Draft Rehabilitation Plan

2017

Cornafulla Bog

This rehabilitation plan is developed under Condition 10 of IPC Licence Ref. 503 (April 2017). It outlines measures that will provide for stabilisation of the bog area upon cessation of peat production and decommissioning of the site. ***Rehabilitation*** *generally comprises natural colonisation with or without targeted management.* ***After-use*** *involves the development of cutaway peatland into other land-uses. Rehabilitation can be incorporated into after-use development (e.g. Mountlucas Windfarm). Bord na Móna has focused after-use development of cutaway bogs into forestry, agriculture, grassland, amenity and biodiversity, (Lough Boora Discovery Park) and commercial industrial development (Drehid Resource Recovery, renewable energy – Mountlucas Windfarm). This rehabilitation plan* ***does not*** *outline future after-use development for Cornafulla Bog. The general after-use strategy of Bord na Móna is outlined in the Bord na Móna Strategic Framework for Future-Use of Cutaway Bogs 2011. Any consideration of future after-uses for Cornafulla Bog such as amenity, developments or mixed uses will be conducted following the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.*

Rehabilitation of industrial peatlands is a key objective of the Bord na Móna Biodiversity Action Plan 2016-2021. This action plan outlines the main objectives and actions around biodiversity on Bord na Móna lands.

Draft Rehabilitation Plan			
Bog Name:	**Cornafulla**	**Area (ha):**	465 ha
Works Name:	Blackwater	**County:**	Roscommon
Author(s):	BnM Ecology Team	**Survey/ Monitoring Date(s):**	8th March 2012
Maps:	Habitats Map, Potential Future Habitats Map, Landuse Map		

- **Review status:** Reviewed Spring 2017.

Background

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. 502). 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. Cornafulla Bog is part of the Blackwater bog group.

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

- criteria which define the successful rehabilitation,
- consultation to date with interested parties,
- main issues for rehabilitation,
- proposed rehabilitation programme,
- proposed timeframe to implement this programme, and,
- associated aftercare, maintenance and monitoring.

The basis for the proposed approaches and implementation is the experience gained in 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (see reference documents).

Scope

The scope of the rehabilitation plan seeks to address issues of concern as identified by Bord na Móna and the consultees. The key issues identified so far (pre-consultation) are:

- Categorisation of the habitats developing on Cornafulla Bog (outlined in Appendix I & II)
- Environmental stabilisation of the former peat production areas
- Maintenance of drainage and silt control through the site
- Remediation of water courses where necessary *(decommissioning)*
- The timeframe for cutaway bog rehabilitation
- The impact of the other potential developments on the site and rehabilitation plan

List of consultees to date

Open consultation with range of stakeholders at annual BAP review days 2010-2017.

This rehabilitation plan remains a draft plan until formal consultation is carried out with relevant stakeholders.

The Blackwater Bogs

Cornafulla is one of a cluster of bogs that has developed along the floodplains of the River Shannon. It is one of a group within the Blackwater bog group. This group of bogs vary in terms of peat depth remaining, as many of the sites were brought into industrial peat production at different stages during the past forty years.

Site description

Cornafulla is located approximately 8.5km south-west of Athlone (south of the R446 Old Athlone to Ballinasloe road). The site has been in active industrial peat production since 1987. Clooniff Bog is located less than 1km to the south of Cornafulla Bog. The majority of the site is managed for active peat production and is classed as bare peat. Cornafulla is divided into two main sites, a smaller section to the west and a larger section to the east. A small works area is located between the two sections of bog.

The majority of Cornafulla contains in excess of 2.5m of peat remaining on the site, the majority of the peat is red or *Sphagnum* peat and is underlain with a mixture of gravel and shell marl. The south eastern corner of the site contains an area of high bog that is currently in development. Two pumps have been installed on the site.

There are sections of remnant high bog (PB1) located at the margins of the site that still retains typical raised bog features. These sections have become degraded over time as a result of activities associated with drainage and burning. The bog is generally soft underfoot. A power line runs along the eastern boundary of the largest section of the site over an area ofof high bog.

A railway line connects the site with Clooniff to the south.

Overall this site is in full peat production and the majority of the site has been mapped as bare peat with no vegetation on the main section of the site.

See Appendix I for more detail on site, habitats and local features.

Current peat production programme, land-use and proposed BnM developments

- Cornafulla has been managed for industrial peat production since 1987. At the time the ecological survey was undertaken, the majority of the site was in active peat production with no areas zoned as cutaway.
- A section of the site in the south-east corner has been in bog development for peat production for some time. This area has now been taken out of peat production.
- The majority of Cornafulla has in excess of 2.5 m of peat according to the peat depth 2012 survey. It is anticipated that industrial peat production will continue at Cornafulla Bog into the future, depending on future milled peat resource requirements.

Other considerations

- **Cessation of peat production**. Bord na Móna announced in 2015 that peat production for the generation of electricity was to cease by 2030 (http://www.bordnamona.ie/wp-content/uploads/2016/01/Sustainability_Statement_2015.pdf). Industrial peat production (with regard to all appropriate regulations) to supply other customers or sectors (e.g. horticulture) may continue after this date.
- **Peat extraction regulations**. New regulations for the extraction of peat are currently being drafted by government. Peat extraction on sites greater than 30 ha will be regulated through IPC licencing administered by the EPA. This draft rehabilitation plan has been prepared under the conditions of the original IPC licence.
- **Bord na Móna infrastructure**: There are still travel paths and drainage channels maintained around the site for access and drainage of industrial peat production areas. A rail line also runs through the site.

Decommissioning of this infrastructure is dependent on the general cessation of industrial peat production for supply of peat to West Offaly Power.

- **Re-wetting potential**: Cornafulla Bog has a pumped drainage system. Water pumps are located within the site; a re-wetting assessment of the site will be required to determine any impacts on the site and adjoining lands. Bogs with pumped drainage are more likely to develop wetland habitats when industrial peat production ceases.
- **Private sod peat production**: there is no active cutting ongoing.

Key biodiversity features of interest (2017)

- Teal present in numbers at silt ponds located within the site (possible breeders).
- Records of Hen Harrier hunting over the southern boundary of the site.
- Area of relatively wet bog formerly in development for peat production. This area will be restored in the future.

Current ecological rating (Local Importance (higher value) and (lower value) *following NRA (2009) Guidelines*)

The majority of the site is rated as **Locally important (lower value)** due to the dominance of bare peat. Cutaway habitats are poorly developed at present, however, habitats such as Raised Bog (PB1) located along marginal areas are deemed to be of **Local Importance (higher value)**. .

Criteria defining successful rehabilitation

- The main criteria are stabilisation of the former industrial peat production area and mitigation of potential silt run-off.

Cornafulla bog is a relatively young production bog that comprises relatively deep peat reserves in parts. Natural colonisation is likely to form the basis for the stabilisation of the current production area in the future when it comes out of production. Former production bog had previously re-vegetated naturally before being re-developed for active milled-peat production again, so it would be expected that the active production areas would develop in a similar manner.

The majority of the site is in active industrial peat production supplying fuel peat. When industrial peat production at the site has ceased, a baseline ecology survey will be carried out to determine the status of natural colonisation, the potential for targeted re-vegetation and/or rewetting and the future development at the site to ensure stabilisation of the future cutaway. Two likely scenarios are possible, both which will result in sustainable development of the site:

Scenario 1: Upper peat layers removed, significant acidic peat remaining. If this is the outcome upon cessation of industrial peat production, there will be an assessment of the site to block drains and promote re-establishment of more typical bog communities such as *Sphagnum* (embryonic bog communities). This is only possible where an acidic layer of peat remains in situ and where the water level of drains can be returned to the surface of the peat. This would require a level survey and a comprehensive drain blocking regime.

Scenario 2: Fuel peat removed, alkaline peat exposed. In this instance, it is likely that the current production areas will revert to more alkaline poor fen/wetland communities and/or Birch dominated scrub. The development of such communities will depend on the depth of remnant peat and potential to rewet the site.

In both scenarios, best practice will be employed to ensure stabilisation of the former production areas. It is likely that Scenarios 1 and 2 will apply to different parts of the bog when production ceases.

- At this point in time, due to the depth of peat remaining, Scenario 1 is chosen as the basis for rehabilitation provisioning for the site. In Scenario 1, a proportion of (~10%) the site is expected to develop as woodland and scrub, ~30% has the potential to develop as wetlands and ~57% has the potential to develop as embryonic raised bog communities on deeper peat, with the reminder being other habitats.

- No active rehabilitation is anticipated for any of the remnant raised bog around the margins of the site as these areas are still being used for private sod peat cutting or are too small for any active raised bog restoration and will be allowed to develop naturally.
- Rehabilitation of watercourses and silt ponds where possible.

Proposed Rehabilitation programme

Short-term (0-2 years)

- The most sustainable management option for un-vegetated areas within the site is to allow continued natural re-colonisation of the site.
- Significant bare peat areas through the site and the progress of natural re-colonisation of the cutaway areas will be monitored.
- Assess potential for drain-blocking and bog restoration in the former development bog area.

Short-term (0-2 years) (when production ceases)

- All stock-piles should be removed from the site as part of the decommissioning phase of industrial peat production operations. Any remaining or old stockpiles should be bulldozed and levelled as part of the rehabilitation/decommissioning process.
- Blocking the outfalls and field drains and decommissioning the pumps will allow low lying areas within the site to rewet and thus facilitate the creation of wetlands. The potential to enhance wetland development through drain-blocking will be re-assessed at this stage and active measures carried out where appropriate (drain and/outfall blocking).
- While natural colonisation is expected to proceed almost immediately once industrial peat production ceases, there will be a determination of extent of bare peat and selection of best measures to accelerate re-vegetation (if necessary).
- Re-vegetation measures will be carried out as soon as possible post peat production. These will be monitored to determine effectiveness and success.

Medium-term

- ***T***argeted active management such as seeding of a nursery crop or use of fertiliser to help promote natural re-colonisation (see Drumman Rehabilitation Trials) will be carried out, if natural re-colonisation of significant bare peat areas within the active production areas has not progressed satisfactorily at this stage.
- The effect of any targeted active management will continue to be monitored and further work determined.

Long-term

- This phase will follow on from cessation of industrial peat production in adjacent bogs.
- Monitoring of the site to ensure stabilisation and complete re-vegetation.
- Decommissioning of silt-ponds will be assessed.
- Assess requirements for decommissioning of pumps and BnM railway on the site.
- Evaluate success of short-term rehabilitation measures outlined above and enhance where necessary (to be determined by selected short-term management above).
- Reporting to the EPA will continue until the IPC License is surrendered.

Timeframe for rehabilitation

Short-term (2017-2019

- Monitor re-vegetation of the cutaway area and assess requirements of targeted active management of the bare peat areas using fertiliser/nursery crop treatments.
- On-going monitoring of the overall site.

Long-term

- Long-term monitoring of the site to ensure stabilisation (based on outcome of previous assessments)
- This phase will follow on from cessation of industrial peat production in adjacent bogs.
- Continued monitoring and planning will take place to assess further rehabilitation requirements at Cornafulla taking account of ongoing peat-production on the site and new areas of cutaway, including potential for wetland development, ongoing natural colonisation of the production areas (when production ceases).
- Reporting to the EPA will continue until the IPC License is surrendered.

After-care and maintenance

- There will be annual assessments of the site to determine the progress of the rehabilitation work and requirements for further enhancement measures.
- It is not expected that there will be any requirement for after-care and maintenance other than ecological monitoring.
- Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties and subject to relevant planning regulations. Other after-uses can be proposed for licensed areas and must go through the appropriate assessment and planning procedures.

Potential future natural habitats on the site

This section attempts to predict the development of natural habitats on the site, assuming current land-use and known after-use plans for the cutaway (development etc). This prediction is based on research and methods used to predict the natural vegetation of Ireland (Cross, 2006). Cross (2006) predicted that cutaway bog is likely to develop a mosaic of Birch forest, alder and ash-alder carr, fen and heath in the future. There is no time-line given for the development of these habitats, although it could be expected that the development of natural climax habitats could take hundreds of years. The complexity is the result of small scale variations in the substrate and other environmental factors such as drainage and ground-water influence.

- The remnant sections of raised bog along the edges of the site are likely to remain and degraded raised bog (PB1).
- Large sections of the site contain deep acidic peat. These areas would be expected to develop wet heath (HH3).
- Large sections of the site are likely to develop a wetland mosaic (mixture of open water, fen and wet woodland).
- The remnant sections of raised bog along the edges of the site are likely to remain and degraded raised bog (PB1).
- Dry species poor Birch woodland (WN7) is likely to develop along the edges of the site.
- The travel path to the south of the site would be expected to develop a wetland mosaic dominated by reed beds and wet Willow woodland.
- Some remnant areas of high bog (PB1) unused by private sod-peat cutters could be expected to remain open but dry Heather-dominated habitats, with some sections developing Birch woodland (WN7) and dry heath mosaics.
- Cutover bog (PB4) is likely to develop Birch woodland (WN7) in the long-term, depending on land-use.

Budget and costing

- It is anticipated that the majority of the rehabilitation at this site will be through natural re-colonisation. Some preliminary budgeting can be carried out assuming that approximately 57% of the site is likely to have relatively deep peat remaining upon cessation of industrial peat production with the potential for enhancement of embryonic bog communities though a more intensive drain-blocking regime, and approximately 30% of the site will be developed as wetlands with some active management required to block outfalls to enhance re-wetting. The allocated rehabilitation provision will be based on this estimate.
- Note: Any rehab provision and costs is based on area allocation of various habitats, dryland mosaic, wetland and deep peat. Budgets are relative to rehabilitation measures agreed and the habitats targeted for rehab or present on the site

Appendix I

Ecological Survey Report

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

Bog Name:	**Cornafulla**	**Area (ha):**	465ha
Works Name:	Blackwater	**County:**	Roscommon
Recorder(s):	DF	**Survey Date(s):**	8th March 2012

Habitats present (in order of dominance)

The most common habitats present at this site include:

- Bare peat (BP) (Codes refer BnM classification of pioneer habitats of production bog. See Appendix II).
- Pioneer poor fen communities dominated by Soft Rush (pJeff)
- Pioneer dry heath communities (dHeath)
- Emerging Birch scrub (eBir)
- Silt Ponds (Silt) with associated habitats such as scrub, Bracken, rank grassland (GS2), dry calcareous grassland (gCal) and typical pioneer communities of disturbed areas (disTuss).

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

- Birch woodland (WN7) (Codes refer to Heritage Council habitat classification, Fossitt 2000), See Appendix II)
- Scrub (WS1) (Gorse scrub and Birch scrub developing of dry high bog around margins)
- Raised bog (PB1)
- Cutover bog (PB4) (several small fragments)
- Wet grassland (GS4) along the edges of the site.

Description of site

Cornafulla is located approximately 8.5km south west of Athlone (south of the R446 Old Athlone to Ballinasloe road). The site has been managed for active peat production since 1987. Clooniff Bog is located less than 1km to the south of Cornafulla. The majority of the site is in active peat production and is classed as bare peat. Cornafulla is divided into two main sites, a smaller section to the west and the largest section to the east. A small works area is located between the two sections of bog.

The majority of Cornafulla contains in excess of 2.5m of peat remaining on the site, the majority of the peat is red or Sphagnum peat and is underlain with a mixture of gravel and shell marl. The south eastern corner of the site contains an area of high bog that is currently being drained in order to begin industrial peat production in the area. Two pumps are to be installed on the site in 2012.

Sections of remnant marginal high bog (PB1) located at the margins of the site still retains typical raised bog features. These sections are degraded through drainage and burning. There are still some pools present that contain *S. cuspidatum*, but these show signs of degradation and are sunken in appearance. The bog is generally spongy underfoot. Other *Sphagnum* species include *S. capillifolium*, which is frequent, and *S. subnitens*. Some *S. magellanicum* was also recorded. Much of this *Sphagnum* re-growth is probably as a result of the disturbance from surrounding drainage and peat production, and surface water features supplying nutrients. A power line runs along the eastern boundary of the largest section of the site and has been installed on the high bog.

A railway line connects the site with Clooniff to the south.

Overall, this site is in full peat production and the majority of the site has been mapped as bare peat with no vegetation on the main section of the site.

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

None

The River Shannon SAC (NPWS site code: 000216) is located within 200m of the southern section of the site.

Adjacent habitats and land-use

Adjacent habitats include lowland depositing river (FW2), wet grassland (GS4), improved agricultural grassland (GA1), cutaway bog (PB4) and raised bog (PB1).

Watercourses (major water features on/off site)

- All drains on the site drain towards the River Shannon.
- The River Shannon is located within 200m of the southern boundary of the site.

Peat type and sub-soils

The majority of the site has in excess of 2.5m of peat remaining. Cornafulla has only been in active peat production since 1987, which is young in terms of production bog. The peat on site is mostly red of Sphagnum peat.

Fauna biodiversity

Birds

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

- Hen Harrier
- Kestrel
- Teal (may be breeding in the silt ponds towards the south of the site).
- Other more common species include Robin, Rook, Grey Crow and Wood Pigeon.

Mammals

Signs of several mammal species were noted on the site during the survey.

- Fox
- Badger

Other species

Frog spawn in drains

References

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

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

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

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

Appendix II. Codes used for habitat classification.

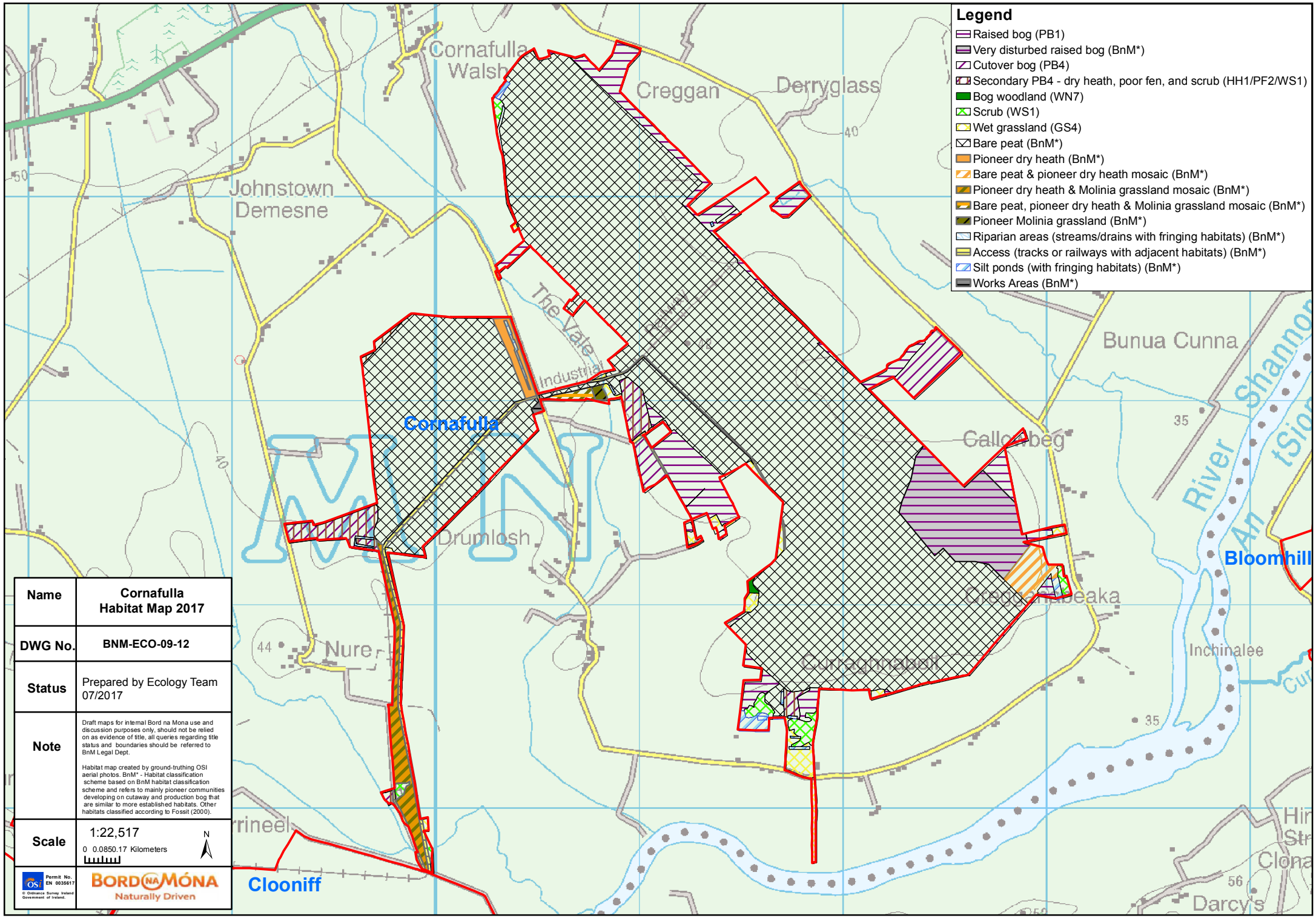
Bord na Mońa habitat classification scheme

	General	Vegetation community [1]	BnM habitat code	Equivalent Heritage Council codes [2]
Pioneer habitats of industrial cutaway	Peatland	Bare peat (0-50% cover)	BP	ED2
		Embryonic bog community (containing *Sphagnum* and Bog Cotton)	PBa	PB
		Embryonic bog community (Calluno-Sphagnion)	PBb	PB
	Flush and Fen	Pioneer *Campylopus*-dominated community	pCamp	PF2
		Pioneer *Juncus effusus*-dominated community (Soft Rush)	pJeff	PF2
		Pioneer *Eriophorum angustifolium*-dominated community (Bog Cotton)	pEang	PF2
		Pioneer *Juncus bulbosus*-dominated community (Bulbous Rush)	pJbulb	PF2
		Pioneer *Triglochin palustris*-dominated community (Marsh Arrowgrass)	pTrig	PF2
		Pioneer Caricion davallianae-Community with *Cladium* (rich fen)	pCladium	PF1
		pioneer *Schoenus nigricans* community (rich fen)	pSchon	PF1
		pioneer *Carex viridula*/brown moss community (rich fen)	pVir	PF1
	Emergent communities	Pioneer *Carex rostrata*-dominated community (Bottle Sedge)	pRos	PF2/FS1
		Pioneer *Phragmites australis*-dominated community (Common Reed)	pPhrag	FS1
		Pioneer *Typha latifolia*-dominated community (Reedmace)	pTyp	FS1
		Pioneer *Schoenoplectus lacustris*-dominated community (Bulrush)	pSch	FS1
	Open water	Charaphyte-dominated community	pChar	FL2
		Permanent pools and lakes	OW	FL2
		Temporary open water	tOW	
	Woodland and scrub	Emergent *Betula*/*Salix*-dominated community (A) (Birch/Willow)	eBir	WS1
		Open *Betula*/*Salix*-dominated community (B) (Birch/Willow)	oBir	WS1
		Closed *Betula*/*Salix*-scrub community (C) (Birch/Willow)	cBir	WS1
		Ulex europaeus-dominated community (Gorse)	eGor	WS1
		Betula/*Salix*-dominated woodland (Birch/Willow)	BirWD	WN7
	Heathland	Pioneer dry *Calluna vulgaris*-dominated community (Heather)	dHeath	HH1
		Dense *Pteridium aquilinum* (Bracken)	dPter	HD1
	Grassland	Pioneer dry calcareous and neutral grassland (Centaureo-Cynosuretum)	gCal	GS1
		Dactylis-Anthoxanthum-dominated community (Cocksfoot-Sweet Vernalgrass)	gCo-An	GS2
		Anthoxanthum-Holcus-Equisetum community (Sweet Vernalgrass-Yorkshire Fog-Horsetail)	gAn-H-Eq	GS
		Molinia caerulea-dominated community (dry) (Purple Moorgrass)	gMol	GS4
		Marsh (Meadowsweet and other tall herbs) (Filipendulion ulmariae)	Mar	GM1
	Disturbed	*Tussilago farfara*-dominated community (vegetation > 50%) (Colt's Foot)	DisCF	ED3
		Epilobium-dominated community (vegetation > 50%) (Willowherb spp.)	DisWil	ED3
	General	Riparian areas (streams or drain with associated edge habitats (e.g. FW2/4 + WS1, GS2 etc)	Rip	FW2 +
		Silt Ponds (artificial ponds with associated bank habitats (e.g. FL8 + WS1, GS2, ED2, ED3)	Silt	FL8 +
		Access (tracks or railways with associated edge habitats (e.g. BL3 + gCal, gMol, eGor etc)	Acc	BL3 +
		Works areas (predominately built land but can include landscaped and brownfield habitats (e.g. GA2, WS3, WD4, ED2, ED3)	Works	BL3 +

[1] These are generally pioneer habitats of bare peat and the communities can contain a significant proportion of bare peat. Some habitats are more developed than others. They frequently occur in mosaic with each other.
[2] Not all these communities are equivalent to habitat classes used by The Heritage Council habitat classification scheme (Fossitt 2000) as some are quite rudimentary and undeveloped.

Heritage Council habitat classification scheme (Fossitt 2000)

	General	Habitat	Heritage Council code
Semi-natural and modified habitats	Peatlands	Raised Bog	PB1
		Lowland Blanket bog	PB3
		Cutover Bog	PB4
		Rich fen and flush	PF1
		Poor fen and flush	PF2
		Transition mire and quaking bog	PF3
	Woodland and scrub	Oak-Birch-Holly woodland	WN1
		Oak-Ash-Hazel woodland	WN2
		Wet Pendunulate Oak-Ash woodland	WN4
		Riparian Woodland	WN5
		Wet Willow-Alder-Ash woodland	WN6
		Bog woodland	WN7
		Mixed broad-leaved woodland	WD1
		Mixed broad-leaved/conifer woodland	WD2
		Conifer plantation	WD4
		Scrub (Gorse)	WS1
		Emergent Betula-dominated community	WS1
		Closed Betula scrub community	WS1
		Recently-planted woodland	WS2
		Ornamental scrub	WS3
		Short-rotation coppice	WS4
		Recently-felled woodland	WS5
	Linear woodland	Hedgerow	WL1
		Treeline	WL2
	Grasslands and Marsh	Improved grassland	GA1
		Amenity grassland	GA2
		Dry calcareous and neutral grassland	GS1
		Dry meadows and grassy verges	GS2
		Dry-humid acid grassland	GS3
		Wet grassland	GS4
		Freshwater Marsh	GM1
	Heath and Bracken	Dry Heath	HH1
		Dry calcareous Heath	HH2
		Wet Heath	HH3
		Dense Bracken	HD1
	Disturbed ground	Exposed sand, gravel or till	ED1
		Spoil and bare ground	ED2
		Recolonising bare ground	ED3
		Active quarry	ED4
	Freshwater	Acid Oligotrophic lakes	FL2
		Mesotrophic lakes	FW4
		Artificial ponds (slit ponds)	FL8
		Depositing rivers	FW2
		Canals	FW3
		Drains	FW4
	Cultivated and Built land	Stonewalls and other stonework	BL1
		Earth Banks	BL2
		Buildings and artificial surfaces	BL3
		Arable crops	BC1
		Horticulture	BC2
		Tilled land	BC3


Legend
Raised bog (PB1)
Very disturbed raised bog (BnM*)
Cutover bog (PB4)
Secondary PB4 - dry heath, poor fen, and scrub (HH1/PF2/WS1)
Bog woodland (WN7)
Scrub (WS1)
Wet grassland (GS4)
Bare peat (BnM*)
Pioneer dry heath (BnM*)
Bare peat & pioneer dry heath mosaic (BnM*)
Pioneer dry heath & Molinia grassland mosaic (BnM*)
Bare peat, pioneer dry heath & Molinia grassland mosaic (BnM*)
Pioneer Molinia grassland (BnM*)
Riparian areas (streams/drains with fringing habitats) (BnM*)
Access (tracks or railways with adjacent habitats) (BnM*)
Silt ponds (with fringing habitats) (BnM*)
Works Areas (BnM*)
Cornafulla Walsh
Creggan
Derryglass
Johnstown Demesne
The Vale
Industrial
Cornafulla
Bunua Cunna
Callowbeg
River Shannon
An tSionn
Drumlosh
Bloomhill
Nure
Inchinalee
Clooniff
Darcy's
Name
Cornafulla Habitat Map 2017
DWG No.
BNM-ECO-09-12
Status
Prepared by Ecology Team 07/2017
Note
Draft maps for internal Bord na Mona use and discussion purposes only, should not be relied on as evidence of title, all queries regarding title status and boundaries should be referred to BnM Legal Dept.
Habitat map created by ground-truthing OSI aerial photos. BnM* - Habitat classification scheme based on BnM habitat classification scheme and refers to mainly pioneer communities developing on cutaway and production bog that are similar to more established habitats. Other habitats classified according to Fossit (2000).
Scale
1:22,517
0 0.850.17 Kilometers
N
Permit No. EN 0035617
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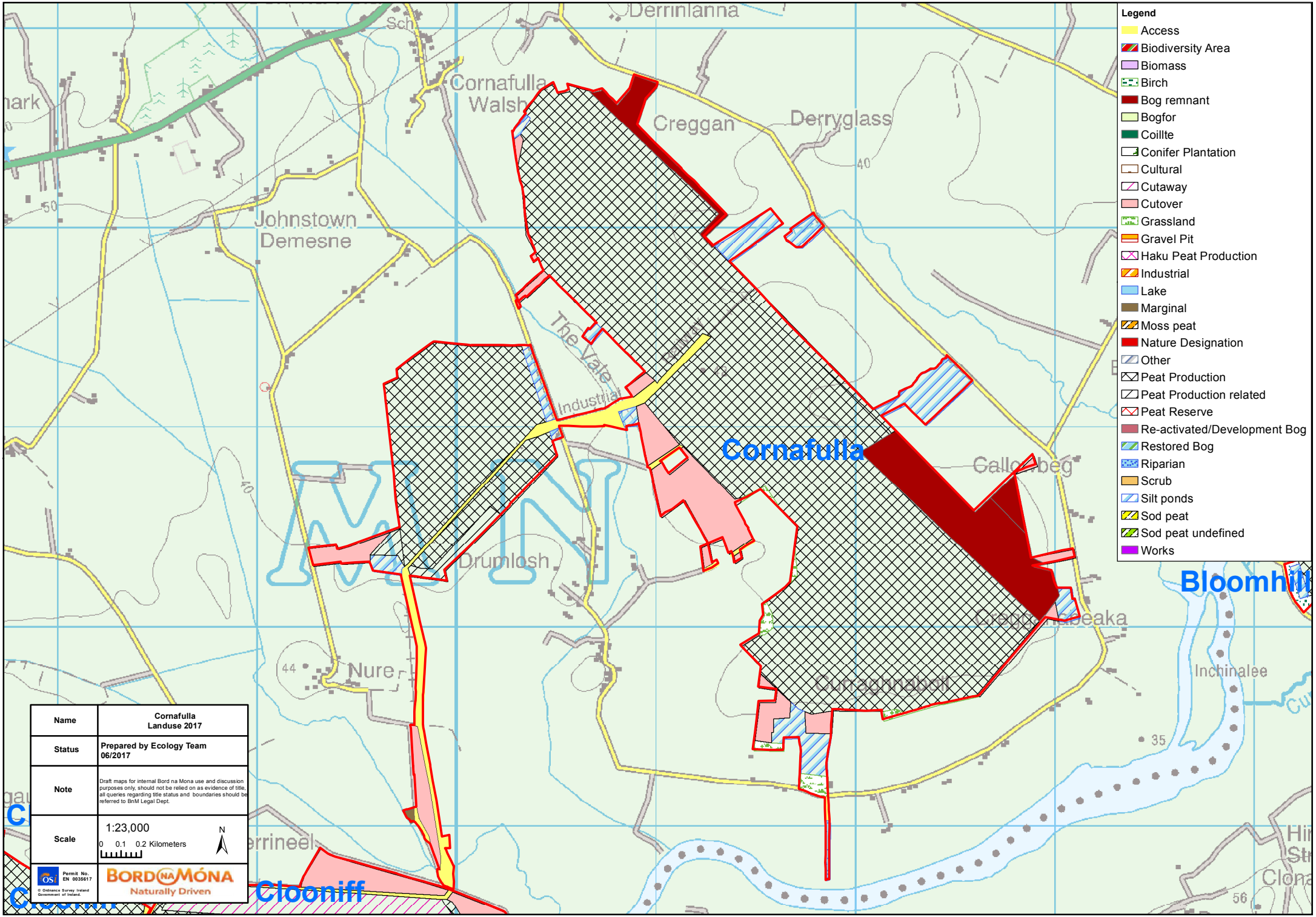
BORD NA MÓNA
Naturally Driven


Legend
Access
Biodiversity Area
Biomass
Birch
Bog remnant
Bogfor
Coillte
Conifer Plantation
Cultural
Cutaway
Cutover
Grassland
Gravel Pit
Haku Peat Production
Industrial
Lake
Marginal
Moss peat
Nature Designation
Other
Peat Production
Peat Production related
Peat Reserve
Re-activated/Development Bog
Restored Bog
Riparian
Scrub
Silt ponds
Sod peat
Sod peat undefined
Works
Derrinlanna
Cornafulla Walsh
Creggan
Derryglass
Johnstown Demesne
The Vale
Industrial
Cornafulla
Callowbeg
Drumlosh
Nure
Inchinalee
Clooniff
Bloomhill
Name
Cornafulla Landuse 2017
Status
Prepared by Ecology Team 06/2017
Note
Draft maps for internal Bord na Mona use and discussion purposes only, should not be relied on as evidence of title, all queries regarding title status and boundaries should be referred to BnM Legal Dept.
Scale
1:23,000
0 0.1 0.2 Kilometers
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BORD NA MÓNA
Naturally Driven

Draft Rehabilitation Plan

2017

Cornaveagh Bog

This rehabilitation plan is developed under Condition 10 of IPC Licence Ref. 503 (April 2017). It outlines measures that will provide for stabilisation of the bog area upon cessation of peat production and decommissioning of the site. ***Rehabilitation*** *generally comprises natural colonisation with or without targeted management.* ***After-use*** *involves the development of cutaway peatland into other land-uses. Rehabilitation can be incorporated into after-use development (e.g. Mountlucas Windfarm). Bord na Móna has focused after-use development of cutaway bogs into forestry, agriculture, grassland, amenity and biodiversity, (Lough Boora Discovery Park) and commercial industrial development (Drehid Resource Recovery, renewable energy – Mountlucas Windfarm). This rehabilitation plan* ***does not*** *outline future after-use development for Cornaveagh Bog. The general after-use strategy of Bord na Móna is outlined in the Bord na Móna Strategic Framework for Future-Use of Cutaway Bogs 2011. Any consideration of future after-uses for Cornaveagh Bog such as amenity, developments or mixed uses will be conducted following the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.*

Rehabilitation of industrial peatlands is a key objective of the Bord na Móna Biodiversity Action Plan 2016-2021. This action plan outlines the main objectives and actions around biodiversity on Bord na Móna lands.

Draft Rehabilitation Plan			
Bog Name:	**Cornaveagh**	**Area (ha):**	501 ha
Works Name:	Blackwater	**County:**	Roscommon
Author(s):	BnM Ecology Team	**Survey/ Monitoring Date(s):**	22nd March 2012, 25/06/2014 & 26/10/2016
Maps:	Habitats Map, Future Habitats Map, Landuse Map		

Review status: Reviewed Spring 2017

Background

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. 502). 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. Cornaveagh Bog is part of the Blackwater bog group.

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

- criteria which define the successful rehabilitation,
- consultation to date with interested parties,
- main issues for rehabilitation,
- proposed rehabilitation programme,
- proposed timeframe to implement this programme, and,
- associated aftercare, maintenance and monitoring.

The basis for the proposed approaches and implementation is the experience gained in 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (see reference documents)..

Scope

The scope of the rehabilitation plan seeks to address issues of concern as identified by Bord na Móna and the consultees. The key issues identified so far (pre-consultation) are:

- Categorisation of the habitats developing on Cornaveagh Bog (outlined in Appendix I)
- Environmental stabilisation of former industrial peat production areas
- Maintenance of drainage and silt control through the site
- Remediation of water courses where necessary *(decommissioning)*
- The timeframe for cutaway bog rehabilitation
- The impact of the other potential developments on the site and rehabilitation plan

List of consultees to date

- Open consultation with range of stakeholders at annual BAP review days 2010-2017.
- This rehabilitation plan remains a draft plan until formal consultation is carried out with the relevant stakeholders.

The Blackwater-Shannon Bogs

Cornaveagh is one of a cluster of bogs that has developed along the floodplains of the River Shannon. It is one of a group within the Blackwater bog group. This group of bogs vary in terms of peat depth remaining, as many of the sites were brought into industrial peat production at different stages during the past forty years.

In each of these bogs, a significant portion of the industrial peat production areas lie below the winter water level of the Shannon and pumping these sites is critical to sustaining industrial peat production. This presents an alternative scenario to those bogs in East Offaly which are typically gravity drained to a greater extent. Consequently, the issues to be considered during rehabilitation of these sites require further detail in terms of understanding the hydrological regime during, and when industrial peat production stops in these bogs.

Site description

Cornaveagh is located 1.5 km west of Shannonbridge in Co. Roscommon. Cornaveagh is part of the Blackwater group of bogs and there is a railway link from Cloniff to the north and Culliaghmore to the west to Cornaveagh and on to Garryduff via a bridge over the River Suck. This bog is located close to the confluence of the River Suck and River Shannon, with the southern margin extending to the River Suck and the eastern margin running parallel to the River Shannon Callows. It is bordered to the north-west by an esker ridge. The bog is bisected by the R357 Shannonbridge to Ballinasloe Road, with the largest section of production bog to the north of the road.

The northern section of bog is currently nearly all in milled-peat production with virtually no development of typical pioneer cutaway habitats. This production area has a pumped drainage system and is divided into two main catchments (north/south). There are pumps located at silt-pond complexes along the eastern margin of the site for both catchments. There is a fall from high ground in the west (adjacent to esker) to low ground to the east (see LIDAR map) (where shell marl is exposed under peat in some drains). Some small sections of the production area (close to the pumps) show signs of being wet during the previous winter.

The eastern side of the northern section has some old cutover bog sections with associated Birch-dominated scrub and small patches of Birch woodland. Some of this cutover bog (within the BnM boundary) is being actively cut for sod peat by private individuals, while some has been abandoned and has re-vegetated with Gorse, Heather-dominated dry heath and patches of Purple Moor-grass, Bog Cotton and Soft Rush. This area is accessed by a lane that runs along part of the eastern boundary and also accesses nearby farmland and callows. The eastern margin also has several small remnant high bog areas that are quite dried out and dominated by Heather. Recolonising Sphagnum mosses such as *Sphagnum papillosum, S. subnitens, S. palustre, S. tenellum* and *S. cuspidatum* were noted in cutover and remnant high bog areas.

The northern and western margins of the production area have very little marginal or remnant habitats within the BnM GIS boundary. Development of bog in this area has been quite efficient, with nearly all of the bog in production.

The smaller area of production bog to the south of the road is divided into two main sections with active peat production to the north and some ditched high bog to the south. This area is not pumped directly but some drainage from the bog flows across the road towards pumps with in the larger section. This area of high bog was classified as development bog and was never fully developed for production. The railway runs along the western side of this section through an underpass below the road. There is a cutting for the railway through gravel near the road and further south along the margin of the bog towards the River Suck. Some pioneer calcareous grassland is developing along these cuttings as well as scrub and ranker tussocky grassland (GS2). There is a silt pond area to the north adjacent to the road. This area contains some patches of open Birch and Willow-dominated scrub as well as some grassland areas with Cocksfoot-dominated rank tussocky grassland (GS2). Some of the grassland is also dominated by Purple Moor-grass.

The development bog to the south of the site is of particular interest due to the presence of a relatively large wet area that supports active raised bog (sub-central ecotope). An overhead electrical powerline (110kV) runs along the northern margin of the high bog. This area was previously ditched in the past. However, some of the ditches have now infilled with Sphagnum mosses and the water table raised due to the drainage system on the high bog breaking down. As a consequence, there is a relatively large wet quaking area with abundant Sphagnum cover. This wet area seems to have developed in a shallow basin or a subsided area and also seems to have been part

of a former flushed area. This wet 'active' bog area is relatively large (~0.54 ha) relative to the overall size of the remaining high bog (21.9 ha). The fact that it is so large, located in a basin and in good relatively condition indicates that there may be positive prospects for its conservation. The bog remnant at Cornaveagh is listed on Bord na Móna's Raised Bog Restoration Project and is targeted for future drain blocking measures.

See Appendix I for more detail on site, habitats and local features.

Current peat production programme, land-use and proposed BnM developments

- Nearly all of Cornaveagh is in active industrial peat production, with very little bog unavailable for production at present. The majority of the bog has between 1.1-2.5 m of peat left with deeper peat more frequent to the east. Several ridges underlay the peat in the western half (see peat depth map) and these zones have thinner remaining peat (< 1 m).
- It is anticipated that industrial peat production will continue at Cornaveagh Bog into the future, depending on future peat resource requirements.
- The bog remnant to the south has been zoned for biodiversity by Bord na Móna.

Other considerations

- **Cessation of peat production.** Bord na Móna announced in 2015 that peat production for the generation of electricity was to cease by 2030 (http://www.bordnamona.ie/wp-content/uploads/2016/01/Sustainability_Statement_2015.pdf). Industrial peat production (with regard to all appropriate regulations) to supply other customers or sectors (e.g. horticulture) may continue after this date.
- **Peat extraction regulations.** New regulations for the extraction of peat are currently being drafted by government. Peat extraction on sites greater than 30 ha will be regulated through IPC licencing administered by the EPA. This draft rehabilitation plan has been prepared under the conditions of the original IPC licence.
- **Bord na Móna infrastructure**: There are still travel paths and drainage channels maintained around the site for access and drainage of industrial peat production areas. A rail line also runs through the site.
- **Re-wetting potential**: Cornaveagh has a pumped drainage system. Water pumps are located within the site and are used to prevent high water levels; a re-wetting assessment of the site will be required to determine any impacts on the site and adjoining lands. Bogs with pumped drainage are more likely to develop wetland habitats when industrial peat production ceases.
- **Private sod peat production**: private sod peat cutting is active along the eastern margins of the site.
- **Raised Bog Restoration Project**: The bog remnant located in the southern section is listed on Bord na Móna's Raised Bog Restoration Project and has been targeted for future drain blocking measures to restore the bog hydrology and encourage the development of peat forming species (i.e. *Sphagnum* mosses).

Key biodiversity features of interest (2017)

- The majority of the bog currently has no features of biodiversity value as it is currently in active peat production and virtually no typical cutaway habitats have developed as yet.
- The margins of the BnM property include some remnant habitats including raised bog (PB1) and Birch woodland (WN7) that acts as a refuge for local wildlife.
- The largest ditched remnant high bog area to the south of the site is of particular ecological value as it is quite wet with some 'active' bog. This habitat qualifies as the Annex I EU Habitats Directive habitat – 'active raised bog' (7110) with the remaining development bog qualifying as 'degraded raised bog capable of regeneration' (7120).
- Cornaveagh Bog (railway) extends to and crosses the River Suck, so there is a minor amount of overlap with the River Suck Callows SPA.

Current ecological rating ranges from International to Local Importance (lower value); *following NRA (2009) Evaluation Criteria.*

The majority of the site is rated as **local importance (lower value)** due to the dominance of bare peat (cutaway bog). The margins of the production bog support semi-natural habitat such as small remnants of raised bog and bog woodland deemed to be of **local importance (higher value)**.

The area of ditched high bog to the south of the site is deemed to of **national importance**, due to the presence of active raised bog which supports vegetation community complexes that correspond to sub-central ecotope (Fernandez et al. (2014). The small parts of the site located within the SPA (Special Protection Area) boundary have been rated as **Internationally Important**, due to their designation.

Criteria defining successful rehabilitation

- The main criteria are stabilisation of the former industrial peat production area and mitigation of potential silt run-off.

Cornaveagh Bog is almost entirely managed for active industrial peat production. It is expected that natural colonisation will continue to form the basis for the stabilisation of the former production area and that the bare peat areas will continue to re-colonise depending on future land-use. Travel paths are also likely to remain un-vegetated if they are used regularly.

No active rehabilitation management is feasible at present, such as blocking drains, as this would also affect the production areas. When larger units come out of production, then it may be feasible to block single outfalls, without affecting other production areas and enhancing wetland development.

There is potential for the creation of wetlands at Cornaveagh Bog and at least 26% of the site (production areas) is likely to become wetland. Water pumps located on the site are needed to prevent high water levels at present and water-levels over this area could be raised easily by decommissioning these pumps. Raising the water-levels would increase the extent of wetland cover within the natural basins that have been created from industrial peat production. Large areas of deeper lakes are likely to form with associated reed-beds and wetland vegetation in the shallower areas.

The remaining areas on the site would be likely to develop into Birch dominated woodland.

Overall wetlands should account for up to 26% of the site into the future with woodland and scrub accounting for the other 63% of the site.

Given the relatively high ecological value of development bog area at the southern end of Cornaveagh and the fact that it retains raised bog features, the main success criteria in the degraded raised bog areas is rewetting by means of drain blocking to assist in recovery of parts of the site to *active* raised bog (the bog remnant is listed on Bord na Mónas Raised Bog Restoration Project). This will require targeted drain blocking based on a level survey of this part of the site.

- It is anticipated that future restoration work of raised bog remnant to the south will be undertaken in the short to medium term.
- No active rehabilitation is anticipated for any of the remnant raised bog around the margins of the site as these areas are still being used for private sod peat cutting or are too small for any active raised bog restoration and will be allowed to develop naturally.
- Remediation of silt ponds and watercourses where required.

Proposed Rehabilitation programme

Short-term (2017-2019 years)

- The most sustainable management option for un-vegetated areas within the production areas site is to allow continued natural re-colonisation of the site.
- Significant bare peat areas and the progress of natural re-colonisation of the cutaway areas will be monitored.

- Level survey of former high bog area to determine the appropriate location for dams to be built/drain blocked. This is generally at any point where there is a fall in a drain level of 10 cm as outlined in NPWS guidelines (McDonagh 1997).
- Block drains/construction of peat dams on former development bog area, where required.
- The success of the rehabilitation work will be monitored using the methods developed by NPWS for nationwide monitoring of raised bogs.

Short-term (0-2 years) (when production ceases)

- All stock-piles should be removed from the site as part of the winding down of industrial peat production operations. Any remaining or old stockpiles should be bulldozed and levelled as part of the rehabilitation/decommissioning process.
- Blocking the outfalls and field drains and decommissioning the pumps will allow low lying areas within the site to rewet and thus facilitate the creation of wetlands. The potential to enhance wetland development through drain-blocking will be re-assessed at this stage and active measures carried out where appropriate (drain and/outfall blocking).
- A re-wetting assessment will be necessary for Cornaveagh as the site is frequently wet during the winter and any management to reduce or turn off pumps may impact on surrounding lands (See Appendix I).
- While natural colonisation is expected to proceed almost immediately once industrial peat production ceases, there will be a determination of extent of bare peat and selection of best measures to accelerate re-vegetation (if necessary).
- Re-vegetation measures will be carried out as soon as possible post peat production. These will be monitored to determine effectiveness and success.
- Silt-ponds will be monitored during this period and there will be continued maintenance and cleaning (if required) to prevent silt run-off from the site during the rehabilitation phase.
- Carry out targeted drain blocking measures of the bog remnant to the south in line with Bord na Móna's Raised Bog Restoration Project.
- Continue to monitor features of conservation interest such as the bog remnant to the south and carry out ecotope surveys at five yearly intervals.

Medium-term

- Targeted active management such as seeding of a nursery crop or use of fertiliser to help promote natural re-colonisation (see Drumman Rehabilitation Trials) will be carried out, if natural re-colonisation of significant bare peat areas within the active production areas has not progressed satisfactorily at this stage.
- The effect of any targeted active management will be monitored and further work determined.

Long-term(up to 10 years)

This phase will follow on from cessation of industrial peat production in adjacent bogs

- Monitoring of the site to ensure stabilisation and complete re-vegetation.
- Decommissioning of silt-ponds will be assessed.
- Assess requirements for decommissioning of pumps and BnM railway on the site.
- Evaluate success of short-term rehabilitation measures outlined above and enhance where necessary.
- Reporting to the EPA will continue until the IPC License is surrendered.

Timeframe for rehabilitation and restoration

Short-term (2017-2019)

- Monitor re-vegetation of the cutaway area and assess requirements of targeted active management of the bare peat areas using fertiliser/nursery crop treatments.
- On-going monitoring of the overall site.
- Level survey of former development bog area at the southern end of Cornaveagh. Block drains/construction of peat dams where required.

Long-term

- Long-term monitoring of the site to ensure stabilisation (based on outcome of previous assessments)
- This phase will follow on from cessation of industrial peat production in adjacent bogs.
- Continued monitoring and planning will take place to assess further rehabilitation requirements at Cornaveagh taking account of ongoing peat-production on the site and new areas of cutaway, including potential for wetland development, ongoing natural colonisation of the production areas (when production ceases).
- Reporting to the EPA will continue until the IPC License is surrendered.

After-care and maintenance

- There will be annual assessments of the site to determine the progress of the rehabilitation work and requirements for further enhancement measures.
- It is not expected that there will be any requirement for after-care and maintenance other than ecological monitoring.
- Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the appropriate assessment and planning procedures.

Potential future natural habitats on the site

This section attempts to predict the development of natural habitats on the site, assuming current land-use and known after-use plans for the cutaway (development etc). This prediction is based on research and methods used to predict the natural vegetation of Ireland (Cross, 2006). Cross (2006) predicted that cutaway bog is likely to develop a mosaic of Birch forest, alder and ash-alder carr, fen and heath in the future. There is no time-line given for the development of these habitats, although it could be expected that the development of natural climax habitats could take hundreds of years. The complexity is the result of small scale variations in the substrate and other environmental factors such as drainage and ground-water influence.

- A large part of the site is expected to develop dry species-poor Birch woodland (WN7) in the drier areas. There is likely to be a succession from a mosaic of Birch scrub, dry grassland, and poor fen/wet grassland vegetation types to this type of woodland. The time required for development of closed woodland from cutaway is likely to vary significantly.
- A wetland mosaic with a significant calcareous influence (FS1/PF1/PF2/WN6) could be expected to develop in over a large part of the site due to re-wetting, the influence of the local topography and underlying deep shell marl. The extent of wetland habitats could be increased with suitable management. Some permanent open water could be created depending on the final depth of water, and the final depth of peat.
- Elements of Ash-Hazel woodland (WN2) are likely to develop along the north-western boundary and on ridges through the bog if gravel is exposed.

- Some remnant areas of high bog (PB1) unused by private sod-peat cutters could be expected to remain open but dry Heather-dominated habitats, with some sections developing bog woodland (WN7) and dry heath mosaics.
- Cutover bog (PB4) is likely to develop Birch woodland (WN7) in the long-term, depending on land-use.
- The section of development bog is likely to remain open as raised bog (PB1) and it likely to retain a wet 'active' bog area. The bog remnant will be the subject of targeted drain blocking measures to restore the bog hydrology and provide favourable baseline conditions to continue the development of active raised bog.

Budget and costing

- It is anticipated that the majority of the rehabilitation at this site will be through natural re-colonisation. Some preliminary budgeting can be carried out assuming that approximately 26% of the site will be developed as wetlands with some active management required blocking outfalls to enhance re-wetting. The allocated rehabilitation provision will be based on this estimate.
- Note: Any rehab provision and costs is based on area allocation of various habitats, dryland mosaic, wetland and deep peat. Budgets are relative to rehabilitation measures agreed and the habitats targeted for rehab or present on the site.

Appendix I

Ecological Survey Report

Note: This report outlines an ecological survey of the bog. This report should not be taken as a management plan for the site as other land-uses may still be considered. Information within this report may inform the development of other land-uses and identify areas with particular biodiversity value. The report outlines potential options for biodiversity management after industrial peat production has ceased, (if this is the proposed main land-use for the site).

Bog Name:	**Cornaveagh**	**Area (ha):**	499.4 ha (1234.4 acres)
Works Name:	Blackwater	**County:**	Roscommon
Recorder(s):	Mark McCorry (MMcC) & Barry O'Loughlin (BO'L)	**Survey Date(s):**	22/03/2012; 21/10/2016 & 26/10/2016

Habitats present (in order of dominance)

The most common habitats present at this site include:

- Bare peat (BP) (Codes refer BnM classification of pioneer habitats of production bog. See Appendix II).
- Riparian zones (RIP)
- Pioneer Purple Moorgrass-dominated grassland (gMol) with Gorse-dominated scrub (eGor)
- Pioneer Soft Rush-dominated poor fen (pJeff)
- Pioneer Reedbed (pPhrag) (in marginal small drainage ditch)
- Pioneer dry heath (dHeath) with open Birch-dominated scrub (oBir) or Purple Moorgrass-dominated grassland (gMol) (generally in old cutover or marginal bog areas).
- Riparian areas (RIP)
- Silt ponds (Silt) with associated habitats

The most common habitats found around the margins of the site include:

- Marginal raised bog (PB1) (Codes refer to Heritage Council habitat classification, Fossitt 2000), See Appendix II.)
- Cutover bog (PB4)
- Raised bog (PB1)
- Scrub (WS1)
- Bog woodland (WN7)
- Dry meadows and grassy verges (GS2) (marginal grassy areas)
- Wet grassland (GS4) (privately managed farmland)
- Improved grassland (GA1) (privately managed farmland)

Description of site

Cornaveagh is located 1.5 km west of Shannonbridge in Co. Roscommon. Cornaveagh is part of the Blackwater group of bogs and there is a railway link from Cloniff to the north and Culliaghmore to the west to Cornaveagh and on to Garryduff via a bridge over the River Suck. This bog is located close to the confluence of the River Suck and River Shannon, with the southern margin extending to the River Suck and the eastern margin running parallel

to the River Shannon callows. It is bordered to the north-west by an esker ridge. The bog is bisected by the R357 Shannonbridge to Ballinasloe Road, with the largest section of production bog to the north of the road.

The northern section of bog is currently nearly all in milled-peat production with virtually no development of typical pioneer cutaway habitats. There was little or no vegetation colonising on this section of the high bog during field visits (as of October 2016). This production area has a pumped drainage system and is divided into two main catchments (north/south). There are pumps located at silt-pond complexes along the eastern margin of the site for both catchments. There is a fall from high ground in the west (adjacent to esker) to low ground to the east (see LIDAR map) (where shell marl is exposed under peat in some drains). Some small sections of the production area (close to the pumps) show signs of having been rewetted during the previous winter.

The eastern side of the northern section has some old cutover bog sections with associated Birch-dominated scrub and small patches of bog woodland. Some of this cutover bog (within the BnM GIS boundary) is being actively cut for sod peat by private individuals, while some has been abandoned and has re-vegetated with Gorse, Heather-dominated dry heath and patches of Purple Moor-grass, Bog Cotton and Soft Rush. This area is accessed by a lane that runs along part of the eastern boundary and also accesses nearby farmland and callows. The eastern margin also has several small remnant high bog areas that are quite dried out and dominated by Heather. Recolonising *Sphagnum* mosses such as *Sphagnum papillosum, S. subnitens, S. palustre, S. tenellum*and *S. cuspidatum* were noted in cutover and remnant high bog areas.

The northern and western margins of the production area have very little marginal or remnant habitats within the BnM GIS boundary. Development of bog in this area has been quite efficient, with nearly all of the bog in production.

The smaller area of production bog to the south of the road is divided into two main sections with active industrial peat production to the north and some ditched high bog to the south. This area is not pumped directly but some drainage from the bog flows across the road towards pumps with in the larger section. This area of high bog is classified as development bog and was never fully developed for production due to constraints of electrical poles crossing this section of bog. The railway runs along the western side of this section through an underpass below the road. There is a cutting for the railway through gravel near the road and further south along the margin of the bog towards the River Suck. Some pioneer calcareous grassland is developing along these cuttings as well as scrub and ranker tussocky grassland (GS2). There is a silt pond area to the north adjacent to the road. This area contains some patches of open Birch and Willow-dominated scrub as well as some grassland areas with Cocksfoot-dominated rank tussocky grassland (GS2). Some of the grassland is also dominated by Purple Moorgrass.

The development bog to the south of the site is of particular interest due to the presence of a relatively large wet area. An overhead electrical powerline runs along the northern margin of the high bog. This area was previously ditched in the past. However, some of the ditches have now filled in again and there is a relatively large wet quaking area with abundant *Sphagnum* cover. This wet area seems to have developed in a shallow basin or a subsided area and also seems to have been part of a former flushed area. Some of the wettest sections contain species such as *Aulacomnium palustre*, Cranberry (*Vaccinium oxycoccus*), Common Cotton-grass (*Eriophorum angustifolium*), Bogbean (*Menyanthes trifoliata*) and Great Sundew (*Drosera anglica*), which is typical of flushed (or sub-central ecotope) raised bog areas. The *Sphagnum* cover in sub-central zones is dominated by lawns and low hummocks of S. *papillosum* and *S. magellanicum* with *S. capillifolium*, *S. subnitens* and occasional *S. tenellum* and *S. cuspidatum*. The dominant vegetation composition in wetter areas is characterised by extensive cover of White Beak-sedge (*Rhynchospora alba*), Bog Asphodel (*Narthecium ossifragum*), Common Bog Cotton and Hare's-tail Bog Cotton-grass (*Eriophorum vaginatum*) growing in association with *Sphagnum* mosses. The drains which bisect the high bog have infilled with *Sphagnum papillosum, S. capillifolium, S. magellanicum and S. cuspidatum.* The functional capacity of drainage ditches on the high bog has been reduced in recent years. The surrounding bog does show signs of degradation with die-back of *Sphagnum* cover. *Sphagnum subnitens* is also more prevalent in the drier sections. However, there is still extensive *Sphagnum* cover that extends close to the margin of the development bog. There are also several relic hummocks of *S. fuscum* and *S. austinii*. This wet 'active' bog area is relatively large (~0.54 ha) relative to the overall size of the remaining high bog (21.9 ha). The fact that it is so large, located in a basin and in good relatively condition indicates that there may be positive prospects for its conservation. These small sections of high bog more typically tend to dry out.

2016 Survey

The site managed for industrial peat production has not changed significantly. There are no significant areas of colonising vegetation on the production bog. There is some establishment of Sphagnum mosses on adjoining cutover areas to the east of the production bog. However, *Sphagnum* mosses were only occasionally encountered.

Secondary cutover bog (dry heath, poor fen and scrub) was the most common habitat type encountered on cutaway margins to the east and south-east. There were some smaller raised bog remnants to the east of the site, however, these areas are degraded whose vegetation community complexes conform to 'facebank' and 'marginal' ecotopes where *Sphagnum* cover is typically less than 10%.

The high bog to the south appears to be progressively wetter from previous surveys as evident by *Sphagnum* infilled drainage ditches on the high bog. The *Sphagnum* cover in sub-central zones ranges from 40% to 70% in places and is dominated by lawns and low hummocks of S. *papillosum* and *S. magellanicum* with *S. capillifolium*, *S. subnitens* and occasional *S. tenellum* and *S. cuspidatum*. The dominant vegetation composition in wetter areas is characterised by extensive cover of White Beak-sedge (*Rhynchospora alba*), Bog Asphodel (*Narthecium ossifragum*), Common Bog Cotton and Hare's-tail Bog Cotton-grass (*Eriophorum vaginatum*) growing in association with *Sphagnum* mosses. The drains which bisect the high bog have infilled with *Sphagnum papillosum, S. capillifolium, S. magellanicum and S. cuspidatum.* The functional capacity of drainage ditches on the high bog has been reduced in recent years. There is good regeneration of *Sphagnum* mosses in adjoining cutover areas to the south of the high bog particularly *Sphagnum magellanicum* and *S. papillosum*. Scrub encroachment was noted along the margins of the high bog particularly along the eastern and western sections where Common Gorse (*Ulex europaeus*) dominates. A small number of Birch (*Betula* sp.) trees and Pine (*Pinus* sp.) trees were noted in drier sections of the high bog.

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

There is minor overlap between Cornaveagh and the Suck River Callows NHA (NPWS site code 000222) and SPA (NPWS site code 0004097). This site has been designated for its importance for wintering wildfowl and species of conservation importance such as Greenland White-fronted Geese and Whooper Swan.

The railway through Cornaveagh crosses the River Suck. The railway crossing and a small amount of adjacent land is located within the designated area. The overlapping area is 1.29 ha.

The site is also located close to the River Shannon Callows cSAC and SPA (NPWS site code 000216), although there is no overlap between this designated area or adjacent boundaries.

Adjacent habitats and land-use

Cutover bog (PB4), bog woodland (WN7), scrub (WS1), raised bog (PB1), improved agricultural grassland (GA1) and wet grassland (GS4) all border the site. There is a significant amount of callows type wet grassland to the east of the site adjacent to the River Shannon. There is also a small gravel pit (ED2) adjacent to the railway crossing at Split Hill at western side of the site. There is some private sod-peat cutting around margins of the eastern side.

Watercourses (major water features on/off site)

- Cornaveagh is located within the River Shannon catchment.
- The site is drained by several small streams that are tributaries of the main River Shannon channel.
- The main bog has two main catchments with pumps located adjacent to silt-ponds along the eastern margin, which flow to the small channelized streams.
- The catchment of the southern section also flows to the main River Shannon channel via silt ponds along the road.

Peat type and sub-soils

The main peat type exposed at this site is fen peat. The peat is underlain with shell marl through the eastern side of the site and this is exposed in silt-ponds. The peat is underlain with gravel along the western margin of the site from a nearby esker. Mounds/ridges of gravel are also occasionally exposed around the margins of the site. The peat depths map seems to indicate some ridges of glacial gravel underlying the bog. The underlying soils and sub-soils are classed as 'Cut – Raised Bog Cutaway/Cutover' (EPA Envision, 2016 (http://gis.epa.ie/Envision)).

Fauna biodiversity

Birds

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

- Several Meadow Pipit, Blue Tit, Great Tit, Mallard (4), Treecreeper, Goldfinch, Chaffinch, Robin, Wren, Reed Bunting, Wood Pigeon, Magpie, Pied Wagtail, Grey Crow and Blackbird were all recorded using the margins of the site in various places.
- Mute Swan (6) were noted flying over the northern production bog.
- Kestrel (1) (hunting) Meadow Pipit (2) and Snipe (2) were recorded on the southern development bog

2016 Survey

Additional bird species were noted during the 2016 survey:

- Lapwing (2) were recorded in an area of bare peat in the northern development bog during October 2016.
- Aural registrations of wintering Golden Plover were recorded in the immediate surrounding environs to the East, along the River Shannon. The site is likely to occasionally attract roosting birds during winter months.
- A small part of the site was periodically rewetted during the winter season (attributed to high rainfall) and this rewetted section is likely to occasionally attract Whooper Swans.

Mammals

Signs of several mammal species were noted on the site during the survey.

- Fox Droppings were frequently noted around the margins of the site.
- There were frequent signs of Badger foraging around the eastern and northern margins of the site with prints.
- Mink (droppings) were also noted along the margin.
- Hare (prints) were frequently noted around the margins of the site and a Hare was spotted along the western margin.

Other species

- Peacock butterfly (2)
- Frog Spawn

Activities on the site

Activities on the site include:

- Typical BnM activities related to milled-peat production.
- BnM railway operations.
- Private sod-peat cutting of remnant high bog around the eastern margin margins outside and within BNM GIS boundary.

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

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

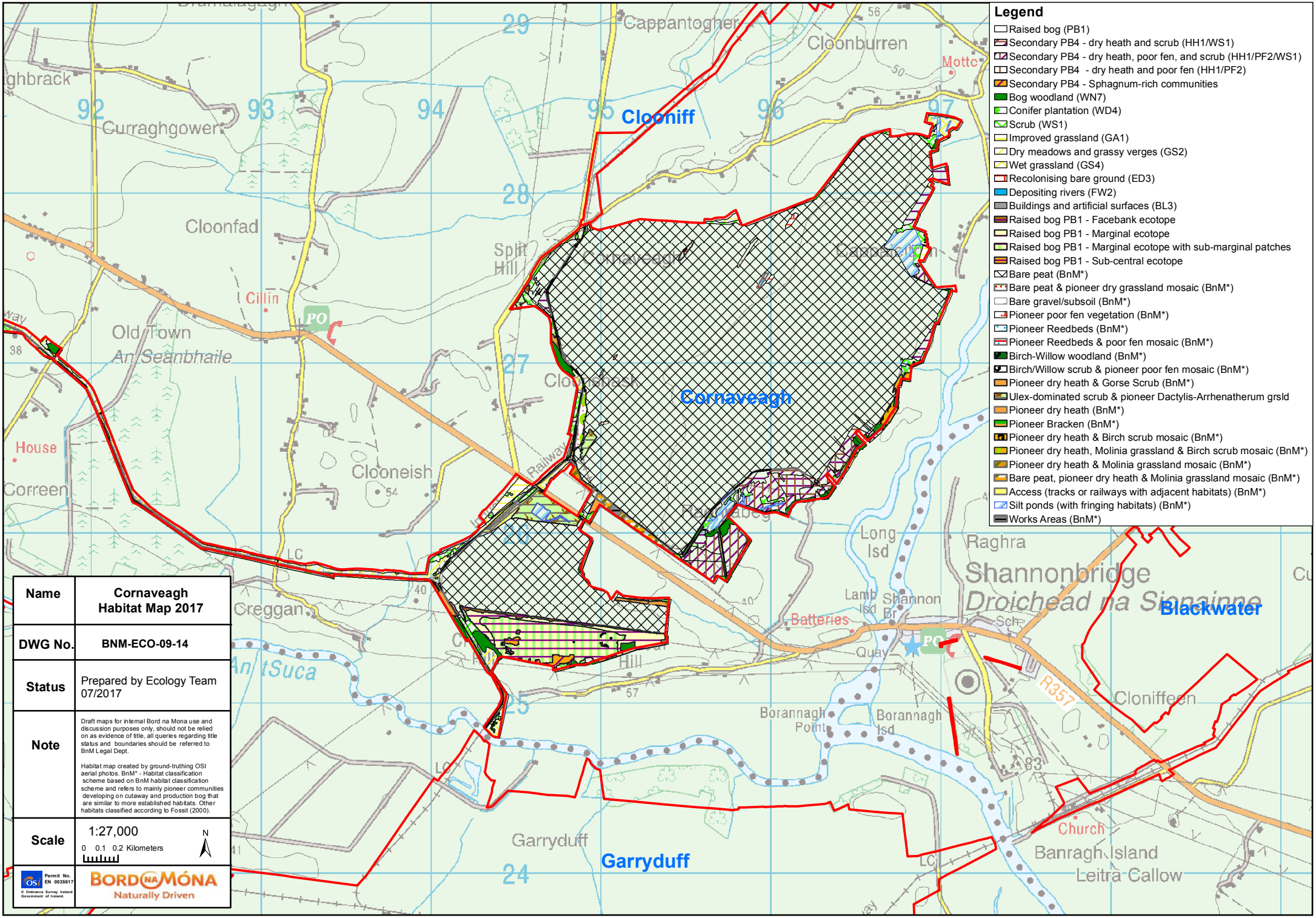
Appendix II. Codes used for habitat classification.
Bord na Mońa habitat classification scheme

	General	Vegetation community [1]	BnM habitat code	Equivalent Heritage Council codes [2]
Pioneer habitats of industrial cutaway	Peatland	Bare peat (0-50% cover)	BP	ED2
		Embryonic bog community (containing *Sphagnum* and Bog Cotton)	PBa	PB
		Embryonic bog community (Calluno-Sphagnion)	PBb	PB
	Flush and Fen	Pioneer *Campylopus*-dominated community	pCamp	PF2
		Pioneer *Juncus effusus*-dominated community (Soft Rush)	pJeff	PF2
		Pioneer *Eriophorum angustifolium*-dominated community (Bog Cotton)	pEang	PF2
		Pioneer *Juncus bulbosus*-dominated community (Bulbous Rush)	pJbulb	PF2
		Pioneer *Triglochin palustris*-dominated community (Marsh Arrowgrass)	pTrig	PF2
		Pioneer Caricion davallianae-Community with *Cladium* (rich fen)	pCladium	PF1
		pioneer *Schoenus nigricans* community (rich fen)	pSchon	PF1
		pioneer *Carex viridula*/brown moss community (rich fen)	pVir	PF1
	Emergent communities	Pioneer *Carex rostrata*-dominated community (Bottle Sedge)	pRos	PF2/FS1
		Pioneer *Phragmites australis*-dominated community (Common Reed)	pPhrag	FS1
		Pioneer *Typha latifolia*-dominated community (Reedmace)	pTyp	FS1
		Pioneer *Schoenoplectus lacustris*-dominated community (Bulrush)	pSch	FS1
	Open water	Charaphyte-dominated community	pChar	FL2
		Permanent pools and lakes	OW	FL2
		Temporary open water	tOW	
	Woodland and scrub	Emergent *Betula*/*Salix*-dominated community (A) (Birch/Willow)	eBir	WS1
		Open *Betula*/*Salix*-dominated community (B) (Birch/Willow)	oBir	WS1
		Closed *Betula*/*Salix*-scrub community (C) (Birch/Willow)	cBir	WS1
		Ulex europaeus-dominated community (Gorse)	eGor	WS1
		Betula/*Salix*-dominated woodland (Birch/Willow)	BirWD	WN7
	Heathland	Pioneer dry *Calluna vulgaris*-dominated community (Heather)	dHeath	HH1
		Dense *Pteridium aquilinum* (Bracken)	dPter	HD1
	Grassland	Pioneer dry calcareous and neutral grasssland (Centaureo-Cynosuretum)	gCal	GS1
		Dactylis-Anthoxanthum-dominated community (Cocksfoot-Sweet Vernalgrass)	gCo-An	GS2
		Anthoxanthum-Holcus-Equisetum community (Sweet Vernalgrass-Yorkshire Fog-Horsetail)	gAn-H-Eq	GS
		Molinia caerulea-dominated community (dry) (Purple Moorgrass)	gMol	GS4
		Marsh (Meadowsweet and other tall herbs) (Filipendulion ulmariae)	Mar	GM1
	Disturbed	*Tussilago farfara*-dominated community (vegetation > 50%) (Colt's Foot)	DisCF	ED3
		Epilobium-dominated community (vegetation > 50%) (Willowherb spp.)	DisWil	ED3
	General	Riparian areas (streams or drain with associated edge habitats (e.g. FW2/4 + WS1, GS2 etc)	Rip	FW2 +
		Silt Ponds (artificial ponds with associated bank habitats (e.g. FL8 + WS1, GS2, ED2, ED3)	Silt	FL8 +
		Access (tracks or railways with associated edge habitats (e.g. BL3 + gCal, gMol, eGor etc)	Acc	BL3 +
		Works areas (predominately built land but can include landscaped and brownfield habitats (e.g. GA2, WS3, WD4, ED2, ED3)	Works	BL3 +

[1] These are generally pioneer habitats of bare peat and the communities can contain a significant proportion of bare peat. Some habitats are more developed than others. They frequently occur in mosaic with each other.
[2] Not all these communities are equivalent to habitat classes used by The Heritage Council habitat classification scheme (Fossitt 2000) as some are quite rudimentary and undeveloped.

Heritage Council habitat classification scheme (Fossitt 2000)

	General	Habitat	Heritage Council code
Semi-natural and modified habitats	Peatlands	Raised Bog	PB1
		Lowland Blanket bog	PB3
		Cutover Bog	PB4
		Rich fen and flush	PF1
		Poor fen and flush	PF2
		Transition mire and quaking bog	PF3
	Woodland and scrub	Oak-Birch-Holly woodland	WN1
		Oak-Ash-Hazel woodland	WN2
		Wet Pendunulate Oak-Ash woodland	WN4
		Riparian Woodland	WN5
		Wet Willow-Alder-Ash woodland	WN6
		Bog woodland	WN7
		Mixed broad-leaved woodland	WD1
		Mixed broad-leaved/conifer woodland	WD2
		Conifer plantation	WD4
		Scrub (Gorse)	WS1
		Emergent Betula-dominated community	WS1
		Closed Betula scrub community	WS1
		Recently-planted woodland	WS2
		Ornamental scrub	WS3
		Short-rotation coppice	WS4
		Recently-felled woodland	WS5
	Linear woodland	Hedgerow	WL1
		Treeline	WL2
	Grasslands and Marsh	Improved grassland	GA1
		Amenity grassland	GA2
		Dry calcareous and neutral grassland	GS1
		Dry meadows and grassy verges	GS2
		Dry-humid acid grassland	GS3
		Wet grassland	GS4
		Freshwater Marsh	GM1
	Heath and Bracken	Dry Heath	HH1
		Dry calcareous Heath	HH2
		Wet Heath	HH3
		Dense Bracken	HD1
	Disturbed ground	Exposed sand, gravel or till	ED1
		Spoil and bare ground	ED2
		Recolonising bare ground	ED3
		Active quarry	ED4
	Freshwater	Acid Oligotrophic lakes	FL2
		Mesotrophic lakes	FW4
		Artificial ponds (slit ponds)	FL8
		Depositing rivers	FW2
		Canals	FW3
		Drains	FW4
	Cultivated and Built land	Stonewalls and other stonework	BL1
		Earth Banks	BL2
		Buildings and artificial surfaces	BL3
		Arable crops	BC1
		Horticulture	BC2
		Tilled land	BC3


Legend
Raised bog (PB1)
Secondary PB4 - dry heath and scrub (HH1/WS1)
Secondary PB4 - dry heath, poor fen, and scrub (HH1/PF2/WS1)
Secondary PB4 - dry heath and poor fen (HH1/PF2)
Secondary PB4 - Sphagnum-rich communities
Bog woodland (WN7)
Conifer plantation (WD4)
Scrub (WS1)
Improved grassland (GA1)
Dry meadows and grassy verges (GS2)
Wet grassland (GS4)
Recolonising bare ground (ED3)
Depositing rivers (FW2)
Buildings and artificial surfaces (BL3)
Raised bog PB1 - Facebank ecotope
Raised bog PB1 - Marginal ecotope
Raised bog PB1 - Marginal ecotope with sub-marginal patches
Raised bog PB1 - Sub-central ecotope
Bare peat (BnM*)
Bare peat & pioneer dry grassland mosaic (BnM*)
Bare gravel/subsoil (BnM*)
Pioneer poor fen vegetation (BnM*)
Pioneer Reedbeds (BnM*)
Pioneer Reedbeds & poor fen mosaic (BnM*)
Birch-Willow woodland (BnM*)
Birch/Willow scrub & pioneer poor fen mosaic (BnM*)
Pioneer dry heath & Gorse Scrub (BnM*)
Ulex-dominated scrub & pioneer Dactylis-Arrhenatherum grsld
Pioneer dry heath (BnM*)
Pioneer Bracken (BnM*)
Pioneer dry heath & Birch scrub mosaic (BnM*)
Pioneer dry heath, Molinia grassland & Birch scrub mosaic (BnM*)
Pioneer dry heath & Molinia grassland mosaic (BnM*)
Bare peat, pioneer dry heath & Molinia grassland mosaic (BnM*)
Access (tracks or railways with adjacent habitats) (BnM*)
Silt ponds (with fringing habitats) (BnM*)
Works Areas (BnM*)
Cooniff
Cornaveagh
Garryduff
Blackwater
Cappantogher
Cloonburren
Curraghgower
Cloonfad
Split Hill
Cillin
Old Town
An Seanbhaile
House
Correen
Clooneish
Creggan
Lamb Isd
Batteries
Raghra
Shannonbridge
Droichead na Sionainne
Long Isd
Borannagh Point
Borannagh Isd
Cloniffeen
R357
Church
Banragh Island
Leitra Callow
Garryduff
Name
Cornaveagh Habitat Map 2017
DWG No.
BNM-ECO-09-14
Status
Prepared by Ecology Team 07/2017
Note
Draft maps for internal Bord na Mona use and discussion purposes only, should not be relied on as evidence of title, all queries regarding title status and boundaries should be referred to BnM Legal Dept.
Habitat map created by ground-truthing OSI aerial photos. BnM* - Habitat classification scheme based on BnM habitat classification scheme and refers to mainly pioneer communities developing on cutaway and production bog that are similar to more established habitats. Other habitats classified according to Fossit (2000).
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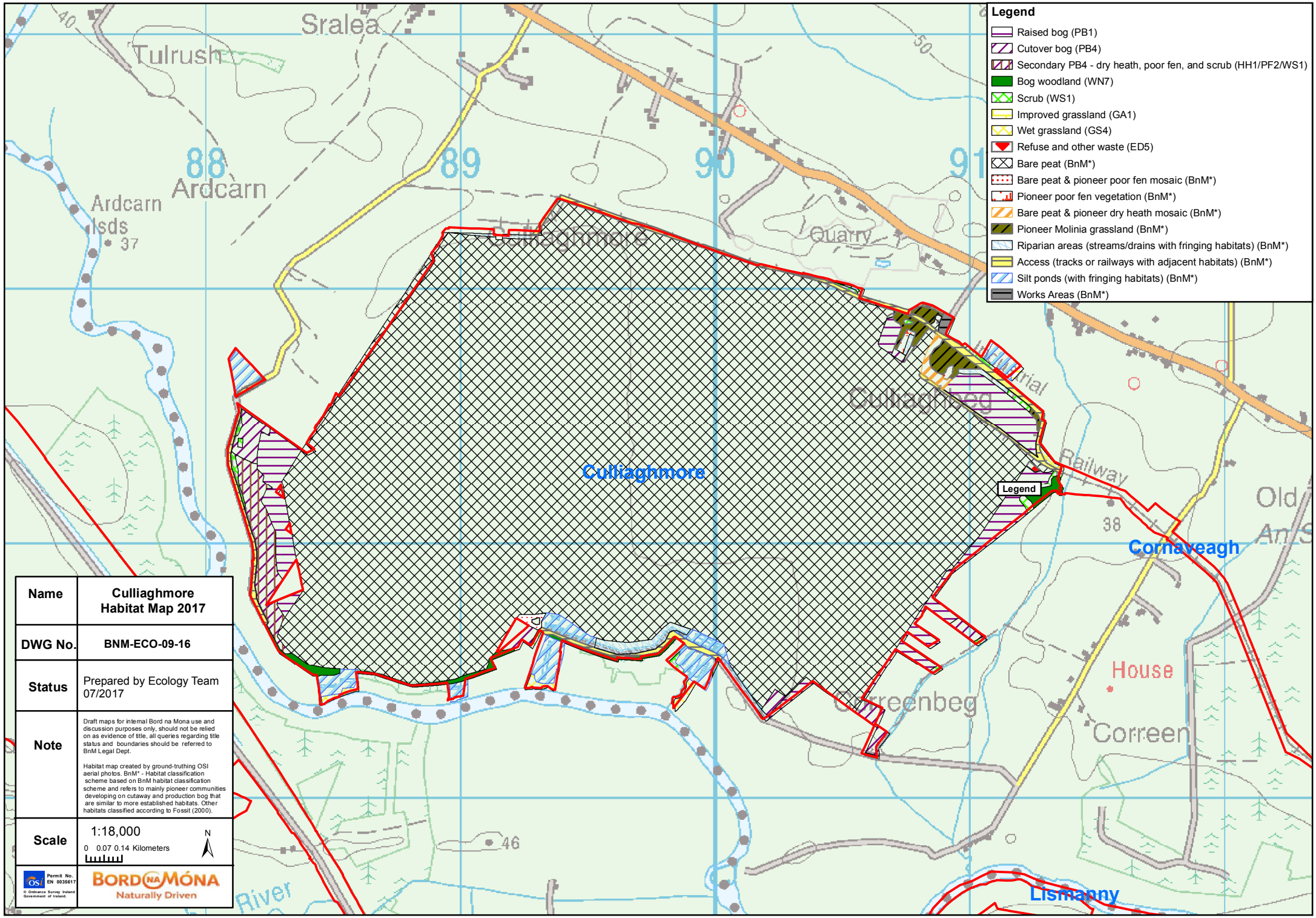
BORD NA MÓNA
Naturally Driven


Legend
Raised bog (PB1)
Cutover bog (PB4)
Secondary PB4 - dry heath, poor fen, and scrub (HH1/PF2/WS1)
Bog woodland (WN7)
Scrub (WS1)
Improved grassland (GA1)
Wet grassland (GS4)
Refuse and other waste (ED5)
Bare peat (BnM*)
Bare peat & pioneer poor fen mosaic (BnM*)
Pioneer poor fen vegetation (BnM*)
Bare peat & pioneer dry heath mosaic (BnM*)
Pioneer Molinia grassland (BnM*)
Riparian areas (streams/drains with fringing habitats) (BnM*)
Access (tracks or railways with adjacent habitats) (BnM*)
Silt ponds (with fringing habitats) (BnM*)
Works Areas (BnM*)
Culliaghmore
Cornaveagh
Lismanny
Sralea
Tulrush
Ardcarn
Quarry
Railway
House
Correen
Name
Culliaghmore Habitat Map 2017
DWG No.
BNM-ECO-09-16
Status
Prepared by Ecology Team 07/2017
Note
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Habitat map created by ground-truthing OSI aerial photos. BnM* - Habitat classification scheme based on BnM habitat classification scheme and refers to mainly pioneer communities developing on cutaway and production bog that are similar to more established habitats. Other habitats classified according to Fossit (2000).
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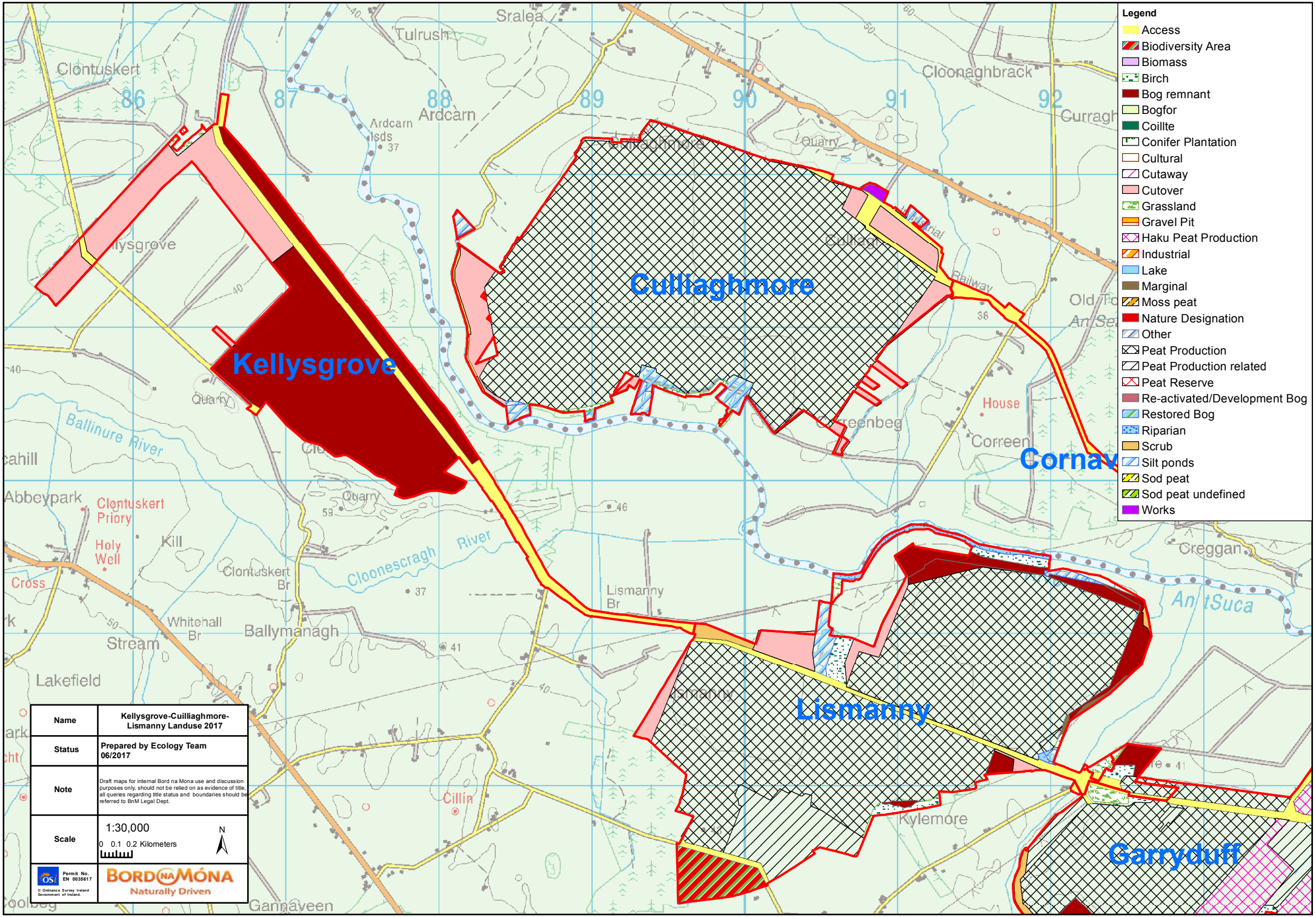
Legend
Access
Biodiversity Area
Biomass
Birch
Bog remnant
Bogfor
Coillte
Conifer Plantation
Cultural
Cutaway
Cutover
Grassland
Gravel Pit
Haku Peat Production
Industrial
Lake
Marginal
Moss peat
Nature Designation
Other
Peat Production
Peat Production related
Peat Reserve
Re-activated/Development Bog
Restored Bog
Riparian
Scrub
Silt ponds
Sod peat
Sod peat undefined
Works
Kellysgrove
Culliaghmore
Cornay
Lismanny
Garryduff
Clontuskert
Sralea
Tulrush
Cloonaghbrack
Ardcarn
Quarry
Ballinure River
Abbeypark
Clontuskert Priory
Holy Well
Kill
Cross
Cloonescragh River
Clontuskert Br
Whitehall Br
Stream
Ballymanagh
Lismanny Br
Lakefield
Creggan
Correen
House
Kylemore
Cillin
Gannaveen
Name
Kellysgrove-Cuilliaghmore-Lismanny Landuse 2017
Status
Prepared by Ecology Team 06/2017
Note
Draft maps for internal Bord na Mona use and discussion purposes only, should not be relied on as evidence of title, all queries regarding title status and boundaries should be referred to BnM Legal Dept.
Scale
1:30,000
0 0.1 0.2 Kilometers
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Draft Rehabilitation Plan

2017

Culliaghmore Bog

This rehabilitation plan is developed under Condition 10 of IPC Licence Ref. 503 (April 2017). It outlines measures that will provide for stabilisation of the bog area upon cessation of peat production and decommissioning of the site. ***Rehabilitation*** *generally comprises natural colonisation with or without targeted management.* ***After-use*** *involves the development of cutaway peatland into other land-uses. Rehabilitation can be incorporated into after-use development (e.g. Mountlucas Windfarm). Bord na Móna has focused after-use development of cutaway bogs into forestry, agriculture, grassland, amenity and biodiversity, (Lough Boora Discovery Park) and commercial industrial development (Drehid Resource Recovery, renewable energy – Mountlucas Windfarm). This rehabilitation plan* ***does not*** *outline future after-use development for Culliaghmore Bog. The general after-use strategy of Bord na Móna is outlined in the Bord na Móna Strategic Framework for Future-Use of Cutaway Bogs 2011. Any consideration of future after-uses for Culliaghmore Bog such as amenity, developments or mixed uses will be conducted following the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.*

Rehabilitation of industrial peatlands is a key objective of the Bord na Móna Biodiversity Action Plan 2016-2021. This action plan outlines the main objectives and actions around biodiversity on Bord na Móna lands.

Draft Rehabilitation Plan			
Bog Name:	**Cuilliaghmore**	**Area (ha):**	450 ha
Works Name:	Blackwater	**County:**	Roscommon
Author(s):	BnM Ecology Team	**Survey/ Monitoring:**	7th March 2012
Maps:	Habitats Map, Potential Future Habitats Map, Landuse Map		
Review status: Reviewed Spring 2017.			

Background

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Blackwater bog group (Ref. 502). 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. Cuilliaghmore Bog is part of the Blackwater bog group.

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

- criteria which define the successful rehabilitation,
- consultation to date with interested parties,
- main issues for rehabilitation,
- proposed rehabilitation programme,
- proposed timeframe to implement this programme, and,
- associated aftercare, maintenance and monitoring.

The basis for the proposed approaches and implementation is the experience gained in 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (see reference documents)..

Scope

The scope of the rehabilitation plan seeks to address issues of concern as identified by Bord na Móna and the consultees. The key issues identified so far (pre-consultation) are:

- Categorisation of the habitats developing on Cuilliaghmore Bog (outlined in Appendix II)
- Environmental stabilisation of the former industrial peat production areas
- Maintenance of drainage and silt control through the site
- Remediation of water courses where necessary *(decommissioning)*
- The timeframe for cutaway bog rehabilitation
- The impact of the other potential developments on the site and rehabilitation plan

List of consultees to date

- Open consultation with range of stakeholders at annual BAP review days 2010-2017.
- This rehabilitation plan remains a draft plan until formal consultation is carried out with relevant stakeholders.

The Blackwater-Shannon Bogs

Cuilliaghmore is one of a cluster of bogs that has developed along the floodplains of the River Shannon. It is one of a group within the Blackwater bog group. This group of bogs vary in terms of peat depth remaining, as many of the sites were brought into industrial peat production at different stages over the past forty years.

In each of these bogs, a significant portion of the industrial peat production areas lie below the winter water level of the Shannon and pumping these sites is critical to sustaining peat production. This presents an alternative scenario to those bogs in East Offaly which are typically gravity drained to a greater extent. Consequently, the issues to be considered during rehabilitation of these sites require further detail in terms of understanding the hydrological regime during, and when peat production ceases in these bogs.

Site description

Culliaghmore Bog is located 4km south-east of Ballinasloe in Co. Roscommon. It is part of the Blackwater Bog group and is one of the outlier bogs, being 7km from Shannonbridge. There is a rail connection from Culliaghmore through farmland to Cornaveagh. Culliaghmore is also located adjacent to the River Suck, which flows along the southern boundary. There are local access and tracks along the western margin to access cutover bog, and along the southern margin to access callow grassland along the river.

There is a narrow band of callow-type wet grassland along the river floodplain, which flows in the winter. This transitions to a narrow band of Birch woodland along the fringes of the bog. The majority of the grassland along the river is grazed. It is also designated as part of the River Suck Callows SPA and NHA. The BnM property line overlaps with the SPA designation at several locations along the southern margin, and these overlapping sections mainly contain silt ponds. Some of the undisturbed callows grassland around the fringes of the silt-ponds within the BnM GIS boundary is ungrazed and is dominated by Reed Canary-grass (GS2).

The bog has formed between the main channel of the Suck and an esker to the north. The esker is being used for gravel extraction, with a large active quarry located to the north of the site. The northern half of the bog is underlain with gravel. There are indications from the LIDAR map of some gravel mounds under the peat, but none of these have been exposed yet. Shell marl is found under the peat at the southern end of the bog.

Culliaghmore has a mainly pumped drainage system and part of the site tends to become wet at times when the pumps are not operational. Nearly all of the bog is in full production and it is estimated that about 75% of the bog peat has been exploited on the site. There has been virtually no development of pioneer cutaway vegetation at this site, apart from some minor development around the yard and around silt ponds. There are also several piles of bog timber around the site. The grassland that has developed around the yard is typically dominated by Purple Moor-grass, although there are some pockets more typical of Dry meadows and grassy verges (GS2) habitat and dominated by Reed Canary-grass. Some the remnant high bog has also been disturbed in the past and is re-vegetating as a mosaic of pioneer dry heath and bare peat.

There are some remnant habitats along the margins of the production bog. High bog (Raised bog (PB1)) located close to the works area was typically degraded and disturbed with evidence of drying and a prominent slope to towards the south. The bog surface was spongy. However, there were still sections with moderate high *Sphagnum* cover as well as typical western raised bog indicators such as *Pleurozia purpurea*. Some *Sphagnum fuscum* and *S. imbricatum* was noted in this section. The majority of the *Sphagnum* cover was made up of *S. subnitens* along with *S. capillifolium* and S. *papillosum*. One Snipe was roosting in this section.

The remnant high bog at the south-west corner of the site is quite degraded and well-drained. *Sphagnum cuspidatum* was present in some of the bog drains. Some of this high bog is being actively cut for sod peat inside and outside the BnM boundary by private individuals. The high bog was of marginal ecotope quality. Further south, the production area is fringed by mature Birch woodland (WN7), some of which is within the BnM GIS boundary. This woodland is dominated by mature Birch and also contains some Scot's Pine and other species like Holly.

The high bog located along the eastern margin is quite dried out and dominated by Heather (marginal ecotope). Eroded bare hummocks are present with *Campylopus introflexus*. It is also being colonised by Spruce and Pine from nearby conifer stand.

See Appendix I for more detail on site, habitats and local features.

Current peat production programme, land-use and proposed BnM developments

- Nearly all of the production bog is currently available for production. The majority of the bog has between 1.1-2.5 m depth of peat available, with deeper peat towards the northern end and some shallower peat (< 1 m) towards the centre of the bog.
- It is anticipated that industrial peat production will continue at Cuilliaghmore Bog into the future, depending on future milled peat resource requirements.
- All bogs are currently being assessed for potential after-uses including renewable energy, other appropriate commercial developments and biodiversity enhancement.

Other considerations

- **Cessation of peat production**. Bord na Móna announced in 2015 that peat production for the generation of electricity was to cease by 2030 (http://www.bordnamona.ie/wp-content/uploads/2016/01/Sustainability_Statement_2015.pdf). Industrial peat production (with regard to all appropriate regulations) to supply other customers or sectors (e.g. horticulture) may continue after this date.
- **Peat extraction regulations**. New regulations for the extraction of peat are currently being drafted by government. Peat extraction on sites greater than 30 ha will be regulated through IPC licencing administered by the EPA. This draft rehabilitation plan has been prepared under the conditions of the original IPC licence.
- **Bord na Móna infrastructure**: There are still travel paths and drainage channels maintained around the site for access and drainage of industrial peat production areas. A rail line also runs through the site. Decommissioning of this infrastructure is dependent on the general cessation of industrial peat production for supply of peat to West Offaly Power.
- **Re-wetting potential**: Culliaghmore has a pumped drainage system. A water pump is located within the site and is used to prevent high water levels; a re-wetting assessment of the site will be required to determine any impacts on the site and adjoining lands. Bogs with pumped drainage are more likely to develop wetland habitats when industrial peat production ceases.
- **Private sod peat production**: private sod peat cutting is active along the margins of the site.

Key biodiversity features of interest (2017)

- Culliaghmore Bog BnM property line is partially overlapped by the River Suck Callows SPA (NPWS site code: 004097) and the Suck River Callows NHA (NPWS site code: 000222), which mainly contains silt-ponds, as well as a small sections callow-type wet grassland.
- The River Suck zone (adjacent to the site) attracts significant numbers of wintering wildfowl and Whooper Swans.
- The majority of the bog currently has no features of biodiversity value. The majority of the bog is currently in active industrial peat production and virtually no typical cutaway habitats have developed as yet.
- The margins of the BnM property include some remnant habitats including raised bog (PB1) and Birch woodland (WN7). The Birch woodland located along the southern margin is quite well-developed in places.

Current ecological rating (ranges from Local importance (lower value) to International importance; *following NRA (2009) Guidelines*)

The majority of the terrestrial habitats in isolation are deemed to be of **local importance (lower value)** due to the dominance of bare peat. The margins of the production bog contain some habitats of higher value including remnant raised bog and Birch woodland deemed to be of **local importance (higher value)**. Sections of the site located within the SPA boundary to the south have been rated as **internationally important**, due to their European designation status.

Criteria defining successful rehabilitation

- The main criteria are stabilisation of the former peat production area and mitigation of potential silt run-off.

A large proportion of Cuilliaghmore Bog is still in active industrial peat production although some areas comprise cutaway bog and have started to re-vegetate to some extent. The vegetated areas contain pioneer poor fen plant communities (mainly Soft Rush (*Juncus effusus*)) and pioneer Birch (*Betula* sp.) scrub. There has not been any significant increase in vegetation cover when the 2004 and 2011 aerial photos for the site are visually compared. It is expected that natural colonisation will continue to form the basis for the stabilisation of the former production area and that the bare peat areas will continue to re-colonise depending on land-use. Travel paths are also likely to remain un-vegetated if they are used regularly.

The cutaway at Culliaghmore is classed as production-related cutaway, meaning that it is developing in areas that are still hydrologically connected to the current production areas. This means that no active rehabilitation management is feasible at present, such as blocking drains, as this would also affect the adjacent production areas. However, this cutaway is still developing naturally and typical colonisation and development of pioneer cutaway habitats is continuing. When larger units come out of production, then it may be feasible to block single outfalls, without affecting other production areas and enhancing wetland development.

There is potential for the creation of wetlands at Culliaghmore Bog and at least 21% of the site (production areas) is expected to develop as wetland habitat. Water pumps located on the site are needed to prevent high water levels at present and water-levels over this area could be raised easily by decommissioning these pumps. Raising the water-levels would increase the extent of wetland cover within the natural basins that have been created from industrial peat production. Large areas of deeper lakes are likely to form with associated reed-beds and wet land vegetation in the shallower areas.

The remaining areas on the site would be likely to develop into Birch dominated woodland.

Overall wetlands should account for up to 21% of the site into the future with woodland and scrub accounting for the other 74% of the site.

- No active rehabilitation is anticipated for any of the remnant raised bog around the margins of the site as these areas are still being used for private sod peat cutting or are too small for any active raised bog restoration and will be allowed to develop naturally.
- Remediation of silt ponds and watercourses where required.

Proposed Rehabilitation programme

Short-term (2017-2019 years)

- The most sustainable management option for un-vegetated areas within the site is to allow continued natural re-colonisation of the site.
- Significant bare peat areas through the site and the progress of natural re-colonisation of the cutaway areas will be monitored.

Short-term (0-2 years) (when production ceases)

- All stock-piles should be removed from the site as part of the decommissioning phase of industrial peat production operations. Any remaining or old stockpiles should be bulldozed and levelled as part of the rehabilitation/decommissioning process.
- Blocking the outfalls and field drains and decommissioning the pumps will allow low lying areas within the site to rewet and thus facilitate the creation of wetlands. The potential to enhance wetland development through drain-blocking will be re-assessed at this stage and active measures carried out where appropriate (drain and/outfall blocking).
- A re-wetting assessment will be necessary for Cuilliaghmore as the site is frequently inundated during the winter and any management to reduce or turn off pumps may impact on surrounding lands (See Appendix I).
- While natural colonisation is expected to proceed almost immediately once industrial peat production ceases, there will be a determination of extent of bare peat and selection of best measures to accelerate re-vegetation (if necessary).
- Re-vegetation measures will be carried out as soon as possible post peat production. These will be monitored to determine effectiveness and success.
- Silt-ponds will be monitored during this period and there will be continued maintenance and cleaning (if required) to prevent silt run-off from the site during the rehabilitation phase.

Medium-term

- Targeted active management such as seeding of a nursery crop or use of fertiliser to help promote natural re-colonisation (see Drumman Rehabilitation Trials) will be carried out, if natural re-colonisation of

significant bare peat areas within the active production areas has not progressed satisfactorily at this stage.

- The effect of any targeted active management will continue to be monitored and further work determined.

Long-term

- This phase will follow on from cessation of industrial peat production in adjacent bogs.
- Monitoring of the site to ensure stabilisation and complete re-vegetation.
- Decommissioning of silt-ponds will be assessed.
- Assess requirements for decommissioning of pumps and BnM railway on the site.
- Evaluate success of short-term rehabilitation measures outlined above and enhance where necessary (to be determined by selected short-term management above).
- Reporting to the EPA will continue until the IPC License is surrendered.

Timeframe for rehabilitation

Short-term (2017-2019)

- Monitor re-vegetation of the cutaway area and assess requirements of targeted active management of the bare peat areas using fertiliser/nursery crop treatments.
- On-going monitoring of the overall site.

Long-term

- Long-term monitoring of the site to ensure stabilisation.
- This phase will follow on from cessation of industrial peat production in adjacent bogs.
- Continued monitoring and planning will take place to assess further rehabilitation requirements at Cuilliaghmore taking account of ongoing peat-production on the site and new areas of cutaway, including potential for wetland development, ongoing natural colonisation of the production areas (when production ceases).
- Reporting to the EPA will continue until the IPC License is surrendered.

After-care and maintenance

- There will be annual assessments of the site to determine the progress of the rehabilitation work and requirements for further enhancement measures.
- It is not expected that there will be any requirement for after-care and maintenance other than ecological monitoring.
- Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties and subject to relevant planning regulations. Other after-uses can be proposed for licensed areas and must go through the appropriate assessment and planning procedures.

Potential future natural habitats on the site

This section attempts to predict the development of natural habitats on the site, assuming current land-use and known after-use plans for the cutaway (development etc). This prediction is based on research and methods used to predict the natural vegetation of Ireland (Cross, 2006). Cross (2006) predicted that cutaway bog is likely to develop a mosaic of Birch forest, alder and ash-alder carr, fen and heath in the future. There is no time-line given for the development of these habitats, although it could be expected that the development of natural climax habitats could take hundreds of years. The complexity is the result of small scale variations in the substrate and other environmental factors such as drainage and ground-water influence.

- A large part of the site is expected to develop dry species-poor Birch woodland (WN7) in the drier areas. There is likely to be a succession from a mosaic of Birch scrub, dry grassland, and poor fen/wet grassland vegetation types to this type of woodland. The time required for development of closed woodland from cutaway is likely to vary significantly.
- A wetland mosaic with a significant calcareous influence (FS1/PF1/PF2/WN6) could be expected to develop in over a large part of the site due to re-wetting, the influence of the local topography and underlying deep shell marl. The extent of wetland habitats could be increased with suitable management. Some permanent open water could be created depending on the final depth of water, and the final depth of peat.
- Elements of Ash-Hazel woodland (WN2) are likely to develop along the northern boundary if gravel is exposed.
- Some remnant areas of high bog (PB1) unused by private sod-peat cutters could be expected to remain open but dry Heather-dominated habitats, with some sections developing Birch woodland (WN7) and dry heath mosaics. Pine may spread from the southern boundary.
- Cutover bog (PB4) is likely to develop Birch woodland (WN7) in the long-term, depending on land-use.

Budget and costing

- It is anticipated that the majority of the rehabilitation at this site will be through natural re-colonisation. Some preliminary budgeting can be carried out assuming that approximately 21% of the site will be developed as wetlands with some active management required blocking outfalls to enhance re-wetting. The allocated rehabilitation provision will be based on this estimate.
- Note: Any rehab provision and costs is based on area allocation of various habitats, dryland mosaic, wetland and deep peat. Budgets are relative to rehabilitation measures agreed and the habitats targeted for rehab or present on the site.

Appendix I

Ecological Survey Report

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

Bog Name:	**Cuilliaghmore**	**Area (ha):**	450ha
Works Name:	Blackwater	**County:**	Roscommon
Recorder(s):	DF	**Survey Date(s):**	7th March 2012

Habitats present (in order of dominance)

The most common habitats present at this site include:

- Bare peat (BP) (Codes refer BnM classification of pioneer habitats of production bog. See Appendix II).
- Riparian zones (RIP)
- Pioneer Purple Moorgrass-dominated grassland (gMol)
- Pioneer Soft Rush-dominated poor fen (pJeff)
- Pioneer dry heath (dHeath)
- Bog timber

The most common habitats found around the margins of the site include:

- Marginal raised bog (PB1) (Codes refer to Heritage Council habitat classification, Fossitt 2000), See Appendix II.)
- Cutover bog (PB4)
- Scrub (WS1)
- Birch woodland (WN7)
- Wet grassland (callow grassland) (GS4)
- Improved grassland (GA1)

Description of site

Culliaghmore Bog is located 4km south-east of Ballinasloe in Co. Roscommon. It is part of the Blackwater Bog group and is one of the outlier bogs, being 7 km from Shannonbridge. There is a rail connection from Culliaghmore through farmland to Cornaveagh and onto Garyduff over a bridge across the River Suck. Culliaghmore is also located adjacent to the River Suck, which flows along the southern boundary. There are local access and tracks along the western margin to access cutover bog, and along the southern margin to access callows grassland along the river.

There is a narrow band of callow-type wet grassland along the river Birch woodland plain, which flows in the winter. This transitions to a narrow band of Birch woodland along the fringes of the bog. The majority of the grassland along the river is grazed. It is also designated as part of the River Suck Callows SPA and NHA. The BnM property overlaps with the SPA designation at several locations along the southern margin, and these overlapping sections mainly contain silt ponds. Some of the undisturbed callows grassland around the fringes of the silt-ponds within the BnM GIS boundary is ungrazed and is dominated by Reed Canary-grass (GS2).

The bog has formed between the main channel of the Suck and an esker to the north. The esker is being used for gravel extraction, with a large active quarry located to the north of the site. The northern half of the bog is

underlain with gravel. There are indications from the LIDAR map of some gravel mounds under the peat, but none of these have been exposed yet. Shell marl is found under the peat at the southern end of the bog.

Culliaghmore has a mainly pumped drainage system and part of the site tends to become quite wet at times when the pumps are not operational. Nearly all of the bog is in full production and it is estimated that about ¾ of the bog peat has been exploited on the site. There has been virtually no development of pioneer cutaway vegetation at this site, apart from some minor development around the yard and around silt ponds. There are also several piles of bog timber around the site. The grassland that has developed around the yard is typically dominated by Purple Moor-grass, although there are some pockets more typical of GS2 and dominated by Reed Canary-grass. Some the remnant high bog has also been disturbed in the past and is re-vegetating as a mosaic of pioneer dry heath and bare peat.

There are some remnant habitats along the margins of the production bog. High bog located close to the works area was typically degraded and disturbed with evidence of drying and a prominent slope to towards the south. The bog surface was spongy. However, there were still sections with moderate high *Sphagnum* cover as well as typical western raised bog indicators such as *Pleurozia purpurea*. Some *Sphagnum fuscum* and *S. imbricatum* was noted in this section. The majority of the *Sphagnum* cover was made up of *S. subnitens* along with *S. capillifolium* and S. *papillosum*. One Snipe was roosting in this section.

The remnant high bog at the south-west corner of the site is quite degraded and well-drained. *Sphagnum cuspidatum* was present in some of the bog drains. Some of this high bog is being actively cut for sod peat inside and outside the BnM boundary by private individuals. The high bog was of marginal ecotope quality. Further south, the production area is fringed by mature Birch woodland (WN7), some of which is within the BnM GIS boundary. This woodland is dominated by mature Birch and also contains some Scot's Pine and other species like Holly.

The high bog located along the eastern margin is quite dried out and dominated by Heather (marginal ecotope). Eroded bare hummocks are present with *Campylopus introflexus*. It is also being colonised by Spruce and Pine from nearby conifer stand.

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

Culliaghmore Bog BnM property line is partially overlapped by the River Suck Callows SPA (NPWS site code: 004097) and the Suck River Callows NHA (NPWS site code: 000222),

The southern boundary of the production bog adjoins this long designated area that follows the path of the River Suck. Some non-production marginal areas are located within the designated area. This site has been designated for its importance for wintering wildfowl and species of conservation importance such as Greenland White-fronted Geese and Whooper Swan.

Some undeveloped and partially fringe habitats within the northern BnM boundary are designated as part of this NHA and SPA. Two sections contain a series of silt ponds and associated habitats. Other habitats include small amounts of remnant high bog, scrub and Birch woodland. Part of the BnM boundary extends out to the River Suck and this section takes in some wet grassland and fringing Reedbed and scrub along the edge of the river. There are 6.17 ha within the NHA boundary in the Culliaghmore property.

Adjacent habitats and land-use

Cutover bog (PB4), Birch woodland (WN7), scrub (WS1), raised bog (PB1), improved agricultural grassland (GA1) and wet grassland (GS4) all border the site. There is a significant amount of private sod-peat cutting around margins of the western side.

Watercourses (major water features on/off site)

- Culliaghmore bog is located within the River Suck catchment.
- The bog is mostly drained by a series of silt ponds along the southern margin. These are pumped and connect directly to the main River Suck channel. A small silt pond is located at the northern end of the site and this drains to a stream flowing along the east side of the site that flows to the River Suck.

Peat type and sub-soils

The main peat type exposed at this site is fen peat. The peat is underlain with shell marl at the southern end of the site and this is exposed in silt-ponds. The peat is underlain with gravel along the northern end of the site from a nearby esker.

Fauna biodiversity

Birds

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

- Mallard (10), Mute Swan (2), Whooper Swan (80), Teal (130) and Moorhen (1) were recorded using the River Suck, adjacent to the bog.
- Coal Tit, Blue Tit, Great Tit, Chaffinch, Wren, Long-tailed Tit and Blackbird were all noted using the Birch woodland that fringes the southern margin.
- Other more common species recorded around the site includes Grey Crow, Starling (100), Mallard (2) (NW corner), Snipe (2) SE corner in ditch), Mistle Thrush, Chaffinch, Robin, Wren, Blackbird and Dunnock (around works area).

Mammals

Signs of several mammal species were noted on the site during the survey.

- Hare droppings and prints were noted at several locations around the bog.
- Badger prints were noted along the southern margin of the bog.

Other species

- Frog spawn noted on some of the remnant high bog.

References

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

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

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Appendix II. Codes used for habitat classification.

Bord na Mońa habitat classification scheme

	General	Vegetation community [1]	BnM habitat code	Equivalent Heritage Council codes [2]
Pioneer habitats of industrial cutaway	Peatland	Bare peat (0-50% cover)	BP	ED2
		Embryonic bog community (containing *Sphagnum* and Bog Cotton)	PBa	PB
		Embryonic bog community (Calluno-Sphagnion)	PBb	PB
	Flush and Fen	Pioneer *Campylopus*-dominated community	pCamp	PF2
		Pioneer *Juncus effusus*-dominated community (Soft Rush)	pJeff	PF2
		Pioneer *Eriophorum angustifolium*-dominated community (Bog Cotton)	pEang	PF2
		Pioneer *Juncus bulbosus*-dominated community (Bulbous Rush)	pJbulb	PF2
		Pioneer *Triglochin palustris*-dominated community (Marsh Arrowgrass)	pTrig	PF2
		Pioneer Caricion davallianae-Community with *Cladium* (rich fen)	pCladium	PF1
		pioneer *Schoenus nigricans* community (rich fen)	pSchon	PF1
		pioneer *Carex viridula*/brown moss community (rich fen)	pVir	PF1
	Emergent communities	Pioneer *Carex rostrata*-dominated community (Bottle Sedge)	pRos	PF2/FS1
		Pioneer *Phragmites australis*-dominated community (Common Reed)	pPhrag	FS1
		Pioneer *Typha latifolia*-dominated community (Reedmace)	pTyp	FS1
		Pioneer *Schoenoplectus lacustris*-dominated community (Bulrush)	pSch	FS1
	Open water	Charaphyte-dominated community	pChar	FL2
		Permanent pools and lakes	OW	FL2
		Temporary open water	tOW	
	Woodland and scrub	Emergent *Betula*/*Salix*-dominated community (A) (Birch/Willow)	eBir	WS1
		Open *Betula*/*Salix*-dominated community (B) (Birch/Willow)	oBir	WS1
		Closed *Betula*/*Salix*-scrub community (C) (Birch/Willow)	cBir	WS1
		Ulex europaeus-dominated community (Gorse)	eGor	WS1
		Betula/*Salix*-dominated woodland (Birch/Willow)	BirWD	WN7
	Heathland	Pioneer dry *Calluna vulgaris*-dominated community (Heather)	dHeath	HH1
		Dense *Pteridium aquilinum* (Bracken)	dPter	HD1
	Grassland	Pioneer dry calcareous and neutral grassland (Centaureo-Cynosuretum)	gCal	GS1
		Dactylis-Anthoxanthum-dominated community (Cocksfoot-Sweet Vernalgrass)	gCo-An	GS2
		Anthoxanthum-Holcus-Equisetum community (Sweet Vernalgrass-Yorkshire Fog-Horsetail)	gAn-H-Eq	GS
		Molinia caerulea-dominated community (dry) (Purple Moorgrass)	gMol	GS4
		Marsh (Meadowsweet and other tall herbs) (Filipendulion ulmariae)	Mar	GM1
	Disturbed	*Tussilago farfara*-dominated community (vegetation > 50%) (Colt's Foot)	DisCF	ED3
		Epilobium-dominated community (vegetation > 50%) (Willowherb spp.)	DisWil	ED3
	General	Riparian areas (streams or drain with associated edge habitats (e.g. FW2/4 + WS1, GS2 etc)	Rip	FW2 +
		Silt Ponds (artificial ponds with associated bank habitats (e.g. FL8 + WS1, GS2, ED2, ED3)	Silt	FL8 +
		Access (tracks or railways with associated edge habitats (e.g. BL3 + gCal, gMol, eGor etc)	Acc	BL3 +
		Works areas (predominately built land but can include landscaped and brownfield habitats (e.g. GA2, WS3, WD4, ED2, ED3)	Works	BL3 +

[1] These are generally pioneer habitats of bare peat and the communities can contain a significant proportion of bare peat. Some habitats are more developed than others. They frequently occur in mosaic with each other.
[2] Not all these communities are equivalent to habitat classes used by The Heritage Council habitat classification scheme (Fossitt 2000) as some are quite rudimentary and undeveloped.

Heritage Council habitat classification scheme (Fossitt 2000)

	General	Habitat	Heritage Council code
Semi-natural and modified habitats	Peatlands	Raised Bog	PB1
		Lowland Blanket bog	PB3
		Cutover Bog	PB4
		Rich fen and flush	PF1
		Poor fen and flush	PF2
		Transition mire and quaking bog	PF3
	Woodland and scrub	Oak-Birch-Holly woodland	WN1
		Oak-Ash-Hazel woodland	WN2
		Wet Pendunulate Oak-Ash woodland	WN4
		Riparian Woodland	WN5
		Wet Willow-Alder-Ash woodland	WN6
		Bog woodland	WN7
		Mixed broad-leaved woodland	WD1
		Mixed broad-leaved/conifer woodland	WD2
		Conifer plantation	WD4
		Scrub (Gorse)	WS1
		Emergent Betula-dominated community	WS1
		Closed Betula scrub community	WS1
		Recently-planted woodland	WS2
		Ornamental scrub	WS3
		Short-rotation coppice	WS4
		Recently-felled woodland	WS5
	Linear woodland	Hedgerow	WL1
		Treeline	WL2
	Grasslands and Marsh	Improved grassland	GA1
		Amenity grassland	GA2
		Dry calcareous and neutral grassland	GS1
		Dry meadows and grassy verges	GS2
		Dry-humid acid grassland	GS3
		Wet grassland	GS4
		Freshwater Marsh	GM1
	Heath and Bracken	Dry Heath	HH1
		Dry calcareous Heath	HH2
		Wet Heath	HH3
		Dense Bracken	HD1
	Disturbed ground	Exposed sand, gravel or till	ED1
		Spoil and bare ground	ED2
		Recolonising bare ground	ED3
		Active quarry	ED4
	Freshwater	Acid Oligotrophic lakes	FL2
		Mesotrophic lakes	FW4
		Artificial ponds (slit ponds)	FL8
		Depositing rivers	FW2
		Canals	FW3
		Drains	FW4
	Cultivated and Built land	Stonewalls and other stonework	BL1
		Earth Banks	BL2
		Buildings and artificial surfaces	BL3
		Arable crops	BC1
		Horticulture	BC2
		Tilled land	BC3