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This file contains draft Bord na Móna rehab plans for various sites in the Derrygreenagh IPC Licence.

These plans and maps were updated in 2017.

The file is in 5 parts, A to E.

Draft Rehabilitation Plan

2017

Ballybeg 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 Ballybeg 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 Ballybeg 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:	**Ballybeg**	**Area (ha):**	847 ha
Works Name:	Derrygreenagh	**County:**	Offaly
Author(s):	BNM Ecology	**Survey/ Monitoring Date(s):**	23-28th August 2010 26/07/2011 05/03/2013 10/04/2015
Maps:	Habitats Map, Potential Future Habitats 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 Derrygreenagh bog group (Ref. 501). 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. Ballybeg bog is part of the Derrygreenagh bog group.

This plan is a specific rehabilitation plan for Ballybeg 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 are:

- Categorisation of the habitats developing on Ballybeg Bog (outlined in Appendix I)
- 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 bog rehabilitation/restoration
- The impact of any other proposed development on the site and rehabilitation plan

List of consultees to date

- Open consultation with range of stakeholders at annual BAP review days 2010-2017.
- Department of Arts, Heritage and Gaeltacht (archaeology)
- This rehabilitation plan remains a draft plan until formal consultation is carried out with relevant stakeholders.

Site description

Ballybeg is located between Croghan Hill and the town of Rhode in Co. Offaly. Ballybeg is situated in a group of Bord na Móna bogs that includes Derryarkin to the north and Cavemount to the south. The most southern part of the site is adjacent to the Grand Canal pNHA. This is a pumped bog with main pumps located near the centre

of the site and connected to a drainage system that flows through a series of silt ponds and onto the Yellow River via a tributary.

Ballybeg has a large area to the north of the site that has been out of production for some time. The maturity of the cutaway decreases further south, where fields probably came out of production at a later date. This area has developed a complex mosaic of Birch scrub, dry grassland and poor fen dominated by Soft Rush. A significant area is still unvegetated with bare peat and there are also significant areas between the patches of scrub that have scattered Soft Rush in association with the bare peat. The north-east section is being used for gravel extraction for the supply of gravel used for railways. This area contains a series of old and newer spoil heaps.

A large area of cutaway (about 60 ha) east of the main railway line has been recently planted with Alder as a biomass trial for East Offaly Power. The southern half of the site is mostly in milled-peat production and is dominated by bare peat.

Ballybeg also includes a small area of undeveloped raised bog (PB1) at the southern end, part of which is owned by Bord na Mona. The area is being cut for sod turf by private individuals. The ownership of this area is currently being reviewed. No drainage was carried out in this area by Bord na Móna. This area is located south of a minor road from Rhode and is adjacent to the travel path and rail-link into Cavemount. This area is adjacent to the Grand Canal pNHA, although none of the Bord na Móna-owned section is designated.

Peat production programme and proposed developments

- Milled peat production is anticipated to continue at Ballybeg for the foreseeable future, depending on further milled peat resource requirements.
- Part of the cutaway has been developed as an Alder biomass plantation.
- Ballybeg has been zoned under the BnM Decision Framework Management process as a potential development area.

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 railway.** This bog railway is an active link to Edenderry Power station (EPL). Decommissioning of this infrastructure is dependent on the general cessation of industrial peat production for supply of peat to EPL.
- **Re-wetting potential.** Ballybeg Bog has a partially pumped bog drainage whose water table will be below the surrounding water table for part of the site. It can be expected that once this site goes out of production and pumps are turned off that water tables will rise internally and part of the site will develop as wetlands. The actual area that will develop into wetlands will relate to the local topography and water courses.
- **Private sod-peat production.** There is some private sod-peat production around the margins of the high bog inside and outside the ownership of Bord na Móna.
- **Archaeology.** Ballybeg contains an important archaeological site. Some active rehabilitation was carried out in 2011 to re-vegetate and stabilise this area with re-seeding.

Key biodiversity features of interest (2017)

- Large area of undeveloped raised bog (PB1) (22.3 ha) (Coole Bog) at southern end of site. This portion of bog is in relatively good condition and is adjacent to the Grand Canal pNHA. It qualifies as the Annex I EU Habitats Directive habitat – 'degraded raised bogs still capable of regeneration' – 7120. (Number codes refer to EU habitat classification system – European Commission 1996).
- Large area of cutaway at northern end. This area is largely dry and developing a mosaic of Birch scrub and woodland with frequently un-vegetated open areas. There are small scattered wetlands with small amounts of open water through this area.
- Blue Fleabane, a nationally rare plant species listed in the Irish Red Data Book (Curtis and McGough 1988) and whose status is listed as endangered, is present on the site.
- The bog is used by small flocks of Golden Plover in the winter and by breeding Snipe and Ringed Plover in the summer (Biosphere Environmental Services 2014).

Current ecological rating (A-E; *following from NRA Guidelines*)

A large part of the site can be rated as having a **low local ecological value (E)** as it is in milled peat production. The large area of cutaway has a higher local ecological value **(D)**. The area of undeveloped raised bog also has a high local ecological value **(C) (County significance)**, although its restoration prospects are poor.

Criteria defining successful rehabilitation

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

A large section of Ballybeg is already out of production and has been classed as cutaway. This section contains a range of habitats dominated by Birch scrub and woodland and also containing small wetlands. The vegetated areas contain typical pioneer habitats of cutaway and are developing in a typical manner. The cutaway area is also notable for significant cover of bare peat between the vegetated sections. The exposed peat at Ballybeg is a *Phragmites*-based peat and is similar in its physical properties to the peat at Drumman. It is prone to drying out and becoming mobile in the summer, which hinders and slows the natural colonisation process, compared to most other cutaway. Targeted active rehabilitation like the use of fertiliser treatments and/or nursery crops (see Drumman rehabilitation trails) are likely to be required for some of the largest areas of bare peat within the cutaway area, to aid natural colonisation. A large section of the cutaway has already been developed as an Alder Biomass trial.

Some of the cutaway at Ballybeg 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.

Ballybeg is a partially pumped bog with the main pump being located along the central eastern part of the site. Pumping is likely to affect the drainage of both the cutaway and the active production areas. Therefore, some wetland development can be expected in the future at Ballybeg when pumping ceases, as water-levels will rise and re-wet a portion of the cutaway. However, this wetland development will be delayed until peat production finally ceases. Continued pumping may be required for the development of the Alder plantation.

The southern half of the site is in milled-peat production and is likely to be in peat production for some time (up to 2030) due to its deep peat reserves. It is somewhat more difficult to predict future habitats and suggest possible management options for this relatively young section, as the bog landscape has the capacity to significantly change as production removes more and more peat. The final landscape will be determined by production decisions (i.e. how much peat is removed) and by the underlying topography, drainage etc. Prolonged production of milled peat is likely to change the landscape of this site significantly.

The potential to restore *active* raised bog in the small area of undeveloped raised bog located at the southern end of Ballybeg is poor, due to its relatively small size (22 ha), and the fact that Bord na Móna only own a portion of the overall bog unit. It is also being used for private sod-peat production with turf cutting around the margins.

However, it is located adjacent to the Grand Canal pNHA so the preservation (of the Bord na Móna owned section) complements the conservation objectives of the Grand Canal pNHA. There is also a high voltage power line passing through the site.

There is still a small active gravel pit at the northern end of Ballybeg. It is not known at this time how long this gravel pit will be required. Blue Fleabane is present in this area and has the potential to maintain its population status into the future on suitable exposed gravel habitats.

- Remediation of silt ponds and watercourses where required.
- At this point in time, 74% of the site is expected to develop as Birch woodland and scrub, 23% is likely to develop as wetland and 3% is likely to remain as raised bog (PB1).

Proposed Rehabilitation programme

Completed

- A significant portion of the site (>50%) has already naturally re-vegetated with typical cutaway habitats. Natural re-colonisation of the cutaway so far has been quite effective.
- Part of the cutaway has been re-developed for an Alder biomass trial and planted with Alder.

Short-term (0-2 years)

- Targeted rehabilitation of the bare peat areas can be considered within the cutaway area.
- There will be ongoing monitoring of the site and appropriate rehabilitation planning related to any changes in land-use at Ballybeg.
- Continued planning should take place to assess the potential to enhance and the scale of wetland development at Ballybeg. This will include a survey of drainage on the site to assess suitability for drain-blocking of the major outfalls and re-wetting.

Upon cessation of peat production

- The most sustainable management option for the active production areas within the site is to allow natural re-colonisation of the site, once the decision is made to cease production at the site.
- All stock-piles should be removed from the site as part of the winding down of peat production operations. Any remaining or old stockpiles should be bulldozed and levelled as part of the rehabilitation/decommissioning process.
- Significant bare peat areas through the site and the progress of natural re-colonisation of the active peat production areas will be monitored.
- Rehabilitation requirements of the gravel pit area will also be assessed at this stage. Some new spoil heaps should be retained to maintain the status of the Blue Fleabane population on the site.
- The potential to enhance wetland development through drain-blocking will be re-assessed at this stage.
- Pumps will also be decommissioned at this stage.
- 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 be monitored.

Long-term

- This phase will follow on from cessation of peat production in adjacent bogs.
- Monitoring of the site to ensure stabilisation and complete re-vegetation.
- Evaluate success of short-term rehabilitation measures outlined above and enhance where necessary

(to be determined by selected short-term management above).

- Decommissioning of silt-ponds will be assessed.
- Decommission the BnM railway on site.
- 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

- Continued monitoring and planning will take place to assess further rehabilitation requirements at Ballybeg 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) and rehabilitation requirements of the gravel pit.
- 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 2005). Cross (2005) 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 majority 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. Some of this succession is already occurring on the site and there is already development of small area of rudimentary or poorly developed Birch woodland/scrub. However the time required for development of closed woodland from cutaway is likely to vary significantly. Some sections where peat production has ceased for some time are still unvegetated and dominated by bare peat.
- Wetland mosaics with emergent poor fen communities dominated by Soft Rush, Bog Cotton and Bottle Sedge (PF2), some permanent open water, (FL), Reedbeds (FS1), wet Willow woodland and scrub (WN6) and Birch woodland (WN7) in the drier sections are likely to develop in the lower topographical areas including a zone along the main access route. Small open water pools surrounded by these other habitats are already developing in the northern cutaway.

- Small wetlands surrounded by woodland/scrub and containing emergent Reedbeds (FS2) and aquatic vegetation (FL4-5) would also be expected to develop in the gravel extraction area.
- The access zones including the railways through the site are likely to develop Oak-Ash-Hazel woodland over time, as the railways are built on a sub-soil embankment. Some of the silt pond areas could also develop this type of woodland as the spoil heaps are made up of marl and gravel sub-soil.
- Most of the small high bog remnants and cutover bog around the margins are likely to be slowly invaded by scrub and develop into Birch woodland (WN7) as they dry out.
- The largest section of high bog to the south of Ballybeg is likely to retain degraded raised bog features (PB1).

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 23% 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.

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:	**Ballybeg**	**Area (ha):**	847ha
Works Name:	Derrygreenagh	**County:**	Offaly
Recorder(s):	MMC	**Survey Date(s):**	23-25/08/2010

Habitats present (in order of dominance)

The most common habitats present on production bog and cutaway 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) in northern section of cutaway, frequently in mosaic with bare peat and Birch scrub. Smaller amounts of poor fen dominated by Bog Cotton (pEang) and sometimes associated with open water on the site. Small amounts of Marsh Arrowgrass-dominated vegetation in places (pTrig).
- Emerging, open and closed Birch scrub (eBir). Mainly in the northern cutaway area and in mosaic with poor fen (pJeff) and dry grassland (gAn-H-Eq, gMol).
- Large area of cutaway planted with Alder as a biomass crop (WS2).
- Active gravel pit (ED4) with associated vegetation communities of disturbed areas (DisTuss, An-Ho-Eq, eBir) on some of the older spoil. There are also several flooded pits with permanent water and emergent Reedbeds (pTyph).
- Small patches of open water (OW) or hollows with temporary open water (TOW) with emergent poor fen vegetation (pJeff). Minor amount of Reedbeds (pTyph) and other poor fen such as Bottle Sedge dominated community present (pRos).
- Small amounts of dry heath (dHeath) mainly in mosaic with Birch scrub along margins of northern cutaway and around silt ponds.
- Silt Ponds (Silt) and Riparian zones (RIP) with associated habitats such as scrub (WS1), Bracken (HD1), rank grassland (GS2), dry calcareous grassland (gCal), Purple Moorgrass-dominated grassland (gMol) and typical pioneer communities of disturbed areas (disTuss) developed on spoil heaps dug from the ponds and drainage areas.
- Access zones (Acc). These include the railway lines and permanent gravel tracks. These zones have associated vegetation communities such as scrub with Birch (oBir) and Gorse (eGor), grassland (gMol, gCal) and patches of Bracken (dPter).

The most common habitats present around the margins of the production bog and in other sections of this site include:

- Raised bog (PB1) (several fragments) (Codes refer to Heritage Council habitat classification, Fossitt 2000), See Appendix II.)
- Birch woodland (WN7)
- Scrub (WS1) (Gorse scrub and Birch scrub developing of dry high bog around margins)
- Dense Bracken (HD1)
- Cutover bog (PB4) (several small fragments)
- Improved grassland (GA1) and wet grassland (GS4) (minor areas along boundaries where boundary

overlaps adjacent fields)

- Depositing river (Esker Stream) (FL2)

Description of site

Ballybeg is located between Croghan Hill and the town of Rhode in Co. Offaly. Ballybeg is situated in a group of Bord na Móna bogs that includes Derryarkin to the north and Cavemount to the south. The most southern part of the site is adjacent to the Grand Canal pNHA. This is a pumped bog with main pumps located near the centre of the site and connected to a drainage system that flows through a series of silt ponds and onto the Yellow River via a tributary. This bog can be more easily described by dividing it into four main sections according the principal land-use of each section and the natural topography of the site.

Northern cutaway area

Ballybeg has a large area to the north of the site that has been out of production for some time. The maturity of the cutaway seems to decrease further south, where fields probably came out of production at a later date. This area has developed a complex mosaic of Birch scrub, dry grassland and poor fen dominated by Soft Rush. A significant area is still unvegetated with bare peat and there are also significant areas between the patches of scrub that have scattered Soft Rush in association with the bare peat. The underlying topography seems to have had a significant influence on the development of various vegetation communities as a comparison of the aerial photos to the LIDAR map shows an unusual crescent-moon shape that remains largely unvegetated. This corresponds exactly to lower lying land on the LIDAR map. Higher ridges running through the site are vegetated with the Birch scrub, dry grassland and poor fen. The overall area is quite dry and similar to parts of Drumman with loose dry crumbly peat that is prone to be wind-blown. The topography also varies and there are a series of low mounds and small basins through-out this section.

The Birch scrub varies from small areas of dense closed and mature scrub to more prominent open areas of Birch scrub that are developing in association with dry grassland and or Soft Rush. Pine and Spruce are occasionally found through-out the cutaway but are more common towards the west and northern sides, where the cutaway is adjacent to conifer plantation. There are occasional sections where Spruce is frequent. The dry grassland (gAn-H-Eq) is never extensive and has developed on the drier mounds through the area. It is similar to the dry grassland communities that have developed at Drumman and Derryarkin and is dominated by Bentgrass with Yorkshire Fog, Thistle, Rosebay Willowherb, Colt's-foot. The grassland is quite open and there is significant cover of *Campylopus introflexus* moss. This community is quite disturbed in places and could be classified as disturbed vegetation (disCF, DisWill) in places. There is also a calcareous influence with species such as Knapweed prominent in places. Soft Rush and Purple Moorgrass are present and there is a subtle transition to poor fen dominated by Soft Rush in places. The east side of this cutaway area tends to be less developed and there is more emergent Birch scrub, poor fen with Soft Rush and bare peat present.

Small basins with impeded drainage have developed throughout the cutaway. There is not much open water and most of these basins could be classified as temporary open water with mainly Soft Rush-dominated vegetation. Wetland development is quite poor and the cover of Bottle Sedge and Bog Cotton around these small basins was relatively low. Part of the west side is some-what more diverse and dominated by Bog Cotton (pEang) in contrast with the rest of the cutaway. This area also contains some Reedbeds with Common Reed and some Bog Sedge. .

Dry heath is more prevalent towards the northern end of the cutaway. Heather dominates in association with open Birch scrub and dry grassland dominated by Purple Moorgrass on fields that must not have been exploited very intensively (*Sphagnum* peat still present - along margins?). There are large areas of mainly bare peat between the vegetated fields and these contain dry crumbly wind-blown peat. Some high fields are being colonised primarily by Spruce.

There are a series of deep drains with associated spoil heaps that run through this section. Some of these gravel spoil heaps have developed extensive populations of Blue Fleabane. Some of the older spoil is developing scrub in places and Blue Fleabane is absent or rare in these sections. Some iron-pan deposits are present at the southern end of the cutaway.

The north-east section is being used for gravel extraction. This area contains a series of old and newer spoil heaps. Older spoil heaps are being vegetated with disturbed vegetation (disTuss), open Birch scrub and some dry grassland (gMol, gCal) There are also some old gravel pits with permanent water. Some of these pits have

developed Reedbeds with Reedmace and they also contain other aquatic and emergent vegetation with Pondweds, Watercress, Bottle Sedge and Bur-weed. One of the pits was being used by Moorhen and Mallard.

Eastern Alder Biomass plantation

A large area of cutaway (about 60 ha) east of the main railway line has been recently planted with Alder to supply a biomass crop to East Offaly Power. Some Birch has also been planted. Saplings have been regularly planted in rows in bare peat and in typical pioneer cutaway communities in this area including poor fen dominated by Soft Rush and emerging and open Birch scrub with Birch and Willow. The topography of this area is variable with some naturally occurring small basins and low mounds. Some small hollows that generally are vegetated with poor fen (pJeff) but also become wet during the winter (tOW). Some of these hollows do contain permanent water (OW) but most have been planted with Alder. The mounds are generally developing Birch and Willow scrub in association with dry grassland (gAn-H-Eq). Alder saplings are growing best in the areas that have been already vegetated with dry grassland and open scrub. They are also growing in many of the small basins that were planted and are now infilled with poor fen.

This area also includes a large old silt pond and small area of unplanted cutaway to the north. Spoil heaps on both sides of the silt pond are developing scrub (oBir) and some dry grassland and disturbed vegetation (gMol, disTuss, gCal). Some of the open grassland developing on the gravel contains Blue Fleabane, which is widely scattered along the northern spoil heap. The small unplanted cutaway area includes a series of bare fields with little pioneer vegetation cover interspersed with higher fields that contain open Birch scrub and some pioneer dry heath. The unvegetated fields in this area contain dry crumbly peat that is similar to the cutaway of Drumman.

This area also contains a small portion of high bog at the northern end. Some of this high bog was ditched in the past but was never harvested. The high bog is quite dry and being invaded by Birch and Pine.

Southern production area

This area is mostly in production and is dominated by bare peat. It is divided into two main sections by a central travel path and railway. The main Works area is located at the east side and there are a series of silt ponds and associated long spoil heaps in this area that are vegetated along the main access route into the site. There are also old access routes and rail links into the old site of Rhode Power Station. This area is colonised with a range of typical cutaway communities of drier areas including Purple Moorgrass-dominated grassland (gMol), patches of dense Bracken (dPter) and some Gorse and Birch scrub. The old tracks are also developing some dry calcareous grassland that is species-rich in places. This calcareous grassland is replaced by Purple Moor-grass dominated grassland in places and there is also some rank grassland dominated by species such as False Oatgrass and Cocksfoot that is developing. Silt ponds to the west and south of the access area are partially vegetating with similar communities. There are a series of fields to the south of the works area that are out of production. Some mounds of marl, and gravel are exposed in these fields and these areas are partially vegetated with dry grassland (gAn-H-Eq) and emergent Birch scrub (eBir).

The southern part of this section still has deep peat and has not been as intensively exploited as other sites. Some of this peat is likely to be *Sphagnum* peat. Peat depths increase from the north to the south. Very little pioneer cutaway vegetation has developed along the southern margins in this section. Towards the northern end of this section (east side) there are some fields that have come out of production and are beginning to develop pioneer poor fen communities. Reedmace is found in some of the drains and Marsh Arrowgrass and Soft Rush are beginning to colonise the fields. Shell marl is being exposed in some of these fields.

Production extends further north to the west of the access and riparian zone and the main Works area. Bare peat is the dominant habitat in this area. There are some small patches where Marl and gravel is being exposed and these are being vegetated by disturbed vegetation with Rosebay Willowherb (disWill) and some Marsh Arrowgrass (pTrig).

There is a small area of high bog at the west side of the site that is partially owned by Bord na Móna. This area has been ditched but was never harvested. It is relatively dry with heather dominating and scrub spreading along some sections. Parts have been cut by private individuals in the past and are re-colonising with Deergrass and other species. Some of this high bog is also grazed by cattle.

There are very little undeveloped marginal habitats around the remainder of this section. A riparian zone is present along the eastern boundary with a deep channel and associated long bank of spoil, now vegetated with Bracken and scrub. A minor band of scrub and Birch woodland can be found along the western margin.

Southern raised bog

Ballybeg also includes a small area of undeveloped raised bog (PB1) at the southern end, part of which is owned by Bord na Mona. This area is located south of the Rhode-xxx minor road and is adjacent to the travel path and rail-link into Cavemount. This area is adjacent to the Grand Canal pNHA, although none of the Bord na Móna part of the bog is designated. This area is also being cut by individuals for peat along the western margin. Private peat-cutting has intensified and spread south along the margins in recent years, although there is also some old regenerating cutover bog (PB4) to south, adjacent the Grand Canal. A power-line passes over the bog and some pylons are located on it.

The high bog is in moderate condition and the majority of it would be classified as sub-marginal (Ecotope) quality. The bog was wet but not quaking. There are signs of degradation and drying in places. The high bog has been burnt in the past and the *Cladonia* sp. lichen cover is < 5%. The micro-topography is also degraded (by burning) with very few large hummocks or mounds present. *Sphagnum* cover is moderate and is dominated by hummocks of *S. capillifolium* and S. *papillosum*. There were very few hollows with *S. cuspidatum* present. This species was only really found along some of the infilled drains through this area. Pools were not present and some former pools are now dry hollows. Several Snipe were roosting on the high bog.

There were minor amounts of scrub (WS1) with Gorse and Birch on the edges of the high bog adjacent to the Grand Canal in places. The old face-bank at the south-western corner has developed into moderately sloping cutover bog and there is some regenerating cutover bog with high *Sphagnum* cover in this area. A drain along the edge of the track and the cutover bog has been cleaned recently.

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

The Grand Canal pNHA (NPWS site code 002104)

The Grand Canal pNHA is located adjacent to the site at the southern end. There is no actual overlap between BNM property and the designated area even though the adjacent BnM area is undeveloped raised bog (Coole Bog). A large area of raised bog adjacent to the BnM property (and in the adjacent townland) has been included within the designation.

Adjacent habitats and land-use

The surrounding landscape is dominated by farmland with improved grassland. Adjacent habitats include those of reclaimed cutover bog such as conifer plantation (WD4), improved grassland (GA1) and wet grassland (GS4). There are also some high bog (PB1) remnants and active cutover bog (PB4) around the margins that are not in ownership by BnM. There has been some gravel extraction to the north (ED3) and some of the land adjacent to the east side is planted with broad-leaved forestry (WS2).

Watercourses (major water features on/off site)

- This site is located within the River Boyne catchment.
- A tributary of the Yellow River drains the eastern side of the bog and the channelised drainage that flows through the bog.
- A channelised drain flows south along the SE boundary and is a feeder for the Grand Canal.

Peat type and sub-soils

The main peat type exposed on this site is fen peat, although the peat towards the southern end of the site was red or *Sphagnum* peat. The site is likely to be underlain with limestone tills, as these sub-soils are exposed around the margins of the site. Glacial sub-soil/gravel deposits are exposed around the gravel pit to the north of the site and along some of the main drains through the cutaway area and Alder plantation. Shell Marl was exposed along some silt ponds in the centre of the site, as was blue-silty clay in places.

Fauna biodiversity

Birds

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

- Kestrel
- Reed Bunting
- Flock of ~50 Goldfinches
- Snipe (3)
- Moorhen
- Mallard
- Other species present included Meadow Pipit, Blackbird, Rook, Wren, Skylark, Heron, Magpie, Pheasant, Wood Pigeon, Swallow, Wheatear and Chaffinch.
- The site also attracts some swans (Whooper Swans) and ducks (Teal, Mallard, Wigeon) in the winter, when there is standing water.

Mammals

- Signs of Fox, Rabbit and Badger were noted on the site.
- Hares were observed on the site and there are frequent signs of Hares around the site.
- Mink have been noted on the site in the past.

Other Species

- Green-veined White
- Large White
- Small Tortoise-shell
- Peacock
- Common Blue,
- Speckled Wood,
- Small Copper

Blue Fleabane distribution

This rare species (whose status is listed as endangered) was recorded at several locations around the site. It has not been recorded at this site before. Blue Fleabane (*Erigeron acer*) is an annual species that is found in dry pastures and sandy or gravely places such as eskers and its distribution is mainly confined to the central and south-eastern parts of Ireland (Webb *et al.* 1992). It has been recorded in several 10 km grid squares in Offaly in the past and has recently been recorded from Derryarkin and Drumman, to the north of this site.

Several populations were recorded on the site (see Habitat Map). The largest population was noted in the area around the gravel pit. Blue Fleabane has extensively colonised old spoil heaps and some of the disturbed ground where quarrying activity is low at present. It is widely distributed in this area. It also appears on several of the old spoil heaps that were dug out from silt ponds and some large drains.

This species is not likely to have been present on the site prior to the development of the cutaway. Subsequent development of the site including construction of railways on gravel embankments, construction of drains and silt ponds, and more recently the development of the quarry have created suitable exposed gravel banks made up

of calcareous rich material that this species prefers. In the long-term, it could be expected that these spoil heaps and exposed gravel patches will re-vegetate with grassland and scrub, which will not favour this species.

Fungal biodiversity

N/A

References

European Commission (1996). Interpretation manual of European Union habitats. Brussels. European Commission, DGXI.

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

Appendix II. Codes used for habitat classification.

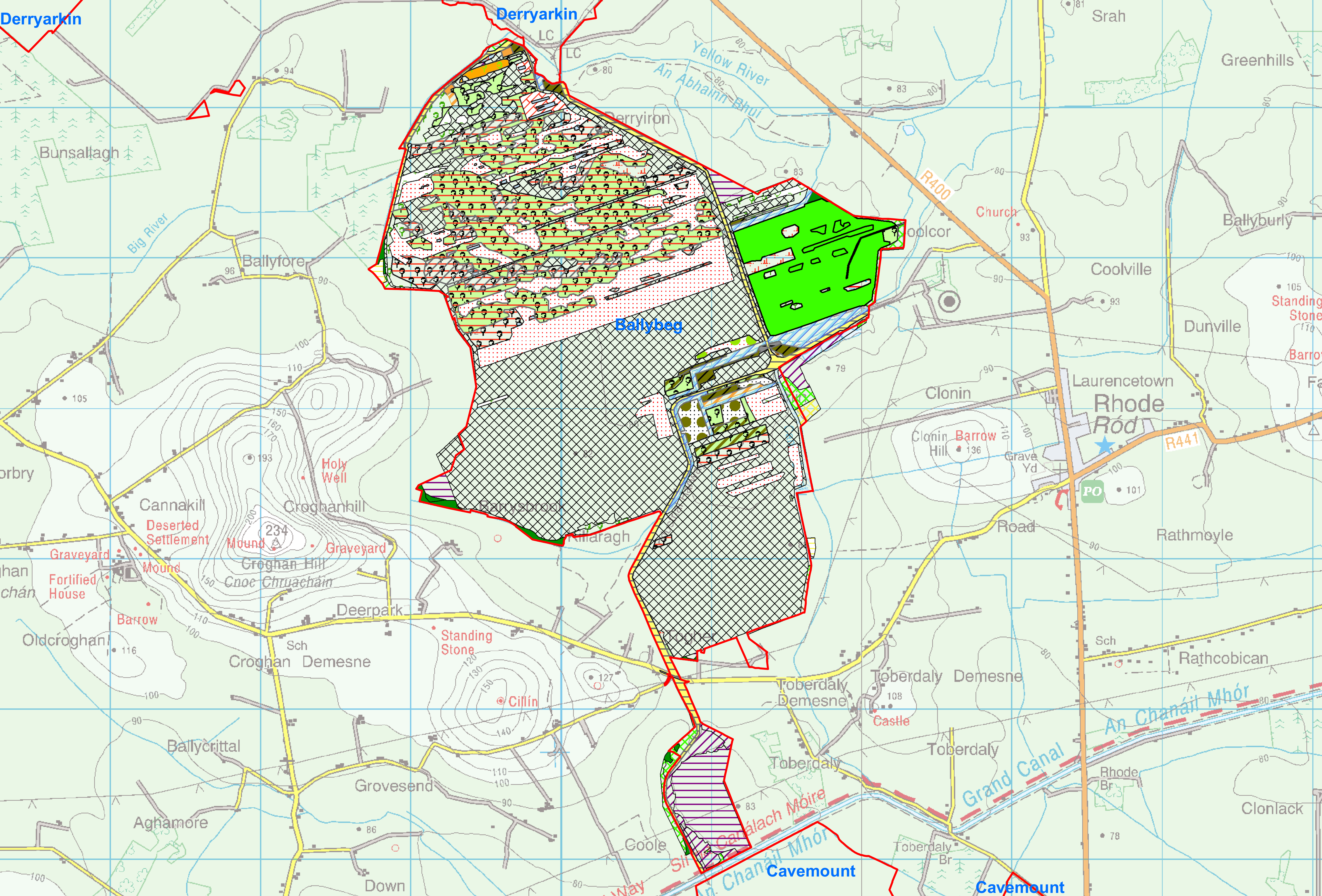
Bord na Mońa habitat classification scheme

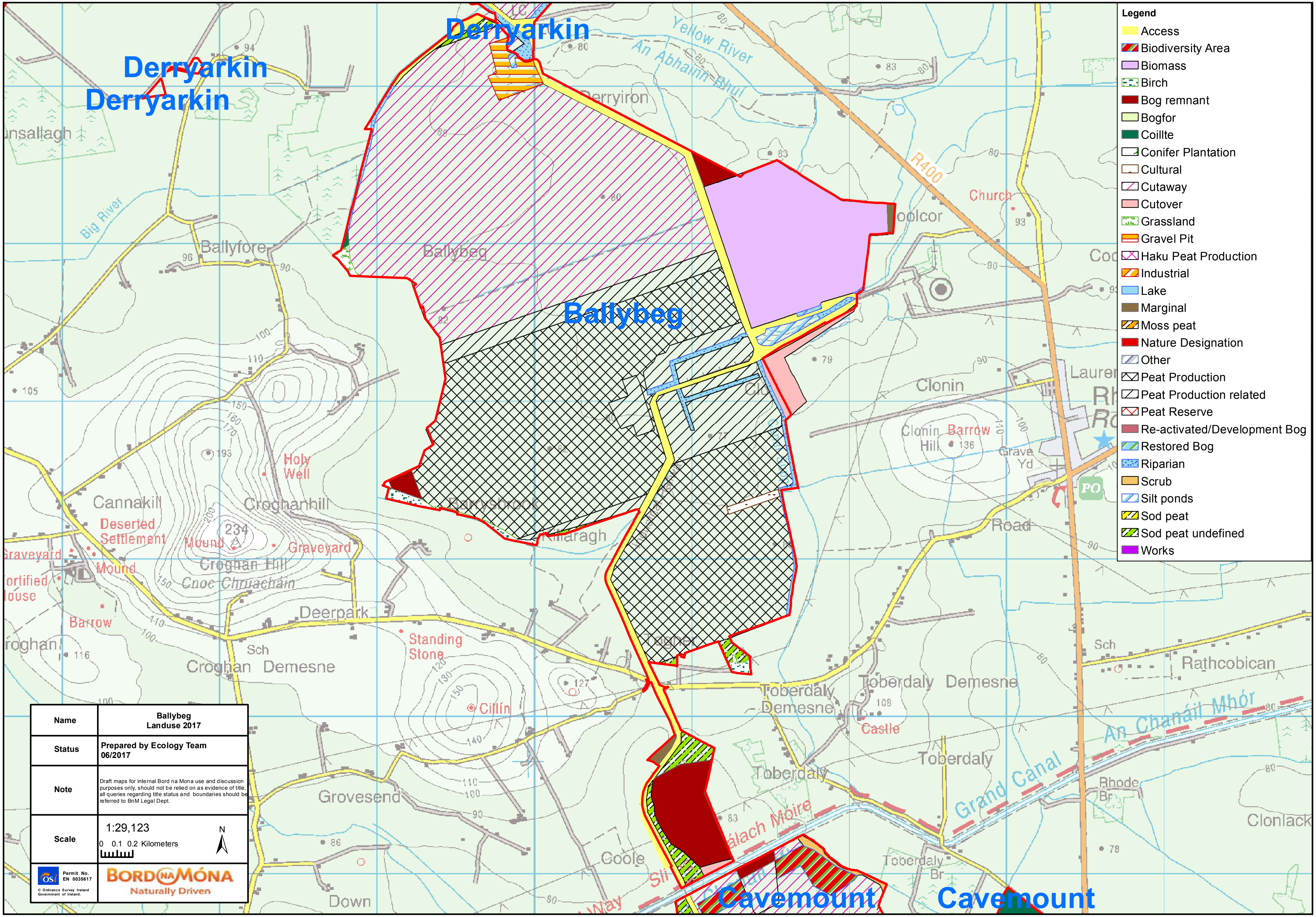
	General	Habitat [1]	BnM habitat code	Equivalent Heritage Council codes [2]
Pioneer habitats of industrial cutaway	Peatland	Bare peat (0-50% cover)	BP	ED2
		Embryonic bog community (containing *Sphagnum* and Bog Cotton)	PBa	PB
		Embryonic bog community (Calluno-Sphagnion)	PBb	PB
	Flush and Fen	Pioneer *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
	Emergent communities	Pioneer *Carex rostrata*-dominated community (Bottle Sedge)	pRos	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


Derryarkin
Derryarkin
Srah
Greenhills
Yellow River
An Abhainn Bhuí
Derryiron
Bunsallagh
Big River
Ballyfore
R400
Church
Coolcor
Ballyburly
Coolville
Standing Stone
Dunville
Ballybeg
Laurencetown
Rhode
Ród
R441
Clonin
Clonin Hill
Barrow
Grave Yd
PO
Holy Well
Croghanhill
Cannakill
Deserted Settlement
Graveyard
Mound
Fortified House
Croghan Hill
Cnoc Chruachain
Barrow
Oldcroghan
Deerpark
Standing Stone
Killaragh
Road
Rathmoyle
Sch
Rathcobican
Croghan Demesne
Toberdaly Demesne
Castle
Cillín
Toberdaly
Ballycrittal
Grovesend
Grand Canal
An Chanáil Mhór
Rhode Br
Clonlack
Aghamore
Goole
Canálach Móire
Cavemount
Cavemount
Toberdaly Br
Down


Derryarkin
Derryarkin
Derryarkin
Ballybeg
Cavemount
Cavemount
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
Name
Ballybeg
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
1:29,123
0 0.1 0.2 Kilometers
N
Permit No. EN 0035617
© Ordnance Survey Ireland Government of Ireland
BORD NA MÓNA
Naturally Driven
Yellow River
An Abhainn Bhuí
Derryiron
R400
Church
Big River
Ballyfore
Clonin
Clonin Hill
Barrow
Grave Yd
Road
Holy Well
Cannakill
Deserted Settlement
Croghanhill
Mound
Graveyard
Croghan Hill
Cnoc Chruachán
Deerpark
Standing Stone
Croghan Demesne
Sch
Killaragh
Toberdaly Demesne
Castle
Toberdaly
Rathcobican
Grand Canal
An Chanáil Mhór
Rhode Br
Clonlack
Grovesend
Coole
Cillín
Down
PO

Draft Rehabilitation Plan

2017

Derryarkin 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 Derryarkin 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 Derryarkin 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:	**Derryarkin**	**Area (ha):**	710.0 ha (1754.5 acres)
Works Name:	Derrygreenagh	**County:**	Offaly
Author(s):	BNM Ecology	**Survey/ MonitoringDate (s):**	27th & 28th October 2009 27/01/2011 9/05/2013 Re-surveyed 15/08/2013, 04/2015, 13/05/2016
Maps:	Habitats Map, Potential Future Habitats Map, Land-use 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 Derrygreenagh bog group (Ref. 501). 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. Derryarkin bog is part of the Derrygreenagh bog group.

This plan is a specific rehabilitation plan for Derryarkin 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 are:

- Categorisation of the habitats developing on Derryarkin Bog (outlined in Appendix I)
- 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 bog rehabilitation/restoration
- The impact of any other proposed development on the site and rehabilitation plan

List of consultees to date

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

Site description

Derryarkin is located in north Co. Offaly, 2.5 km south-east of Rochfortbridge and adjacent to the R400 Rochfortbridge to Rhode road. This site is situated close to several other Bord na Móna Bogs in Derrygreenagh including Drumman and Ballybeg, and is also located adjacent to the Bord na Móna offices at Derrygreenagh The Offaly/Westmeath county boundary follows the path of the Mongagh River, which flows through the west side of the site. Industrial milled-peat production has ceased at Derryarkin largely in the 1990s, although there is still an industrial railway through the site that is part of the greater Derrygreenagh network. There are also travel paths still through the site.

Part of the cutaway in the northern part of the site was developed as a conifer plantation by Coillte in the 1990's, as was cutaway located on the north-east side of the road. This plantation comprises of Sitka Spruce and Lodgepole Pine and is in an overall poor condition with areas ranging from moderate quality trees to dying and completely stunted areas of forestry.

A large section of cutaway has also been developed since 2001 for sand and gravel extraction by a joint venture between Roadstone and Bord na Móna (Derryarkin Sand & Gravel Ltd). An Environmental Impact Statement was prepared for this development. Part of this development extends into the former conifer plantation. A private tarred road connects the quarry with the R400 road. Gravel extraction began in 2002. The most notable features of this section of the site are the gravel areas (tall gravel piles and levelled out areas of gravel) along with the large lake that has been created as a result of the gravel extraction. A large part of the site is zoned by Bord na Móna for this activity and the sand and gravel extraction areas have the capacity to expand in the future.

The remainder of the site at Derryarkin is classed as cutaway. This cutaway contains a range of pioneer habitats including pioneer poor fen, small scattered patches of open water and Birch scrub forming many small wetland complexes. There are a regular series of much barer unvegetated higher fields through this area and there are also several fields with abandoned stock-piles that are also revegetating slowly. There is also some exposed gravel (formerly underlying the bog) that is now being colonised by Blue Fleabane along with other plant species. Bare peat still forms a significant portion of the ground cover within the cutaway. The exposed peat in this site is noted to be made up of *Phragmites* layered peat and is known as being a difficult medium in which to establish trees and for natural colonisation. One notable feature of this site is that there is still a substantial amount of unvegetated bare ground, even after very little activity in parts of the cutaway in over 20 years.

There has been some active rehabilitation at Derryarkin in the south-east portion of the cutaway to enhance wetland development and re-vegetation of the site. This part of the cutaway was re-wetted in 2001-2002 by blocking drains along with the main outfall. As a result there has been significant development of Birch scrub, pioneer poor fen and small wetland complexes. A substantial portion of ground scattered through this area is still bare peat. This wetland area has also been zoned for sand and gravel extraction in the future.

Some additional rehabilitation was carried out in 2016 with a fertiliser treatment to approx. 30 ha of cutaway bog in the north-east part of the site adjacent to the Rochfortbridge to Rhode road.

Peat production programme, land-use and proposed developments

- Industrial milled-peat production has ceased in parts of Derryarkin since the 1990s. There are no plans to recommence industrial milled peat production at this site as the energy peat has been commercially exhausted.

- Bord na Móna have in partnership with Roadstone developed part of the site for sand and gravel extraction (Derryarkin Sand and Gravel Ltd). This activity has been ongoing since 2001. A cement block production facility and tarmacadam production facility have also been developed on the site.
- Bord na Móna have also leased a small area of cutaway to DAMX Ltd for the development of an off-road moto-cross track at Derryarkin.
- Derryarkin has been zoned during the BnM Decision Framework Management process for sand and gravel extraction, amenity development and biodiversity.

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 railway.** This bog railway is an active link to Edenderry Power station (EPL). Decommissioning of this infrastructure is dependent on the general cessation of industrial peat production for supply of peat to EPL.
- **Private sod-peat production**. There is some private sod-peat production around the margins of the high bog inside and outside the ownership of Bord na Móna. There is also some sod peat production carried out by a contractor that is licensed by Bord na Móna.
- **Coillte conifer plantation**. A significant portion of the cutaway was leased to Coillte for the development of conifer forestry.

Key biodiversity features of interest (2017)

- A large lake has been created on the site with the development of the quarry in the past few years. This lake is attracting significant numbers of waders and wildfowl. Biosphere Environmental Services (2014) have monitored wintering and breeding bird populations at this site. They have rated the overall site as having National ecological value **(B)** due to its usage by wintering Whooper Swans, Hen Harrier, Peregrine and wintering and breeding wetland birds, including Black-headed Gull. The lake holds a very significant colony of Black-headed Gull (Red listed species) and the lake and wider site is used by breeding waders like Ringed Plover and Lapwing. There is a nationally significant flock of Whooper Swans that uses this site in addition to the surrounding grassland and adjacent bogs such as Cavemount and Ballycon.
- A large wetland area with open water was created on the eastern section, where cutaway was re-wetted. This area is developing a diverse mosaic of wetland habitats. (This area is also zoned for further quarry development).
- Blue Fleabane, a nationally rare plant species listed in the Irish Red Data Book (Curtis and McGough 1988), whose status is listed as endangered, is present on the site. Quarrying and the creation of new spoil heaps has the potential to provide new habitat for this rare species and preserve its status on the site.
- There is some remnant undeveloped raised bog (PB1) around the margins of the site. (Codes refer to habitat classification described by Fossitt 2000). Generally the remnant patches of high bog are relatively small and are being cut from the outside for sod-peat.

Current ecological rating (A-E; following from NRA Guidelines)

Biosphere Environmental Services (2014) have rated the overall site as having National ecological value **(B)** due to its usage by wintering Whooper Swans, Hen Harrier, Peregrine and wintering and breeding wetland birds, including Black-headed Gull.

Criteria defining successful rehabilitation

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

The site can currently be divided into three main land-uses for rehabilitation: sand and gravel extraction (50%), cutaway and conifer plantation. Some cutaway was developed in the past as farmland. This land has now been sold.

The main focus of the rehabilitation of the areas used for sand and gravel extraction was the development of a large lake, islands and associated wetland areas (see EIS) with potential after-uses such as biodiversity and amenity (water-sports). Material (peat and sub-soil) stripped from the site prior to sand and gravel extraction generally was back-filled into the extracted areas. No other significant landscaping on the site was anticipated. A large lake has developed in the remaining depression. It was expected that natural re-colonisation would re-vegetate the disturbed areas. Examination of various aerial photo series and the ecological baseline survey shows that some sections that have already been abandoned within the sand and gravel extraction area are already re-vegetating. The EIS recommended that some planting of various native broad-leaved trees take place. However, it is anticipated that some trees such as Birch and Willow will quickly colonise the site and that other species such as Ash and Hawthorn will also colonise in time.

Only a portion of the area zoned for sand and gravel extraction is being used for this activity at present, although the area being used is increased year by year. The reminder of this zoned area is developing normally as cutaway. The vegetated areas contain typical pioneer habitats of cutaway and are developing in a typical manner. This cutaway area is also notable for significant cover of bare peat between the vegetated sections. The exposed peat in this site is noted to be made up of *Phragmites* layered peat (similar to Drumman) and is known as being a particularly difficult medium in which to establish trees and for natural colonisation, especially as it is underlain by significant gravel deposits. It is prone to drying out and becoming mobile in the summer, which hinders and slows the natural colonisation process, compared to most other cutaway. One notable feature of this site is that there is still a substantial amount of unvegetated bare ground, even after very little activity in parts of the cutaway in 10-20 years. Some localised basins hold temporary standing water in the winter, but become quite dry with bare peat during the summer, due to the underlying gravel, which allows percolation and drainage of standing water. Therefore there are significant seasonal fluctuations in water-levels in localised basins, which constrains natural re-colonisation on these peats. Targeted active rehabilitation may be suitable for some of the largest areas of bare peat within this cutaway area that while zoned for sand and gravel extraction, are not likely to be used for this activity. This includes a zone of cutaway along the Rhode-Rochfortbridge road and on both sides of the access route into the site. The use of fertiliser treatments and/or nursery crops (see Drumman rehabilitation trails) may be suitable for some of the largest areas of bare peat within this cutaway area, to aid natural colonisation. Consultations are required with Roadstone management on site about the future development of sand and gravel extraction.

Bare peat still forms a significant portion of the ground cover within the cutaway. Some rehabilitation trials using fertiliser/nursery crops have been carried out in part of the bare peat cutaway area (See Drumman crop trials). These trials have successfully created vegetation cover.

The area zoned for sand and gravel extraction also includes the wetland area where some cutaway rehabilitation (raising the water-level) was already carried out. This area is showing somewhat more advanced natural colonisation (compared to the above area) due to the elevated water levels and the increase in wetland cover. Comparison of various aerial photo series from 2000-2010 shows slow increases in habitat cover. There are still some significant areas of bare peat within this section. However, additional active rehabilitation may not be suitable if the area is to be used in the near future for sand and gravel extraction. The majority of the habitats in this pioneer wetland are likely to be removed in the future.

There is an additional area of cutaway not zoned for sand and gravel extraction at the southern end of the site. Comparison of various aerial photo series from 2000-2010 shows gradual increases in habitat cover, although there are still some significant bare peat areas within this area of cutaway. It is expected that natural colonisation will continue to form the basis for the stabilisation of this area, although there will be continued

monitoring to assess re-vegetation. Some targeted active management such as use of fertiliser treatments and/or nursery crops (see Drumman rehabilitation trails) may be required if the larger bare peat areas do not re-vegetate at an adequate rate.

Part of the site has already been developed for forestry by Coillte. Management within these areas can be considered as ongoing maintenance with routine operations related to timber production and/or development of the conifer plantations as biodiversity areas. Issues of peat stabilisation and potential silt run-off will have to be addressed during forestry operations on the site by Coillte.

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.
- At this point in time, a proportion of (~65%) the site is expected to develop as woodland and scrub (including 12% conifer plantation), ~31% is likely to develop as a lake and associated wetland habitats. Only 2% is likely to remain as remnant raised bog (PB1).

Proposed Rehabilitation programme

Completed

- A significant portion of the site has already been developed as a conifer plantation by Coillte (12%).
- Some cutaway was developed in the past (1980's) as farmland. This land has now been sold.
- Rehabilitation (wetland creation) has already been carried out in an additional 20% of the cutaway, although this area is zoned for sand and gravel extraction and land-use has potential to change in the future, if this area is required for sand and gravel extraction. Natural re-colonisation of the cutaway so far has been quite effective across parts of the site.
- A significant portion of the remaining site has already naturally re-vegetated with typical cutaway habitats.

Short-term (0-2 years)

- Consultations will be carried out with local quarry management regarding appropriate rehabilitation of bare peat cutaway within the area zoned for sand and gravel extraction. Consultations will also be carried out regarding the development of a suitable after-use plan for when the sand and gravel extraction ceases on site. Consideration should be given to any rehabilitation within the area zoned for sand and gravel extraction that can be carried out in the short term and that will complement rehabilitation of the bare peat cutaway.
- The most sustainable management option for the cutaway within the site is to allow natural re-colonisation of the site. Targeted rehabilitation of bare peat areas will be carried out if required (informed via consultation).
- There will be ongoing monitoring of the site and appropriate rehabilitation planning related to any changes in land-use at Derryarkin.
- Continued planning should take place to assess the potential to enhance and the scale of wetland development at Derryarkin. This will include a survey of drainage on the site to assess suitability for drain-blocking of the major outfalls and re-wetting.
- Any remaining or old stockpiles should be bulldozed and levelled as part of the rehabilitation/decommissioning process.
- Rehabilitation requirements of the gravel pit area will also be assessed at this stage. Some new spoil heaps should be retained to maintain the status of the Blue Fleabane population on the site.
- 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 cutaway has not progressed satisfactorily at this stage.

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

Long-term

- An appropriate rehabilitation and after-use plan for the areas used for sand and gravel extraction will be implemented, when these operations cease. The quarry's activities have the potential to develop large lake on the site. Already large numbers of birds are using the current lake and this could be further enhanced by allowing some riparian habitats to develop. Any after-use plan (further development) should consider biodiversity and the development of semi-natural habitats as one of its main management objectives. Other suitable after-uses include amenity and water-storage. There is potential to create a large open body of water along with fringing wetland habitats. The area around the lake is likely to be colonised with habitats such as grasslands and Birch woodland. There is also the potential to develop somewhat different woodland habitat in the long-term (Oak-Ash-Hazel, WN2) as a result of the exposure of the more calcareous glacial sand and gravel deposits (compared to bog woodland that will develop on peat). There will also be opportunities to promote the conservation of Blue Fleabane on the site, although this species is likely to spread naturally onto suitable habitats on the site.
- Continued monitoring of the site to ensure stabilisation and complete re-vegetation.
- Decommissioning of silt-ponds will be assessed.
- Evaluate success of any short-term rehabilitation measures outlined above and enhance where necessary (to be determined by selected short-term management above).

Timeframe for rehabilitation

***Short-term* (2017-2019)**

- Continued monitoring of re-vegetation of the cutaway area and assessment of requirements of targeted active management of the any bare peat areas using fertiliser/nursery crop treatments within cutaway not zoned for sand and gravel extraction.

Long-term

- This phase will follow on from cessation of peat production in adjacent bogs.
- Continued monitoring and planning will take place to assess further rehabilitation requirements at Derryarkin taking account of ongoing sand and gravel operations on the site.
- Assess potential for enhancement of biodiversity within conifer plantations through appropriate forestry operations and management with Coillte.
- Assess requirements for decommissioning of BnM railway on the site.
- Monitoring of the site to ensure stabilisation and complete re-vegetation.
- 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 2005). Cross (2005) 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 significant portion of the south-western cutaway 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 calcareous grassland, and poor fen/wet grassland vegetation types to this type of woodland.
- A significant portion of this area will develop as wetland complexes, which will develop in the wetter areas with impeded drainage. These wetter areas will form a mosaic with the drier Birch woodland. These wetland complexes will contain open water with aquatic communities, emergent Tall reedbeds (FS1), fringing Poor fen communities (PF1) and Willow-dominated scrub/woodland (WN6). As the open water is relatively shallow, some succession and terrestrialization would be expected to occur with the expansion of Reedbeds and wet Willow-dominated woodland/scrub. Some of these habitats are already developing, although there is little development of Reedbeds and only small patches of scrub at present.
- Small areas with exposed glacial till are likely to develop somewhat differently. Time required to re-vegetate these areas may also very significantly. Dry calcareous grassland (GS1) could be expected to initially develop in these areas in association with scrub (dominated by Birch). There is likely to be a slow succession to Ash-Hazel rich woodland (WN2) (in comparison to development of Birch woodland). Other dry ridges with some peat cover may develop Dry heath dominated by Heather (HH1).
- The quarry could be expected to develop a shallow mesotrophic lake (FL4). With some intervention marginal wetland habitats such as Tall Reedbeds and wet Willow woodland (WN6) could be expected to develop. There is considerable scope for landscape development of the area around the quarry including spoil heaps. Development of this area would depend on factors such as the amount of peat present etc but rehabilitation could include woodlands, improved grasslands, semi-natural grasslands and wetlands.

Budget and costing

- Budget and costing cannot be completed at this point as it is uncertain where the costs of rehabilitation following the quarry development lie.
- However, given that it is expected that 60% will go to dryland habitats and 31% to wetlands; the allocated rehabilitation provision will be based on this estimate.

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:	Derryarkin	**Area (ha):**	710.0 ha (1754.5 acres)
Works Name:	Derrygreenagh	**County:**	Offaly/Westmeath
Recorder(s):	MMC & DF	**Survey Date(s):**	27th & 28th October 2009

Habitats present (in order of dominance)

The most common habitats present on the industrial cutaway include:

- Bare peat (BP), pioneer Poor Fen communities (pJeff, pEang, pTrig, pRos) and Birch-dominated scrub (eBir, oBir) in the naturally re-colonising areas. There are relatively small areas of other Poor fen communities (pRos, pTrig) and other communities such as dry grassland (gCal) and pioneer vegetation (DisCF) of glacial sub-soils. (Codes refer BnM classification of pioneer habitats of industrial cutaway. See Appendix II).
- There is a large wetland area with a significant area of shallow open water in the eastern section and smaller pools of open water scattered across the rest of the cutaway. Wetland complexes are developing around these open water areas and include emergent vegetation such as Tall Reeds (pPhrag, pTyph) and fringing Poor fen communities and scrub noted above.
- A quarry is located in the northern section of the site. A lake (FL8) has developed with a large area of open water. No significant amount of riparian vegetation has developed in this area yet. Large areas of gravel spoil (both piles of gravel and areas of levelled gravel) are located in the area surrounding the lake and are at various stages of re-colonisation (ED2, ED3). (Codes refer to Heritage Council habitat classification, Fossitt 2000), See Appendix II.)
- Two blocks of conifer forestry (WD4) has been planted on the site. One in the north section and the other in the north east section.
- Some dry heath (dHeath) has developed on part of the mineral island in the north section and on a small knoll in the south-western cutaway in association with Dense Bracken.
- A railway crosses the site and this can also be classed as built land along with some works areas with associated infrastructure (BL3).
- There is a small amount of raised bog (PB1) high bog around the margins of the site.
- Other fringe habitats around the margins of the bog include Scrub (Birch-dominated and Gorse dominated), Birch woodland (WN7), a Quarry (ED4), Conifer plantation (WD4) and Cutover Bog (active and abandoned).

Description of site

This site is composed of four main sections of bog. The R400 Rochfortbridge to Rhode road runs in a north west direction and separates the bogs of Derryarkin and Drumman with the exception of the smallest section of Derryarkin bog being located on the east side of the road, adjacent to Drumman bog. The Offaly/Westmeath county boundary follows the path of the Mongagh River, which flows through the west side of the site. There is no industrial peat production at Derryarkin although a large area is zoned for sand and gravel extraction.

North East Section

This section of bog is isolated from the other three sections of the site and is located north of the Mongagh River in Co. Westmeath. This section is zoned as Forestry (largest area) and other (a mosaic of habitats including

some sod-peat)) on the BnM land use maps. The majority of the site is planted with conifer trees – Sitka Spruce (*Picea sitchensis)* and Lodgepole Pine (*Pinus contorta*). The surrounding area is vegetated with areas of bare peat, pioneer vegetation, Gorse scrub, pioneer Calcareous Grassland (gCal), Acid Grassland and Dry Heath (dHeath). (Codes refer to BnM habitat classification. See Appendix II). The Mongagh River flows along the southern boundary of the site. The conifer plantation was established over twenty years ago and is in a poor condition with poor growth forms along with stunted trees and dead trees throughout the plantation. The peat in this section of the site is noted to be made up of *Phragmites* layered peat and is known as being a difficult medium in which to establish trees and other plants (Egan, T. pers.comm). One notable feature of this site is that there is still a substantial amount of unvegetated bare ground, even after very little activity in parts of this section in over 20 years. Blue Fleabane was noted in this area on some exposed glacial sub-soil.

Sod peat activities have been carried out on the site in past years on the eastern side of this section with some bags of turf remaining on the site from previous years; however there did not appear to have been any sod peat activity on the site from 2009.

North Section

This section of the site is bordered by the R400 Road to the east while BnM railway lines separate it from the two other sections of the bog. The Monagh River flows along its northern boundary. The majority of this section is zoned as sand and gravel quarry (Roadstone) with a smaller area zoned as forestry, according to the BnM land use maps. The main activity on this section of the site is a large active sand and gravel quarry operated by Roadstone. A private tarred road connects the quarry with the R400 road. The quarry was originally located in the north west of the site but over the past number of years it has grown in size and now occupies almost half of the northern section of the site. Gravel extraction began in 2002. The most notable features of this section of the site are the gravel areas (gravel piles and levelled out areas of gravel) along with the large lake that has been created as a result of the quarries activities over a number of years.

A conifer plantation is also located in the north and north eastern part of this section of the site. This plantation comprises of Sitka Spruce (*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta)* and is in an overall poor condition with areas ranging from moderate quality trees to dying and completely stunted areas of forestry.

The remaining eastern part of this section of the site is cutaway that has been allowed to revert back to a more vegetated state with pools of open water, bare peat, and pioneer Poor fen communities (pJeff, PEang and gCal). One notable feature in this section of the site is a mineral island along the railway line that is made up of dry heath and areas of bare gravel with some dry grassland (gCal). Some deep pits have been excavated in this area possibly a result of some quarry activity.

South West Section

This section is bound by intact raised bog (PB1), improved grassland (GA1), cutover bog (PB4) and conifer plantation (WD4), with the aforementioned sand and gravel quarry directly to the north east of this section. A BnM railway line runs in a NE-SW direction through the site. This section is listed on the BnM land use maps as being cutaway bog and does not appear to have been harvested commercially in a number of years. As a result, a mosaic of habitats have established themselves in this area with pioneer Poor fen communities being most prominent (pEang, pJeff, pRos), along with small scattered patches of open water and some Birch scrub forming many small wetland complexes. There is minor development of emergent Tall Reed communities around the many wetland complexes but both Common Reed and Reedmace are present. Bare peat still forms a significant portion of the ground cover. There are a regular series of much barer unvegetated higher fields through this area and there are also several fields with abandoned stock-piles that are also revegetating slowly. One notable feature in this area is the exposed gravel and glacial till that appears near the eastern side and is also a prominent feature in the silt pond area and along the railway embankments. This material is revegetating slowly. A small glacial mound vegetated with Dry heath (dHeath) and Bracken is located in the northern half of this area.

The site extends further south-east along an access route that links Derryarkin to adjacent bogs. This zone contains a railway and tracks used by BnM vehicles. The vegetation is dominated by dry calcareous grassland (GS1) and some wet grassland (GS4).

A small adjacent section (two agricultural fields) are located in the south-east corner of this section appear to have been areas of cutover bog that have been converted to agricultural grassland in the past. This appears to have had limited success and the area is dominated by Birch scrub (eBir and oBir) with acid grassland (gMol).

South East Section

This section is mapped as wetlands and was an area of cutaway that was deliberately re-wetted in 2001-2002 to

create wetlands (BnM landuse map). However it has since been zoned for sand and gravel extraction. No industrial peat harvesting operations have been carried out in this section of the site in recent years, as a result a mosaic of habitats have become established around a large and fragmented area of open water. This open water forms a wetland mosaic with large patches of Common Reed and some fringing pioneer Poor fen communities (pRos) that are diversified by higher fields with other vegetation such as Birch and Willow scrub that extends into the open water. The un-flooded sections on both sides of the wetland are dominated by mosaic of Birch scrub (eBir and oBir), pioneer Poor fen communities (pJeff, pEang) and pioneer grassland of drier areas (gCal, DisCF). Vegetation communities of drier areas (dHeath and gMol) appeared around the boundaries at the ends of the higher fields. There was also some exposed glacial sub-soil in this area that contained pioneer vegetation (DisCF).

Blue Fleabane was noted in this area on some exposed glacial sub-soil. To the north west of the site a poor fen habitat was noted with small amounts *Sphagnum*. In this section of the site boundary habitats include agricultural grasslands, raised bog, quarry and the R400 Road.

To the north east of this section, a mineral ridge runs towards the northern section of the site. This ridge contained Birch scrub, pioneer vegetation and some Poor fen vegetation (eBir, Discf and pJeff).

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

None

Adjacent habitats and land-use

Adjacent land uses include conifer plantation (WD3), Improved grassland (GA1), turf cutting, hedgerows (WL1), tree line (WL2), cutover bog (PB4), depositing/lowland river (FW2), raised bog (PB1), active quarry (ED4), drainage ditches (FW4), arable crops (BC1) and buildings and artificial surfaces (BL3) (Derrygreenagh works site).

Watercourses (major water features on/off site)

The Monagh river forms a boundary with the northern section while also forming a boundary to the south of the north east section further down stream. A tributary of the Monagh River forms the boundary along the eastern edge of the north east section of the site. The Yellow River forms a boundary with the lower end of the south east section, while the Big River is located approximately 1.6km to the south of the site. These rivers are part of the Boyne catchment.

All of the aforementioned watercourses have been canalised and modified along their BnM boundaries.

Site topography

The site is generally low lying and flat as is usual on cutover bogs although a raised area of mineral island along with a mineral ridge are contained within the site along with various large mounds of gravel that are associated with the quarry activity.

Fauna biodiversity

- Several birds were noted around the site. Wren, Robin, Thrush and Blackbird in scrub areas around site, Meadow Pipit (>10) using a variety of habitats on site, Snipe (>15) in some of the wetter pioneer Poor fen vegetation and in the drains around the site. Grey Crow and Mallard were also noted on the site.
- Three Mallard were noted in a drain in the south-western cutaway area. Other species present included Blackbird (2), Robin, Wren, Reed Bunting (3), Goldfinch (10), Meadow Pipit (5) and Snipe (8).
- A number of bird species were noted In the large lake that has been created by quarry activity including Lesser Black-backed Gull (15), Black Headed Gull (25), Teal (10), Mute Swan (7), Lapwing (3) and Curlew (>15) flying over the site. A second flock of Curlew (35) was noted in the north eastern section of the site (Westmeath) where they were roosting on the bare peat before taking flight.
- A large flock (>100) of unidentified Finches were also observed amongst areas of Birch scrub in the south-eastern section of the site. Snipe (3), Heron (1) and Meadow Pipit (3) were also noted in this area. Several large nests were also noted in some of the scrub (SE corner).
- Signs of Rabbits are widespread and common around the site.

- Signs of Hares also noted. One Hare was observed in the SW cutaway area.
- Deer tracks were observed along the southern boundary of the south western section of the site.
- Pine Marten scats were observed.
- Signs of Badger activity in the bog included tracks and scrapes.
- Fox droppings recorded at several locations.
- Frogs recorded at several locations on the site.
- Stickleback (fish) observed in some of the smaller drains close to the quarry lake.

Fungal biodiversity

Geastrum triplex (Collared Earthstar), *Russula betularum* (Birch Brittlegill), *Aleuria aurantia* (Orange Peel), *Hygrocybe cantharellus* (Goblet Waxcap), *Lactarius vietus* (Grey Milkcap), *Lycoperdon lividum* (Common Puffball) and *Leccinum scabrum* (Brown Birch Bolete).

Blue Fleabane distribution

This rare species (whose status is listed as endangered) was recorded at several locations around the site. It has not been recorded at this site before. Blue Fleabane (*Erigeron acer*) is an annual species that is found in dry pastures and sandy or gravely places such as eskers and its distribution is mainly confined to the central and south-eastern parts of Ireland (Webb et al 1992). It has been recorded in several 10 km grid squares in Offaly in the past, including the grid square where the current sites are located.

Several populations were recorded on the site (see Habitat Map). The largest population was noted in the south-eastern cutaway area around the silt pond area. Many plants (500-1000) were growing on exposed gravel and glacial till that made up the spoil heaps from the silt ponds. Smaller populations were also noted along the railway embankment that bisects this cutaway and also on exposed glacial till towards the eastern side of the cutaway area. Populations were also noted on spoil heaps along the main entrance road to the Derryarkin quarry and on exposed glacial till within the area mapped as wetland (south-eastern section) and zoned for further quarry development.

This species is not likely to have been present on the site prior to the development of the cutaway. Subsequent development of the site including construction of railways on gravel embankments, construction of drains and silt ponds, and more recently the development of the quarry have created suitable exposed gravel banks made up of calcareous rich material that this species prefers. In the long-term, it could be expected that these spoil heaps and exposed gravel patches will re-vegetate with grassland and scrub, which may not favour this species.

Activities on the site

The main activities observed on the site were:

- The active quarry and associated concrete-products industry. The quarry has developed significantly in size in the past five years as is evident from comparison of the site with the 2004 aerial photographs. The associated lake area grown dramatically in size in this period. The large area mapped as wetland in the south-east of the site is zoned for sand and gravel extraction.
- Forestry.
- Sod-peat cutting around the fringes of the cutaway area in the south-western section (there is no industrial peat production at Derryarkin).
- Large sections of the site have become more vegetated and are reverting to a more natural state.
- Some tracks from scrambler or quad bikes (possibly associated with sod peat cutting on adjacent cutover bog) were noted in the South-western cutaway.

HABITAT DESCRIPTIONS

(See Habitat Description Document for detailed description of each vegetation community not described in this section.)

Raised Bog (PB1)

This habitat is found along the western boundary of the south-western cutaway area within and adjacent to the BnM site boundary. Most of this high bog is begin cut for sod peat by private individuals on the outside of the bog. The largest area within the boundary is located towards the SW corner of the cutaway. This section has a small area with a notable transition from species-rich wet grassland dominated by *Molinia caerulea* to Birch Woodland along the edge of the high bog and then to high bog. The high bog is in reasonable condition and has not been burnt for some time. Typical ecotopes are present including Facebank, Marginal and Sub-marginal. The sub-marginal has a high cover of *Cladonia portentosa*. The vegetation is dominated by *Eriophorum vaginatum*, *Eriophorum angustifolium* and *Calluna vulgaris*. Other species present include *Trichophorum cespitosum*, *Carex panicea* and *Narthecium ossifragum*. *Sphagnum capillifolium* and S. *papillosum* are present (overall cover 10-20%) and *S. magellanicum* is present in one of the larger drains. There is some development of hummocks but there are no pools present and only a few small damp hollows with *S. cuspidatum*. Some degraded hummocks of *Sphagnum* as present. *Pinus* saplings and young trees are rare on this section of high bog. Meadow Pipit was noted on the high bog.

Appendix II. Codes used for habitat classification.

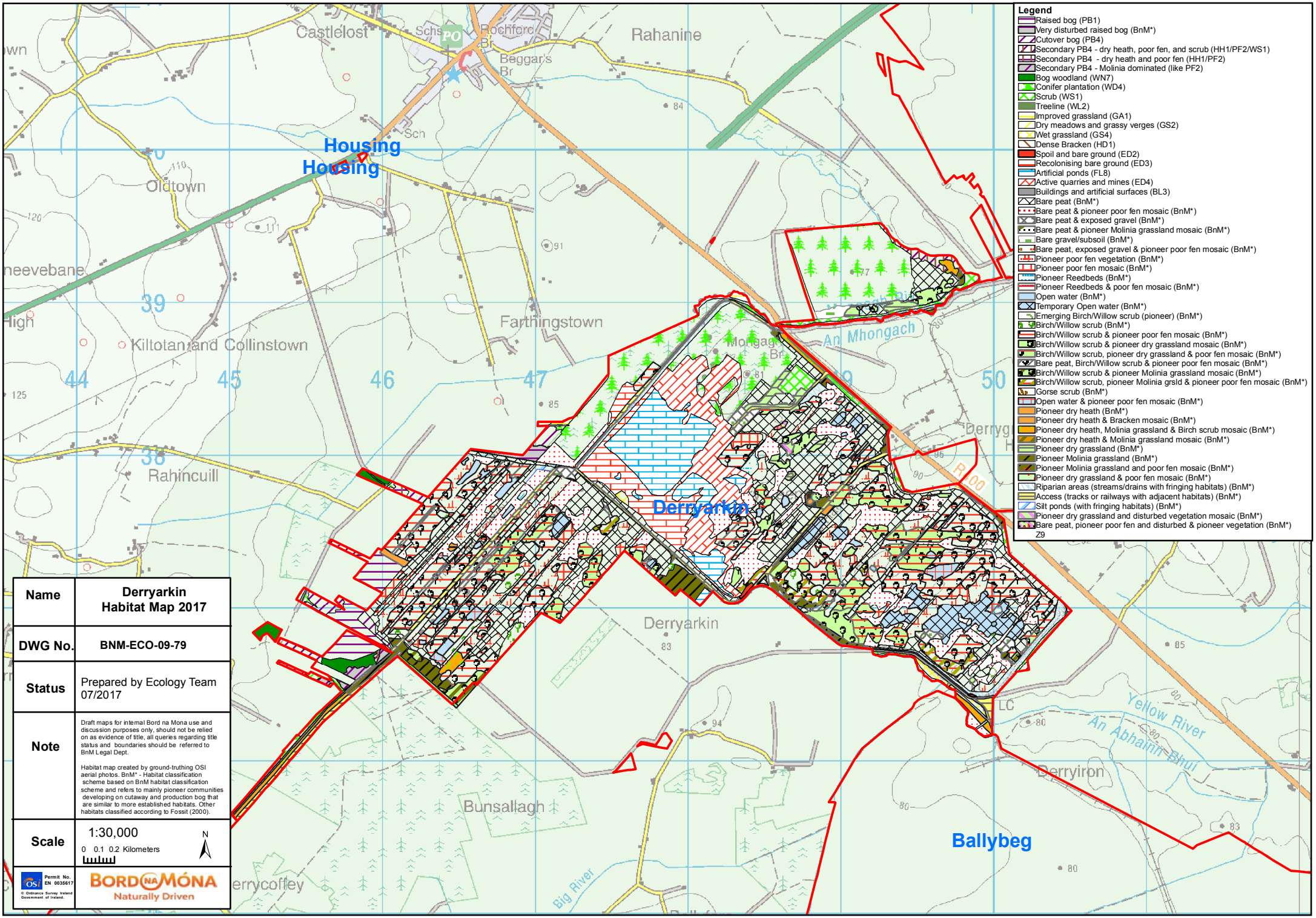
Bord na Mońa habitat classification scheme

	General	Habitat [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
	Emergent communities	Pioneer *Carex rostrata*-dominated community (Bottle Sedge)	pRos	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.

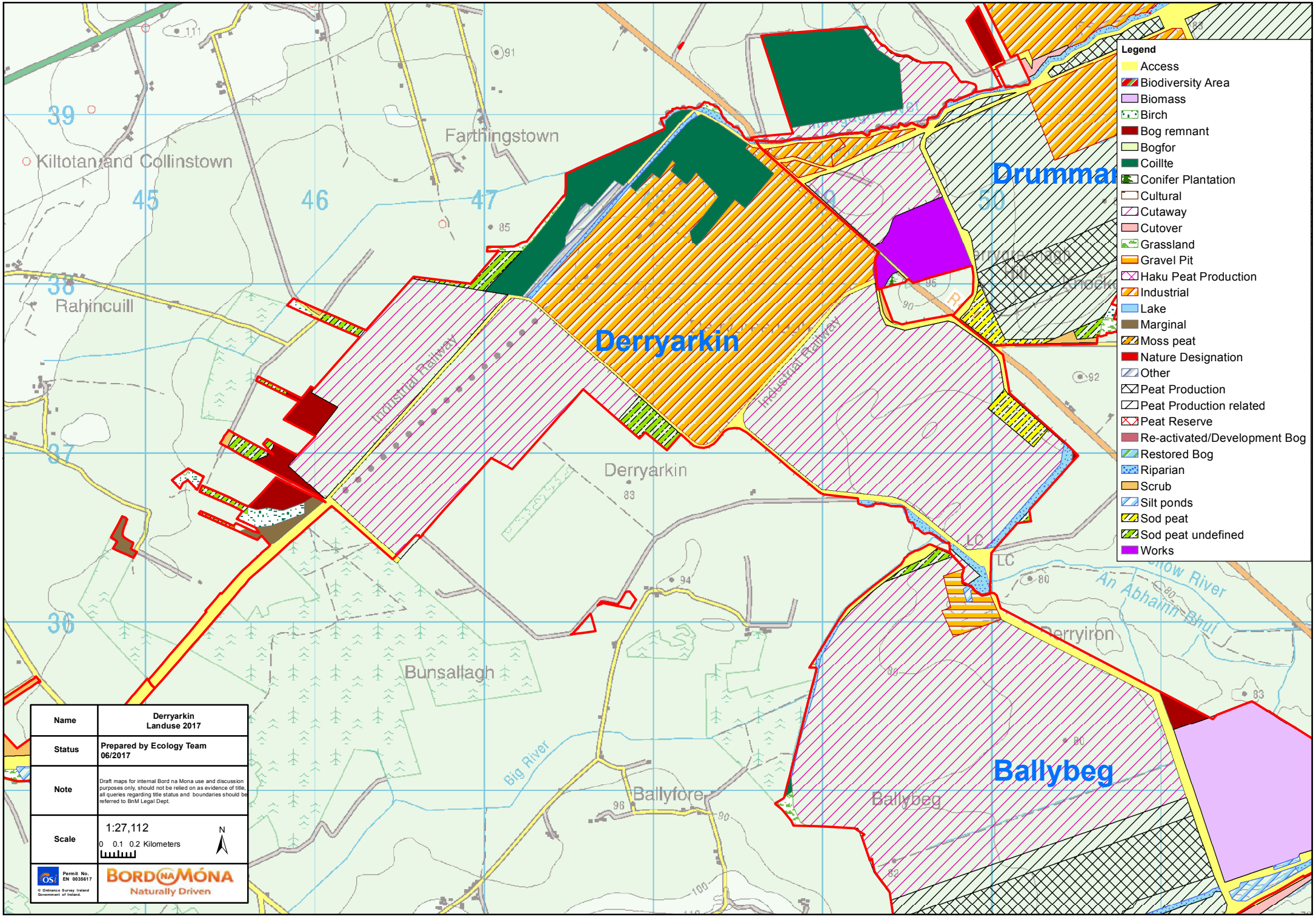
Heritage Council habitat classification scheme (Fossitt 2000)

	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 grsld	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



Name	**Derryarkin Habitat Map 2017**
DWG No.	**BNM-ECO-09-79**
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	1:30,000 0 0.1 0.2 Kilometers N

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
Derryarkin
Drummar
Ballybeg
Kiltotan and Collinstown
Farthingstown
Rahincuill
Derryarkin
Bunsallagh
Ballyfore
Ballybeg
Derryiron
Industrial Railway
Big River
An Abhainn Bhui
Name
Derryarkin 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
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BORD NA MÓNA
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Draft Rehabilitation Plan

2017

Derryhinch 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 Derryhinch 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 Derryhinch 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:	**Derryhinch**	**Area (ha):**	337 ha (832.2 Acres)
Works Name:	Derrygreenagh	**County:**	Meath/Westmeath
Author(s):	BNM Ecology	**Survey/ Monitoring Date(s):**	21st October 2009 22/02/2012 5/07/2013 12,24,27/03/2014 30/07/2014
Maps:	Habitats Map, Potential Future Habitats Map, Land-use 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 Derrygreenagh bog group (Ref. 501). 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. Derryhinch bog is part of the Derrygreenagh bog group.

This plan is a specific rehabilitation plan for Derryhinch 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 are:

- Categorisation of the habitats developing on Derryhinch Bog (outlined in Appendix I)
- 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 bog rehabilitation/restoration
- The impact of any other proposed development 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.

Site description

Derryhinch is located along the Co. Offaly/Westmeath border, 5 km east of Rochfortbridge. The new M6 motorway passes directly to the western edge of the site. Construction of this new motorway 'cut off' some of the original bog area along the western boundary. The boundary of the bog now extends to the base of the motorway embankment. This site is situated close to several other Bord na Móna Bogs in Derrygreenagh including Derryarkin and Drumman. The Offaly/Westmeath county boundary passes through the site.

There is ongoing industrial milled-peat production over most of Derryhinch, while part of the site is out of production and can considered production-related cutaway. Derryhinch is a gravity-drained bog. The majority of the site is composed of areas of bare peat at present. A small amount of cutaway is out of production and is developing typical pioneer cutaway habitats including poor fen and scrub, including a zone along the motorway boundary. There are several ridges and mounds with higher ground and some exposed gravel under lying some of this cutaway. At present none of the production-related cutaway through the site is of a significant size to consider any targeted active management. There is also still an industrial railway through the site that is a link to the greater Derrygreenagh network.

Derryhinch also includes a small sod-peat production area. Most of the plots have been abandoned but there is still some active private sod-peat cutting in several plots. It was naturally regenerating with a range of cutaway habitats including Birch woodland, scrub and some embryonic peatland habitats.

Peat production programme, land-use and proposed developments

- Continued industrial milled-peat production is anticipated to continue at Derryhinch for the foreseeable future, depending on future milled peat production requirements.
- Derryhinch has been zoned for industrial development within the BnM decision-framework process.

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 railway.** This bog railway is an active link to Edenderry Power station (EPL). Decommissioning of this infrastructure is dependent on the general cessation of industrial peat production for supply of peat to EPL.
- **Private sod-peat production**. There is some private sod-peat production around the margins of the high bog inside and outside the ownership of Bord na Móna.

Key biodiversity features of interest (2017)

- The majority of the site is in active production or is considered production-related cutaway and does not

have any significant features of biodiversity interest.

- A notable and rare plant species of conservation interest, Blue Fleabane (*Erigeron acer*) was recorded on the railway track running along the southern boundary of the site. This plant is listed in the Irish Red Data Book (Curtis and McGough 1988) and its current status is endangered. A single plant was observed in this location.
- The site is used occasionally by Hen Harrier, Peregrine, Merlin and small groups of Golden Plover and Lapwing in the winter (Biosphere Environmental Services 2014).

Current ecological rating (A-E; *following NRA Guidelines*)

The majority of the site can be rated as having a **low local ecological value (E)** as it is still unvegetated production bog or has recently emerging pioneer cutaway habitats. The cutover area (abandoned sod-peat area) and some marginal habitats have a higher ecological value **(D)**.

Criteria defining successful rehabilitation

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

Natural colonisation is likely to form the basis for the stabilisation of the current production area when it comes out of production. Some small sections of production-related cutaway were already re-vegetating with typical pioneer cutaway habitats. However, this production area may pose similar re-vegetation issues to nearby Drumman if similar type peat is exposed, so targeted active management will also be used. There may also be opportunities for wetland enhancement with blocking of outfalls. There is a natural basin in the south-west part of the site.

The cutaway at Derryhinch 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.

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.
- At this point in time, a large proportion of (~71%) the site is expected to develop as Birch woodland and scrub and about 29% is likely to develop as a wetland habitat mosaic.

Proposed Rehabilitation programme

Completed

- Trees planted in a zone along the motorway to help create a screen between motorway and production bog (Spring 2014). Fertiliser was spread over this area to help tree growth and natural re-colonisation, to help create a buffer zone along the motorway.

Short-term (0-2 years)

- There will be ongoing monitoring of the site and appropriate rehabilitation planning related to any changes in land-use or proposed developments in the future at Derryhinch.

Upon cessation of peat production

- The most sustainable management option for the active production areas within the site is to allow natural re-colonisation of the site, once the decision is made to cease production at the site.
- All stock-piles should be removed from the site as part of the winding down of peat production

operations. Any remaining or old stockpiles should be bulldozed and levelled as part of the rehabilitation/decommissioning process.

- Significant bare peat areas through the site and the progress of natural re-colonisation of the active peat production areas will be monitored.
- Potential for rewetting and blocking outfalls will be assessed in the south-west part of the site.
- 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.

Long-term

- This phase will follow on from cessation of peat production in adjacent bogs.
- Monitoring of the site to ensure stabilisation and complete re-vegetation.
- Decommission the BnM railway on site.
- Decommissioning of silt-ponds will be assessed.
- Reporting to the EPA will continue until the IPC License is surrendered.

Timeframe for rehabilitation

Short-term (2017-2019)

- On-going monitoring of the overall site.

Long-term

- Continued monitoring and planning will take place to assess further rehabilitation requirements at Derryhinch taking account of ongoing milled peat production 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).

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 2005). Cross (2005) 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 majority of the site is likely to develop dry Birch-dominated woodland (WN7) in the medium to long-term after production. This woodland is likely to be a mosaic containing small patches of more open habitat with scrub (WS1), wet grassland (GS4) and poor fen vegetation (PF2), especially in wetter areas where drainage is impeded. Any wet areas have the capability to develop wet Willow-Alder woodland

(WN6) in the long-term.

- The small mineral island in the western half of the site is likely to develop Oak-Ash-Hazel woodland (WN2) and in the long-term. Some of the drier sections of bog in the eastern half that currently have some dry grassland development also have the potential to develop this type of woodland in the future, especially if more peat is harvested and the underlying mineral sub-soil is exposed. There is likely to be a succession from calcareous grassland (GS1) to scrub (WS1) and then to woodland.
- The section of the site to the south of the railway line (sod-peat area) is also likely to develop into Birch woodland (WN7). Some of this woodland is likely to be wet and there is also likely to be sections with active *Sphagnum* regeneration.
- The small area of high bog (Raised bog) is likely to dry out and become dominated by Heather. This area may be colonised by trees in the future as well.

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 29% 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.

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:	**Derryhinch**	**Area (ha):**	337ha
Works Name:	Derrygreenagh	**County:**	Westmeath and Meath
Recorder(s):	MMC & DF	**Survey Date(s):**	21-10-2009

Habitats present (in order of dominance)

- Most of the site is in active production or is production-related cutaway and contains bare peat (BP with minor re-colonisation of Poor fen vegetation (pJeff, pEang). There are several areas where there is more substantial development of pioneer communities. The most common habitats present in these areas on the industrial cutaway include: Bare peat (BP), pioneer Poor Fen communities (pJeff, PEang) and *Betula pubescens*-dominated scrub (eBir).
- A small area of production related cutaway in the north-east section contains a mosaic of pioneer dry grassland (gCal) and Gorse scrub (eGor).
- A small mineral island located in the mid-west section contains Birch scrub and is surrounded by dry grassland (gCal).
- A wetland mosaic has developed in association with the scrub in the southern section within the old cutover area (Sod-peat). Wet and drier Birch scrub (eBir, oBir) is most common and other habitats such as Poor fen communities (pRos, PEang), Tall Reedbed (pThy) and Dry heath (dHeath) are present. There is also some active cutover bog with bare peat where sod-turf is being actively removed.
- Fringe habitats found on the edges around the site include dry grassland (gCal), Birch scrub and Gorse scrub (WS1), scrub railway lines (BL3) and drainage ditches (FW4).
- There are several silt pond areas. These areas contain steep banks vegetated with dry grassland (gCal), Bracken (), disturbed vegetation and developing scrub. The ponds contain open water with poor development of aquatic or emergent wetland vegetation.

Description of site

Derryhinch Bog is located to the north east of Derrygreenagh works near Rochfortbridge. The new M6 motorway passes directly to the western edge of the site. Construction of this new motorway 'cut off' some of the original bog area along the western boundary. The boundary of the bog now extends to the base of the motorway embankment.

The majority of the site is composed of areas of bare peat with stock piles of covered milled peat located in various sections. At the time of the ecological survey, work was on-going over a large part of the site to clear vegetation and take away stockpiled peat in order to commence peat harvesting in 2010 after a five year lull. The majority of this area contains bare peat and only small sections have a developing pioneer vegetation. The is primarily made up of pioneer Poor fen communities with emergent Birch scrub. Some sections towards the north-east corner and in the eastern section are developing some drier communities with emergent Birch scrub (eBir), Gorse scrub (eGor), dry grassland (gCal), disturbed vegetation (DisCF) and some Poor fen (pJeff0 all represented. Wetter patches containing poor fen (pEang, pJeff) and emergent Gorse scrub (eBir) are present along the southern section of the active-production/related cutaway and along the western boundary.

A small section of the site south of the railway is classified on the land-use map as a sod-peat area. This section contained the most significant features of biodiversity interest. The majority of the site is old cutover bog with a mosaic of face-banks, fields and drains at different heights. Most of the plots have been abandoned but there is still some active sod-peat cutting in several plots. This area was quite treacherous and dangerous to survey, particularly the denser scrub, due the variety of drains and face-banks. The vegetation is quite well established in this area and a complex mosaic of habitats has developed that is related to the underlying environmental conditions that the cutover plots were left in and the time elapsed since the plots were abandoned. The majority of this area is developing mature Birch scrub with some small patches doing to Birch woodland (WN7). The underlying conditions are quite variable, ranging from standing water with emergent Reedmace or Bottle Sedge

to dry sections, and this adds to the diversity of the area. Some sections are still open and may have wetter or drier communities depending on level of the cutover. The drier open sections are dominated by Heather while there are damper hollows with some excellent *Sphagnum* regeneration that is associated with cutover bog vegetation dominated by Bog Cottons. Other indicators of a more acidic substrate (compared to industrial cutaway) were present such as *Eriophorum vaginatum*.

A small area of high bog is located in the north-west corner of this sod-peat area. This area is largely intact, although there were some signs of surface cutting in the past. The majority of this area would be classified as marginal ecotope as it is quite dry with signs of degradation. The damaged sections have mainly re-vegetated and there is some *Sphagnum* regeneration in these damaged areas with *Rhynchospora alba* that could be classified as the Annex I habitat 'Depressions on the peat substrates of the Rhynchosporion (7150)'.

A Works area with cabins, material storage and refuelling facilities is located along the northern boundary of the site.

An iron flush was noted in the eastern half, towards the centre of the bog in a raised area with a mosaic of pioneer communities.

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

None

Adjacent habitats and land-use

Habitats and land-use around the site include improved grassland (GA1) for grazing livestock and growing fodder, a remnant patch of raised bog (PB1), some Birch woodland (WN7), and a new motorway (M6) on an embankment (BL3). A significant area of conifer plantation (WD4) has been planted on more mineral soil to the south of the site.

Watercourses (major water features on/off site)

Drainage ditches (FW4) are located along the site's southern and northern boundaries and there are also several silt pond areas present on the site. Two water courses are located to the south of the site – the Miltown River and the Mongagh River are situated approximately 200m and 400m respectively from the southern boundary of the site. Both rivers drain east towards the Boyne catchment. A third stream/drain also flows along part of the northern boundary. This stream drains towards the Kinnegad River and is part of the Boyne River catchment.

Fauna biodiversity

- Several birds were noted around the site. Snipe were widespread around the site roosting in the poor fen vegetation, drainage ditches and scrub (13 sightings around site). Meadow Pipit also widespread around site using cutaway areas and areas with established vegetation cover (4 occurrences). Reed Bunting, Blackbird, Wren, Robin and Blue Tit were noted in the Birch scrub in the southern section of the site and in other areas. Several Long-tailed Tits were noted using the silt-pond area in the south-east corner of the site. A pair of Mallard was roosting in a drain in the eastern section.
- Signs of Rabbits are common around the site and on the mineral island. Signs of Hares widespread around site, especially on younger cutaway with establishing vegetation and some bare peat.
- Signs of Deer activity (droppings) in southern part of the site along the boundary with the conifer plantation.
- Pine Marten tracks noted in the southern section.
- Signs of Badger activity in the middle section among pJeff sections.
- Fox droppings recorded in the south western section.
- Frog recorded in the northern section.
- Sticklebacks (fish) noted in drains in the north and north west.

Fungal biodiversity

Common puffball (*Lycoperdon perlatum*), Vermillion Waxcap (*Hygrocybe miniata*), Bleached Brittle gill *(Russula exalbicans*), *Lactarius uvidus, Armillaria sp.,* Brown Birch Bolete *(Leccinum scabrum)* and *Lepiota hystrix*.

HABITAT DESCRIPTIONS

(See Habitat Descriptions Document for detailed description of each vegetation community not described in this section.)

Sod-peat area (open Birch scrub mosaic)

This area contains a range of habitats that have developed into a mosaic due to the history of the site as a domestic cutover area. A mosaic of fields, drains and face-banks of different highest and sizes has been abandoned and left to naturally re-colonise for some time. This area now contains mainly open Birch scrub although there are pockets of more mature trees that could be classified as Birch woodland (WN7) as well as more open areas with energizing Birch scrub, patches of poor fen communities with no scrub and drier fields with Dry Heath dominated by *Calluna vulgaris*. Several access strips divide this area into several sections and these strips are drier or are dominated by *Calluna vulgaris.*

The *Betula pubescens* scrub contains frequent *Salix cinerea* and *Salix aurita*. Other species present include *Rubus fruticosus*, *Chamaerion angustifolium*, *Ulex europaeus*, Pinus contorta saplings and young trees, *Molinia caerulea*, *Calluna vulgaris*, *Potentilla anserina, Potentilla erecta, Plantago lanceolata, Crataegus monogyna, Urtica dioica, Succisa pratensis, Lonicera periclymenum, Agrostis stolonifera, Anthoxanthum odoratum, Myrica gale, Dryopteris dilatata, Deschampsia caespitosia, Deschampsia flexuosa, Juncus effusus and Polystichum setiferum. Moss species included Polytrichum spp., Hypnum spp* and *Pseudoscleropodium purum. Typha latifolia* was noted in some of the old drains.

Denser patches of *Betula pubescens* (Birch woodland) contain *Rubus fruticosus*, *Hedera helix*, *Molinia caerulea*, *Luzula sylvatica*, *Vaccinium myrtillus, Blechnum spicant, Dryopteris felix-mas* and *Pteridium aquilinum* in the ground layer. Mosses present include *Polytrichum formosum*, *Thuidium tamariscinum*, *Dicranum scoparium*, *Pseudoscleropodium purum* and *Sphagnum* spp.

The more open sections could be classified as a mosaic of dHeath, eBir, gMol and pEang. The eastern section is quite dry and is dominated by *Calluna vulgaris* with *Erica tetralix*, *Myrica gale*, *Vaccinium myrtillus* and *Molinia caerulea*. Several hollows contain large hummocks of *Sphagnum capillifolium* and *S. palustre* as well as *S. subnitens* and *S. cuspidatum*. *Sphagnum* cover in some sections is up to 80% while *Aulacomnium palustre* was also present. Other species associated with these damper hollows include *Molinia caerulea*, *Juncus effusus*, *Carex flacca*, *Carex demissa*, *Eriophorum angustifolium* and *Eriophorum vaginatum.*

Raised bog (PB1)

A small area of this habitat is located in the northwest corner of the sod-peat area, north of the silt ponds. This area is largely intact high bog, although there has been some surface cutting in the past, and the damaged areas have now revegetated. Most of the bog is dominated by *Calluna vulgaris* with *Eriophorum vaginatum*, *Molinia caerulea*, *Eriophorum angustifolium*, *Carex panicea*, *Trichophorum cespitosum*, *Narthecium ossifragum* and some *Myrica gale. Sphagnum capillifolium, S. papillosum* and *S. subnitens* are all present. *Rhynchospora alba* is prominent in some of the damaged sections in association with some lawns of *S. papillosum and some S. magellanicum.* Some of these damaged sections correspond with the EU Annex I habitat 'Depressions on the peat substrates of the Rhynchosporion (7150), although they are small in extent.

Dry calcareous grassland community (gCal) and *Ulex europaeus*-dominated community (eGor) mosaic

This vegetation mosaic is found at the north-eastern corner of the site. The vegetation is characterised by a pioneer dry grassland community developing in conjunction with frequent *Ulex europaeus* bushes along the edges of the fields. Some *Betula pubescens* saplings and young trees are also present along with small *Salix aurita* bushes. The pioneer grassland is characterised by species such as *Carex flacca*, *Carex demissa*, *Centaurea nigra*, *Molinia caerulea*, *Filipendula ulmaria*, *Potentilla anglica, Succisa pratensis, Plantago lanceolata, Vicia cracca, Agrostis stolonifera, Calluna vulgaris, Achillea millefolium, Juncus effusus, Potentilla anserina, Equisetum sp., Tussilago farfara, Cerastium fontanum, Trifolium repens, Rumex acetosella, Rubus fruticosus, Polygala serpyllifolia, Triglochin palustre, Polytrichum* spp*., Dactylorhiza* sp*., Hypochaeris radicata, Lotus corniculatus, Phragmites australis and Pteridium aquilinum.*

Appendix II. Codes used for habitat classification.

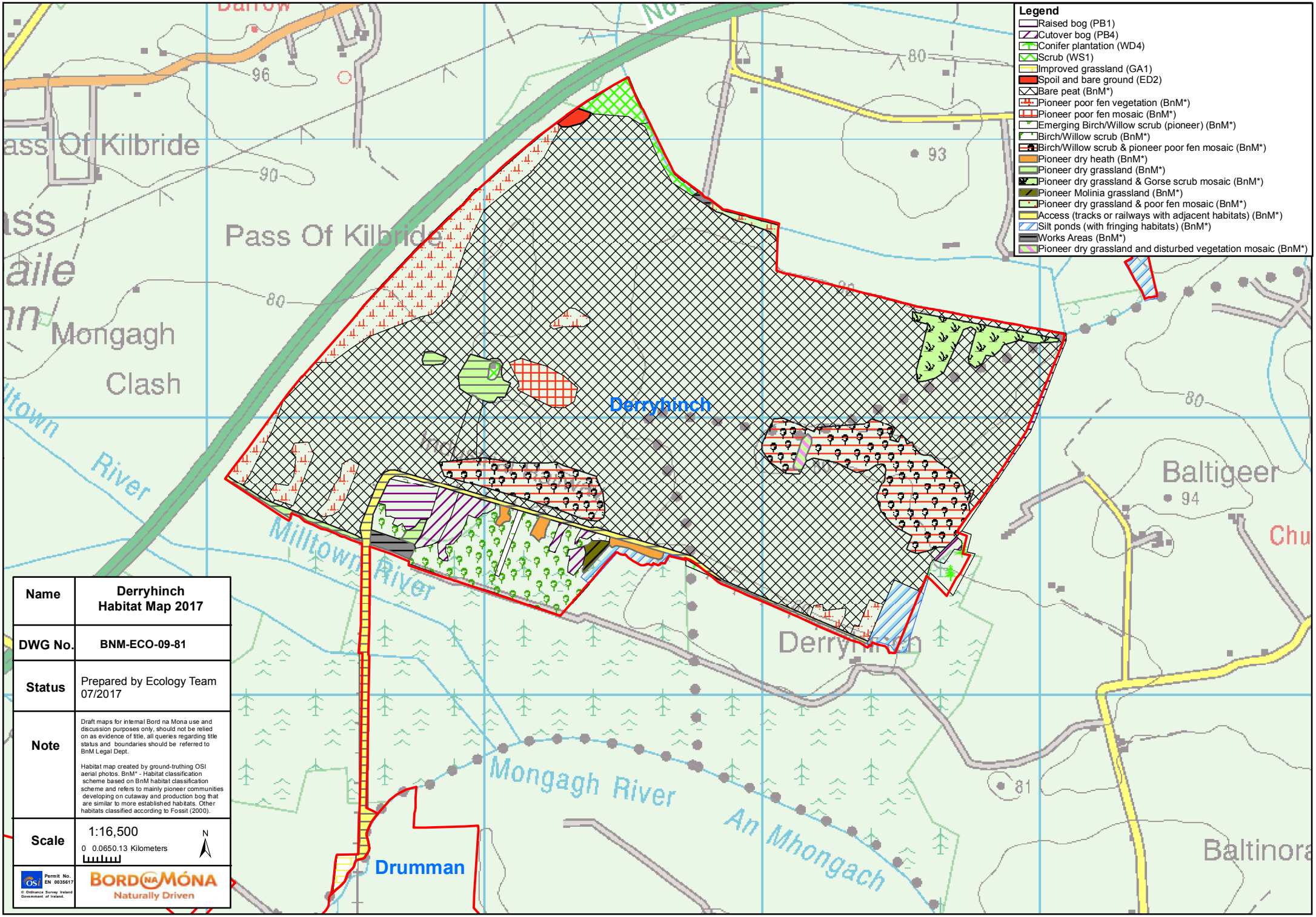
Bord na Moṅa habitat classification scheme

	General	Habitat [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
	Emergent communities	Pioneer *Carex rostrata*-dominated community (Bottle Sedge)	pRos	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 grsld	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



Name	**Derryhinch Habitat Map 2017**
DWG No.	**BNM-ECO-09-81**
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	1:16,500 0 0.0650.13 Kilometers N
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