decommissioning at Clonad Bog will involve the deployment of a work crew to collect and oversee the removal of any remaining plant or potentially contaminating waste left *in situ* in line with Condition 7 of License Ref. P0503-01. This condition specifically requires that BnM's procedures for the Disposal or recovery of waste shall take place only as specified in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* of the IPC license and in accordance with the appropriate National and European legislation and protocols. No other waste shall be disposed of/recovered either on-site or off-site without prior notice to, and prior written agreement of, the EPA. Waste sent off-site for recovery or disposal shall only be conveyed to a waste contractor, as agreed by the EPA, and only transported

from the site of the activity to the site of recovery/disposal in a manner which will not adversely affect the environment.

A full record, which shall be open to inspection by authorized persons of the EPA at all times, shall be kept by the licensee (BnM) on matters relating to the waste management operations and practices at Clonad 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 Clonad 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 an EPA Exit Audit (EA) and the eventual partial or full surrender of the license.

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

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

Peat stockpiles: Any existing and unsalable peat stockpiles which are required to be 'decommissioned' will have protective polythene removed. This will involve the stripping of the polythene cover as per standard procedure where the polythene is rolled/baled by a polywrapper for transport to the area hardstand for removal off-site. Any peat stockpiles that are unsalable will be required to be decommissioned and rehabilitated into the adjoining fields ('levelling'), from where it was originally harvested. This process first involves the associated silt pond being cleaned if necessary, the stockpile field drains blocked to capture any

run-off, with blockages every 100m. The peat is then deposited by dozer onto the adjoining field and blocked drain, where it is cambered and compacted.

Silt Ponds: Silt ponds will continue to be maintained during rehabilitation and decommissioning. Where required, decommissioning of silt-ponds will be assessed and carried out as necessary.

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

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 Clonad **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 Project⁵ - see also **Section 2.8.2** Sources of Information.

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 Clonad Bog, along with:

- Significant international engagement during this period with other countries in relation to best-practise regarding peatland rehabilitation and after-use through the International Peatland Society and the Society for Ecological Restoration (Joosten & Clarke, 2002; Clarke & Rieley, 2010; Gann et al., 2019); and
- Consultation and engagement with internal and external stakeholders.
- GIS Mapping
- BnM drainage surveys
- Bog topography
- Hydrological modelling

Rehabilitation Packages 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 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

⁵ 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>

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 5/6) with detailed drawings presented in **Appendix D**.

A breakdown of the extent of deep peat rehabilitation packages is provided in **Table 5**, below.

Deep Peat Cutover Bog		Extent (ha)
DPT4	Berms and field re-profiling (45m x 60m cell) + blocking outfalls and managing overflows + drainage channels for excess water + Sphagnum inoculation	38.0
DPT5	Cut and Fill cell bunding (30m x 30m cell) + blocking outfalls and managing overflows + drainage channels for excess water + Sphagnum inoculation	8.3

Table 5: Extent of Deep Peat Rehabilitation proposed at Clonad.

A breakdown of the extent of wetland, dry cutaway rehabilitation types and silt ponds is provided in **Table 6**, below. See **Appendix D** for the full suite of Methodology Drawings.

Dry Cutaway and Wetland		Extent (Ha)
DCT2	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	84.70
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	2.4
WLT4	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	189.60
MLT1	No work required	93.6
MLT2	More intensive drain blocking (max 7/100 m)	13.96
n/a	Silt ponds	0.7
n/a	Archaeological Constraints	0.5
n/a	Other Constraints (Pipeline) ⁶	15.7

Table 6: Extent of Dry Cutaway and Wetland proposed at Clonad.

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

1. Regular Drain Blocking (3/100m) (Speed Bump - DCT2)
2. Intensive Drain Blocking (max 7/100m) (Excavator -DPT4 and DPT5, WLT4)

⁶ Areas identified as constraints will have no interventions. For areas where the proposed IW pipeline corridor overlaps proposed rehabilitation, PCAS activities will be fully undertaken post construction of the pipeline (should it be consented). In the meantime the pipeline corridor will be isolated from surrounding rehabilitation vis-à-vis a hydraulic break (drain) and berm. The creation of these features is considered to constitute 'minimal rehabilitation' for the purposes of the PCAS scheme, as natural vegetation colonisation is expected to occur in the short term following same.

3. Blocking Outfalls
4. Managing Water levels (Overflow pipes)
5. Field Reprofilling (Variant on DPT4)
6. Berms and field reprofiling (45m x 60m cell)
7. Drainage channels for excess water (DPT4 and DPT5)
8. Cut and fill cell bunding (30m x 30m cell) (DPT5)
9. Sphagnum Inoculation (DPT4 and DPT5)
10. Silt Pond Cleaning
11. Retention of Hydraulic Breaks (DMP measure)

The rehabilitation measures and layout plan are displayed in **Figure 12** and **Figure 13** below. A full set of Detailed Drawings for the Proposed Rehabilitation Works Methodologies are included in **Appendix D**.

1. Regular Drain Blocking (3/100m) (Speed Bump)

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

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

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

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

See Methodology Drawing **PCAS-0100-001**.

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

This measure can be applied to cutover bog, cutaway bog and drained raised bog with different environmental characteristics. It can be applied to residual peat of various depths including deep cutover peat. The main objective is to 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 a max of 7 blocks per 100m of field drain. The methodology follows NPWS guidelines published by the National Parks and Wildlife Service (Mackin *et al.*, 2017⁷) 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

⁷ https://www.npws.ie/sites/default/files/publications/pdf/IWM99_RB_Restoration_Best%20Practice%20Guidance.pdf

width of the block is 3-5 times the width of the drain. Blocks have to be wide enough to prevent water moving around the blockage and to prevent further leakage when the block subsides. Where possible and available, vegetation is used to cover the peat forming the outfall blockage. This measure is strongly linked with the next in respect of water level management.

See Methodology Drawing **PCAS-0100-014**.

4. Managing water levels

Overflow Pipes

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

Overflow pipes are installed using an excavator.



Figure 7: Examples of installed overflow pipes

5. Field Reprofiling

Typical existing bare peat fields are cambered (higher) in the centre and lower towards the drains, helping drainage of the fields but limiting the re-wetting of the central area. The concept of field re-profiling is to level the surface of the individual peat production fields to retain surface water at the required depth. On peatlands with increased slopes it will be more advantageous to create shallow depressions.

This variation of the DPT4 process, which uses a screw-leveller and bulldozer, can be described as a number of distinct phases.

Phase 1: Re-Profiling of Field Surface

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

Phase 2: Infilling of Drains

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

Phase 3: Final Levelling of Drains & Field

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

Phase 4: Drain Blocking

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

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

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

Phase 5: Cross Berm

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

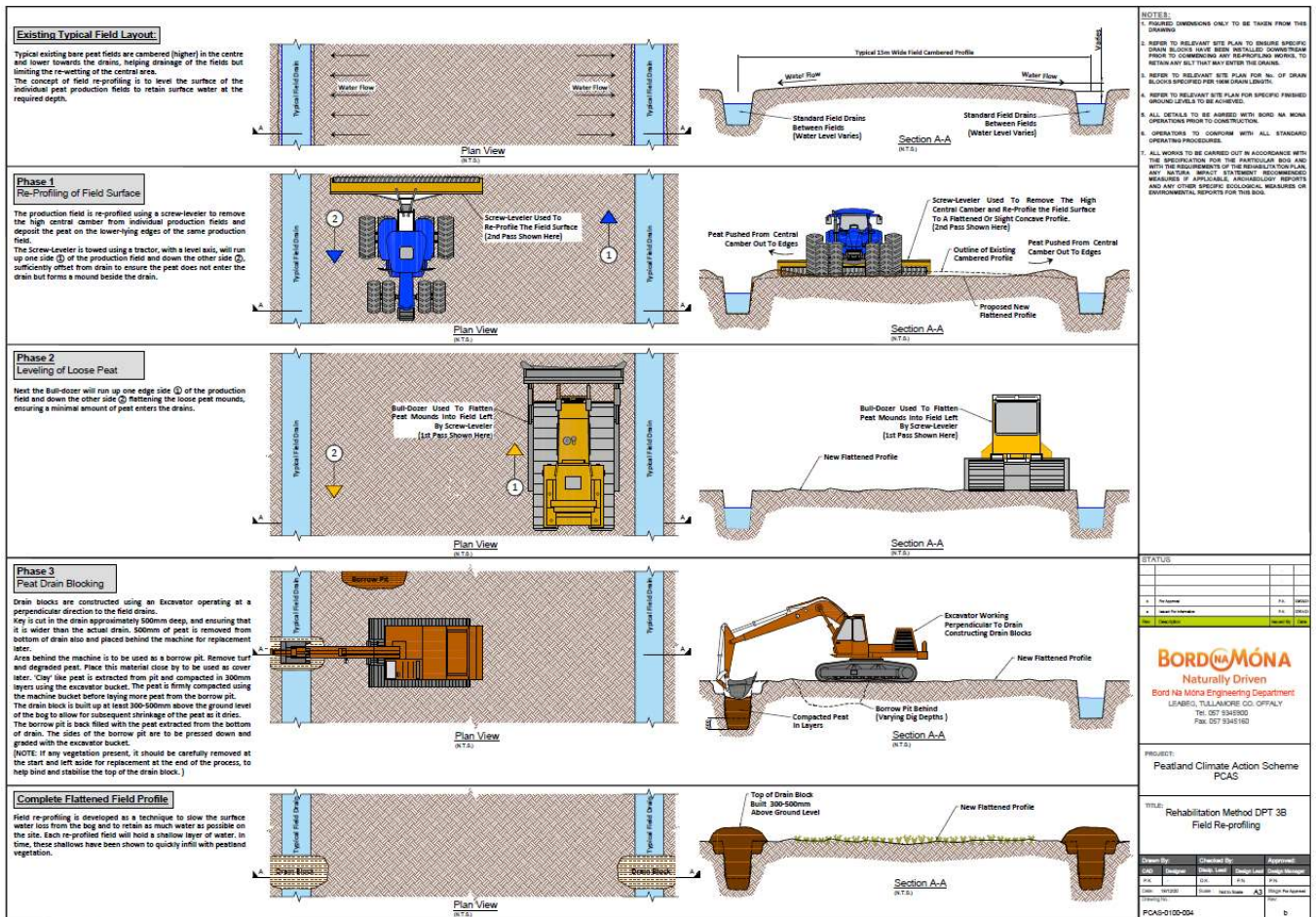


Figure 8: Indicative methodology for field profiling DPT3B

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

This measure (DPT4 variation) seeks to create large flat areas or cells of shallow water on bare peat, across multiple fields that are enclosed by shallow berms to retain shallow surface water. The creation of cells will help retain surface water, keeping peat wet and will further slow water movement through the cutaway.

Phase 1 Drain Blocking and Re-Profiling of Fields Surface

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

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

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

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

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

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

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

Phase 3 Final Profile

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

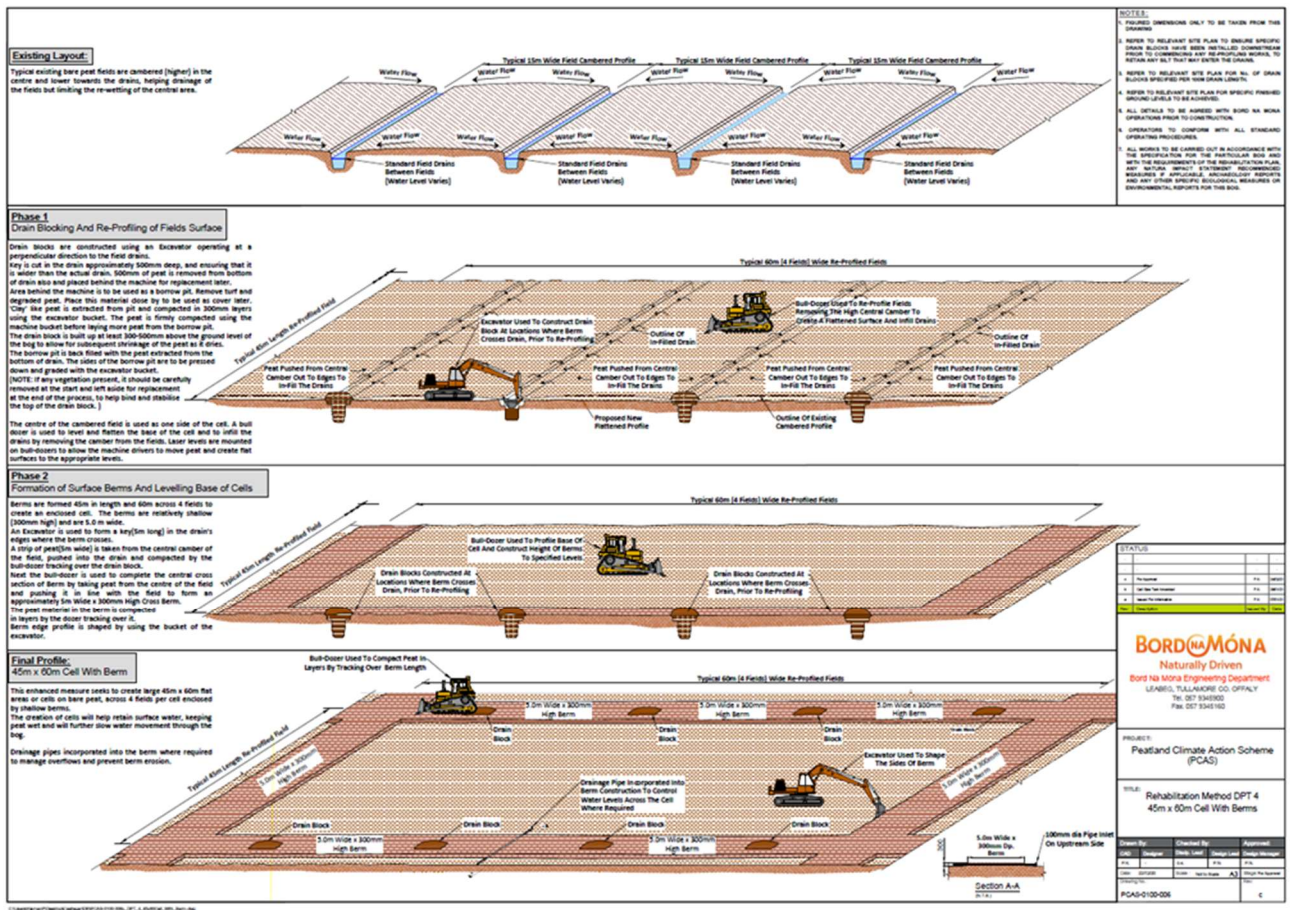


Figure 9: Rehabilitation Method DPT4 45m x 60m Cell with Berms

7. Drainage channels for excess water

New drainage channels (swales) are appropriate to help manage larger volumes of water at large sites during high rainfall events. The main objective is not to drain any residual peat but to manage excess water and prevent significant flooding. Swales (shallow wide drainage channels) are a common measure used in the design and construction of constructed wetlands. They may only get occasional use during the year during periods of high rainfall.

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

In some instances, 'taps' can be cut between peat fields to allow water flow/reduce volumes of water from one part of the bog to another.

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).

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

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

The cut and fill cell bunding approach as DPT5 aims to create 'saucers' or flat bunded areas (cells) on peat with berms to hold shallow water at appropriate levels. Each cell is approximately 30 x 30 m and laser levels will be used on excavators and bulldozers to aid the construction of flat cells surrounded by slightly convex berms. As cells are constructed production field drains will be infilled with peat. Cells will be sized relatively small to prevent wave erosion affecting the development of moss growth.

Phase 1 Drain Blocking and Re-Profiling of Fields Surface

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

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

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

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

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

Berms are formed 30m in length and 30m across 3 fields to create an enclosed cell. The berms are relatively shallow (300mm high) and are 5.0 m wide.

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

Phase 3 Final Profile

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

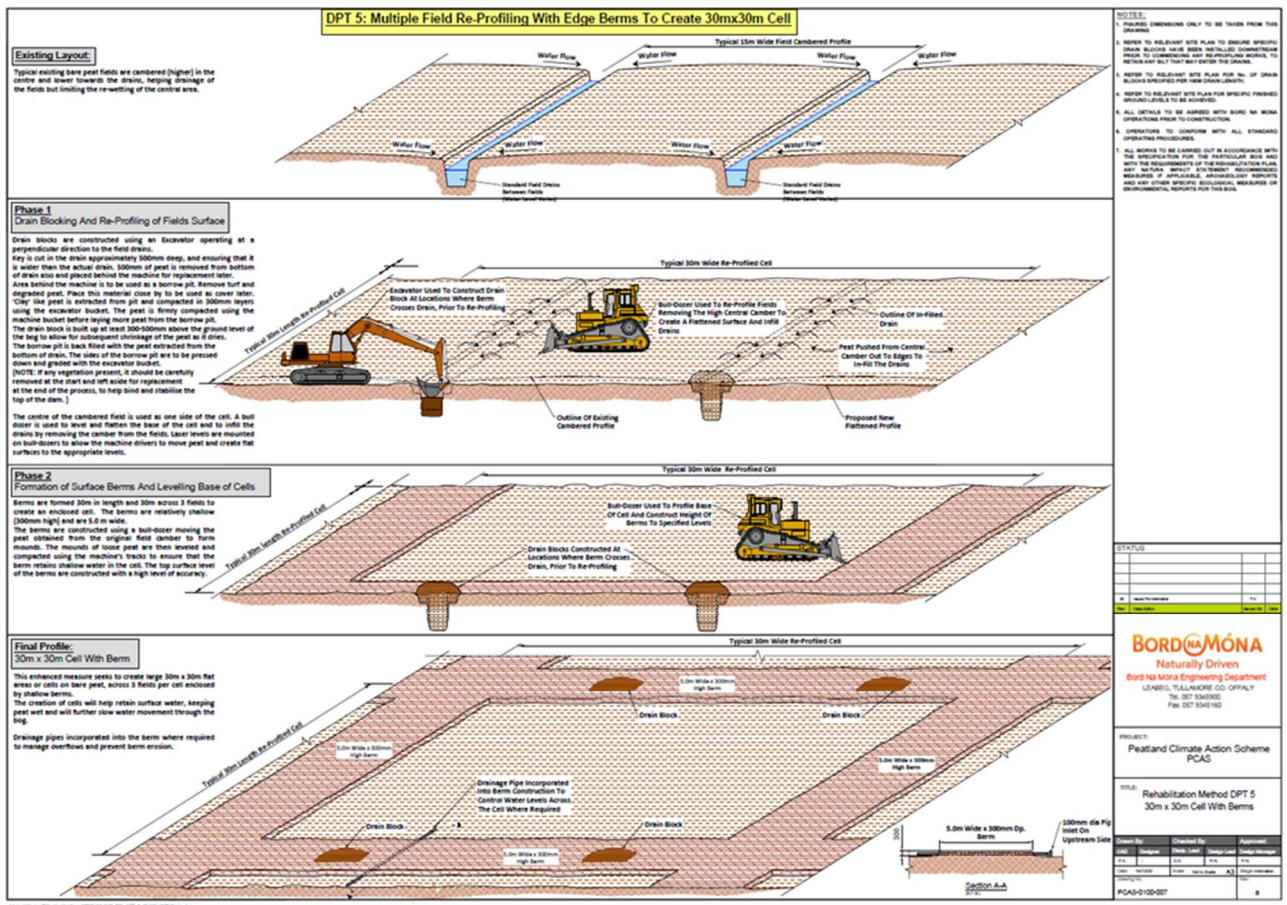


Figure 10: Rehabilitation Method DPT5 30m x 30m cell with Berms

9. *Sphagnum* Inoculation

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

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

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

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

to accelerate and optimise the development of *Sphagnum*-rich vegetation on suitable deep peat cutaway sites.

10. Silt Pond Cleaning

The cleaning procedure is as follows:

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

11. Hydraulic Breaks

To sustain hydrological continuity through the margins of the proposed rehabilitation and decommissioning site and to avoid flooding of adjacent lands, it is proposed to retain/create certain key hydraulic breaks (drains) along the margins of the bog site. These works will be completed to retain peripheral surface water drainage around the margins of the bog rehabilitation sites allowing hydrological flow from lands upstream of the site to areas downstream of the rehabilitation site. These works may require localised instream excavation, widening and regrading of existing drains with tracked excavators, and the removal of debris. These works may require localised instream excavation, widening and regrading of existing drains with tracked excavators. **Figure 11** below provides an image from the Clonad Bog Drainage Management Plan which shows the locations and extent of proposed drainage management features. This mostly includes the retention of existing drainage features, maintenance of silt ponds, and the creation of a new channel near the southern boundary of the site.

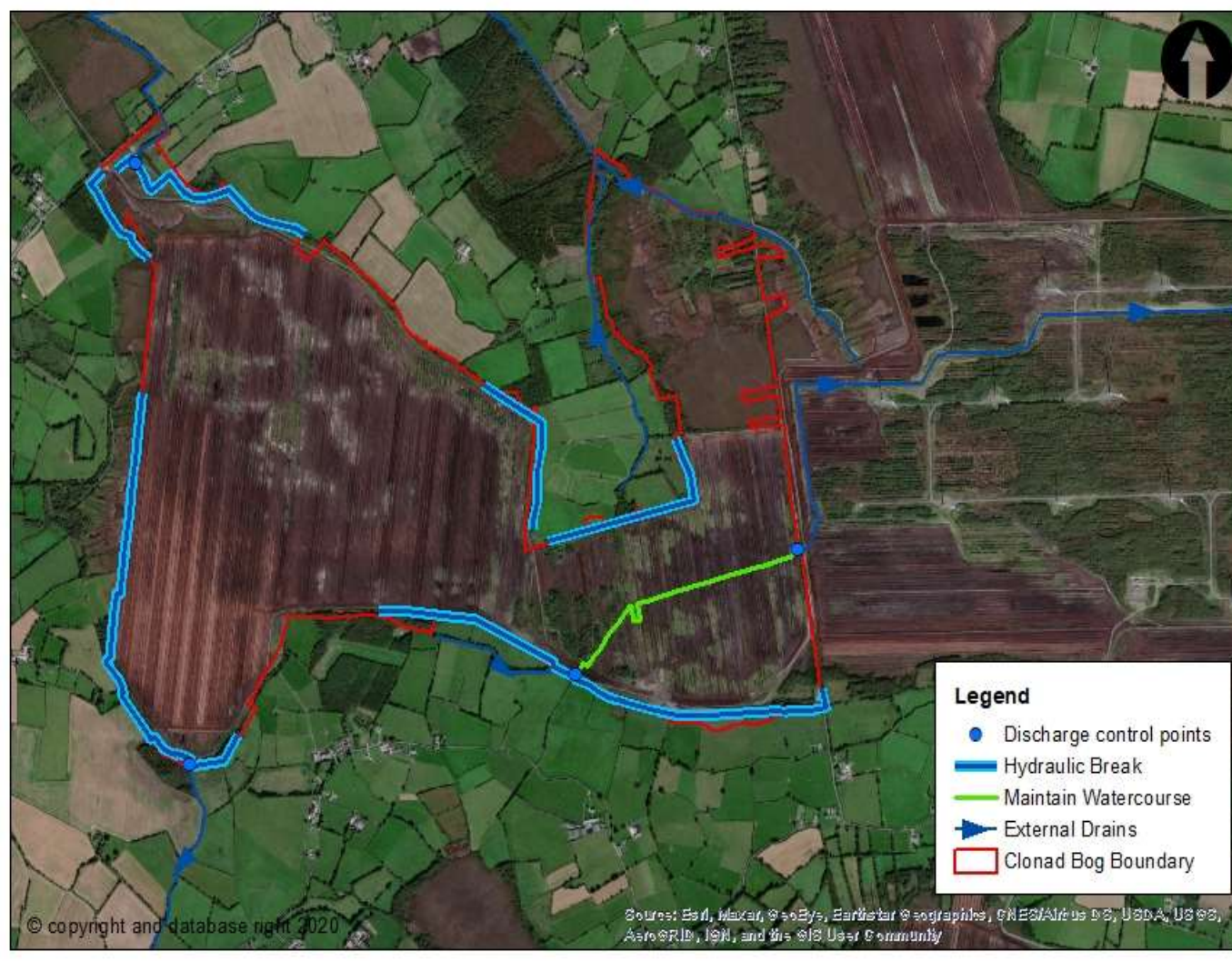


Figure 11: Drainage Management Measures for Clonad Bog (derived from the Drainage Management Plan for Clonad Bog)
See **Appendix D** for the full suite of Methodology Drawings.

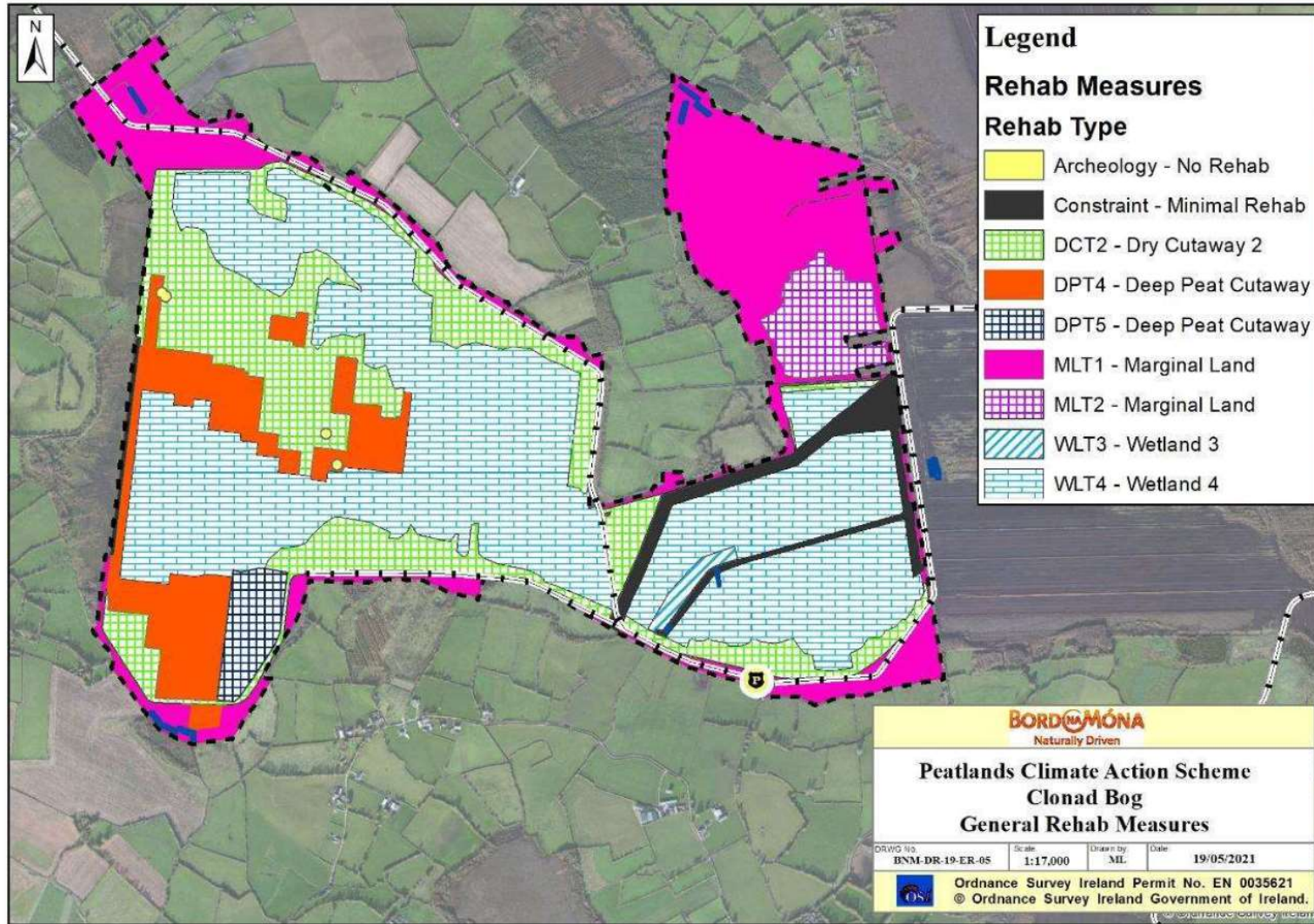


Figure 12: Proposed Enhanced (PCAS) Rehabilitation Plan⁸

⁸ The enhanced rehabilitation Map is sourced from Section 8 of the appended Decommissioning and Rehabilitation Plan (**Appendix B**).

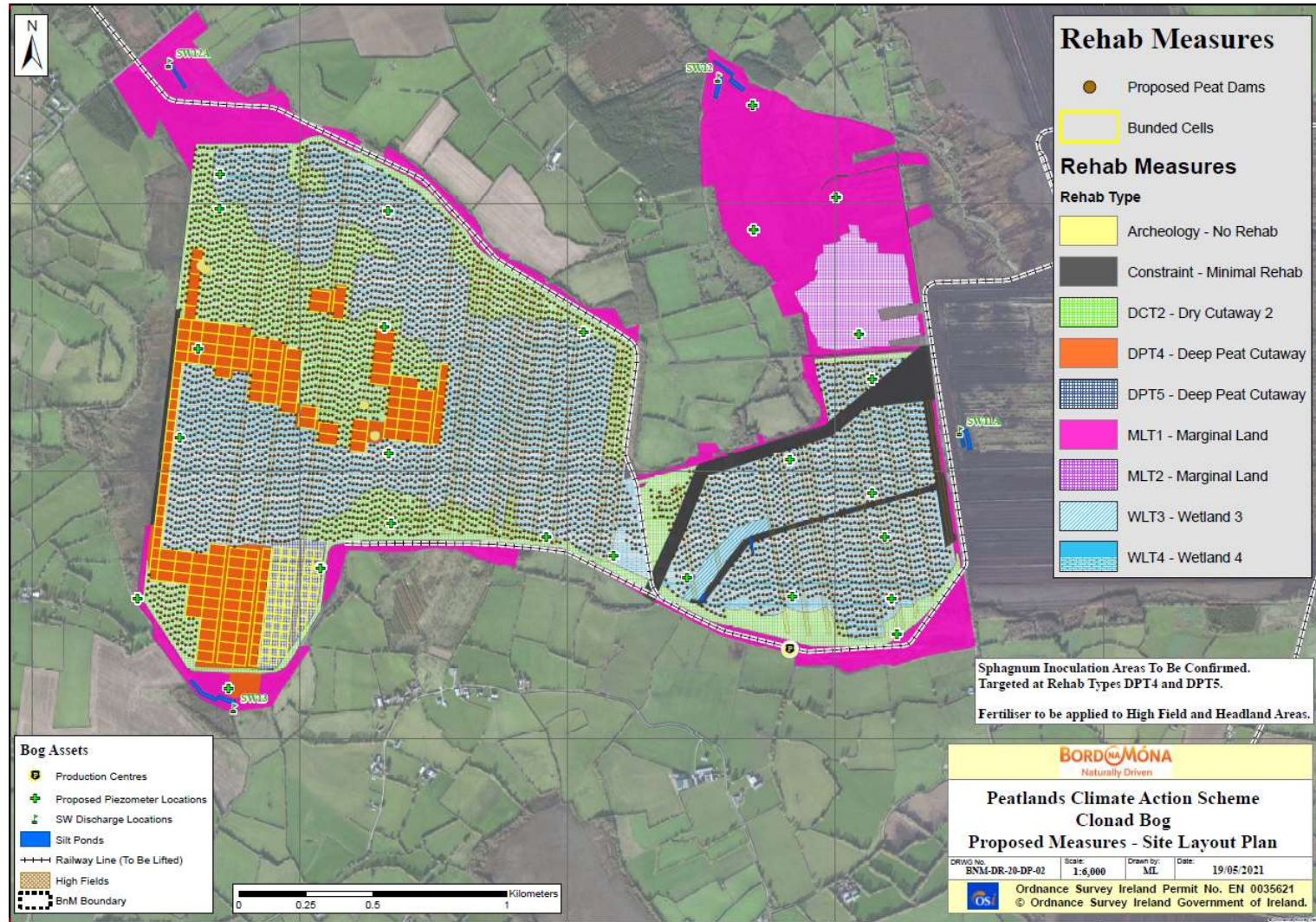


Figure 13: Proposed Site Layout Plan for Clonad Bog

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 July 2022.

Rehabilitation activities will be completed within a period of approximately 12 months. In general activities will be carried out between the months of April and October inclusive.

The duration of activities provided are approximate and may be slightly shorter or longer, depending on weather conditions and progress on rehabilitation prescriptions. Activities may cease for the winter months due to rainfall and poor ground conditions, in line with typical BnM work practice and H&S requirements. In any case, the rehabilitation period will not be longer than 1 year.

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 336.96 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 blocks. 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. Reprofiling the surfaces of exposed peat using a ‘dozer’ or ‘screw leveller’ and creating ‘speed bump’ blockages or infilling drains produces a higher potential for the release of dust, however the duration of this is expected to be brief (i.e. with effects lasting less than a day). Enhanced measures where bunded cells are created may take longer duration.

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

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

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

Welfare Facilities: Welfare facilities are available at Clonad Bog. Where required, Portaloos and additional welfare facilities may be added to the Clonad site. This may be required to accommodate guests or additional workers during the summer months and to assist with social distancing requirements during the ongoing Covid-19 pandemic.

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 operations 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 within the silt pond infrastructure will be retained to assist with decommissioning methods.

Operational Access: Operational access will be through the Newtown townlands western boundary of the site, where existing infrastructure is already in place via access tracks and railway lines to facilitate the previous peat extraction.

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

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

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

Fugitive emissions to air

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

Carbon Emissions

Following rehabilitation and into the early operational stage Clonad 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.

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

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

Other bogs within the larger Bog Group or within the River Barrow Catchment (including Cavemount Bog, Mountlucas Bog, Esker Bog and Cloncreen Bog) 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 near the northern boundary of Clonad Bog and at other locations within 15km and the downstream catchment of the River Barrow and River Nore SAC. 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.

Mount Lucas windfarm (Planning Reference: 09453) is located immediately east of Clonad Bog. This windfarm development supports connectivity to the upstream sections of the Daingean_010 and Figile watercourses. This development consists of thirty two turbines up to 100m hub height and up to 112m rotor diameter with a total height not exceeding 156m; a transformer and crane hardstanding area at each turbine, underground electrical and communication cables linking the turbines; internal site tracks; a permanent met lattice mast 100m high; a 110Kv substation and associated equipment and control building. Another windfarm project is currently in development at Cloncreen, south of the Esker Bog rehabilitation site.

In December 2020, Bord na Móna applied to Offaly County Council for the continued use of the previously permitted ash repository (Planning Ref No: 20621) (An Bord Pleanála PL 19.216998 / Offaly County Council 05/1267) for deposition of up to 20,000 tonnes of peat ash and biomass during 2023, with an amendment to the planning boundary to incorporate the site entrance. This application is located in Cloncreen and Clonbulloge Co. Offaly and was accompanied by a Natura Impact Statement which considered potential impacts consequent significant adverse effects and requisite mitigation measures to European Sites within the project zone of influence, including the River Barrow and River Nore SAC. This granted development is located 9.5km east of the Clonad Bog.

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

A planning application for the demolition and construction of pig houses (Planning Reference Number 152) was submitted to Offaly County Council in 2015. The planning application sought for the demolition of 10 no. existing pig houses and construction of 2 no. pig houses and extension to 2 no. existing structures to form pig house no. 3, together with all ancillary structures and all associated site works on the site of an existing pig house enterprise. This application related to a development which is for the purposes of an activity requiring an Integrated Pollution Prevention and Control (IPPC). An Environmental Impact Statement and Natura Impact Statement has been submitted with this planning application. This planning application is located greater than 30km downstream of the site located on the western fringes of the Figile_060 River.

A small portion of cutaway bog (15 ha) within Clonad Bog will be constrained from re-wetting as it is part of the Proposed Irish Water Supply Project – Eastern and Midlands Region pipeline route. It is anticipated that rehabilitation within the Clonad Bog site will occur in advance of the construction of this pipeline. There is expected to be ongoing consultation to further minimise the footprint of the constrained Irish Water footprint and it is also anticipated that the proposed pipeline construction and operation will be subject to Screening for AA and Natura Impact Statement to determine likely significant effects and adverse effects to

European Sites within the project Zone of Influence. It is expected that the footprint of the corridor will be rehabilitated post the construction of the proposed Water Supply Project – Eastern and Midlands Region. This zone is expected to recolonise naturally during this period.

There are 4 no. local authority jurisdictions within 15km of Clonad Bog (Offaly County Council, Laois County Council, Westmeath County Council and Kildare 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 Clonad Bog. Restoration activities at these bogs may have the potential for in combination effects with decommissioning and rehabilitation at Clonad Bog, however there is no currently known temporal or spatial overlap between any planned restoration activities and the decommissioning and rehabilitation of Clonad Bog.

2.6.3.1 Other BnM Bog Group Decommissioning and Rehabilitation

Other BnM bogs within the larger Allen Bog group will also be subject to decommissioning and rehabilitation to meet the various, pertinent, IPC license conditions, however, currently, the only known temporal overlap between these proposed activities elsewhere on Bord na Móna lands that support proximity and supporting potential connectivity is as follows:

- Mountlucas Bog – Located immediately east of Clonad Bog and drains to the Daingean_030 and Esker_010 watercourses which are part of the Figile River catchment. The downstream section of the Figile River catchment are designated as part of the River Barrow and River Nore SAC.
- Cloncreen Bog - Located 8.3km east of Clonad Bog and drains to the Figile_040 watercourse. The Figile River is designated as part of the River Barrow and River Nore SAC 38.9km downstream of Clonad Bog.
- Cavemount Bog - Located 3.8km north-east of Clonad Bog and drains to the Esker_010 (upstream sections of the Esker_020 watercourse which drains the Clonad Bog site) and Daingean_030 watercourses. The Esker_010 watercourse is a tributary of the Figile River which is designated as part of the River Barrow and River Nore SAC 38.9km downstream of Clonad Bog.
- Esker Bog – Located 6.2km north-east of Clonad Bog. This bog is drained by the Esker_020 and Figile watercourses. The Figile River is designated as part of the River Barrow and River Nore SAC 38.9km downstream of Clonad Bog.
- Ummeras Bog – Location 15.3km south-east and more than 30km downstream along the Figile catchment. The Figile River is designated as part of the River Barrow and River Nore SAC 38.9km downstream of Clonad Bog and 8.5km downstream of Ummeras Bog.

All five bog sites within the Allen Bog group proposed for rehabilitation in 2021 are located in proximity to one another and all are located within the Figile River_020 Water Framework Directive subcatchment.

The construction phase of decommissioning and rehabilitation at these bogs may overlap those proposed for Esker Bog and Ummeras Bog. Bogs sites within the Allen Bog Group are located within the Barrow catchment and support connectivity with the River Barrow and River Nore SAC. Should decommissioning or rehabilitation at these sites commence alongside or overlap those proposed for Esker and Ummeras, this could result in in-combination or cumulative effects to the River Barrow and River Nore SAC.

The Operational stage of Clonad Bog Decommissioning and Rehabilitation will overlap the Rehabilitation stage of other bogs within the Allen Bog group (such as the nearby Esker Bog) however the expected magnitude of any effects from Clonad 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 Allen Bog Group proposed for decommissioning and rehabilitation in 2021, support potential connectivity with the Figile River catchment and downstream areas of the River Barrow and River Nore SAC. The decommissioning and rehabilitation of any other bogs within the greater Allen Bog 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.

2.6.3.2 Turbary

Analysis of aerial photography identified private turbary near the northern boundary of Clonad Bog. Analysis of aerial photography displays evidence of unauthorised turbary occurs at various locations within 15km of Clonad Bog and in those bog sites fringing the Figile River catchment downstream of the Clonad Bog site, such as Cloncreen Bog. Hydrological linkages between these turbary sites and the receiving environment at Clonad Bog may exist, primarily via drainage to EPA blue line watercourses. These linkages provide potential to contribute to in-combination or cumulative effects to the River Barrow and River Nore SAC.

2.6.3.3 NPWS Raised Bog Restoration Raheenmore Bog SAC (000582), Knockacoller Bog SAC (002333) and Coolrain Bog SAC (002332)

Raheenmore Bog SAC (000582), located 6.1km north of Clonad Bog is included as part of the Living Bog project sites. This is an EU LIFE 2014-2020 Programme funded project aimed at Restoring Active Raised Bogs in Ireland's SAC Network 2016-2020 (**LIFE14 NAT/IE/000032**) aims to restore active raised bog on 12 raised bog SACs in the network, including Raheenmore Bog SAC.

Knockacoller Bog SAC (002333) and Coolrain Bog SAC (002332) are located 34km and 36km south-west of the proposed Clonad bog rehabilitation area respectively and may possibly be subject to restoration and rehabilitation practices in the short-term.

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 Plan⁹. One of the primary mitigation elements proposed is that screening for appropriate assessment and if necessary appropriate assessment will be carried out in relation to any site specific/project level measures including restoration measures and turf-cutting. If AA of a project at site level determines that adverse effects are likely, or cannot be ruled out, the project will either not be pursued or, where considered appropriate, the derogation steps of Article 6(4) will apply, but only in a case in which there are imperative reasons of overriding public interest (IROPI) requiring a project to proceed, there are no less damaging alternative solutions, and compensatory measures have been identified that can be put in place.

On this basis, it is assumed that the appropriate level of Appropriate Assessment has or will be carried out in respect of any future proposed restoration activities at the above bog, and that any required mitigation to avoid adverse effects on European Site integrity will be in place.

⁹ https://www.npws.ie/sites/default/files/general/AA%20Determination%20NRBMP%202017_2022_0.pdf

2.6.3.4 Agricultural Activity

Given the remote and tenuous connectivity between Clonad Bog and the River Barrow and River Shannon catchment, 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 Clonad Bog. Most of these activities are not subject to Appropriate Assessment, and form part of the existing baseline environment.

2.6.3.5 IPPC Licencing

Two IPPC licences issued P0614-01 & P0614-02 to a pig farm in the downstream sections of the Figle watercourse upstream of Bracknagh, Co. Offaly. These pig farms are located within proximity to the Figle_080 watercourse. Activities within this facility are subject to the licencing conditions, controls and ongoing monitoring.

2.6.3.6 Mountlucas Windfarm

Bord na Mona Energy Ltd have constructed a 32 turbine windfarm, with turbines measuring up to 100m hub height and 112m rotor diameter. Additional and ancillary developments include a transformer and crane hardstanding, underground electrical cables, internal site tracks, met mast, 110Kv substation and control building with associated septic tank and treatment system, extension to existing borrow pit, drainage and all associated works. This windfarm is currently operational and will not contribute to in-combination or synergistic effects with the proposed decommissioning and rehabilitation works. There is no potential for in-combination effects due to construction or rehabilitation activities.

2.6.3.7 Local Authority Development Plans

The following development plans have been identified:

- Offaly County Development Plan 2021 – 2027
- Offaly Heritage Plan 2017-2021

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.

2.6.3.8 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. In addition, there may be plans to development amenity facilities for some Bord na Móna bog sites. Such developments will be subject to the planning process and will be screened for Appropriate Assessment as necessary. Nonetheless the possibility of secondary effects from activities forming part of decommissioning or rehabilitation at Clonad Bog cannot be excluded – a precautionary approach is taken.

2.6.3.9 Local Authority Drainage Schemes

As part of the Barrow Drainage District Offaly County Council (and other local authorities located downstream on the Barrow catchment such as Laois and Kildare) may wish to commence drainage maintenance schemes within watercourses supporting connectivity with the proposed decommissioning and rehabilitation works at Clonad Bog, including watercourses located upstream and downstream along the Figle catchment. There

is the potential for in-combination effects should these drainage schemes be completed in the absence of best practice measures or considered mitigation. However, such drainage maintenance schemes are subject to their own Appropriate Assessment prior to commencement, which will consider potential impacts, consequent significant effects and requisite mitigation measures to offset potential adverse effects to European Sites within the project Zone of Influence.

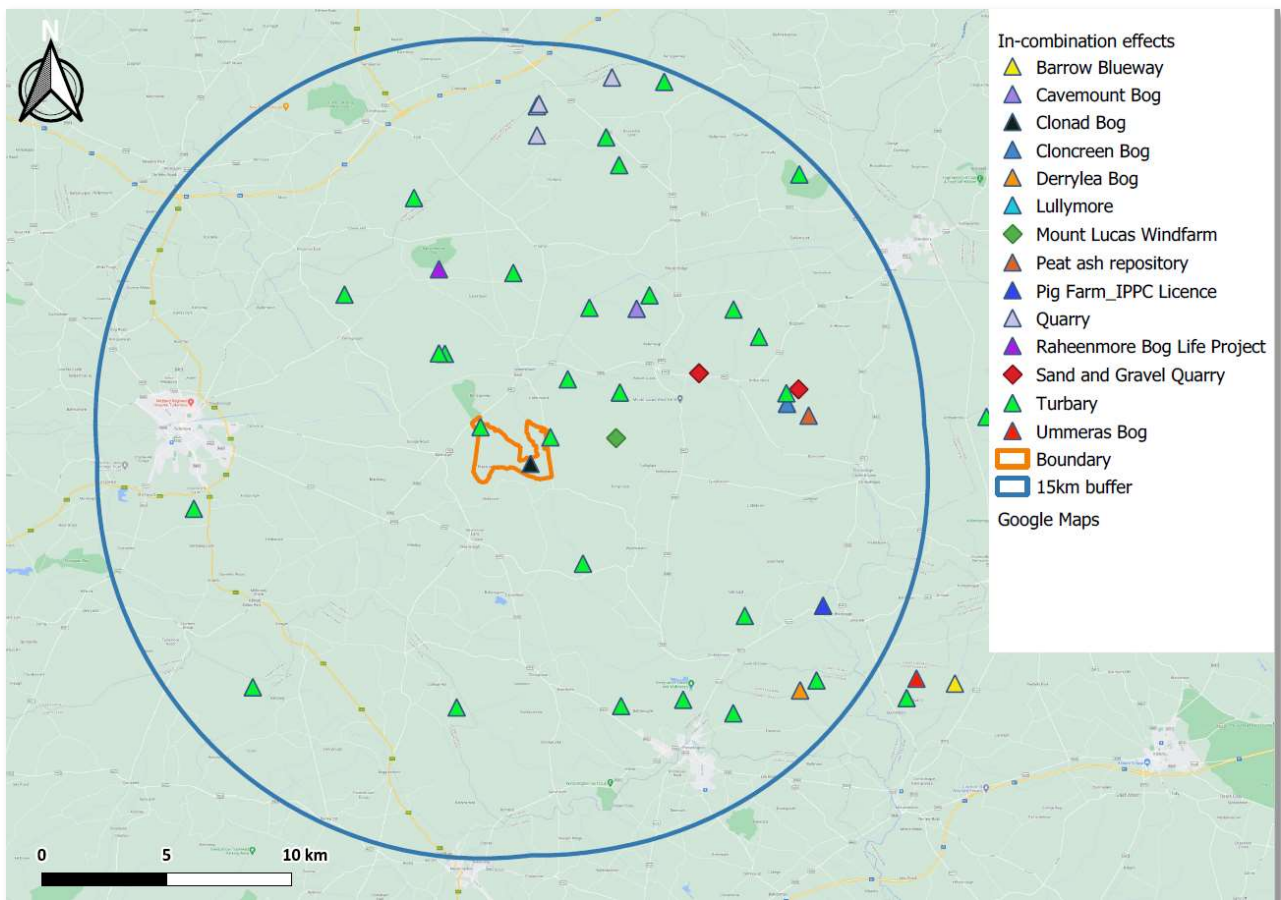


Figure 14: Other projects and activities within 15km of the proposed Clonad bog rehabilitation work

2.7 European Sites under consideration

2.7.1 Distance of the Project to European Sites

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

There are **5 European Sites** - 5 Special Area's of Conservation (SAC) **within 15km of Clonad Bog**. There are no SPAs located within 15km of Clonad Bog. In addition, Clonad Bog supports remote hydrological connectivity to the River Shannon Callows SAC and the Middle Shannon Callows SPA (which are both located outside of the 15km buffer zone) via the Tullamore and Brosna watercourses. These European Sites are considered further given their hydrological connectivity.

The locations of these five European Sites are illustrated in **Figure 15: European Sites within the Zone of Influence of Clonad Bog** and **Figure 16: Proximal, adjacent or overlapping European Sites**, with the distances from the bog rehabilitation site and comment on hydrological connectivity provided in **Table 7**.

Table 7: Proximity of the proposed Clonad Bog to European Sites

European Site (SAC or SPA)	Site Code	Distance from the Proposed Bog Rehabilitation*	Hydrological Connectivity (Y/N: If Yes Downstream or Upstream connectivity relative to Clonad Bog)
River Barrow and River Nore SAC	002162	11.6km south and 38.9km downstream	Y: Remote downstream connectivity via the Daingean_010, Daingean_020, Daingean_030, Figile_040, Figile_050, Figile_060 and Figile_080 watercourses.
Raheenmore Bog SAC	000582	6.0km north	N: No, this European Site is located upstream of the proposed bog rehabilitation. No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Charleville Wood SAC	000571	12.7km west and 14.5km downstream	Y: Remote downstream connectivity via the Tullamore_020 and Tullamore_030 watercourses.
Split Hills and Long Hill Esker SAC	001831	12.0km north-west	N: No, this European Site is located upstream of the proposed bog rehabilitation. No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
Mountmellick SAC	002141	14.3km south	N: No, this European Site is located upstream of the proposed bog rehabilitation. No hydrological connectivity between the proposed bog rehabilitation site and this European Site.
River Shannon Callows SAC	000216	42.7km west and 53km downstream	Y: Remote downstream connectivity via the Tullamore_020, Tullamore_030, Tullamore_040, Tullamore_050, Brosna_110, Brosna_120, Brosna_130 and Brosna_140 watercourses.
Middle Shannon Callows SPA	004096	42.7km west and 53km downstream	Y: Remote downstream connectivity via the Tullamore_020, Tullamore_030, Tullamore_040, Tullamore_050, Brosna_110, Brosna_120, Brosna_130 and Brosna_140 watercourses.

*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 European Sites examined in this Screening Report are provided in **Table 8**.

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.

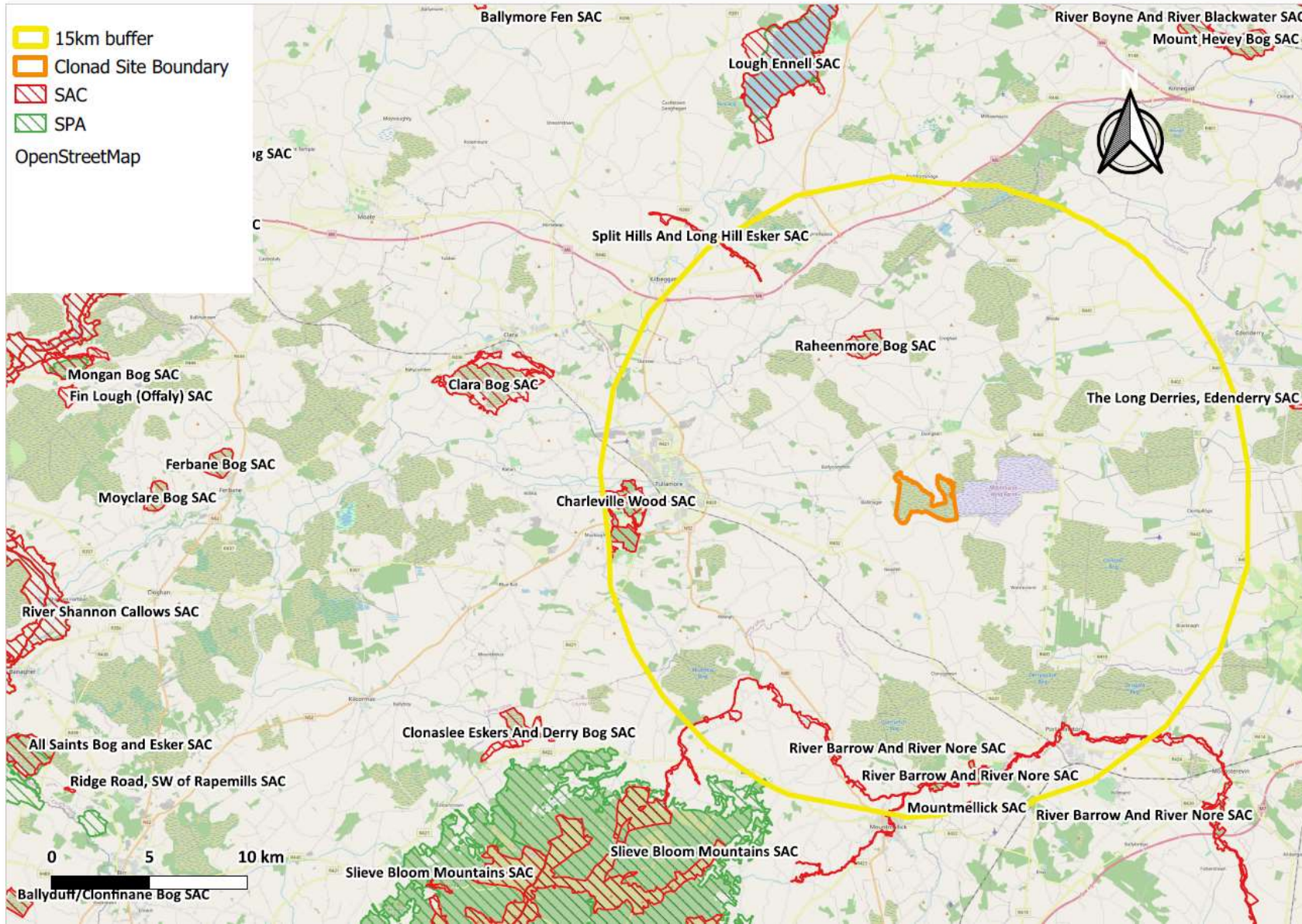


Figure 15: European Sites within the Zone of Influence of Clonad Bog

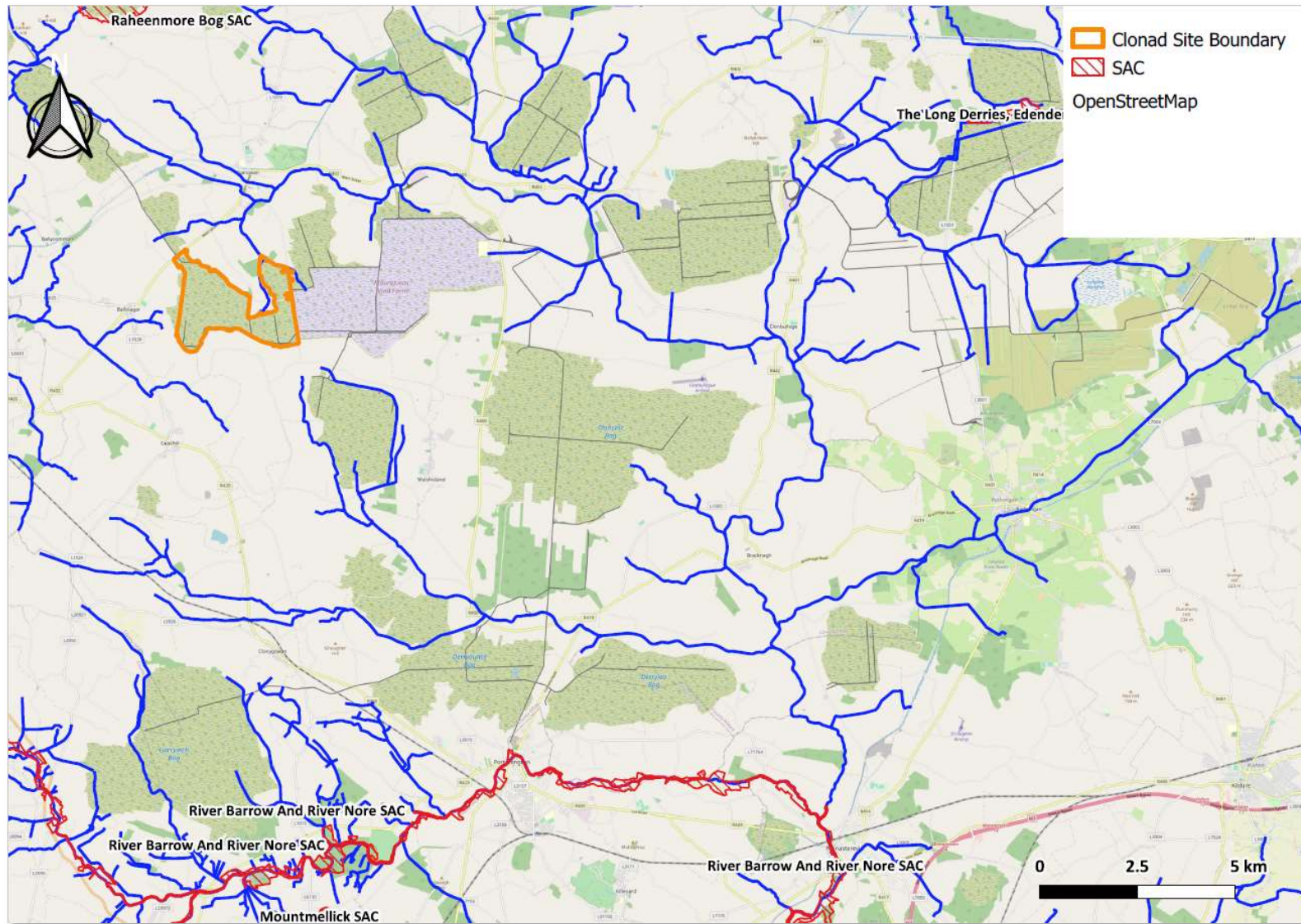


Figure 16: Proximal, adjacent or overlapping European Sites

Table 8: Description of European Sites within the Zone of Influence of Clonad Bog

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
1	River Barrow and River Nore SAC (002162)	<p>[1016] Desmoulin's whorl snail (<i>Vertigo moulinsiana</i>)</p> <p>[1029] Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)</p> <p>[1092] White-clawed crayfish (<i>Austropotamobius pallipes</i>)</p> <p>[1095] Sea lamprey (<i>Petromyzon marinus</i>)</p> <p>[1096] Brook lamprey (<i>Lampetra planeri</i>)</p> <p>[1099] River lamprey (<i>Lampetra fluviatilis</i>)</p> <p>[1103] Twaite shad (<i>Alosa fallax</i>)</p> <p>[1106] Atlantic salmon (<i>Salmo salar</i>) (only in fresh water)</p> <p>[1130] Estuaries</p> <p>[1140] Mudflats and sandflats not covered by seawater at low tide</p> <p>[1310] <i>Salicornia</i> and other annuals colonizing mud and sand</p> <p>[1330] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)</p> <p>[1355] Otter (<i>Lutra lutra</i>)</p> <p>[1410] Mediterranean salt meadows (<i>Juncetalia maritimi</i>)</p> <p>[1421] Killarney fern (<i>Trichomanes speciosum</i>)</p> <p>[1990] Nore freshwater pearl mussel (<i>Margaritifera durrovensis</i>)</p> <p>[3260] Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation</p> <p>[4030] European dry heaths</p>	<p>This site consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford. Major towns along the edge of the site include Mountmellick, Portarlinton, Monasterevin, Stradbally, Athy, Carlow, Leighlinbridge, Graiguenamanagh, New Ross, Inistioge, Thomastown, Callan, Bennettsbridge, Kilkenny and Durrow. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow, and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore (NPWS, 2016).</p>	<p>NPWS (2011) River Barrow and River Nore SAC 002162. Version date: 19.07.2011. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.</p> <p>Accessed online 24.01.2021</p>

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
		<p>[6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels</p> <p>[7220] * Petrifying springs with tufa formation (Cratoneurion)</p> <p>[91A0] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles</p> <p>[91E0] * Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)</p>		
2	Raheenmore Bog SAC	<p>[7110] Active raised bogs</p> <p>[7120] Degraded raised bogs still capable of natural regeneration</p> <p>[7150] Depressions on peat substrates of the Rhynchosporion</p>	<p>This raised bog developed in a small basin in the catchment of two major river systems i.e. the Brosna and the Boyne. It is situated about 5 km from Daingean in Co. Offaly. The peat is very deep, up to 15 m in places. The bog has a well-developed hummock and hollow system. Raheenmore Bog is a classic example of a midland raised bog and the deepest remaining in Ireland. It is of high conservation importance as it contains good examples of the priority Annex I habitat active raised bog, and the non-priority habitats degraded raised bog and depressions on peat substrates (Rhynchosporion). Most of the site is owned by the NPWS and there has been considerable research and restoration work carried out on the site over the past 15 years. Of particular notes is that this is one of the few raised bogs where restoration of the lagg zone remains feasible (NPWS, 2013).</p>	<p>NPWS (2015) Conservation Objectives: Raheenmore Bog SAC 000582. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Accessed online 08.02.2021</p>
3	Charleville Wood SAC	<p>91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*</p> <p>1016 Desmoulin's Whorl Snail <i>Vertigo moulinsiana</i></p>	<p>Charleville Wood is a large woodland surrounded by estate parkland and agricultural grassland located about 3 km south-west of Tullamore in Co. Offaly. The site, which is underlain by deep glacial deposits, includes a small lake with a wooded island, and a stream runs along the western perimeter. The woodland is one of very few ancient woodlands remaining in</p>	<p>NPWS (2021) Conservation objectives for Charleville Wood SAC [000571]. Generic Version 8.0. Department of Housing, Local Government and Heritage.</p>

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			Ireland, with some parts undisturbed for at least 200 years. Charleville Wood is one of the most important ancient woodland sites in Ireland. The woodland has a varied age structure and is relatively intact with areas of both closed and open canopy. The understorey and ground layers are also well-represented. Alluvial forest is a priority habitat listed on Annex I of the E.U. Habitats Directive, while the rare snail species, <i>Vertigo moulinsiana</i> , is listed on Annex II of this Directive. The wetland areas, with their associated bird populations, rare insect and Myxomycete species, contribute further to the conservation significance of the site (NPWS, 2020).	
4	Split Hills and Long Hill Esker SAC	6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites)	Split Hills and Long Hill Esker is a 5 km long site which crosses the main Galway-Dublin road mid-way between Kilbeggan and Tyrrellspass in Co. Westmeath. It is a prominent feature on the local landscape. Split Hill and Long Hill Esker is one of the finest and longest wooded eskers in the country. It is also one of the few woodlands in the area and a fine geomorphological feature of great scenic value. The trees are particularly well-grown and impressive, and much of the woodland has developed naturally on its steep slopes. The presence of a species-rich ground flora, which includes a rare and legally protected plant species at its only known Irish location, makes this site of great botanical and ecological importance. The site also supports some excellent examples of calcareous grassland which is rich in orchids. The increasing rarity of this habitat (due to agricultural intensification) is recognised in that it is awarded priority status on Annex I of the E.U. Habitats Directive (NPWS, 2013).	NPWS (2018) Conservation Objectives: Split Hills and Long Hill Esker SAC 001831. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
5	Mountmellick SAC	1016 Desmoulin's Whorl Snail <i>Vertigo moulinsiana</i>	This site comprises a disused stretch of the Grand Canal between Dangan's Bridge and Skeagh Bridge, approximately 3 km east of Mountmellick in Co. Laois. 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. The Mountmellick site is important as it provides useful habitat for a population of <i>Vertigo moulinsiana</i> (NPWS, 2013).	NPWS (2021) Conservation Objectives: Mountmellick SAC 002141. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
6	River Shannon Callows SAC	6410 <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) 6510 Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>) 7230 Alkaline fens 8240 Limestone pavements* 91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* 1355 Otter <i>Lutra lutra</i>	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 (2021) Conservation objectives for River Shannon Callows SAC [000216]. Generic Version 8.0. Department of Housing, Local Government and Heritage.
7	Middle Shannon Callows SPA	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>	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	NPWS (2021) Conservation objectives for Middle Shannon Callows SPA [004096]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

	European Site Name and Code	Qualifying Interest / Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source
			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.	

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, both national and local stakeholders, including neighbours whose land adjoins Clonad 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 Clonad 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. Due cognisance was also given to information available on the NPWS website at:

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

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

2.8.2 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 Clonad 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 Clonad 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 (no potential for this impact to occur)

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

2.9.1.2 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 may require localised instream works, mobilisation of particulate matter, local excavations within drainage channels, machinery works within and adjacent to watercourses.

Pathway: water runoff flow paths, watercourses, air

Potential Clonad 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 proposed operations are located outside of and at a distance from any designated SAC. The Clonad Bog supports remote connectivity with the River Barrow and River Nore SAC (38.9km downstream) via the Daingean_010, Daingean_020 Figile_040, Figile_050, Figile_060 and Figile_080 watercourses.

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 up to 12 months. Once decommissioning and rehabilitation are complete, the decommissioned and rehabilitated Clonad 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, plus activities to retain the function of hydraulic breaks, following inspection. 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.

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 may require localised instream works, mobilisation of particulate matter, local excavations within drainage channels, machinery works within and adjacent to watercourses.

Pathway: land cover, contact, air, visibility

Potential Clonad 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*. The Clonad Bog site is drained via the Daingean and Figile watercourses, which may provide foraging or commuting habitat for otter associated with River Barrow and River Nore SAC. Otters utilising these watercourses may experience ex-situ disturbance effects as a result of the proposed rehabilitation practices.

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.

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 may require localised instream works, mobilisation of particulate matter, local excavations within drainage channels, machinery works within and adjacent to watercourses.

Pathway: contact

Potential Clonad 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 construction works and construction 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 may require localised instream works, mobilisation of particulate matter, local excavations within drainage channels, machinery works within and adjacent to watercourses.

Pathway: land cover, contact, air, visibility

Potential Clonad 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 Clonad 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

There is no spatial overlap between **Clonad Bog** and any of the SPA's under consideration. It can therefore reasonably be concluded that there is no potential for direct impact/effects (such as habitat loss, or loss of habitat connectivity) on any SPA's from the proposed decommissioning and rehabilitation of Clonad Bog. Possible pathways can only exist for indirect effects on SPA's either secondary, cross-factor or 'ex-situ'. Therefore, there is **no possibility of direct impacts to SPA** species or their associated habitats, and this impact pathway is screened out from further evaluation. No potential for likely significant effects identified. Furthermore, the proposed bog rehabilitation site is not located within 15km of any SPA site and does not support immediate downstream connectivity with an SPA site.

2.9.2.2 Indirect Impacts to Habitats and Species within SPAs (including ex-Situ effects)

The proposed **Clonad** bog rehabilitation site is not located within 15km of any SPA site and does not support immediate downstream connectivity with a SPA site. The nearest SPA to Clonad Bog is Lough Ennell SPA, located 20km north-west (along the closest straight line distance). Due to the separation distance and lack of connectivity, there will be no indirect impacts (including ex-Situ effects) to SPAs or their associated SCI species and wetland habitats as a result of the proposed bog rehabilitation works. Therefore there will be no indirect impacts (including ex-Situ effects) to SPAs or their associated SCI species and wetland habitats as a result of the proposed bog rehabilitation works.

2.10 Screening Evaluation of the Potential for Effects on European Sites

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

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

- Indirect loss or degradation of terrestrial or aquatic habitats (through changes in existing hydraulic regime – flooding of adjacent lands, increased run-off to downstream sites etc.) within SAC sites, alone and in combination;
- Indirect or ex-situ disturbance or displacement of species of Qualifying Interest, alone and in combination;

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**.

The proposed bog rehabilitation site is not located within 15km of SPA sites and does not support downstream connectivity to SPA sites. There is no potential source-pathway-receptor dynamic between the proposed bog rehabilitation works at Clonad and Special Protection Areas (SPAs). Therefore, potential significant effects to SPA sites as a result of the proposed bog rehabilitation works are not possible. Potential impacts and consequent likely significant effects to SPAs as a result of the proposed bog rehabilitation works will not be considered further in this Appropriate Assessment.

Table 9: Evaluation of Possibly Significant Effects to the six SAC sites

	European Site	Separation Distance from Clonad Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Clonad Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the ten 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>3. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest.</p> <p>4. Indirect or ex-situ mortality of Qualifying Interests</p>
1	River Barrow and River Nore SAC (002162)	11.6km south and 38.9km downstream	Y: Remote downstream connectivity via the Daingean_010, Daingean_020, Daingean_030, Figile_040, Figile_050, Figile_060 and Figile_080 watercourses.	<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 immediate proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened In - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within the SAC and consequent effects to reliant species of Qualifying Interest</p> <p>Due to 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 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 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, and cannot be screened out in the absence of measures to avoid harmful effects such as accidental or inadvertent mortality when undertaking certain works e.g. cleaning of silt ponds.</p>
2	Raheenmore Bog SAC (000582)	6.0km north	N: No, located upstream of the proposed works within a separate hydrological	<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 Clonad Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Clonad Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the ten SAC Sites:</p> <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; 3. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest. 4. Indirect or ex-situ mortality of Qualifying Interests
			subcatchment. No hydrological connectivity 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 the SAC and consequent effects to reliant species of Qualifying Interest 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 Clonad Bog can be excluded.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests The proposed works located 6.0km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect of 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 The proposed works located 6.0km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect of ex-situ effects in this regard.</p>
3	Charleville Wood SAC (000571)	12.7km west and 14.5km downstream	Y: Remote downstream connectivity via the Tullamore_020 and Tullamore_030 watercourses.	<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 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 In - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within the SAC and consequent effects to reliant species of Qualifying Interest Due to the presence of hydrological connectivity between proposed activities and this European Site possible pathways for effects are identified with potential effects to water dependent and nutrient sensitive habitats associated with this European Site.</p> <p>3: Screened Out - No potential for indirect or ex-situ disturbance or displacement of species of Qualifying Interests The proposed works are located 14.5km upstream of this European Site. This European Site supports Desmoulin’s Whorl Snail, a stationary species which is associated with fen and wetland habitats. Therefore there will be no indirect of 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>

	European Site	Separation Distance from Clonad Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Clonad Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the ten 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>3. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest.</p> <p>4. Indirect or ex-situ mortality of Qualifying Interests</p>
				<p>The proposed works located 8.5km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect of ex-situ effects in this regard.</p>
4	Split Hills and Long Hill Esker SAC (001831)	12.0km north-west	<p>N: No, this European Site is located upstream of the proposed bog rehabilitation. No hydrological connectivity between the proposed bog rehabilitation site and this European Site.</p>	<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 the SAC and consequent effects to reliant species of Qualifying Interest</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 Clonad 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 12.0km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect of 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 12.0km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect of ex-situ effects in this regard.</p>
5	Mountmellick SAC (002141)	14.3km south	<p>N: No, this European Site is located upstream of the proposed bog rehabilitation. No hydrological</p>	<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 the SAC and consequent effects to reliant species of Qualifying Interest</p>

	European Site	Separation Distance from Clonad Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Clonad Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the ten SAC Sites:</p> <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; 3. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest. 4. Indirect or ex-situ mortality of Qualifying Interests
			connectivity between the proposed bog rehabilitation site and this European Site.	<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 Clonad 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 14.3km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect of 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 14.3km from this European Site. There are no species of Qualifying Interest listed for this European Site. Therefore there will be no indirect of ex-situ effects in this regard.</p>
6	River Shannon Callows SAC (000216)	42.7km west and 53km downstream	Y: Remote downstream connectivity via the Tullamore_020, Tullamore_030, Tullamore_040, Tullamore_050, Brosna_110, Brosna_120, Brosna_130 and Brosna_140 watercourses.	<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 immediate proximity to this European Site. Therefore there will be no direct impacts to this European Site.</p> <p>2: Screened In - Possibility for indirect loss, reduction or degradation of terrestrial or aquatic habitats within the SAC and consequent effects to reliant species of Qualifying Interest</p> <p>Due to 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 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 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, and cannot be screened</p>

	European Site	Separation Distance from Clonad Bog	Hydrological Connection – Yes/No	<p>Evaluation of the potential for Clonad Bog decommissioning and rehabilitation, either alone or in combination with other plans or projects, to cause either of the following effects to the ten SAC Sites:</p> <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; 3. Indirect/ex-situ disturbance or displacement of species of Qualifying Interest. 4. Indirect or ex-situ mortality of Qualifying Interests
				<p>out in the absence of measures to avoid harmful effects such as accidental or inadvertent mortality when undertaking certain works e.g. cleaning of silt ponds.</p>
7	Middle Shannon Callows SPA (004096)	42.7km west and 53km downstream	<p>Y: Remote downstream connectivity via the Tullamore_020, Tullamore_030, Tullamore_040, Tullamore_050, Brosna_110, Brosna_120, Brosna_130 and Brosna_140 watercourses.</p>	<p>1. Screened Out - Possibility for direct loss, reduction or degradation of terrestrial or aquatic habitats within the SPA 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 Due to the separation distance to this SPA and the extremely remote and tenuous hydrological connectivity between this European Site and Clonad Bog, possible pathways for indirect loss, reduction or degradation of terrestrial or aquatic habitats can be excluded.</p> <p>3: Screened Out - Possibility for indirect or ex-situ disturbance or displacement effects of bird species of Special Conservation Interest Due to the separation distance to this SPA, possible pathways for disturbance or displacement effects to SCI species of the Middle Shannon Callows SPA can be excluded. The Middle Shannon Callows SPA is located 42.7km west north of Clonad Bog. There is no risk of SCI species of the Middle Shannon Callows SPA utilising Clonad Bog as a core foraging area. Therefore, there will be no risk of significant ex-situ disturbance or displacement effects of SCI species to Middle Shannon 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) within the zone of influence of all predicted Project impacts. An extended buffer zone 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 Clonad Bog, as required. There is a total of six European sites located within the zone of consideration; i.e. connected by hydrological features:

1. River Barrow and River Nore SAC (002162)
2. Raheenmore Bog SAC (000582)
3. Charleville Wood SAC (000571)
4. Split Hills and Long Hill Esker SAC (001831)
5. Mountmellick SAC (002141)
6. River Shannon Callows SAC (000216)
7. Middle Shannon Callows SPA (004096)

Following screening it can reasonably be concluded that **there is likelihood of significant effects to three 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 a European Site has not been excluded, and Appropriate Assessment is required in respect of the following European Site:**

- River Barrow and River Nore SAC (002162)
- Charleville Wood SAC (000571)
- River Shannon Callows SAC (000216)

A Stage 2 Appropriate Assessment Report follows in respect of these 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 European Site:

- River Barrow and River Nore SAC (002162)
- Charleville Wood SAC (000571)
- River Shannon Callows SAC (000216)¹⁰

This section comprises a detailed appraisal of the impacts of the proposed Clonad 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 Clonad Bog proposed Decommissioning and Rehabilitation is provided in **Section 2.2**. See also the document included as **Appendix B** of this report.

¹⁰ The site synopses for these European Sites are presented in **Appendix C**

3.1.1 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.

3.1.1.1 River Barrow and River Nore SAC (Site Code 002162)

The site-specific conservation objectives of the River Barrow and River Nore SAC aim to define favourable conservation condition for the particular habitat or species at that site. These objectives and conditions are considered in **Table 10** below in respect of the Qualifying Interests of River Barrow and River Nore SAC which were screened in for further evaluation. Further consideration is provided in **Table 10** 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 Barrow and River Nore 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 Conservation Objectives: NPWS (2011) River Barrow and River Nore SAC 002162. Version date: 19.07.2011. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht and should be read in conjunction with any other supporting documentation on the referenced website as provided above.

3.1.1.2 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 11** below in respect of the Qualifying Interests of the River Shannon Callows SAC which were screened in for further evaluation. Further consideration is provided in **Table 11** 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 the 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. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht and should be read in conjunction with any other supporting documentation on the referenced website as provided above.

3.1.1.3 Charleville Wood SAC

The site-specific conservation objectives of the Charleville Wood SAC aim to define favourable conservation condition for the particular habitat or species at that site. These objectives and conditions are considered in **Table 12** below in respect of the Qualifying Interests of the Charleville Wood SAC which were screened in for further evaluation. Further consideration is provided in **Table 12** 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 the Charleville Wood 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 Charleville Wood SAC [000571]. Generic Version 8.0. Department of Housing, Local Government and Heritage. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht and should be read in conjunction with any other supporting documentation on the referenced website as provided above.

Table 10: Conservation Objectives of the River Barrow and River Nore SAC (Site Code 002162)

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
[1016] Desmoulin's whorl snail (<i>Vertigo moulinsiana</i>)	To maintain the favourable conservation condition of Desmoulin's whorl snail in the River Barrow and River Nore SAC.	No potential source-pathway-receptor link as the proposed bog decommissioning and rehabilitation are a significant distance upstream (>70km upstream) from this estuarine / coastal habitat. The nature and scale of the proposed bog decommissioning and rehabilitation the attenuation capacity of the watercourses between Clonad Bog and the distribution of this species within the SAC means that there will be no potential impact of the proposed decommissioning and rehabilitation to this species.
[1029] Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	The status of the freshwater pearl mussel (<i>Margaritifera margaritifera</i>) as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species. Please note that the Nore freshwater pearl mussel (<i>Margaritifera durrovensis</i>) remains a qualifying species for this SAC.	Clonad Bog and the downstream sections of the River Barrow and River Nore SAC are located within the Barrow FWPM catchment. This catchment is categorised as a <i>catchment with previous records of Margaritifera, but current status unknown</i> . The adjoining Nore catchment supports living Freshwater Pearl Mussel. There is no hydrological connectivity between the catchment draining the proposed decommissioning and rehabilitation works at Clonad and the River Nore Freshwater Pearl Mussel population.
[1092] White-clawed crayfish (<i>Austropotamobius pallipes</i>)	To maintain the favourable conservation condition of White-clawed crayfish in the River Barrow and River Nore SAC.	Yes – potentially located in downstream sections of the River Barrow and River Nore SAC.

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
[1095] Sea lamprey (<i>Petromyzon marinus</i>)	To restore the favourable conservation condition of Sea lamprey in the River Barrow and River Nore SAC.	No potential source-pathway-receptor link as the proposed bog decommissioning and rehabilitation are a significant distance upstream (>95km upstream) from this estuarine / coastal habitat. The nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and the distribution of this species within the SAC means that there will be no potential impact of the decommissioning and rehabilitation to this species.
[1096] Brook lamprey (<i>Lampetra planeri</i>)	To restore the favourable conservation condition of Brook lamprey in the River Barrow and River Nore SAC.	Yes – potentially located in downstream sections of the River Barrow and River Nore SAC.
[1099] River lamprey (<i>Lampetra fluviatilis</i>)	To restore the favourable conservation condition of River lamprey in the River Barrow and River Nore SAC.	Yes – potentially located in downstream sections of the River Barrow and River Nore SAC.
[1103] Twait shad (<i>Alosa fallax</i>)	To restore the favourable conservation condition of Twait shad in the River Barrow and River Nore SAC.	No potential source-pathway-receptor link as the proposed bog decommissioning and rehabilitation are a significant distance upstream (>95km upstream) from this estuarine / coastal habitat. The nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and the distribution of this species within the SAC means that there will be no potential impact of the decommissioning and rehabilitation to this species.

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
		In addition, the distance between the proposed development site and the dilutional capacity of the watercourses, waterbodies and the large transitional waterbody are likely to remove the potential any of significant effects, direct or indirect to this species for the River Barrow and River Nore SAC as a result of water borne pollutants.
[1106] Atlantic salmon (<i>Salmo salar</i>) (only in fresh water)	To restore the favourable conservation condition of Salmon in the River Barrow and River Nore SAC.	Yes – potentially located in downstream sections of the River Barrow and River Nore SAC.
[1130] Estuaries	To maintain the favourable conservation condition of Estuaries in the River Barrow and River Nore SAC.	No potential source-pathway-receptor link as the proposed decommissioning and rehabilitation are a significant distance upstream (>95km upstream) from this estuarine / coastal habitat. The nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and this habitats means that there will be no potential impact of the decommissioning and rehabilitation to this habitat. In addition, the distance between the proposed development site and the dilutional capacity of the watercourses, waterbodies and the large transitional waterbody are likely to remove the potential any of significant effects, direct or indirect to this habitat for the River Barrow and River Nore SAC as a result of water borne pollutants.

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
[1140] Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of the Mudflats and sandflats not covered by seawater at low tide in the River Barrow and River Nore SAC.	No potential source-pathway-receptor link as the proposed decommissioning and rehabilitation are a significant distance upstream (>95km upstream) from this estuarine / coastal habitat. The nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and this habitats means that there will be no potential impact of the decommissioning and rehabilitation to this habitat. In addition, the distance between the proposed development site and the dilutional capacity of the watercourses, waterbodies and the large transitional waterbody are likely to remove the potential any of significant effects, direct or indirect to this habitat for the River Barrow and River Nore SAC as a result of water borne pollutants.
[1310] <i>Salicornia</i> and other annuals colonizing mud and sand	To maintain the favourable conservation condition of <i>Salicornia</i> and other annuals colonizing mud and sand in the River Barrow and River Nore SAC.	No potential source-pathway-receptor link as the proposed decommissioning and rehabilitation are a significant distance upstream (>95km upstream) from this estuarine / coastal habitat. The nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and this habitats means that there will be no potential impact of the decommissioning and rehabilitation to this habitat. In addition, the distance between the proposed development site and the dilutional capacity of the watercourses, waterbodies and the large

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
		transitional waterbody are likely to remove the potential any of significant effects, direct or indirect to this habitat for the River Barrow and River Nore SAC as a result of water borne pollutants.
[1330] Atlantic salt meadows (Glaucopuccinellietalia maritimae)	To restore the favourable conservation condition of Atlantic salt meadows in the River Barrow and River Nore SAC.	No potential source-pathway-receptor link as the proposed bog decommissioning and rehabilitation are a significant distance upstream (>95km upstream) from this estuarine / coastal habitat. The nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and this habitats means that there will be no potential impact of the decommissioning and rehabilitation to this habitat. In addition, the distance between the proposed development site and the dilutional capacity of the watercourses, waterbodies and the large transitional waterbody are likely to remove the potential any of significant effects, direct or indirect to this habitat for the River Barrow and River Nore SAC as a result of water borne pollutants.
[1355] Otter (<i>Lutra lutra</i>)	To restore the favourable conservation condition of Otter in the River Barrow and River Nore SAC.	Yes – potentially located in downstream sections of the River Barrow and River Nore SAC. Also likely to use the sections of the Figile River and Slate River, upstream of the River Barrow and River Nore SAC designation.

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
[1410] Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	To restore the favourable conservation condition of Mediterranean salt meadows in the River Barrow and River Nore SAC.	No potential source-pathway-receptor link as the proposed bog decommissioning and rehabilitation are a significant distance upstream (>95km upstream) from this estuarine / coastal habitat. The nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and this habitats means that there will be no potential impact of the decommissioning and rehabilitation to this habitat. In addition, the distance between the proposed development site and the dilutional capacity of the watercourses, waterbodies and the large transitional waterbody are likely to remove the potential any of significant effects, direct or indirect to this habitat for the River Barrow and River Nore SAC as a result of water borne pollutants.
[1421] Killarney fern (<i>Trichomanes speciosum</i>)	To maintain the favourable conservation condition of Killarney Fern in the River Barrow and River Nore SAC.	No potential source-pathway-receptor link as the proposed bog decommissioning and rehabilitation are a significant distance upstream (>70km upstream) from this species. The nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and the distribution of this species within the SAC means that there will be no potential impact of the proposed rehabilitation to this species.

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
[1990] Nore freshwater pearl mussel (<i>Margaritifera durrovensis</i>)	To restore the favourable conservation condition of the Nore freshwater pearl mussel in the River Barrow and River Nore SAC.	No – there is no hydrological connectivity between Clonad Bog, the downstream sections of the River Barrow and River Nore SAC and this species of Qualifying Interest. The Nore freshwater pearl mussel is located within a separate hydrological catchment to Clonad Bog and is located within the main channel of the River Nore.
[3260] Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation	To maintain the favourable conservation condition of Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation in the River Barrow and River Nore SAC.	Yes – potentially located in downstream sections of the River Barrow and River Nore SAC.
[4030] European dry heaths	To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC.	No potential for connectivity as this is a terrestrial habitat located on the steep valley sides of the Barrow Valley, tributaries and in the Blackstairs Mountains.
[6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in the River Barrow and River Nore SAC.	This Annex I habitat is potentially located in downstream sections of the River Barrow and River Nore SAC, especially in the various areas of alluvial forest and elsewhere within the SAC where the floodplain of the river is intact. However, the nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and the distribution of this habitat within the SAC means that there will be no potential impact of the proposed rehabilitation to this species.

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
[7220] * Petrifying springs with tufa formation (Cratoneurion)	To maintain the favourable conservation condition of Petrifying springs with tufa formation (Cratoneurion) in the River Barrow and River Nore SAC.	This Annex I habitat is potentially located in downstream sections of the River Barrow and River Nore SAC, especially in the various areas of alluvial forest and elsewhere within the SAC where the floodplain of the river is intact. However, the nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and the distribution of this habitat within the SAC means that there will be no potential impact of the proposed rehabilitation to this species.
[91A0] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	To restore the favourable conservation condition of Old oak woodland with <i>Ilex</i> and <i>Blechnum</i> in the River Barrow and River Nore SAC.	The distribution of this habitat within the SAC are described in the SAC site synopsis as follows ' <i>The best examples of old oak woodlands are seen in the ancient Park Hill woodland in the estate at Abbeyleix; at Kyleadohir, on the Delour, Forest Wood House, Kylecorragh and Brownstown Woods on the Nore; and at Cloghristic Wood, Drummond Wood and Borris Demesne on the Barrow, though other patches occur throughout the site</i> '. No potential for connectivity as this is a terrestrial habitat located outside of the river floodplain.
[91E0] * Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)	To restore the favourable conservation condition of Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) in the River Barrow and River Nore SAC.	This habitat located in downstream sections of the River Barrow and River Nore SAC. The Conservation Objectives supporting document for the River Barrow and River Nore SAC identifies this Annex I habitat on the margins of the River Barrow main

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
		>20km downstream of the site. The nature and scale of the proposed decommissioning and rehabilitation and the attenuation capacity of the watercourses between Clonad Bog and the distribution of this species within the SAC means that there will be no potential impact of the proposed rehabilitation to this species.

The findings of the assessment presented in **Table 10** indicates that the proposed works have the potential to impact freshwater dependent and nutrient sensitive aquatic habitats and species associated with the River Barrow and River Nore SAC potentially located downstream of the Clonad Bog Rehabilitation site. The Qualifying Habitats and Species of the River Barrow and River Nore SAC potentially impacted by the proposed works are as follows:

- [1092] White-clawed crayfish (*Austropotamobius pallipes*)
- [1096] Brook lamprey (*Lampetra planeri*)
- [1099] River lamprey (*Lampetra fluviatilis*)
- [1106] Atlantic salmon (*Salmo salar*) (only in fresh water)
- [1355] Otter (*Lutra lutra*)
- [3260] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

Table 11: Conservation Objectives of the River Shannon Callows SAC (Site Code 000216)

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) (6410)	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.	These features of qualifying interest are located 53km of the proposed works via the Tullamore and Brosna watercourses. This represents tenuous and extremely remote connectivity between the proposed works, this European Site and its associated features of Qualifying Interest. The distance, nature and scale of the proposed
Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>) (6510)	To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.	

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
Alkaline fens (7230)	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.	decommissioning and rehabilitation works and the attenuation capacity of the watercourses between Clonad Bog and this European Site means that there will be no potential impact of the proposed rehabilitation to this species.
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* (91E0)	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.	
Otter (<i>Lutra lutra</i>) (1355)	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* (8240)	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.	

The findings of the assessment presented in **Table 11** indicates that the proposed works do not have potential to impact the features of Qualifying Interest of River Shannon Callows SAC, due to tenuous connectivity, the scale of the proposed works and the dilution capacity of receiving hydrological catchment.

Table 12: Conservation Objectives of Charleville Wood SAC (Site Code 000571)

Code and Qualifying Interest	Conservation Objective	Potential Connectivity Source-Pathway-Receptor Link
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* (91E0)	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.	The site synopsis for this European Site identifies the location of this Annex I habitat is found around the lake, which is located south of the Tullamore_040 watercourse which connects the Clonad Bog site with the SAC. There is no connectivity between the Tullamore_040 watercourse and the lake habitat within Charleville Wood. The lack of connectivity to this Annex I habitat and the nature and scale of the proposed decommissioning and rehabilitation works and the attenuation capacity of the watercourses between Clonad Bog means that there will be no potential impact of the proposed rehabilitation works to this species.
Desmoulin's Whorl Snail (<i>Vertigo moulinsiana</i>) (1016)	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.	The distance between the proposed works and this species of qualifying interest and the nature and scale of the proposed decommissioning and rehabilitation works and the attenuation capacity of the watercourses between Clonad Bog and this European Site means that there will be no potential impact from the proposed rehabilitation works to this species

The findings of the assessment presented in **Table 12** indicates that the proposed works do not have potential to impact the features of Qualifying Interest of Charleville Wood SAC, due to tenuous connectivity, the scale of the proposed works and the dilution capacity of receiving hydrological catchment.

3.1.1.4 Summary Analysis

Following the analyses presented in **Tables 10, 11** and **12**, it can be concluded that there is potential connectivity and risk of adverse effects to one European Site within the project Zone of Influence; i.e. River Barrow and River

Nore SAC. The Site Specific Conservation Objectives for this European Site are considered in greater detail in **Section 3.1.2** below.

3.1.2 Site Specific Conservation Objectives for the River Barrow and River Nore SAC

Table 13: Site specific conservation objectives for White-clawed crayfish (*Austropotamobius pallipes*) (1092)

Attribute	Measure	Target	Potential Impact
Distribution	Occurrence	No reduction from baseline.	The proposed decommissioning and rehabilitation works may have the potential to impact these attributes (particularly water quality) in the event of major siltation events (resulting from the impact sources referenced in Section 2.9.1).
Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples	
Negative indicator species	Occurrence	No alien crayfish species	
Disease	Occurrence	No instances of disease	
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	
Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in heterogeneity or habitat quality	

Table 14: Site specific conservation objectives for Brook Lamprey (*Lampetra planeri*) (1096)

Attribute	Measure	Target	Potential Impact
Distribution	% of river accessible	Access to all watercourses down to first order streams	The proposed works will not contribute barrier effects to lamprey or directly effect spawning or distribution dynamics in the downstream catchment. There is the potential for indirect secondary effects as a result of water quality impacts during the proposed rehabilitation works.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	
Juvenile density in fine sediment	Juveniles/m ²	Mean catchment juvenile density of brook/river lamprey at least 2/m ²	
Extent and distribution of spawning	m ² and occurrence	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater),	More than 50% of sample sites positive	

Attribute	Measure	Target	Potential Impact
	downstream of spawning areas		

Table 15: Site specific conservation objectives for River Lamprey (*Lampetra fluviatilis*) (1099)

Attribute	Measure	Target	Potential Impact
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem and major tributaries down to second order accessible from estuary	The proposed works will not contribute barrier effects to lamprey or directly effect spawning or distribution dynamics in the downstream catchment. There is the potential for indirect secondary effects as a result of water quality impacts during the proposed rehabilitation works.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	
Juvenile density in fine sediment	Juveniles/m ²	Mean catchment juvenile density of brook/river lamprey at least 2/m ²	
Extent and distribution of spawning habitat	m ² and occurrence	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	

Table 16: Site specific conservation objectives for Atlantic Salmon (*Salmo salar*) (1106)

Attribute	Measure	Target	Potential Impact
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	The proposed works will not contribute barrier effects to Atlantic Salmon or directly effect spawning or distribution dynamics in the downstream catchment. There is the potential for indirect secondary effects as a result of
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold	

Attribute	Measure	Target	Potential Impact
		value. Currently set at 17 salmon fry/5 min sampling	water quality impacts and deterioration of spawning habitat during the proposed rehabilitation works (resulting from the impact sources referenced in Section 2.9.1).
Out-migrating smolt abundance	smolt abundance Number	No significant decline	
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	
Water quality	EPA Q value by EPA	At least Q4 at all sites sampled by EPA	

Table 17: Site specific conservation objectives for Water courses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation (3260)

Attribute	Measure	Target	Potential Impact
Habitat distribution	Occurrence	No decline, subject to natural processes	The proposed decommissioning and rehabilitation works have the potential to impact these attributes (particularly water quality) in the event of major siltation events (resulting from the impact sources referenced in Section 2.9.1).
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	
Hydrological regime: groundwater discharge	Metres per second	The groundwater flow to the habitat should be permanent and sufficient to maintain tufa formation	
Substratum composition: particle size range	Millimetres	The substratum should be dominated by large particles and free from fine sediments	
Water chemistry: minerals	Milligrammes per litre	The groundwater and surface water should have sufficient concentrations of minerals to allow deposition and	

Attribute	Measure	Target	Potential Impact
		persistence of tufa deposits	
Water quality: suspended sediment	Milligrammes per litre	The concentration of suspended solids in the water column should be sufficiently low to prevent excessive deposition of fine sediments	
Water quality: nutrients	Milligrammes per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	
Floodplain connectivity	Area	The area of active floodplain at and upstream of the habitat should be maintained	

Table 18: Site specific conservation objectives for Otter (*Lutra lutra*) (1355)

Attribute	Measure	Target	Potential Impact
Distribution	Percentage positive sites	No significant decline.	The proposed works will not contribute barrier effects to otter or directly effect breeding dynamics within the SAC boundary. There is the potential for indirect secondary effects as a result of water quality impacts, ex-situ disturbance and mortality during the
Extent of terrestrial habitat Hectares	No significant decline.	No significant decline. Area mapped and calculated as 122.8ha above high water mark (HWM); 1136.0ha along river banks / around ponds	
Extent of marine habitat Hectares	Hectares	No significant decline. Area mapped and calculated as 857.7ha	

Attribute	Measure	Target	Potential Impact
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 616.6km	proposed rehabilitation works (resulting from the impact sources referenced in Section 2.9.1).
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 2.6ha	
Couching sites and holts	Number	No significant decline	
Fish biomass available	Kilograms	No significant decline	

Table 19: Site specific conservation objectives for Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)

Attribute	Measure	Target	Potential Impact
Habitat distribution	Occurrence	No decline, subject to natural	The proposed decommissioning and rehabilitation works will not impact the attributes outlined for this Annex I habitat; i.e. habitat distribution and area, hydrological regime and vegetation structure & composition.
Habitat area	Area stable or increasing,	Area stable or increasing,	
Hydrological regime: Flooding depth/height of water table	Metres	Maintain appropriate hydrological regimes	
Vegetation structure: sward height	Centimetres	30-70% of sward is between 40 and 150cm in height	
Vegetation composition: broadleaf herb: grass ratio	Percentage	Broadleaf herb component of vegetation between 40 and 90%	
Vegetation composition: typical species	Number	At least 5 positive indicator species present	
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control- NB Indian balsam (<i>Impatiens glandulifera</i>), monkeyflower (<i>Mimulus guttatus</i>), Japanese knotweed (<i>Fallopia japonica</i>) and giant	

Attribute	Measure	Target	Potential Impact
		hogweed (Heracleum mantegazzianum)	

Table 20: Site specific conservation objectives for *Petrifying springs with tufa formation (Cratoneurion) (7220)

Attribute	Measure	Target	Potential Impact
Habitat area	Square metres	Area stable or increasing, subject to natural processes	The proposed decommissioning and rehabilitation works have the potential to impact these attributes (particularly water quality) in the event of major siltation events (resulting from the impact sources referenced in Section 2.9.1).
Habitat distribution	Occurrence	No decline. See map 6 for recorded location	
Hydrological regime: height of water table; water flow	Metres; metres per second	Maintain appropriate hydrological regimes	
Water quality	Water chemistry measures	Maintain oligotrophic and calcareous conditions	
Vegetation composition: typical species	Occurrence	Maintain typical species	

Table 21: Site specific conservation objectives for *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae (91E0))

Attribute	Measure	Target	Potential Impact
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 181.54ha for sites surveyed: see map 6	The proposed decommissioning and rehabilitation works will not impact the attributes outlined for this Annex I habitat; i.e. habitat distribution, woodland size and structure, hydrological regime and vegetation composition.
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 6	
Woodland size	Hectares	Area stable of increasing.	
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with	

Attribute	Measure	Target	Potential Impact
		semi- mature trees and shrubs; and well-developed herb layer	
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	
Hydrological regime: Flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	
Woodland structure: dead wood m ³ per hectare;	number per hectare	At least 30m ³ /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	
Woodland structure: veteran trees	Number per hectare	No decline	
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including ash (<i>Fraxinus excelsior</i>) alder (<i>Alnus glutinosa</i>), willows (<i>Salix</i> spp) and locally, oak (<i>Quercus robur</i>)	

Attribute	Measure	Target	Potential Impact
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non- native invasive species, absent or under control	

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

The impact pathways presented in **Table 22** to Qualifying Interests/Special Conservation Interests are examined in relation to each of the three European Sites under consideration, in order to evaluate the effect of Clonad Bog Decommissioning and Rehabilitation, if any, on the integrity of the River Barrow and River Nore SAC.

Table 22: 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 Barrow and River Nore SAC (Site Code 002162)	[1092] White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1096] Brook lamprey (<i>Lampetra planeri</i>) [1099] River lamprey (<i>Lampetra fluviatilis</i>) [1106] Atlantic salmon (<i>Salmo salar</i>) (only in fresh water) [1355] Otter (<i>Lutra lutra</i>) [3260] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	a) Indirect/ex-situ disturbance or displacement of species of Qualifying Interest. b) Indirect loss, reduction or degradation of aquatic habitats within the SAC and consequent effects to reliant aquatic species of Qualifying Interest c) Indirect/ex-situ mortality to species of Qualifying Interest.

3.2.1 Pressures and Threats of River Barrow and River Nore SAC

Threats and pressures published for the River Barrow and River Nore SAC are presented in **Table 23** below.

Table 23 – Threats and Pressures for River Barrow and River Nore SAC

Rank ¹¹	Threat Pressure ¹²	Inside (i) / Outside (o) / Both (b)
H	K01.01 - Abiotic (slow) natural processes - Erosion	i
M	B07 - Forestry activities not referred to above	b
M	C01.03 - Peat extraction	o
L	D03.01 - Port areas	i
H	H01 - Pollution to surface waters (limnic, terrestrial, marine & brackish)	b
H	J02.12.02 - Dykes and flooding defense in inland water systems	i

¹¹ Threat, pressure and impact ranking provided on Natura 2000 data form: H – High, M - Medium, L - Low

¹² Threat code sourced from Natura 2000 data form and follows reference list provided on threats, pressures and activities for European sites

Rank¹¹	Threat Pressure¹²	Inside (i) / Outside (o) / Both (b)
M	J03.02.01 - Reduction in migration/ migration barriers	i
L	A10.01 - Removal of hedges and copses or scrub	i
M	J02.02.01 - Dredging/ removal of limnic sediments	i
L	C01.01.01 - Sand and gravel quarries	b
M	J02 - Human induced changes in hydraulic conditions	b
H	A02.01 - Agricultural intensification	b
M	B02 - Forest and Plantation management & use	b
M	I01 - Invasive non-native species	i
L	F01.01 - Intensive fish farming, intensification	i
M	J02.06 - Water abstractions from surface waters	i
L	E02 - Industrial or commercial areas	o
M	A04.01.01 - Intensive cattle grazing	i
L	F02.01.02 - Netting	i
L	F02.03 - Leisure fishing	i
M	F02 - Fishing and harvesting aquatic resources	o
M	M01 - Changes in abiotic conditions	i
H	J02.05.02 - Modifying structures of inland water courses	i
M	B05 - Use of fertilizers (forestry)	b

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 (Indirect/ex-situ disturbance/displacement of species of Qualifying Interest). Potentially adverse impacts on aquatic habitats and water dependent species of Qualifying Interest are addressed under the treatment of Indirect loss, reduction or degradation of terrestrial or aquatic habitats within the SAC and consequent effects to reliant species of Qualifying Interest. Indirect/ex-situ mortality is only considered relevant in respect of Otter, as this is a volant species capable of entering the Clonad Bog site and utilising the attenuation ponds and adjacent watercourses.

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

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

3.3.1.1 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.

There are no known Otter holts at Clonad Bog or its environs, 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. 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 (such as the Daingean_010 Stream and its tributaries) 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.

Disturbance effects are more likely in respect of foraging or resting animals, ex-situ from the SAC, 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 drainage features present whilst not within an SAC boundary, are ultimately hydrologically connected to a downstream SAC which includes Otter as a Qualifying Interest.

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.

Although there are no known otter holts identified within Clonad Bog site, otter spraints were identified along the Daingean_010 watercourse located on the site's southern boundary. This section of the Daingean_010 watercourse provides suitable foraging and commuting habitat for otter and it is possible that otter may utilise the silt pond features located near the southern boundary of Clonad Bog. Therefore, there is the likelihood of otter disturbance during the proposed rehabilitation works, especially where these works are concentrated on or near silt ponds and the Daingean_010 watercourse near the site's northern and north-eastern boundaries.

In instances where this impact occurs outside or ex-situ the 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 Otter.

3.3.1.2 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 connected areas of the Figile and Barrow subcatchments.

The decommissioning and rehabilitation of Clonad Bog by BnM, which is within the River Barrow catchment, may result in likely significant/ potentially adverse effects on Otter.

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 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.

3.3.1.3 Stage 2 Evaluation

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

3.3.2 Indirect/ex-situ mortality to 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 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 Clonad Bog or its environs, 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.

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.

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 Clonad Bog Decommissioning and Rehabilitation.

Although there are no known otter were holts identified within Clonad Bog site, otter spraints were identified along the Daingean_010 watercourse located on the site's northern and north-eastern boundary. This section of the Daingean_010 watercourse provides suitable foraging and commuting habitat for otter and it is possible that otter may utilise the silt pond features located near the southern boundary of Clonad Bog. Therefore, there is the likelihood of otter mortality during proposed rehabilitation works, especially where these works are concentrated on or near silt ponds and the Daingean_010 watercourse.

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 downstream areas of River Barrow and River Nore SAC.

The decommissioning and rehabilitation of Clonad Bog by BnM, which is also within the River Barrow catchment, may result in likely significant/ potentially adverse effects on Otter.

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.

3.3.2.3 Stage 2 Evaluation

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

3.3.3 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 habitats and species of Qualifying Interest for the River Barrow and River Nore SAC located in the downstream sections of the River Barrow SAC that support indirect and remote hydrological connectivity (See **Table 10**). Deterioration in water quality within Clonad 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 Daingean_010 watercourse and further downstream to the Figile River. Siltation of the receiving watercourses could effect the in-situ and / or reliant QI species for the River Barrow and River Nore SAC such as Otter, Atlantic Salmon, River Lamprey, Brook Lamprey, White-clawed Crayfish and the following aquatic / water dependent habitats for the River Barrow and River Nore SAC; Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation (3260) Petrifying springs with tufa formation (Cratoneurion)* (7220) and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* (91E0). However, the nature of the proposed decommissioning and rehabilitation and the attenuation capacity of the

watercourses between Clonad Bog and the distribution of this species within the SAC means that there will be no potential impact of the proposed rehabilitation to this species.

Decommissioning and Rehabilitation (D&R) at Clonad Bog will require direct excavation of the banks and bed of the existing internal drainage channels (peat production 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.

Clonad Bog is hydrologically connected to the Daingean_010 and Figile_040 watercourse. The contributing catchment area where Clonad bog discharges into the Daingean_010 waterbody is c. 3.5km² which according to the FSU web portal is estimated to have a QMED¹³ of 0.39m³/s. This is greater than 38km upstream of the River Barrow and River Nore SAC. Where this river channel eventually enters the River Barrow and River Nore SAC the contributing catchment areas is c. 622 km² which according to the FSU web portal is estimated to have a QMED of 38.4m³/s. This demonstrates the substantial dilution rates achievable between the main discharge point from Clonad and the nearest downstream SAC.

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 that are achievable between Clonad Bog and the River Barrow and River Nore SAC, 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_010 and Figile_040 watercourses.

3.3.3.1 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 downstream aquatic QI habitats and species for the River Barrow and River Nore SAC. In addition, water quality effects due

¹³ QMED can be defined as the median of the Annual Maximum (Amax) series of a watercourse at a gauged location. The QMED is the flood with a return period of 2 years and is approximately equivalent to bankfull flow.

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 Barrow and River Nore SAC.

Given the substantial dilution rates that are achievable within the Daingean_010 and Figile_040 watercourses, 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_010 waterbody.

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 Clonad 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.

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

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

Stage 2 Evaluation

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

3.3.3.2 Alteration of flow regimes or changes to watercourse morphology

Alone

Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. In the absence of mitigation there is potential for 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 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 the Clonad 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 Clonad Bog could result in increased run-off of potential pollutants to the receiving watercourses; i.e. the Daingean and the Figile watercourses, both of which provide remote connectivity between the site and the River Barrow and River Nore 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 Figile River. 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 Figile River catchment, 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.

The decommissioning and rehabilitation of Clonad by BnM, which is also within the River Figile catchment and supports connectivity to the River Barrow main channel, 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.

Various sources of flow regime or water morphology related effects, with linkage to activities such as Agriculture or Turbary, within the SAC constitute activities requiring consent (ARC) of the minister and therefore are unlikely to result in in combination adverse effects, and notably are a substantial distance downstream. Where other projects with water morphology related effects fall under the planning code, they will be considered by the relevant local authority to determine if Appropriate Assessment/and or consented mitigation measures are required to offset potential adverse effects to European Sites. Therefore such projects are unlikely to result in in combination adverse effects.

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

Stage 2 Evaluation

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

3.3.3.3 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 SAC 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 rehabilitation / decommissioning 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 SAC watercourse it may result in adverse effects on QI's and Conservation objectives such as the resource status and favourable condition of QI habitat, by virtue of effects to structure and composition of QI habitat, an altered hydrological regime and through secondary effects on prey item species, affecting the supporting habitat quality for SCI Species.

In combination

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

The decommissioning and rehabilitation of Clonad by BnM, which is also within the River Barrow catchment, 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.

Various sources of vectors for the introduction of invasive species, with linkage to activities such as Agriculture or Turbary, within the SAC constitute activities requiring consent (ARC) of the minister and therefore are unlikely to result in in combination adverse effects - additionally these are a substantial distance downstream. Where projects with invasive species related effects fall under the planning code, they will be considered by the relevant local authority to determine if Appropriate Assessment/and or consented mitigation measures are required to offset potential adverse effects to European Sites. Therefore such projects are unlikely to result in in-combination adverse effects.

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

Stage 2 Evaluation

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

3.4 Mitigation Measures

3.4.1 Description of the measures

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.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- The proposed works will be restricted to daylight hours and there will be no requirement for artificial lighting.
- Silt ponds will be inspected and maintained as per the IPC Licence.
- During periods of heavy precipitation and run-off, works will be halted.
- Works will be carried out using a suitably sized machine and, in all circumstances, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.
- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
- Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- All waste will be sorted by the works crews, managed within the site in designated waste disposal facilities, and removed to a licenced waste facility, in line with BnM Standard operating practice.
- Vehicles will never be left unattended during refuelling.
- No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
- All plant refuelling will take place using mobile fuel bowsers. Only dedicated trained and competent personnel will carry out refuelling operations.

- All fuels required for machinery and equipment will be stored in a designated location, away from main traffic activity, at the nearest BnM Compound. All fuel will be stored in bunded, locked storage containers. Diesel or petrol fuel and mechanical oils will also be used by site vehicles.
- Mobile storage such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked. All pumps using fuel or containing oil will be locally and securely bunded where there is the possibility of discharge to waters.
- Potential impacts caused by spillages etc. during rehabilitation works will be reduced by keeping spill kits and other appropriate equipment on-site.
- Site works will be carried out in accordance with 'best practice'. In order to ensure compliance and implementation of 'best practice', these measures will be communicated to relevant Bord na Móna staff and updated as required.
- All waste water will be removed by a licenced waste contractor to a licenced waste water treatment facility.
- Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
 1. The land is waterlogged;
 2. The land is flooded, or it is likely to flood;
 3. The land is frozen, or covered with snow;
 4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann).
 5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- No fertiliser will be spread on land within 2 metres of a surface watercourse.
- Buffer zones in respect of waterbodies, as specified on <https://www.epa.ie/about/faq/name,57156,en.html>, will be adhered with at all times with regard to fertiliser application.

The below image / flow chart (**Figure 17**) provides Bord na Móna's proposed clean up procedures for fuel/oil and peat.

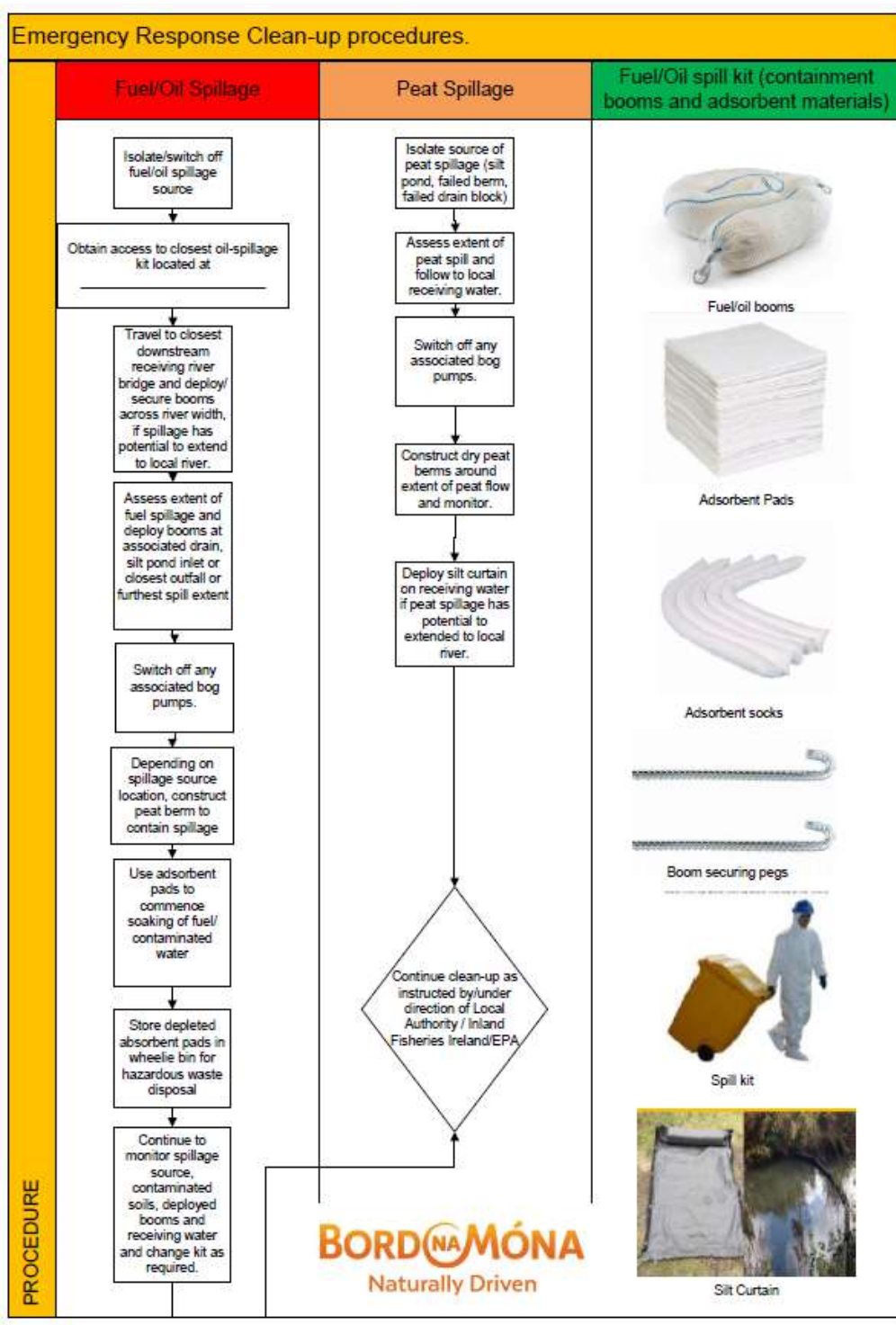


Figure 17: BnM Emergency Response Clean Up Procedures

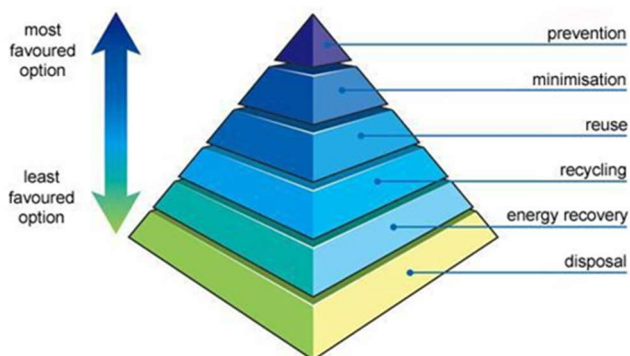
3.4.1.2 Best Practice Measures around the treatment of Waste

Condition 7 of the IPC licence for Peat Extraction at Clonad 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.

3.4.1.3 Best Practice & Biosecurity

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

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 Practice¹⁴ or for activities such as Sphagnum inoculation.
- Virkon Aquatic will be available as required.

3.4.1.4 Silt Ponds

Silt Ponds – 7 no. Silt ponds with a total volume of 14,214.22m³ and area of 0.7ha are in place at Clonad Bog and connected to the existing drainage network.

These silt ponds, already stipulated and in use as mitigation measures in respect of Peat Extraction under IPC license, will continue to function as the primary intervention in terms of sediment release to receiving waterbodies. Regular cleaning and reporting on same already forms part of annual (AER) reporting submitted to EPA. All Silt Ponds at Clonad Bog are currently compliant with EPA requirements. **Table 24** below, and **Figure 18** overleaf summarise and illustrate the onsite Silt Pond locations, the latter also illustrates the current flow

¹⁴ <https://www.biodiversityireland.ie/projects/invasive-species/crayfish-plague/>

regime within the main drainage network (into which any other drains also feed). Continued maintenance and reporting on same will be reported on annually until IPC license Surrender.

Table 24 Silt Ponds in use at Clonad Bog

Bog Name	IPC License Reference	Pond No.	Volume (m ³)
Clonad	503_01	4_20AB	1767.09
Clonad	503_01	2_20	1535.64
Clonad	503_01	2_18_19	2486.01
Clonad	503_01	19B	619.95
Clonad	503_01	18B	392.51
Clonad	503_01	1_18A19A	2092.77
Clonad	503_01	3_21_22	5320.25
		Total	14214.22

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 Barrow and River Nore 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 Clonad Bog the River Barrow and River Nore SAC.

Further detail is provided in this section on the proposed rehabilitation measures at Clonad Bog, particularly the provision of measures Deep Peat 4 (DPT4) and Deep Peat 5 (DPT5).

It is proposed to develop these measures across 46.3ha of the Clonad Bog site (See **Figure 12**, **Figure 13** 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.

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

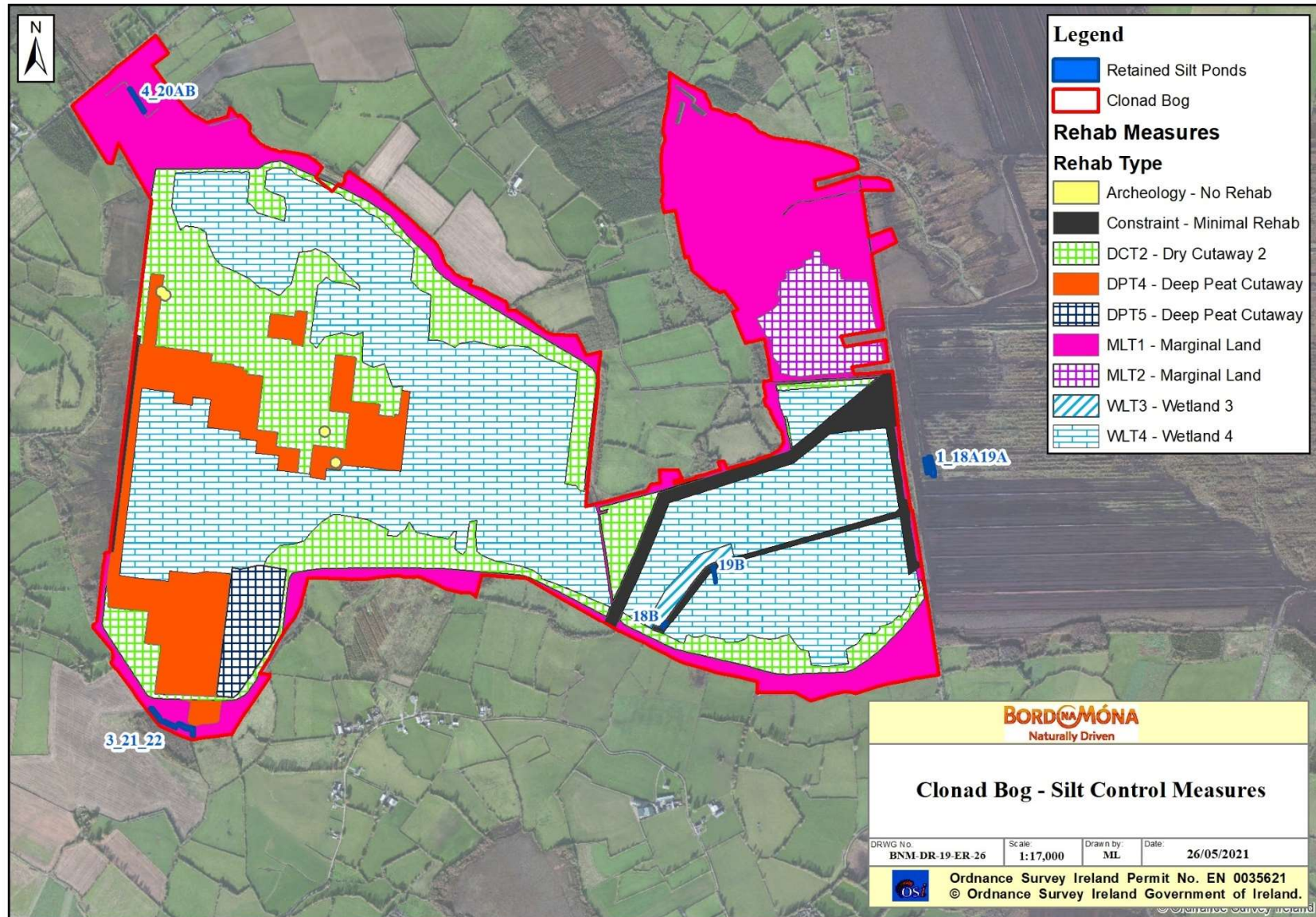


Figure 18: Clonad Site Silt Control Measures

3.4.1.5 Measures to avoid runoff when carrying out drain blocking

The principal mitigation for proposed rehabilitation works at Clonad Bog 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. 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.
- 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 Barrow and River Nore SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.6 Measures for cleaning Silt Ponds within EPA Blue line features

Cleaning of silt ponds integrated into or adjoining EPA Blue line features, will follow the below best practice measures.

- Cleaning of silt ponds will align with best practice measures, including BnM Standard Operating Procedures (SOPs) for works within and near watercourses, works with hydrocarbons, biosecurity measures when working at and different watercourses and waterbodies.
- Prior to cleaning of silt ponds on streams/rivers in any particular year, Inland Fisheries Ireland will be notified in advance.
- Cleaning of silt ponds will be completed under licence (following consultation with IFI) and in accordance with strict biosecurity measures. Cognisance of capture of non-target aquatic species (Crayfish, lamprey, small fish etc.) within the dredged material and the secure rescue and translocation of these species downstream of the pond cleaning works in line with IFI guidance. Silt ponds will be cleaned from the inlet point to the outlet point allowing fish and aquatic life to migrate downstream as the works progress. The silt pond cleaning works and species translocation efforts will be overseen by

a suitably qualified Ecologist/Ecological Clerk of Works/Environmental Supervisor and ongoing monitoring undertaken by the project ecologist.

- Prior to the commencement of the works, the excavator shall be inspected for invasive species. Should any be observed they should be removed and disposed off site to a licenced waste facility. The machine bucket and arm shall be treated with 1% Virkon Aquatic.
- 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.
- Retain vegetation on un-worked banks and avoid unnecessary scraping of silt pond margins and banks.
- The above will be overseen by a suitably qualified Ecologist/Ecological Clerk of Works.

It should be noted, that the silt pond network at Clonad 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 Clonad 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 Barrow and River Nore SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.7 Rehabilitation Design at Clonad Bog

Further detail is provided in this section on the proposed rehabilitation measures at Clonad Bog, particularly the provision of measures Deep Peat 4 (DPT4) and Deep Peat 5 (DPT5).

It is proposed to develop these measures across 46.3ha of the Clonad Bog site (See **Figure 12**, **Figure 13** 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 Clonad Bog are presented in **Figure 18**.

In addition to the above design principles and their inherent attenuation capacities, it is considered that the Daingean_010 watercourse and downstream Figile_040 afford substantial dilution rates. The contributing catchment area where Clonad bog discharges into the Daingean_010 waterbody is c. 3.5km² which according to the FSU web portal is estimated to have a QMED of 0.39m³/s. This is greater than 38km upstream of the River Barrow and River Nore SAC. Where this river channel eventually enters the River Barrow and River Nore SAC the contributing catchment areas is c. 622 km² which according to the FSU web portal is estimated to have a QMED of 38.4m³/s. This demonstrates the substantial dilution rates achievable between the main discharge point from Clonad and the nearest downstream SAC.

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 Daingean and Figile watercourses, 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.

3.4.1.8 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.
- Silt pond cleaning (See **Section 3.4.1.6**) will be monitored by a suitably qualified Ecologist/Ecological Clerk of Works to ensure that there is no disturbance or mortality to otter. This will involve an initial walkover survey / check of the silt pond feature prior to commencement of the cleaning works.
- No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work will not take place within 15m of such holts, except under license.
- The prohibited area associated with otter holts, should they be located in confirmatory surveys, will, where appropriate, be protected from any inadvertent disturbance from any works or personnel occurring nearby such as at a silt pond and declared as 'Ecology Restriction Zone' with no mention of otters to any onsite staff.
- Appropriate awareness of the purpose of the excluded area will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each possible access point. All contractors or operators on site will be made fully aware of the procedures pertaining to Ecology Restriction Zones and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
- All construction works will be carried out during daylight hours.
- All works will be carried out and completed in compliance with Bord na Mona's Standard Operating Procedure for otter (**Appendix G**).

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

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

- Maintenance of peripheral drains and where required, provision of additional drains, 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 first and foremost to avoid flooding of adjacent lands where hydraulic gradients may exist, but secondarily mitigates negative quality effects on watercourses in the receiving environment (from addition nutrient run-off along flooding pathways), and hence downstream connected European Sites (River Barrow and River Nore SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.10 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 (River Barrow and River Nore SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.11 Mitigation to Prevent 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 details on berm design and mitigation incorporated into berm design is provided in **Appendix E - Engineering and Rehabilitation Design Specification**.

- 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 17** 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 Barrow and River Nore SAC) and their nutrient sensitive and water dependent habitats and species of Qualifying Interest.

3.4.1.12 Flood Risk at Clonad Bog

The CFRAM maps show that there is an area to the north of the study area that is at risk of flooding from the Daingean_010 although the bog itself is not. **Figure 19** replicates the flood risk map from the accompanying Drainage Management Plan for Clonad Bog.

There is no significant fluvial flood risk to the bog from the Daingean_010 and Figile_040 watercourses. It should be noted this analysis did not consider the fluvial flood risk from the smaller watercourses. Historical anecdotal evidence was reviewed to ascertain if there are any known flooding or drainage issues from these smaller watercourses to the bog or adjacent land. No drainage issues have been identified along the Clonad Bog boundary drains. Data from the 2015/16 flood event and observations from Bord na Móna indicate surface water flooding to the eastern part of the bog which is consistent with what has been observed by Bord na Móna (See **Figure 19**).

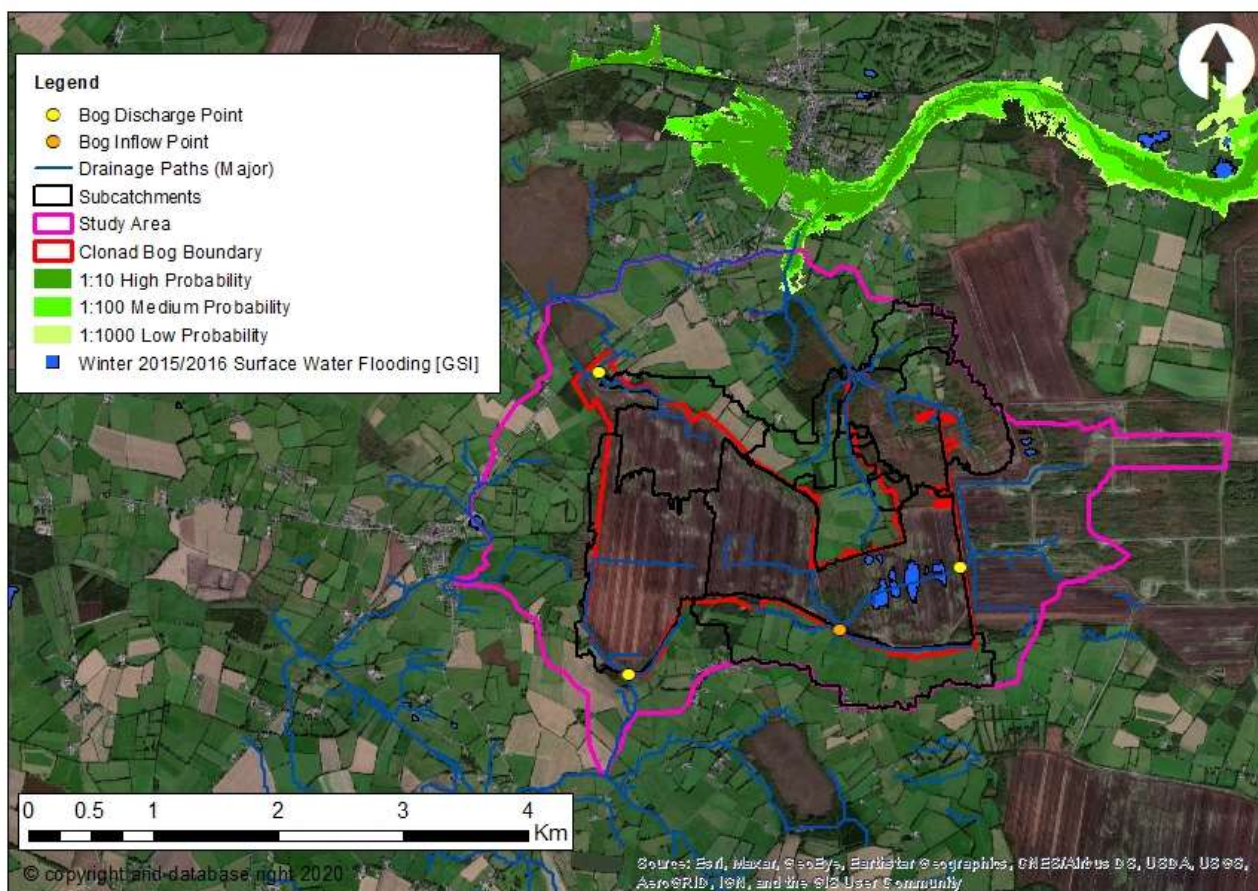


Figure 19: Flood Risk Analysis for Clonad Bog

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. An Environmental Management Plan (EMP) has also been prepared for the proposed works (See **Appendix F**).

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)¹⁵

- 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

¹⁵<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)**¹⁶

- 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)¹⁷;
- NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2010)¹⁸;
- Managing Invasive Non-native Plants in or near Freshwater, Environment Agency (2010)¹⁹;
- Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*, Invasive Species Ireland (2015);
- IFI Biosecurity Protocol for Field Survey Work, Inland Fisheries Ireland (2010)²⁰.

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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¹⁶ Available from <https://www.ciria.org/>

¹⁷ <http://cfins.scrf.co.uk/wp-content/uploads/2014/06/2013-code-of-practice.pdf>

¹⁸ <https://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf>

¹⁹ <https://www.midsussex.gov.uk/media/1725/managing-invasive-non-native-plants.pdf>

²⁰ <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 Culverts²¹.
- 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 Clonad 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:

- 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

²¹<https://www.gov.ie/en/publication/957aa7-consent-requirements-constructionalteration-of-watercourse-infrastru/>

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. Where required, additional composite samplers may be place, with an intensive additional monitoring regime required as part of IPC license surrender.
- 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 Clonad Bog Decommissioning and Rehabilitation on the Integrity of the European Sites under consideration

Using the checklist in the **Table 25** below, the proposed Clonad 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 25: Integrity of European Site checklist

<i>Does the project or plan have the potential to: Yes/No</i>	River Barrow and River Nore SAC (Site Code 002162)
- cause delays in progress towards achieving the conservation objectives of the site?	No
- interrupt progress towards achieving the conservation objectives of the site?	No
- disrupt those factors that help to maintain the favourable conditions of the site?	No
- interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	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
- interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No
- reduce the area of key habitats?	No
- reduce the population of key species?	No
- change the balance between key species?	No
- reduce diversity of the site?	No
- result in disturbance that could affect population size or density or the balance between key species?	No

3.6 Conclusion

This Natura Impact Statement has been prepared to provide sufficient objective scientific information in support of the proposed bog rehabilitation works, 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 Clonad 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 rehabilitation works evaluated that the potential for significant effects on the Qualifying Interests of one European Site could not be excluded; i.e. River Barrow and River Nore SAC. In particular, the potential for indirect effects to downstream aquatic QI habitats and species via a deterioration in water quality and ex-situ disturbance and mortality to otter, a volant QI species of this SAC.

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, there is the potential for:

- Impacts through the release of silt laden surface water to downstream water dependent and nutrient sensitive habitats and species of Qualifying Interest of the River Barrow and River Nore SAC.
- Mortality, disturbance and / or displacement of the ex-situ otter populations associated with the River Barrow and River Nore SAC.

To restrict the above impact pathways, the key protective measure relates to the retention of silt laden water and potentially deleterious materials associated with the decommissioning and rehabilitation works to the project footprint. 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 for 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 Clonad Bog, the River Barrow and River Nore SAC. Other key mitigation measures include the standard best practice environmental control measures, bespoke mitigation measures to avoid berm failure, the utilisation of existing surface water management infrastructure and the provision of further bespoke surface water management, mitigation measures and rehabilitation measures. Finally, It is proposed to develop these measures across 46.3ha of the Daingean Bog site (See **Figure 12**, **Figure 13** 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, the rehabilitation features will act as a source of surface water retention and attenuation on site, further mitigating the risk of run-off from the bog rehabilitation site to the receiving environment. The development of the proposed decommissioning and rehabilitation measures, coupled with best practice design measures and bespoke mitigation measures will ensure that potential impact magnitude will be low and not significant and will not provide baseline impacts upon which synergistic effects from downstream projects and plans may result. In addition to the above design principles and their inherent attenuation capacities, it is considered that the receiving hydrological catchment and its associated watercourses (Daingean_010 and Figile_040) afford substantial dilution rates. 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_010 and Figile_040 watercourses.

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 rehabilitation works 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 Clonad 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 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 was further considered to consider all European Sites potentially connected via environmental vectors, 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 Clonad Bog, as required. There is a total of 7 European sites located within the project zone of consideration:</p> <ul style="list-style-type: none"> - River Barrow and River Nore SAC (002162) 11.6km south and 38.9km downstream - Raheenmore Bog SAC (000582) 6.0km north - Charleville Wood SAC (000571) 12.7km west and 14.5km downstream - Split Hills and Long Hill Esker SAC (001831) 12.0km north-west - Mountmellick SAC (002141) 14.3km south - River Shannon Callows SAC (000216) 42.7km west and 53km downstream Middle Shannon Callows SPA (004096) 42.7km west and 53km downstream
<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 Allen bog group (Ref. P0503-01). 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 Allen bog group. Clonad Bog is located 1.7km south of Daingean, Co. Offaly.</p> <p>A document titled ‘Clonad Bog Cutaway Bog Decommissioning and Rehabilitation Plan 2021’ has been prepared specifically to describe the proposed decommissioning and rehabilitation measures at Clonad Bog as appended to this document as Appendix B.</p> <p>Purpose: The decommissioning and Rehabilitation of Clonad Bog as required under IPC license.</p>
<i>Is the Project or Plan directly connected with or necessary to the</i>	No

Finding of No Significance Effects Report	
<i>management of the site (provide details)?</i>	
<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 small residential and agricultural developments, extensions, alterations 8 Local and Regional Amenity Developments 9 Development Plans
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>	<ul style="list-style-type: none"> - Disturbance of QI species using downstream sections of the Daingean and Figile watercourses and consequently downstream sections of the River Barrow and River Nore SAC. - Indirect effects to downstream sections of the Daingean and Figile watercourses (and their associated aquatic habitats and species) as a result of run-off to receiving watercourses (such as siltation, hydrocarbons etc.) and further downstream to River Barrow and River Nore SAC.
<i>Explain why these effects are not considered significant</i>	<p>Following examination and analysis, and taking account of the protective measures proposed, the proposed rehabilitation works were found not to result in adverse effects due to the standard and targeted protective measures, in particular the attenuation and control of surface water run-off from the bog site to the surrounding and receiving environment.</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 Barrow and River Nore 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</p>

Finding of No Significance Effects Report			
	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 Clonad Bog and the River Barrow and River Nore SAC.		
Name of Agency or Body Consulted	Summary of Response		
NPWS	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. Due cognisance was also given to information available on the NPWS website at: https://www.npws.ie/development-consultations# .		
Data Collected to Carry out the Assessment			
<i>Who carried out the assessment</i>	<i>Sources of Data</i>	<i>Level of assessment completed</i>	<i>Where can the full results of the assessment be accessed and viewed</i>
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.

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

Appendix C Site Synopses

Appendix D Drawings of Proposed Rehabilitation Methodologies

Appendix E Engineering and Rehabilitation Design Specification

Appendix F Environmental Management Plan

Appendix G Standard Operating Procedure for Otter