Chleansaid Wind Farm

ESB Asset Development UK Limited

Appendix 8.1: Habitats and Vegetation

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CONTENTS

ANNEXES

1 INTRODUCTION

1.1.1 This Technical Appendix has been prepared to accompany **Chapter 8** of the Environmental Impact Assessment Report (EIAR) for the proposed Chleansaid Wind Farm (hereafter 'Proposed Development').

1.1.2 It presents detailed methodologies and results of desk study and field surveys completed to establish baseline habitat conditions to inform the design and assessment of the Proposed Development.

1.1.3 It should be read with reference to the following Figures, presented in Volume 3 of the EIAR:

- **Figure 8.1** Non-Ornithological Statutory Designated Sites for Nature Conservation.
- **Figure 8.2:** Phase 1 Habitat Plan.
- **Figure 8.3:** National Vegetation Classification Plan.

1.1.4 **Annex 1** provides the scientific names for the plant species regarded in this Technical Appendix.

1.2 Site Overview

1.2.1 The 'site', as shown by the red line boundary in **Figures 8.1, 8.2** and **8.3**, encompasses the 'turbine area' and 'the access area', and lies 13 km north-east of Lairg, and immediately north of the settlement of Dalnessie, in Sutherland. The site largely comprises open bog, heathland and acid grassland habitats, which continues to the north and east, and is fringed by commercial forestry to the west and south-west. Sròn Leathad Chleansaid is a named hill located along the northern boundary of the turbine area. The Allt nan Con-uisge is a watercourse which flows in the western part of the turbine area. The River Brora marks the south-eastern extent of the turbine area. There are no other waterbodies on-site, although there lochans outside the boundary of the turbine area, with the closest, Loch na Fuaralachd and Loch Beag na Fuaralachd located in forestry to the south-west, and Loch Coire na Bruaiche to the east.

2 METHODOLOGY

2.1.1 This section provides detailed methodologies of baseline desk studies and field studies undertaken to establish baseline habitat and vegetation information to inform the design and assessment of the Proposed Development.

2.1.2 The objectives of the baseline studies were to:

- Establish the spatial distribution of habitats and vegetation communities which may be impacted by the Proposed Development.
- Identify the presence and distribution of any habitat types listed on Annex 1 of the Habitats Directive[1], the Scottish Biodiversity List (SBL) or Local Biodiversity Action Plan (LBAP) and/or which represent potential Groundwater Dependent Terrestrial Ecosystems for (GWDTEs) for subsequent hydrological assessment.
- Record the presence of any protected or non-native plant species listed on Schedule 8 and 9 of the Wildlife and Countryside Act 1981 (as amended) respectively.

[1] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

2.2 Desk Study

2.2.1 A desk study was undertaken to identify the proximity of the site to any statutory or non-statutory designated site for nature conservation with habitat or botanical qualifying interest and to obtain any existing records of protected and/or non-native flora within the site and the surrounding wider area.

2.2.2 Available EIA documentation for the previous Dalnessie Wind Farm (Planning Ref. 12/00890/S36) application, withdrawn in April 2014, has been reviewed. Habitat survey plans which accompanied that application have been made available. At over 13 years old this survey mapping is historic and can only be used as an indication of habitats likely to be within the turbine area. The turbine area is within the boundary of the previous Dalnessie Wind Farm site, which was more extensive, extending into open habitats to the north, east and south-east, but had no proposed infrastructure located within it.

2.2.3 Further desk study sources, search areas and information obtained are summarised in **Table 8.1.1**.

Table 8.1.1: Desk study sources.

Key Source	Information Sought	Search Area
SiteLink[2]	Proximity to statutory designated sites for nature conservation with habitats and/botanical interests.	Within 10 km of the turbine area.
Highland Biological Recording Group (HBRG)	Existing records of protected and notable habitats and plant species and non-statutory designated sites.	Within 2 km of the turbine area.

2.3 Field Surveys

2.3.1 The following field surveys have been completed:

- Phase 1 habitat survey.
- National Vegetation Classification (NVC) survey.

2.3.2 Survey methodologies and subsequent interpretation of results have made reference to the following key pieces of guidance:

- Averis *et al*. (2014). - *An Illustrated Guide to British Upland Vegetation.*
- Joint Nature Conservation Committee (2010). *Handbook for Phase 1 Habitat Survey - a technique for environmental audit.*
- Highland Biodiversity Partnership (2010). *Highland Biodiversity Action Plan 2010 – 2013*.
- SNH (2017). *Commissioned Report 766 - Manual of terrestrial EUNIS habitats in Scotland*.
- Rodwell (2006). *National Vegetation Community Users' Handbook*.
- Rodwell ed. (1991). *British Plant Communities. Volume 1. Woodlands and Scrub*.
- Rodwell ed. (1992). *British Plant Communities. Volume 2. Mires and Heaths.*

[2] https://sitelink.nature.scot/home (Accessed 30/11/2020)

- Rodwell ed. (1992). *British Plant Communities. Volume 3. Grasslands and montane communities*.
- Rodwell ed. (1998). *British Plant Communities. Volume 4. Aquatic communities, swamps and tall-herb fens*.
- SNIFFER (2009). *WFD95: A Functional Wetland Typology for Scotland – Field Survey Manual*.
- Stace (1997). *Field flora of the British Isles*.
- Scottish Environment Protection Agency (2014). *Land Use Planning System Scottish Environment Protection Agency (SEPA) Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems*.

Habitat Study Area

2.3.3 The study area within which baseline habitat and vegetation field surveys have been undertaken has comprised all terrestrial habitats within the turbine area and 250 m buffer, and the access area.

Phase 1 Habitat Survey

2.3.4 A Phase 1 habitat survey of the turbine area was undertaken on the 9th July 2020, with a Phase 1 habitat survey of the access area undertaken on 1st October 2021.

2.3.5 The survey was undertaken in accordance with the UK industry standard Joint Nature Conservation Committee (JNCC) Phase 1 Habitat Methodology (JNCC, 2010[3]).

2.3.6 During the survey all habitats within the study area were mapped according to industry standards and described using a series of 'target notes' (TNs).

NVC Survey

2.3.7 An NVC survey of the turbine area was undertaken on 27th August 2020, with a NVC survey of the access area undertaken on the 2nd October 2021, following the guiding principles detailed within the 'National Vegetation Classification: User's Handbook' (Rodwell, 2006[4]).

2.3.8 The NVC survey comprised all noteworthy habitats within the study area. The survey concentrated on those areas where plant communities were deemed likely to form Annex I habitats and / or represent Groundwater Dependent Terrestrial Ecosystems.

2.3.9 During the survey, square quadrats of relevant size (per guidance) were distributed throughout homogenous stands identified, in order to provide a representative sample of the vegetation community present.

2.3.10 In each quadrat sample area, data were collected on the presence and abundance of vascular plant species using the Domin scale. These data were then analysed and classified to an NVC vegetation community, where possible, using the keys in Rodwell (various) British Plant Communities Volumes 1 to 5 (see list in section 2.3.2), aided by analysis using the Modular analysis of Vegetation Information System (MAVIS) created by the UK Centre for Ecology and Hydrology.

[3] JNCC (2010) *Handbook for Phase 1 Habitat Survey - a technique for environmental audit.*
[4] Rodwell (2006). *National Vegetation Community Users' Handbook*.

Personnel

2.3.11 Surveys were conducted by M. Wood; a competent botanist with considerable experience of undertaking Phase 1 Habitat and NVC surveys for proposed wind farm developments, across numerous comparable upland sites in Scotland.

2.3.12 The NVC analysis was checked by S. Turner a competent botanist with experience of undertaking and analysing NVC surveys for similar upland sites across Scotland.

3 RESULTS

3.1 Desk Study

3.1.1 This section provides details of existing habitat information and existing records of protected and notable plant species identified within and in proximity to the site from desk study sources listed in **Table 8.1.1**.

Designated Sites for Nature Conservation

3.1.2 In review of Sitelink the site does not form a part of any statutory designated site for nature conservation.

3.1.3 **Table 8.1.2** provides a summary of statutory designated sites with qualifying habitat and/or botanical interest located within 10 km of the turbine area and should be read with reference to **Figure 8.1**.

Table 8.1.2: Statutory designated sites for nature conservation.

SAC: Special Area of Conservation, SSSI: Special Site of Scientific Interest.

Designated Site	Distance and Direction from the Turbine Area	Qualifying Interests
Internationally Designated Sites		
Caithness and Sutherland Peatlands SAC	8.3 km, east	• Habitats incl. blanket bog, natural dystrophic lakes and ponds and transition mires and quaking bogs. • Marsh saxifrage.
Nationally Designated Sites		
Ben Klibreck SSSI	5.5 km, north	• Habitats incl. alpine heath and blanket bog.
Skinsdale Peatlands SSSI (part of Caithness and Sutherland Peatlands SAC)	8.3 km, north-east	• Blanket bog. • Vascular plant assemblage.
Cnoc an Alaskie SSSI (part of Caithness and Sutherland Peatlands SAC)	8.6 km, north-west	Blanket bog.
Grudie Peatlands SSSI (part of Caithness and Sutherland Peatlands SAC)	10 km, south-west	Blanket bog.

Non-statutory Designated Sites for Nature Conservation

3.1.4 The data request submitted to the HBRG identifies that the site does not form part of any non-statutory designated sites for nature conservation with habitat and/or botanical interests.

3.1.5 In further review of non-statutory designated sites, the site is also not located within 2 km of any such site with habitat and/or botanical interests.

Existing Habitat and Botanical Records

HBRG

3.1.6 The data request submitted to the HBRG returned no records from within the desk study search area (as defined **in Table 8.1.1**).

Dalnessie Wind Farm Application (Withdrawn)

3.1.7 A summary of the main results from the Phase 1 habitat and NVC surveys undertaken to support the Dalnessie Wind Farm application[5] are presented in **Table 8.1.3.** No further details other than those presented are available.

Table 8.1.3 Existing habitat and NVC communities identified within the Dalnessie Wind Farm site.

Phase 1 Habitat
E1.6.1 - Blanket bog
B5 - Marshy grassland
D6 - Wet heath
E2.1 - Acid/neutral flush
F1 - Swamp
D4 - Montane heath
B1.1 - Unimproved acid grassland
NVC Communities
H17b *Calluna vulgaris-Arctostaphylos alpinus* heath, *Empetrum nigrum ssp. nigrum* sub-community
M6a *Carex echinata-Sphagnum recurvum/auriculatum* mire, *Carex echinata* sub-community
M15c *Scirpus cespitosus-Erica tetralix* wet heath, *Cladonia* spp. sub-community
M17a *Scirpus cespitosus-Eriophorum vaginatum* blanket mire, *Drosera rotundifolia-Sphagnum spp*. sub-community
M19a *Calluna vulgaris-Eriophorum vaginatum* blanket mire, *Erica tetralix* sub-community
M19b *Calluna vulgaris-Eriophorum vaginatum* blanket mire, *Empetrum nigrum* ssp*. nigrum* sub-community
M23a *Juncus effusus/acutiflorus-Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community

[5] SSE (un-dated). *Figures 9.3d ,9.3f, 9.3g and 9.4d, 9.4f, 9.4g of the Dalnessie Wind farm Environmental Statement.*

Phase 1 Habitat
S10b *Carex vesicaria* swamp, *Mentha aquatica* sub-community
U4b *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland, *Holcus lanatus-Trifolium repens* sub-community

3.2 Habitat Survey Results: Overview

3.2.1 This section presents the results of baseline field surveys, including an overview of habitat types present within the study area and their distribution. It should be read with reference to **Figures 8.2** and **8.3**. Where areas of habitat are too limited to show as an area on the figures they are instead described in target notes.

3.2.2 Phase 1 habitat survey target notes are detailed in **Annex 2**, and detailed species lists and NVC tables are presented in **Annex 3**, with photographic plates presented in **Annex 4**.

3.2.3 The turbine area consists of an upland area with moorland habitats flanked by the River Brora on its east side and forestry to the south and west. The northern edge of the turbine area rises to the summit of Sròn Leathad Chleansaid. The southern part sits in a low valley which is bisected by a burn called Allt nan Con-uisge, which flows in a south eastern direction before joining the River Brora.

3.2.4 The part of the turbine area which flanks the north and southern sides of the Allt nan Con-usige burn is chiefly blanket bog which is dotted with small drumlin-like features, where the soil is very shallow and takes on a wet heath-like community. Habitats along the watercourses consist of either rush dominated marshy grassland or a bottle sedge dominated wetland.

3.2.5 The hill which dominates the northern portion of the turbine area has reasonably steep slopes and a relatively flat, plateau like top. The steep south and east facing slopes have generally shallow, peat/soil and is comprised of a complex mosaic of wet heath and acid grassland. In some pockets where the peat is deeper a dry modified bog community is present. Some small rock outcrops protrude in a few spots that have facilitated small calcareous flushes where wild thyme and some other herbs and sedges are present.

3.2.6 The top of the hill, which largely sits in the buffer outside the turbine area, is mostly shallow peat, much of which is hagged and eroding to some degree. At this location is a complex mix of wet heath/moss and lichen heath, with small pockets of bog where the peat is deep enough.

3.2.7 The access area is located in a relatively wide ride within an area of commercial forestry. The habitats are largely a mix of bog and heath, with wet heath particularly notable at the eastern end of the track. Scattered along the access area are occasional small pockets of acid, marshy and neutral grassland as well as some planted broad-leaved trees and commercial forestry.

3.3 Habitat Survey Results: Phase 1 Habitats

3.3.1 Coniferous plantation (A1.2.2) is present in the buffer adjacent to the turbine area to the south and west, and along the access area. This consists mostly of dense commercial Sitka spruce or lodgepole pine in a pre-fell stage, around 20 m tall. The understorey is generally dry, consisting of a dense carpet of needles, with some moss locally. Felled coniferous plantation (A4) is present mainly in the western buffer, some of which is recent and consisting of a tangle of brash (Target Note TN8 in **Figure 8.2**). Some of the older clear-fell patches are starting to regrow with expansive carpets of hare's-tail cottongrass, purple moor-grass or wavy hair-grass. In one area damming of old forestry ditches has been attempted (Target Note TN1 in **Figure 8.2**).

3.3.2 Unimproved acid grassland exists on the south facing slopes of Sròn Leathad Chleansaid. This generally forms small patches in mosaic with wet heath (D6) and can be dominated by a range of species, mostly either a mix of wavy hair grass, mat grass, heath rush or sheep's fescue and common bent.

3.3.3 Semi-improved acid grassland (B1.2) is only present along the banks of the River Brora on the eastern edge of the turbine area, and the buffer at that locality (Target Note TN17). It is found on shallow soil and is the favoured browsing area for the local sheep. This is largely sheep's fescue, mat grass, sweet vernal-grass and some crested dog's-tail and heath rush, with herbs like common mouse-ear, yarrow, heath bedstraw and self-heal present.

3.3.4 Marshy grassland (B5) is restricted to the banks of watercourses and damp channels and is mostly dominated by soft rush, with some areas more dominated by purple moor-grass. In some areas, for example near the River Brora, the ground layer can be dominated by flat-topped bogmoss but more typically has abundant common haircap moss, some creeping soft-grass and sedges such as star sedge and common sedge and herbs such as marsh bedstraw.

3.3.5 Wet dwarf shrub heath (D2) is a widespread habitat within the turbine area. Occurrence is mainly on the tops and slopes of the Sròn Leathad Chleansaid but is also present on the small drumlins that are present in the valley in the south of the turbine area (Target Note TN6 in **Figure 8.2**). It can often look similar to surrounding bog habitats but is typified by being on shallow peat. Much of this habitat is dominated by purple moor-grass with patchy common heather, frequent cross-leaved heath. Bog asphodel is abundant. The hill top wet heath is dominated by deergrass and mosaics with a lichen/bryophyte heath (D3) (Target Note TN13 in **Figure 8.2**).

3.3.6 Lichen/Bryophyte Heath (D3) exists on the highest parts of the hill-top plateau and forms a mosaic with the adjacent wet heath or bog communities. The areas where the lichens and moss are dominant are quite small and occur where peat is very shallow, or bare rock present, where they mostly consist of a mix of cup lichens and woolly fringe moss (Target Note TN14 in **Figure 8.2**). Small areas are also found on the tops of well drained drumlin landforms in the south of the turbine area (Target Note TN7 in **Figure 8.2**).

3.3.7 Blanket bog (E1.6.1) covers large areas of the low ground in the southern half of the turbine area being confined to generally flat to gently sloping/undulating ground. This habitat was on peat more than 50 cm deep and is generally very wet and characterised by a variety of abundant bog-mosses, interspersed with bog pools and bog-moss hollows. Vascular plants in this habitat are dominated by hare's-tail cotton sedge, with some common cotton sedge and deer sedge, cross-leaved heath, common heath, with specialist herbs such as sundews and bog asphodel. Clumps of dwarf birch are present in one locality (Target note TN4 in **Figure 8.2**).

3.3.8 Small localised pockets of blanket bog on deeper peat are also present on the summit plateau of Sròn Leathad Chleansaid, within the wider wet heath habitat, and these areas are noted as Target Note TN15 in **Figure 8.2**.

3.3.9 Wet modified bog (E1.7) is locally present, mostly on the lower hill slopes in the east of the turbine area. This habitat often appears similar to nearby wet heath but it is located on deeper peat and is less rich in species, being largely dominated by purple moor-grass.

3.3.10 Dry modified bog (E1.8) is formed locally on the south facing slope of Sròn Leathad Chleansaid where the slope relief eases enough to allow deeper peat to form. These pockets are characterised by hare's-tail cottongrass tussocks, with lots of hypnoid mosses underneath and abundant wavy hair-grass throughout.

3.3.11 Flush/Spring – Acid/neutral (E2.1) flushes were numerous on the south facing slope of Sròn Leathad Chleansaid usually amidst the wet heath. They typically contain large patches of sedge species, for example star sedge, a variety of mosses including bog-mosses and herbs including butterwort, bog

asphodel and sundews (Target Notes TN9, TN11 and TN18 in **Figure 8.2**). In one small locality (Target Note TN12 in **Figure 8.2**) small flushes of a more calcareous nature were noted (E2.2).

3.3.12 F1 Swamp (F1) consists of bottle sedge dominated communities along the slower flowing parts of the Allt nan Con-usige Burn, along with bog pondweed and slender pondweed present in the pool areas of the burn (Target Note TN3 in **Figure 8.2**).

3.3.13 Dystrophic running water (G1.4) is present with heavily peat-stained waters flowing down the Allt nan Con-uisge Burn and into the River Brora (Target Notes TN16 and TN17 in **Figure 8.2**). Allt nan Con-uisge widens in two places to form ponds (Target Notes TN2 and TN5 in **Figure 8.2**) with marginal / emergent vegetation including sedges and horsetails.

3.3.14 Along the access area, blanket bog (E1.6.1) and wet modified bog (E1.7) are extensive, with blanket bog found in flat or gently sloping areas where the peat is deep. The wet modified bog is typically drier than the blanket bog, and is dominated by purple moor-grass. Wet dwarf shrub heath (D2) is most commonly in the eastern part of the access area, and it is dominated by deergrass. There are areas of unimproved neutral grassland (B2.1) and marshy grassland (B5) adjacent to the watercourses which flow along the access area. There are areas of broad-leaved plantation (A1.1.2) in the west and centre of the access area, and coniferous plantation (A1.2.2) adjacent to the access area. Along the access area are a small number of dystrophic running water (G1.4) watercourses, which are lightly peat-stained.

3.3.15 No protected or non-native plant species listed on Schedule 8 and 9 of the Wildlife and Countryside 1981 (as amended) respectively were recorded within the study area.

3.4 Habitat Survey Results: NVC Communities

Overview

3.4.1 Sròn Leathad Chleansaid hill gets progressively steeper, the top then forming a small plateau comprising a mix of M17 bog and M15 wet heath. There is some H14 dry heath, though this is confined to the summit of the hill. The slopes of the hill drop off to the south and east and are mostly covered in an M15 wet heath community, which forms a complex mosaic of M20 and M25 mires on deeper peat, and U4 and U6c grasslands on shallower soils and along the watercourses. These communities broadly correspond to the following Phase 1 habitats: D2 and D3 heaths, D6 wet heath / acid grassland mosaic, E1.6.1 blanket bog, E1.7 wet modified bog, E1.8 dry modified bog and B1 acid grassland.

3.4.2 The southern half of the turbine area is on lower, predominantly wetter ground which is bisected by the Allt nan con-uisge Burn, either side of which is mostly either M17 or M25 bog on deep peat. The dominant Phase 1 habitat is E1.6.1 blanket bog corresponding to the M17 community. Areas of M25 on deep peat correspond to E1.7 wet modified bog. The area also includes scattered small drumlin type glacial sediments, forming small well-drained hilltops with M15 wet heath community.

3.4.3 Streams within the turbine area are lined with acid grassland and marshy grassland communities, where the peat is shallow or not present. The M23b and M25 communities correspond to the B5 marshy grassland Phase 1 habitats.

3.4.4 All of the turbine area is subject to grazing from sheep and red deer, heavy in places, which impacts on the composition and structure of the vegetation communities present.

3.4.5 Along the access area, bog habitats dominate (E1.6.1 and E1.7) and these correspond to M17 and M25 bog on deep peat. Wet heath (D2) in the east of the access area corresponds to M15, and in most areas this forms mosaic habitat with M25. U4 grassland is restricted to the west of the access area, and MG9 grassland is more extensive with isolated areas throughout the access area, and forming mosaics particularly with M25.

Dry Heaths

H14 – *Calluna vulgaris* – *Racomitrium lanuginosum* heath: no assigned sub-community

3.4.6 This community is patchily distributed around the summit of Sròn Leathad Chleansaid on very shallow peat, on aspects that are exposed to the harshest winds and snows, forming a mosaic with the M15 wet heath. A similar looking community is also found in tiny patches on the top of some of the 'drumlin' like features in the lower areas of the turbine area. The vegetation is characterised by being very short (wind cropped), less than 10 cm and composed of few species, primarily ground hugging hoary rock moss, cup lichens and diminutive common heather, sometimes with alpine bearberry being present.

Wet Heaths

M15 - *Trichophorum germanicum* – *Erica tetralix* wet heath, no assigned sub-community.
M15c *Trichophorum germanicum* – *Erica tetralix* wet heath, *Cladonia* subcommunity.

3.4.7 This community covers very large areas of the turbine area, including much of the upper and lower slopes of Sròn Leathad Chleansaid, and the tops of some lower hills. It is characterised by forming on peat that is less than 50 cm deep and will quickly transition into M17 or M20 bog once the peat deepens. The vegetation is similar to neighbouring M17 communities but differs in that hare's-tail cottongrass is almost completely absent. It is usually heavily dominated by deergrass, and common heather in varying quantities, but always cross-leaved heath and some bog specialists, including bog-mosses, bog asphodel and sundews. Some areas of this heath have more purple moor-grass, giving it attributes of an M15b sub-community, but others have varying proportions of cup lichens and hoary rock moss mixed throughout, which makes it more characteristic of a M15c sub-community.

3.4.8 The M15 community present in the eastern part of the access area typically forms mosaic habitat with M25 bog habitat, and corresponds to the M15c sub-community. The habitat is dominated by deergrass and has been subjected to heavy grazing by deer and livestock. In drier areas hoary rock moss and cup lichens are regular, while in damper areas cross-leaved heath and bog asphodel are numerous.

Blanket Bog / Modified Blanket Bog

M17a - *Trichophorum germanicum* – *Eriophorum vaginatum mire, Drosera rotundifolia* – *Sphagnum* spp. sub-community.

M2 – *Sphagnum cuspidatum / fallax* bog pool community

M3 – *Eriophorum angustifolium* bog pool community

M20 - *Eriophorum vaginatum* mire: no assigned sub-community

M25 – *Molinia caerulea* – *Potentilla erecta* mire: no sub-community assigned.

3.4.9 Along with M15 communities, the M17a community covers the majority of the turbine area. Most lower areas of the turbine area, particularly in the south and east, where the relief of the landscape has facilitated the accumulation of deep peat, support this community. The peat is often over 2 m deep, on flat basins or gentle slopes and usually transitions with adjacent M25 or M15 communities. It is dominated by deergrass and hare's-tail cottongrass, other constant species with lower cover include cross-leaved heath, common cottongrass and common heather. Acute-leaved bog-moss is an abundant throughout with a diverse range of other bog-moss species present, often forming large cushions. Other bryophytes include hoary rock moss which is frequent is some areas, and reindeer lichen is also a constant species. Typical bog species sundews and bog asphodel are present in many

areas. In a few localities in the south of the turbine area dwarf birch grows on the bog and occasional bog myrtle is found.

3.4.10 The M2 bog pools are scattered throughout areas of M17a bog, ranging in size from several metres across down to tiny hollows. They tend to be very wet and are usually completely filled with feathery bogmoss, with limited other species present. They are not shown on **Figure 8.3** due to being numerous, widespread, and too small to map.

3.4.11 The M3 bog pools are present in only a few localities, usually around the edges of the M17a and M25 communities on deep peat. Typically it is wet, but with a high proportion of exposed peat and a scattering of common cotton sedge across the surface. One pool within the M25 modified bog supported a dense marginal sward of common sedge.

3.4.12 The M20 mire is found in a few large patches on the more gentle southern slopes of Sròn Leathad Chleansaid. It has also formed on deep peat, in excess of 2 m where quadrats were undertaken. It transitions into adjacent M15, U6 or M25 communities. The vegetation is dominated by large, dry hare's-tail cottongrass tussocks, with abundant wavy hair grass and hypnoid mosses. It is mostly very dry underfoot and in the driest areas, bilberry and occasional common heather can be present.

3.4.13 The M25 mire community is present on deep peat, but the surface is notably drier compared to the M17a community. It is composed of constant, dominant, purple moor-grass, forming a dense sward with large tussocks. Other plant species diversity is quite low, but tormentil is constant. Hypnoid mosses and some bog-mosses are present in the wet areas between tussocks, usually papillose bog-moss or red bog-moss. Hare's-tail cottongrass and common cottongrass are present, but at mostly low levels of cover.

3.4.14 Along the access area M25 community is extensive, occurring on largely flat ground. The community forms mosaics with MG9 and M23b communities along the existing forestry track. Both these communities show atypical features, with the M23b approaching M6 flush in places. These, along with the M25, are often on deeper peat and likely represent highly modified former blanket bog habitats disturbed by the forestry operations. In the east of the access area, outside the forestry area, the M17a community is notable, and is relatively wet underfoot, and the habitat is subject to moderate levels of grazing.

Upland Flushes

M6 – *Carex echinata – Sphagnum fallax /denticulatum* mire

3.4.15 The small M6 acid flush communities are locally present on the south facing slope of Sròn Leathad Chleansaid, consisting of spring-fed flushes over stones and shallow peat. A variety of small sedges are present, including star sedge and carnation sedge, along with frequent bulbous rush, butterwort and cow-horn bogmoss.

3.4.16 An isolated M6 acid flush is also present along the access area at NC 59635 14178, with similar species composition to the flush habitats in the turbine area, but also supporting bog-mosses.

Marshy Grasslands

M23b *Juncus effusus / acutiflorus - Galium palustre* rush pasture, *Juncus effusus* sub-community.
MG9 – *Deschampsia cespitosa* grassland

3.4.17 The M23b rush pasture is mostly restricted to the borders of watercourses in the far east of the turbine area. It is dominated by soft rush, which can reach a height of 1 m. Species within the habitat typically include a mix of marsh bedstraw, marsh willowherb and mosses such as common haircap moss and

flat-topped bogmoss. Grasses such as Yorkshire fog are usually present also. The ground is usually wet underfoot, especially where mosses predominate.

3.4.18 M23b rush pasture is present along the access area and is mainly confined to disturbed ground adjacent to the existing forestry track.

3.4.19 The MG9 grassland is mostly confined to disturbed areas along the access area in areas of clear-fell and adjacent to watercourses. The community ranged from species-poor in some areas, to quite species diverse in other areas. Dominated by tufted hair-grass, but also with the grasses Yorkshire fog and sweet vernal grass, mosses including common haircap moss, and herbs including meadowsweet, creeping buttercup and tormentil. Alongside the existing track and in areas of clearfell it is atypical and variable in composition, likely reflecting the disturbance due to forestry operations.

Swamps

S9 – *Carex rostrata* swamp.

3.4.20 This S9 swamp is only present in the slower flowing parts of the Allt nan con-uisge Burn in the southern part of the turbine area, forming small ponds. It is comprised of dense stands of emergent bottle sedge, usually with few other species present.

Acid Grasslands

U4 *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland: no sub-community assigned.
U4a *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland, typical sub-community.
U6c *Juncus squarrosus - Festuca ovina* grassland, *Vaccinium myrtillus* sub-community.

3.4.21 The U4 acid grassland community is patchily distributed on the upper south facing slopes of the Sròn Leathad Chleansaid and along the banks of the River Brora on the eastern edge of the turbine area. It occurs on shallow, well drained soils and is likely more subject to grazing by the local sheep and deer due to having more palatable plant species. Animal dung was noted during the survey. The community is largely dominated by a range of constant grasses including sheep's fescue, common bent, mat grass, sweet vernal-grass and heath-grass. Herbs present are variable and can be locally diverse, with heath bedstraw as a constant. In the turbine area, this community often forms a mosaic with the M15 wet heath.

3.4.22 The U6c acid grassland occurs in similar areas to the U4 community and also forms a mosaic with adjacent patches of M15 wet heath or on the edges of M25 modified bog. It differs from the U4 community in that it is on shallow peat, typically in less well drained areas. It is characterised by having a high component of constant, abundant heath rush, and a more scattered mix of grasses, including wavy hair-grass, mat grass and sheep's fescue. There are scatted sedge species and common woodrush is a constant, albeit at low levels of cover. Mosses such as common haircap moss, red-stemmed feathermoss and mountain fern moss can be abundant in places, and herbs such as tormentil and heath bedstraw are constant, at lower levels of cover. This community is also subject to high grazing levels.

3.4.23 U4a acid grassland is present in isolated locations along the access area, especially in the west. It is found in small areas of raised, better drained topography. The grassland has been subjected to varying levels of grazing, with some areas grazed short by livestock.

NVC Summary

3.4.24 Vegetation communities present within the study area and included in the NVC survey are summarised in **Table 8.1.4**, along with corresponding Habitats Directive (92/43/EEC) Annex 1 Habitat types, SBL priority habitat types, LBAP priority habitat types and potential Ground Water Dependant

Terrestrial Ecosystems (GWDTE) status in accordance with SEPA guidance (2014[6]) and SNH NVC / EUNIS / Annex 1 correspondence tables (2017[7]).

[6] SEPA (2014). *Land Use Planning System Scottish Environment Protection Agency (SEPA) Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems*.

[7] SNH (2017). *Commissioned Report 766 - Manual of terrestrial EUNIS habitats in Scotland*.

Table 8.1.4: Summary of vegetation communities.

NVC community	Principal corresponding Habitats Directive Annex I type/s	Corresponding SBL Priority Habitat Type	Highland Biodiversity Action Plan 2010 - 2013[1]	Dependence of community/ habitat on groundwater[2]. 1=High, 2=moderate, 3=low
M2 - Sphagnum cuspidatum bog pool community	H7130 Blanket bog	Blanket Bog	Blanket Bog	3
M3 – *Eriophorum angustifolium* bog pool community	H7130 Blanket bog	Blanket Bog	Blanket Bog	3
M6 – *Carex echinata – Sphagnum fallax /denticulatum* mire	-	Upland flushes, fens and swamps	Upland flushes, fens and swamps	1
M15 *Trichophorum germanicum – Erica tetralix* wet heath: no subcommunity assigned	H4010 Northern Atlantic wet heaths with *Erica tetralix* (If on deep peat >0.5 m, this habitat represents degraded blanket bog, restoration to H7130 Blanket bog may be possible)	Upland Heathland	Upland heathland (blanket bog if on deep peat)	2 (3 if on deep peat)
M15c *Trichophorum germanicum – Erica tetralix* wet heath, *Cladonia* subcommunity	H4010 Northern Atlantic wet heaths with *Erica tetralix*	Upland Heathland	Upland Heathland	2
M17a *Trichophorum germanicum – Eriophorum vaginatum* mire, *Drosera rotundifolia – Sphagnum spp* sub-community	H7130 Blanket bog	Blanket Bog	Blanket Bog	3
M20 – *Eriophorum vaginatum* blanket mire: no sub-community assigned	H7130 Blanket bog	Blanket Bog	Blanket Bog	3
M23b *Juncus effusus/acutiflorus - Galium palustre* rush pasture, *Juncus effusus* sub-community	-	-		1
M25 – *Molinia caerulea – Potentilla erecta* mire: no sub-community assigned	H7130 Blanket bog	Blanket bog	Blanket bog	3 as on deep peat
MG9 - *Deschampsia cespitosa* grassland: no sub-community assigned	-	-	-	2
S9 – *Carex Rostrata* swamp (suggested community)	3160 Natural dystrophic lakes and ponds	Freshwater and wetland	-	3

NVC community	Principal corresponding Habitats Directive Annex I type/s	Corresponding SBL Priority Habitat Type	Highland Biodiversity Action Plan 2010 - 2013[1]	Dependence of community/ habitat on groundwater[2]. 1=High, 2=moderate, 3=low
U4 – *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland: no sub-community assigned	-	-	-	3
U4a *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland, typical sub-community	-	-	-	3
U6c *Juncus squarrosus - Festuca ovina* grassland, *Vaccinium myrtillus* sub-community	-	*Juncus squarrosus-Festuca ovina* grassland	-	2

1 The most recent version of the Highland Biodiversity Action Plan to provide a list of priority habitats, the latest version Highland Biodiversity Action Plan 2015 – 2020 does not provide a list and only refers to habitats where they relate to specific projects.

2 As listed in Appendix 4 of SEPA (2014) LUPS Guidance Note 31. The categorisation of GWDTEs is preliminary and is based on vegetation communities present, and therefore confirmed GWDTE categorisation is based on subsequent formal hydrological assessment.

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ANNEX 1 - SCIENTIFIC PLANT NAMES

Table A1.1 provides common and scientific names of plant species included in this Technical Appendix.

Common Name	Scientific Name
Marsh saxifrage	*Saxifraga hirculus*
Bottle sedge	*Carex Rostrata*
Wild thyme	*Thymus polytrichus*
Sitka spruce	*Picea sitchensis*
Lodgepole pine	*Pinus contorta*
Hare's-tail cottongrass	*Eriophorum vaginatum*
Purple moor-grass	*Molinia caerulea*
Wavy hair-grass	*Avenella flexuosa*
Mat grass	*Nardus stricta*
Heath rush	*Juncus squarrosus*
Sheep's fescue	*Festuca ovina*
Viviparous sheep's fescue	*Festuca vivipara*
Common bent	*Agrostis capillaris*
Sweet vernal-grass	*Anthoxanthem odoratum*
Crested dog's-tail	*Cynosurus cristatus*
Common mouse-ear	*Cerastium fontanum*
Yarrow	*Achillea millefolium*
Heath bedstraw	*Galium saxatile*
Self-heal	*Prunella vulgaris*
Soft rush	*Juncus effusus*
Cup lichens	*Cladonia* spp.
Bog-mosses	*Sphagnum* spp.
Flat-topped bogmoss	*Sphagnum fallax*
Common haircap moss	*Polytrichum commune*
Creeping soft-grass	*Holcus mollis*

Common Name	Scientific Name
Star sedge	*Carex echinata*
Common sedge	*Carex nigra*
Marsh bedstraw	*Galium palustre*
Common heather	*Calluna vulgaris*
Bell heather	*Erica cinerea*
Cross-leaved heath	*Erica tetralix*
Bog asphodel	*Narthecium ossifragum*
Deergrass	*Trichophorum germanicum*
Woolly fringe moss	*Racomitrium lanuginosum*
Common cottongrass	*Eriophorum angustifolium*
Sundews	*Drosera* spp.
Round-leaved sundew	*Drosera rotundifolium*
Great sundew	*Drosera anglica*
Dwarf birch	*Betula nana*
Birch	*Betula* spp.
Aspen	*Populus tremula*
Alder	*Alnus glutinosa*
Rowan	*Sorbus aucuparia*
Whitebeam	*Sorbus aria*
Eared willow	*Salix aurita*
Creeping willow	*Salix repens*
Butterwort	*Pinguicula vulgaris*
Bog pondweed	*Potamogeton polygonifolius*
Slender pondweed	*Potamogeton filiformis*
Horsetails	*Equisetum* spp.
Hoary rock moss	*Racomitrium lanuginosum*
Alpine bearberry	*Arctostaphylos alpinus*
Acute-leaved bog-moss	*Sphagnum capillifolium*

Common Name	Scientific Name
Reindeer lichen	*Cladonia portentosa*
Bog myrtle	*Myrica gale*
Feathery bog-moss	*Sphagnum cuspidatum*
Common sedge	*Carex nigra*
Bilberry	*Vaccininum myrtillus*
Tormentil	*Potentilla erecta*
Papillose bog-moss	*Sphagnum papillosum*
Red bog-moss	*Sphagnum capillifolium*
Carnation sedge	*Carex panicea*
Bulbous rush	*Juncus bulbosus*
Cow-horn bog-moss	*Sphagnum denticulatum*
Marsh willowherb	*Epilobium palustre*
Yorkshire fog	*Holcus lanatus*
Common bent	*Agrostis capillaris*
Heath-grass	*Danthonia decumbens*
Common woodrush	*Luzula multiflora*
Red-stemmed feathermoss	*Pleurozium schreberi*
Mountain fern moss	*Hylocomium splendens*
Marsh cinquefoil	*Comarum palustre*
Fountain apple-moss	*Philonotis fontana*
Fairy flax	*Linus catharticum*
Eyebright	*Euphrasia* sp.
Milkwort	*Polygala* sp.
Common yellow-sedge	*Carex demissa*
Glaucous sedge	*Carex flacca*
Flea sedge	*Carex pulicaris*
Creeping willow	*Salix repens*
Lesser spearwort	*Ranunculus flammula*

Common Name	Scientific Name
Heath plait-moss	*Hypnum jutlandicum*
Soft bogmoss	*Sphagnum tenellum*
Purple spoonwort	*Pleurozia purpurea*
Thorn lichen	*Cladonia uncialis*
Marsh violet	*Viola palustre*
Tufted hairgrass	*Deschampsia cespitosa*
Red fescue	*Festuca rubra*
Meadow buttercup	*Ranunculus acris*
Bottle sedge	*Carex rostrata*
Marsh horsetail	*Equisetum palustre*
Marsh cinquefoil	*Comarum palustris*
Blunt-leaved bogmoss	*Sphagnum palustre*
Sheep's sorrel	*Rumex acetosella*
Heath milkwort	*Polygala serpyllifolia*
Devil's-bit scabious	*Succisa pratensis*
Heath dog-violet	*Viola canina*
Ribwort plantain	*Plantago lanceolata*
Green-ribbed sedge	*Carex binervis*
Yarrow	*Achillea millefolium*
Creeping buttercup	*Ranunculus repens*
Meadowsweet	*Filipendula ulmaria*
Autumn hawkbit	*Scorzoneroides autumnalis*
Common eyebright	*Euphrasia nemerosa*
Little shaggy-moss	*Rhytidiadelphus loreus*
Springy turf-moss	*Rhytidiadelphus squarrosus*

ANNEX 2 - PHASE 1 HABITAT SURVEY TARGET NOTES

Target Notes presented in **Table A2.1** should be read with reference to **Figure 8.2** presented in Volume 2 of the EIAR, and photographic plates presented in **Annex 3**.

Table A2.1: Phase 1 habitat survey Target Notes.

Target Note	Grid reference	Description	Photographic Plate (see Annex 3)
TN1	NC60362 17875	Clear-fell area in the western buffer, where damming of the old forestry ditches has been attempted.	1
TN2	NC60556 17982	Small pond around 8 x 5 m, and 1 m deep. Abundant bottle sedge and horsetails. Great diving beetle *Dytiscus marginalis* observed.	2
TN3	NC60662 17422	Bottle sedge swamp in the Allt nan Con-usige Burn, and also some peat hags on the adjacent blanket bog.	3, 4
TN4	NC60835 17382	Several clumps of dwarf birch growing on the surface of the bog.	5
TN5	NC60929 17299	10 x 10 m pond, >1 m deep. Sedges, pondweed, marsh cinquefoil and horsetails present.	6

Target Note	Grid reference	Description	Photographic Plate (see Annex 3)
TN6	NC 60926 17314	'Drumlin' like feature with shallow peat, forming wet heath community (lots of *Cladonia* lichen and deer sedge) within the blanket bog.	7
TN7	NC60415 17658	'Alpine heath' like community on this individual drumlin dominated by common heather, *Cladonia* lichen, bilberry, deer sedge, carnation sedge, with alpine bearberry also present.	8
TN8	NC60907 17216	Clear-fell in the western buffer with a recovering dry modified bog-like community growing beneath the brash.	9
TN9	NC60509 19026	Acid flush, with abundant bog asphodel and cow-horn bogmoss along with round-leaved sundew, great sundew and star sedge.	10
TN10	NC60561 19054	Small granite outcrops with bell heather and hoary rock moss growing on them.	11
TN11	NC60632 19093	Fountain apple moss / butterwort acid flush on hill slope.	12
TN12	NC60811 19187	Calcareous patches below rocks, where herb-rich flushes have occurred and include species such as wild thyme, fairy flax, eyebright, milkwort, along with grasses such as viviparous sheep's-fescue, sheep's-fescue, common bent and sedges, common yellow-sedge, glaucous sedge and flea sedge.	13

Target Note	Grid reference	Description	Photographic Plate (see Annex 3)
TN13	NC61194 19164	Hilltop plateau, largely wet heath dominated by deer sedge with a high abundance of common cotton sedge, and patches of cup lichen/hoary rock moss heath. Numerous eroding channels and patches of bare peat and also some small bog-moss hollows.	14
TN14	NC61437 18990	Some small areas of exposed granite bedrock where creeping willow is able to grow on top of hoary rock moss.	15
TN15	NC61692 18651	Small patches of bog forming on the plateau of Sròn Leathad Chleansaid in among the wet heath where the peat is deep enough. Where it is present hare's tail cotton sedge becomes more apparent compared to the deer sedge, but is also suffering from hagging and erosion.	16
TN16	NC62733 16746	Small stream, 20 cm wide, 5 cm deep, rocky and fast flowing. Few or no plants present in burn.	17
TN17	NC63221 17382	River Brora with adjacent acid grassland. River 10 m wide, 0.25 m deep, fast flowing and full of large rocks and boulders. Acid grassland, heavily grazed by sheep but contains a large variety of herbs and grasses.	18
TN18	NC61314 18238	Acid flush with bog mosses, cow-horn bogmoss and feathery bogmoss, and abundant lesser spearwort.	19
TN19	NC60958 18740	Old sheepfold full of soft rush.	20
TN20	NC60915 18803	Small dry heath patches growing on rocks here with lots of bell heather present.	21

Target Note	Grid reference	Description	Photographic Plate (see Annex 3)
TN21	NC57614 13958	A couple of small patches of planted broadleaf woodland in the far west of the access area, both are a mix of birch, rowan, aspen and alder. The trees are around 5 m tall and grow over an understory of purple moor-grass tussocks.	34
TN22	NC57669 13999	River, 4 – 5 m wide and around 0.25 m deep, lightly peat stained water flowing quickly and strongly over a bed of boulders, pebbles and bedrock.	35
TN23	NC58306 14066	Small water filled ditch that crosses the track via a pipe. Water vole seen here along with droppings and burrow located.	36
TN24	NC58499 14029	A few clumps of eared willow growing along the side of the track. Around 3 m tall.	37
TN25	NC60715 14090	Burn; around 0.5 m wide and around 0.2 m deep, lightly peat stained water flowing strongly over bedrock and pebbles. Banks of soft rush and tufted hair-grass.	38
TN26	NC60744 14073	Small cluster of planted whitebeams around 5 m tall.	39
TN27	NC62118 14328	Burn; 3 m wide 0.2 m deep, peat stained water flowing weakly over a bed of boulders and bedrock with banks of neutral tufted hair-grass grassland.	40

ANNEX 3 - NVC SURVEY RESULTS

Tables A3.1, **A3.2** and **A3.3** below outline DOMIN scales and scores for NVC survey results.

Table A3.1: Dominance (DOMIN) scale.

Code	Approximate percentage cover in quadrat
10	>90 %
9	75 – 90 %
8	51 – 75 %
7	34 – 50 %
6	26 – 33 %
5	11 – 25 %
4	5 – 10 %
3	<5 %, many individuals
2	<5 %, a few individuals
1	<5 %, one or two individuals

Table A3.2: NVC Tables.

Phase 1 habitat type	**Lichen bryophyte heath**					
NVC Community	**H14 – *Calluna vulgaris – Racomitrium lanuginosum* heath: no subcommunity assigned**					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NC 61778 18420	NC 61864 18323	NC 61898 18272	NC 61891 18251	NC 61914 18252	
Peat Depth (cm)	10	10	7	7	5	
Veg height (cm)	5	5	5	5	10	
Species	**Cover**					**Constancy**
Trichophorum germanicum	6	4	6	5	4	**5**
Carex panicea	4	4	4	3	4	**5**
Racomitrium lanuginosum	8	8	7	9	5	**5**
Calluna vulgaris	5	5	5	5	8	**5**
Arctostaphylos alpinus	4	-	-	-	-	**1**
Cladonia portentosa	6	6	5	5	6	**5**
Molinia caerulea	2	2	-	-	-	**2**
Nardus stricta	3	-	3	-	4	**3**
Juncus squarrosus	4	5	-	-	-	**2**
Erica cinerea	-	4	-	-	3	**2**
Eriophorum angustifolium	-	-	3	-	3	**2**

Phase 1 habitat type	**Wet modified bog / dry modified bog**										
NVC Community	**M15 *Trichophorum germanicum – Erica tetralix* wet heath: no subcommunity assigned.**										
Quadrat	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
OS Grid coordinates	NC 60720 17608	NC 60564 18445	NC 60826 18742	NC 61669 18671	NC 62120 18089	NC 62021 17705	NC 61747 17842	NC 61398 18199	NC 62815 17483	NC 62683 17284	

Phase 1 habitat type	**Wet modified bog / dry modified bog**										
NVC Community	**M15 *Trichophorum germanicum – Erica tetralix* wet heath: no subcommunity assigned.**										
Peat depth (cm)	35	40	30	30	30	35	30	35	15	10	
Veg height (cm)	20	25	20	15	20	20	20	20	15	15	
Species	**Cover**										**Const.**
Trichophorum germanicum	6	7	7	8	9	9	9	8	8	5	**5**
Calluna vulgaris	5	5	5	5	5	4	5	4	4	5	**5**
Sphagnum capillifolium	6	7	6	-	-	-	-	7	4	4	**3**
Cladonia portentosa	7	3	7	7	4	-	3	3	4	4	**5**
Racomitrium lanuginosum	6	4	3	-	-	4	-	-	-	-	**2**
Erica tetralix	3	4	3	-	3	3	3	3	3	3	**5**
Eriophorum angustifolium	3	3	3	-	-	3	3	2	2	1	**4**
Narthecium ossifragum	3	3	3	3	-	3	-	3	3	4	**4**
Potentilla erecta	-	3	2	-	3	-	3	3	-	-	**3**
Drosera anglica	-	2	-	-	-	-	-	-	-	-	**1**
Molinia caerulea	-	3	3	-	-	3	4	3	3	4	**4**
Carex panicea	-	3	-	-	-	-	-	-	-	-	**1**
Sphagnum cuspidatum	-		5	-	-	4	-	-	-	-	**1**
Sphagnum tenellum	-	-	6	-	-	5	5	6	6	5	**3**
Juncus squarrosus	-	-	-	3	-	-	3	-	-	-	**1**
Hypnum jutlandicum	-	-	-	-	5	-	5	3	3	-	**2**
Pleurozia purpurea	-	-	-	-	-	3	-	-	-	3	**1**
Cladonia uncialis	-	-	-	-	-	3	-	-	3	3	**2**
Erica cinerea	-	-	-	-	-	-	2	2	-	-	**1**
Pleurozium schreberi	-	-	-	-	-	-	-	-	-	4	**1**

Phase 1 habitat type	**Blanket bog**										
NVC Community	**M17a – *Trichophorum germanicum – Eriophorum vaginatum* blanket mire, *Drosera rotundifolia – Sphagnum spp.* sub-community.**										
Quadrat	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	.
OS grid coordinates	NC 60621 17289	NC 61230 16428	NC 61929 15757	NC 61255 17231	NC 60642 17739	NC 61571 18848	NC 61715 18571	NC 63185 16995	NC 62970 17796	NC 62668 16494	
Peat depth (cm)	200+	200+	200+	200+	200+	60	200+	200+	200+	200+	
Veg height (cm)	20	20	25	30	25	15	15	20	15	25	
Species	**Cover**										**Const.**
Trichophorum germanicum	6	3	5	6	7	5	7	4	6	6	**5**
Eriophorum vaginatum	4	6	5	4	3	7	5	6	4	5	**5**
Calluna vulgaris	5	5	5	5	4	4	5	-	4	5	**5**
Eriophorum angustifolium	2	4	3	3	3	3	3	3	3	3	**5**
Sphagnum capillifolium	5	6	6	5	4	7	5	5	3	4	**5**
Cladonia portentosa	7	5	5	3	4	7	7	3	5	4	**5**
Pleurozium schreberi	-	-	-	-	-	4	-	-	-	3	**1**
Juncus squarrosus	-	-	-	-	-	4	-	-	-	-	**1**
Sphagnum cuspidatum	4	5	-	-	8	4	4	4	-	4	**4**
Erica tetralix	4	3	7	4	3	1	3	4	3	4	**5**
Sphagnum tenellum	-		3	5	-	-	3	4	5	4	**3**
Racomitrium lanuginosum	-	5	-	6	5	-	6	4	-	4	**3**
Cladonia uncialis	-	2	-	-	3	-	3	-	3	3	**3**
Sphagnum papillosum	6	5	6	-	-	-	-	6	4	6	**3**
Narthecium ossifragum	4	3	4	3	3	-	-	4	4	3	**4**
Drosera rotundifolia	3	3	3	-	3	-	-	3	3	3	**4**
Pleurozia purpurea	-	-	-	-	-	-	-	-	5	-	**1**
Myrica gale	-	-	-	4	3	-	-	-	4	3	**2**

Phase 1 habitat type	**Blanket bog**										
NVC Community	**M17a – *Trichophorum germanicum – Eriophorum vaginatum* blanket mire, *Drosera rotundifolia – Sphagnum spp.* sub-community.**										
Drosera anglica	3	3	-	-	-	-	-	-	-	1	**2**
Betula nana	-	1	-	-	-	-	-	-	-	-	**1**
Molinia caerulea	-	-	-	3	-	-	-	-	-	-	**1**

Phase 1 habitat type	**Dry modified bog**					
NVC Community	**M20 – *Eriophorum vaginatum* blanket mire: no sub-community assigned**					
OS Grid Coordinates	NC 61412 18285	NC 61378 18362	NC 61378 18428	NC 61338 18534	NC 61265 18618	
Quadrat	Q1	Q2	Q3	Q4	Q5	
Peat depth (cm)	200+	200+	200+	200+	200+	
Veg height (cm)	35	35	40	35	35	
Species	**Cover**					**Constancy**
Eriophorum vaginatum	8	9	9	8	8	**5**
Deschampsia flexuosa	4	4	4	4	4	**5**
Pleurozium schreberi	7	7	7	6	6	**5**
Hylocomium splendens	7	7	7	7	8	**5**
Galium saxatile	4	3	3	3	2	**5**
Eriophorum angustifolium	3	2	1	2	-	**4**
Polytrichum commune	3	-	-	-	-	**1**
Molinia caerulea	3	-	-	3	-	**2**
Luzula multiflora	2	-	-	-	-	**1**
Sphagnum capillifolium	-	4	3	3	-	**3**
Erica tetralix	-	2	2	3	-	**3**
Vaccininum myrtillus	-	-	3	-	5	**2**

Phase 1 habitat type	**Dry modified bog**					
NVC Community	**M20 – *Eriophorum vaginatum* blanket mire: no sub-community assigned**					
Potentilla erecta	-	-	3	3	-	**2**
Sphagnum fallax	-	-	-	5	-	**1**
Calluna vulgaris	-	-	-	-	2	**1**

Phase 1 habitat type	**Marshy Grassland**					
NVC Community	**M23b – *Juncus effusus – Galium palustre* rush pasture, *Juncus effusus* sub-community**					
OS grid coordinates	NC 60868 17378	NC 60490 17819	NC 60364 17685	NC 60507 18576	NC 60588 18721	
Quadrat	Q1	Q2	Q3	Q4	Q5	
Veg height (cm)	70	70	60	70	70	
Peat depth (cm)	n/a					
Species	**Cover**					**Constancy**
Juncus effusus	8	9	7	8	8	5
Viola palustre	5	4	-	3	3	4
Galium palustre	4	4	-	3	3	4
Deschampsia cespitosa	5	2	2	-	3	4
Festuca rubra	5	3	-	-	3	3
Epilobium palustre	3	3	-	2	2	4
Holcus lanatus	3	3	-	2	4	4
Ranunculus acris	-	3	-	2	-	2
Carex rostrata	-	3	-	-	-	1
Sphagnum fallax	-	7	8	7	5	4
Equisetum palustre	-	2	-	-	-	1

Phase 1 habitat type	**Marshy Grassland**					
NVC Community	**M23b – *Juncus effusus – Galium palustre* rush pasture, *Juncus effusus* sub-community**					
Comarum palustris	-	3	-	-	-	1
Sphagnum palustre	-	4	-	-	-	1
Polytrichum commune	-	3	7	5	5	4
Molinia caerulea	-	-	3	-	-	1
Potentilla erecta	-	-	3	-	-	1
Rumex acetosella	-	-	-	4	3	2

Phase 1 habitat type	**Wet modified bog**					
NVC Community	**M25 – *Molinia caerulea – Potentilla erecta* mire: no sub-community assigned.**					
OS grid coordinates	NC 61700 16299	NC 61609 16046	NC 62152 16045	NC 61570 17715	NC 60451 18690	
Quadrat	Q1	Q2	Q3	Q4	Q5	
Peat Depth (cm)	200+	200+	200+	200+	60	
Veg height (cm)	40	40	35	40	40	
Species	**Cover**					**Constancy**
Molinia caerulea	9	8	9	9	10	**5**
Potentilla erecta	3	3	3	3	3	**5**
Polygala serpyllifolia	1	-	1	1	-	**3**
Carex echinata	1	-	-	-	3	**2**
Carex panicea	2	-	-	-	-	**1**
Sphagnum papillosum	3	5	5	2	3	**5**
Sphagnum fallax	3	-	-	-	-	**1**
Sphagnum capillifolium	3	5	5	-	-	**3**
Eriophorum vaginatum	4	6	4	3	-	**4**

Phase 1 habitat type	**Wet modified bog**					
NVC Community	**M25 – *Molinia caerulea – Potentilla erecta* mire: no sub-community assigned.**					
Eriophorum angustifolium	3	3	3	3	-	**4**
Erica tetralix	2	3	3	3	-	**4**
Myrica gale	3	4	3	-	-	**3**
Pleurozium schreberi	4	-	3	5	5	**4**
Sphagnum palustre	2	-	-	-	-	**1**
Succisa pratensis	-	2	-	-	-	**1**
Sphagnum cuspidatum	-	-	-	3	-	**1**
Hylocomium splendens	-	-	-	7	6	**2**
Galium saxatile	-	-	-	-	3	**1**

Phase 1 habitat type	**Acid Grassland**					
NVC Community	**U4 – *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland: no sub-community assigned.**					
OS grid coordinates	NC 60776 19088	NC 61232 18848	NC 60925 19009	NC 63197 16701	NC 63249 17342	
Quadrat	Q1	Q2	Q3	Q4	Q5	
Veg height (cm)	15	20	20	25	15	
Peat depth (cm)	n/a					
Species	**Cover**					**Constancy**
Agrostis capillaris	7	5	7	3	5	**5**
Anthoxanthum odoratum	7	4	3	5	3	**5**
Danthonia decumbens	3	3	3	1	1	**5**
Festuca ovina	3	3	3	4	4	**5**
Luzula multiflora	2	0	1	-	1	**4**
Galium saxatile	6	5	3	3	4	**5**

Phase 1 habitat type	**Acid Grassland**					
NVC Community	**U4 – *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland: no sub-community assigned.**					
Viola canina	4	3	3	-	3	**4**
Potentilla erecta	4	3	3	-	1	**4**
Polygala vulgaris	3	2	3	-	-	**3**
Hylocomium splendens	2	7	3	-	5	**4**
Nardus stricta	6	4	2	6	4	**5**
Juncus squarrosus	1	3	-	3	-	**3**
Plantago lanceolata	1	3	-	3	3	**4**
Pleurozium schreberi	-	5	3	-	3	**3**
Rhytidiadelphus squarrosus	-	6	6	7	7	**4**
Carex nigra	-	2	-	-	-	**1**
Trifolium repens	-	3	-	3	4	**3**
Festuca vivipara	-	-	3	-	-	**1**
Carex binervis	-	-	3	-	-	**1**
Carex panicea	-	-	3	-	-	**1**
Vaccinium myrtillus	-	-	3	-	-	**1**
Cynosurus cristatus	-	-	-	3	3	**2**
Achillea millefolium	-	-	-	2	3	**2**
Ranunculus repens	-	-	-	3	3	**2**
Scorzoneroides autumnalis	-	-	-	3	-	**1**
Euphrasia nemerosa	-	-	-	-	2	**1**
Polytrichum commune	-	-	-	-	3	**1**

Phase 1 habitat type	**Acid Grassland**					
NVC Community	**U6c – *Juncus squarrosus – Festuca ovina* grassland, *Vaccinium myrtillus* sub-community**					
OS Grid coordinates	NC 60698 19242	NC 61321 18800	NC 61191 18845	NC 61030 18930	NC 60582 18766	
Quadrats	Q1	Q2	Q3	Q4	Q5	
Peat depth (cm)	30	40	30	10	45	
Veg height (cm)	20	20	20	20	20	
Species	**Cover**					**Constancy**
Juncus squarrosus	7	7	7	6	7	**5**
Anthoxanthum odoratum	4	3	3	3	-	**4**
Carex flacca	3	-	-	-	-	**1**
Carex panicea	3	-	2	4	-	**3**
Carex pulicaris	3	-	-	-	-	**1**
Carex echinata	3	-	-	-	-	**1**
Nardus stricta	4	4	4	5	-	**4**
Holcus lanatus	3	-	-	-	-	**1**
Potentilla erecta	4	3	3	3	3	**5**
Plantago lanceolata	3	-	-	-	-	**1**
Festuca ovina	3	3	3	3	2	**5**
Euphrasia nemerosa	3	-	-	-	-	**1**
Trifolium repens	3	-	-	-	-	**1**
Ranunculus repens	2	-	-	-	-	**1**
Narthecium ossifragum	2	-	-	-	-	**1**
Prunella vulgaris	3	-	-	-	-	**1**
Scorzoneroides autumnalis	3	-	-	-	-	**1**
Rhytidiadelphus loreus	5	-	-	-	3	**2**
Rhytidiadelphus squarrosus	3	-	-	5	4	**3**

Phase 1 habitat type	**Acid Grassland**					
NVC Community	**U6c – *Juncus squarrosus – Festuca ovina* grassland, *Vaccinium myrtillus* sub-community**					
Pleurozium schreberi	3	7	7	6	6	**5**
Luzula multiflora	3	3	2	3	3	**5**
Agrostis canina	-	3	3	4	-	**3**
Vaccinium myrtillus	-	3	3	-	3	**3**
Polytrichum commune	-	4	7	-	6	**3**
Hylocomium splendens	-	5	7	6	6	**4**
Galium saxatile	-	4	4	3	3	**4**
Molinia caerulea	-	4	3	-	-	**2**
Deschampsia flexuosa	-	4	-	-	4	**2**
Polygala vulgaris	-	-	2	-	-	**1**
Calluna vulgaris	-	-	-	4	4	**2**
Festuca vivipara	-	-	-	1	-	**1**
Carex nigra	-	-	-	-	3	**1**

Table A3.3 NVC Tables: Access Area

Phase 1 habitat type	**Marshy Grassland**					
NVC Community	**M23b – *Juncus effusus – Galium palustre* rush pasture, *Juncus effusus* sub-community**					
OS Co-ordinates	NC 61718 14110	NC 61952 14208	NC 61646 14085	NC 58522 14022	NC 58373 14049	
Quadrats	Q1	Q2	Q3	Q4	Q5	
Veg height (cm)	70	80	80	70	70	
Soil depth (cm)	90	55	60	40	50	
Species	**Cover**					**Constancy**
Juncus effusus	8	9	9	8	8	5
Polytrichum commune	3	3	3	3	4	5
Sphagnum fallax	3	-	3	-	3	3
Rumex acetosa	4	4	-	4	4	4
Myrica gale	3	-	-	-	-	1
Molinia caerulea	3	-	-	3	3	3
Succisa pratensis	2	-	2	3	3	4
Galium saxatile	3	3	-	3	3	4
Hylocomium splendens	4	5	4	4	5	5
Pleurozium schreberi	5	5	5	5	4	5
Epilobium palustre	3	-	2	-	-	2
Stellaria graminea	3	-	2	-	-	2
Deschampsia cespitosa	-	3	-	-	-	1
Holcus lanatus	-	3	3	3	3	4
Cirsium palustre	-	-	-	4	5	2
Potentilla erecta	-	-	-	3	-	1

Phase 1 habitat type	**Neutral Grassland**					
NVC Community	**MG9 *Holcus lanatus – Deschampsia cespitosa* grassland no sub-community assigned**					
OS Co-ordinates	NC 57659 13973	NC 60717 14099	NC 62096 14316	NC 58479 14023	NC 62623 14856	
Quadrat	Q1	Q2	Q3	Q4	Q5	
Veg height (cm)	50	70	70	90	90	
Soil depth (cm)	5	20	15	25	20	
Species	**Cover**					**Constancy**
Deschampsia cespitosa	5	7	7	9	9	5
Nardus stricta	4	4	-	-	-	2
Achillea ptarmica	4	-	-	-	-	1
Filipendula ulmaria	4	-	-	-	-	1
Potentilla erecta	4	3	3	-	3	4
Succisa pratensis	4	3	-	3	3	4
Rumex acetosa	3	4	4	3	3	5
Holcus lanatus	3	3	3	3	3	5
Hypericum perforatum	3	-	-	-	-	1
Trifolium repens	3	3	-	-	3	3
Ranunculus acris	3	-	-	-	-	1
Anthoxanthem odoratum	3	3	3	3	-	4
Agrostis stolonifera	5	3	4	-	3	4
Luzula multiflora	3	-	3	-	-	2
Valeriana officianalis	3	-	-	-	-	1
Cynosurus cristatus	3	-	-	-	-	1
Plantago lanceolata	3	-	-	-	-	1
Angelica sylvestris	4	-	-	-	-	1
Molinia caerulea	3	-	3	-	-	2

Phase 1 habitat type	**Neutral Grassland**					
NVC Community	**MG9 *Holcus lanatus – Deschampsia cespitosa* grassland no sub-community assigned**					
Cirsium palustris	3	-	-	-	1	2
Polytrichum commune	3	3	3	3	3	5
Viola palustre	3	4	-	-	2	3
Galium saxatile	3	4	4	-	-	3
Rhytidiadelphus squarrosus	3	3	3	4	4	5
Pleurozium schreberi	3	5	4	4	3	5
Achillea millefolium	3	-	3	-	-	2
Ranunculus repens	-	4	3	-	3	3
Juncus effusus	-	3	-	-	-	1
Sphagnum fallax	-	3	-	-	-	1
Carex binervis	-	-	4	-	-	1
Festuca ovina	-	-	3	-	-	1
Hylocomium splendens	-	-	4	-	-	1
Luzula sylvatica	-	-	4	-	-	1

Phase 1 habitat type	**Blanket bog**					
NVC Community	**M17a – *Trichophorum germanicum – Eriophorum vaginatum* blanket mire, *Drosera rotundifolia – Sphagnum spp.* sub-community.**					
OS Co-ordinates	NC 57635 13915	NC 59999 14238	NC 62886 15328	NC 62618 15576	NC 62520 15641	
Quadrat	Q1	Q2	Q3	Q4	Q5	
Peat depth (cm)	100+	60	100+	100+	100+	
Veg height (cm)	25	25	25	25	25	
Species	**Cover**					**Constancy**

Calluna vulgaris	5	4	3	4	5	5
Eriophorum vaginatum	5	5	5	6	7	5
Trichophorum germanicum	4	4	3	3	5	5
Erica tetralix	5	6	4	4	5	5
Myrica gale	5	5	5	4	3	5
Sphagnum papillosum	6	3	7	5	4	5
Sphagnum tenellum	4	4	3	-	3	4
Rhytidiadelphus triquetrus	4	-	-	-	-	1
Molinia caerulea	3	3	3	4	3	5
Drosera rotundifolia	3	-	3	3	3	4
Cladonia portentosa	3	4	-	3	3	4
Sphagnum capillifolium	3	6	3	5	5	5
Polytrichum commune	3	-	-	-	-	1
Pleurozium schreberi	-	5	-	3	-	2
Eriophorum angustifolium	-	3	4	4	3	4
Narthecium ossifragum	-	-	3	3	3	3
Sphagnum cuspidatum	-	-	4	-	-	1
Carex echinata	-	-	3	-	-	1
Potentilla erecta	-	-	-	3	3	2
Phase 1 habitat type	**Acid Grassland**					
NVC Community	**U4a – *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland: typical sub-community.**					
OS Co-ordinates	NC 57717 13961	NC 60725 14074	NC 62852 15077	NC 62872 15094	NC 57531 13898	
Quadrats	Q1	Q2	Q3	Q4	Q5	
Soil depth (cm)	10	20	5	5	10	
Veg height (cm)	30	30	10	10	25	
Species	**Cover**					**Constancy**

Festuca ovina	7	4	3	3	5	5
Agrostis capillaris	7	6	7	6	5	5
Anthoxanthem odoratum	4	5	4	5	3	5
Holcus lanatus	3	3	3	5	3	5
Rumex acetosa	4	3	3	3	4	5
Cirsium palustre	3	-	-	-	-	1
Rhytidiadelphus squarrosus	4	3	5	5	7	5
Potentilla erecta	3	3	3	3	3	5
Galium saxatile	3	4	3	3	3	5
Plantago lanceolata	3	-	3	-	6	3
Cerastium fontanum	3	-	3	3	-	3
Achillea millefolium	-	3	3	3	3	4
Molinia caerulea	-	3	-	-	-	1
Pleurozium schreberi	-	7	3	3	4	4
Viola canina	-	3	3	3	3	4
Juncus effusus	-	-	4	-	-	1
Nardus stricta	-	-	-	3	-	1
Scorzoneroides autumnalis	-	-	-	-	4	1

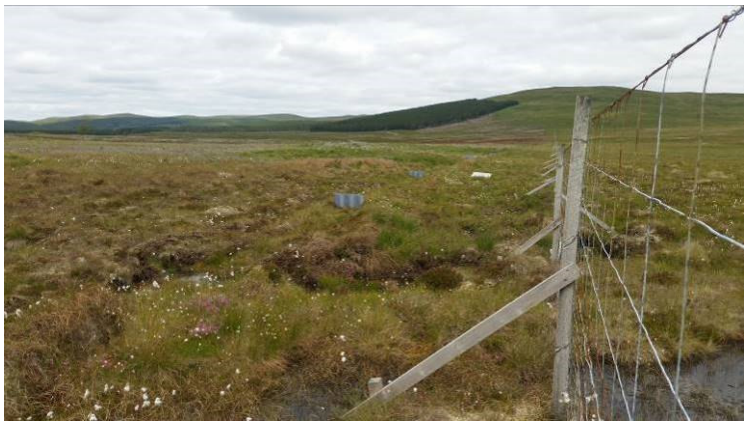
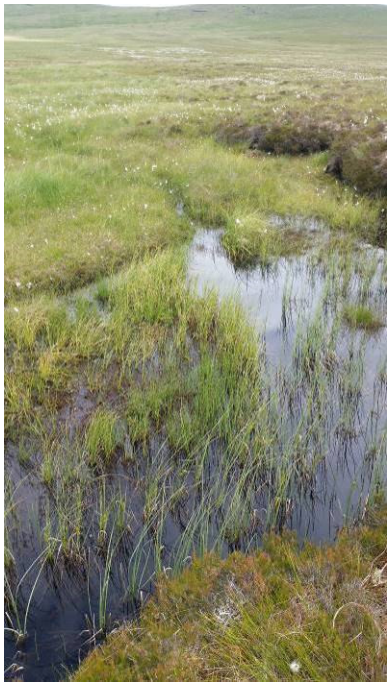
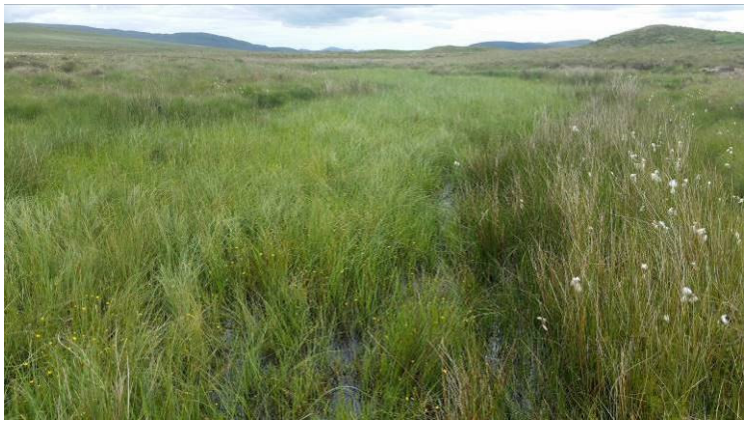
Phase 1 habitat type	**Wet Heath**					
NVC Community	**M15c *Trichophorum germanicum – Erica tetralix* wet heath, *Cladonia* subcommunity**					
OS Co-ordinates	NC 59996 14283	NC 62807 15444	NC 62493 15613	NC 62290 15700	NC 62277 14574	
Quadrats	Q1	Q2	Q3	Q4	Q5	
Peat depth (cm)	10	10	10	10	10	
Veg height (cm)	30	15	15	15	25	
Species	**Cover**					**Constancy**

Trichophorum germanicum	7	5	5	4	8	5
Erica tetralix	4	3	3	4	4	5
Potentilla erecta	3	3	3	3	3	5
Sphagnum capillifolium	4	-	-	4	3	3
Cladonia portentosa	4	7	6	6	4	5
Calluna vulgaris	3	5	5	4	4	5
Pleurozium schreberi	5	4	-	-	-	2
Festuca vivipara	3	-	-	-	-	1
Molina caerulea	3	3	3	4	3	5
Anthoxanthem odoratum	3	-	-	-	-	1
Narthecium ossifragum	-	3	4	4	-	3
Cladonia rangiferina	-	4	-	3	-	2
Carex panicea	-	3	-	-	-	1
Racomitrium lanuginosum	-	3	4	5	-	3
Eriophorum angustifolium	-	3	3	3	3	4
Pleurozia purpurea	-	-	4	-	-	1

Phase 1 habitat type	**Wet modified bog**					
NVC Community	**M25 – *Molinia caerulea – Potentilla erecta* mire: no sub-community assigned.**					
OS Co-ordinates	NC 57911 14068	NC 59574 14160	NC 59000 13971	NC 62177 14462	NC 60462 14194	
Quadrats	Q1	Q2	Q3	Q4	Q5	
Peat Depth(cm)	50	55	100+	100+	80	
Veg height (cm)	40	50	50	50	50	
Species	**Cover**					**Constancy**
Molinia caerulea	8	9	9	9	9	5
Viola palustre	3	-	-	3	3	3

Potentilla erecta	3	3	4	4	4	5
Erica tetralix	4	3	3	4	3	5
Hylocomium splendens	6	5	5	4	3	5
Pleurozium schreberi	4	5	4	3	3	5
Succisa pratensis	3	-	3	3	3	4
Calluna vulgaris	-	3	-	-	-	1
Polytrichum commune	-	-	-	4	-	1

ANNEX 4 – PHOTOGRAPHS

Photo	Description
Phase 1 Target Notes	
	**Photo 1** TN1
	**Photo 2** TN2
	**Photo 3** TN3

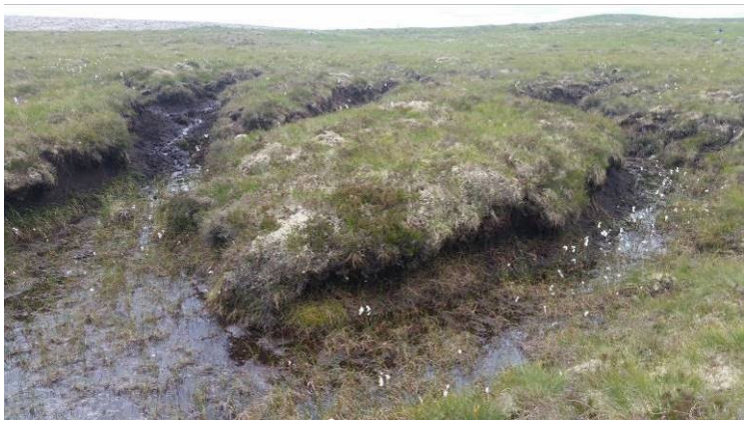
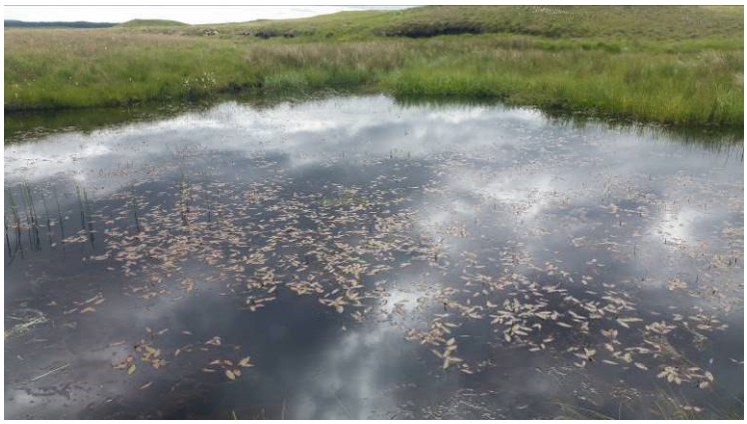
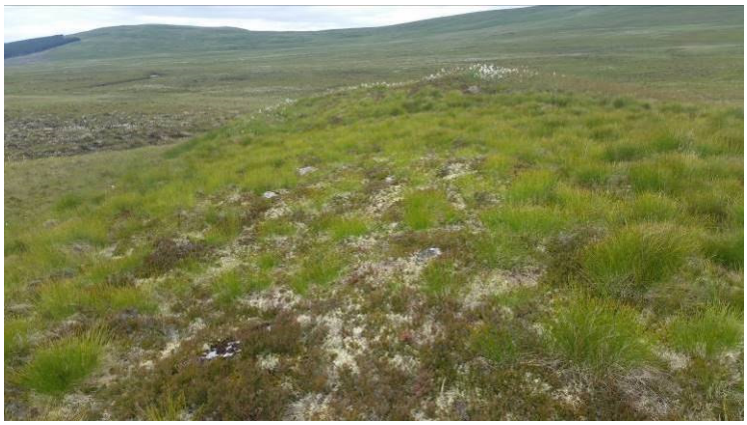
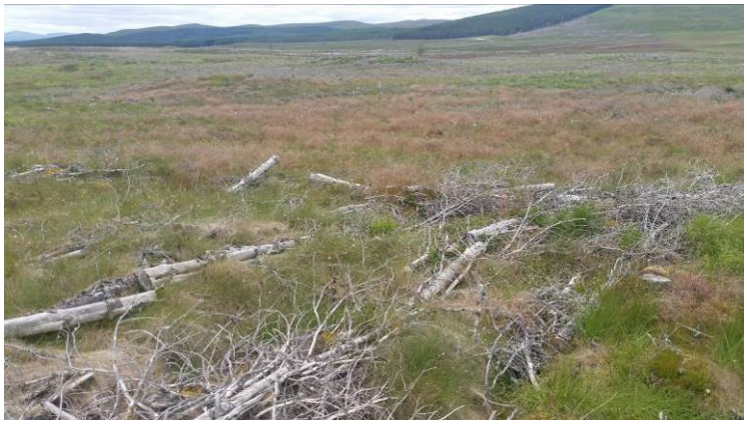
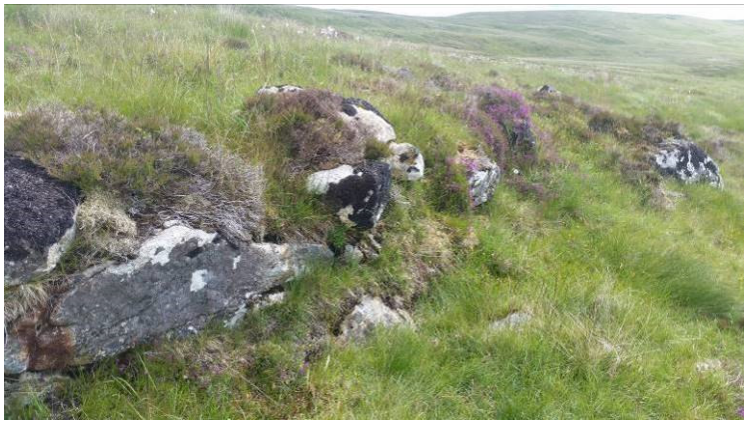
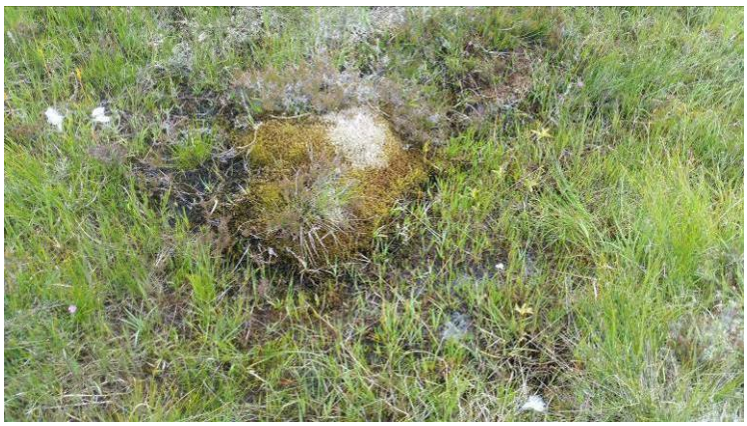
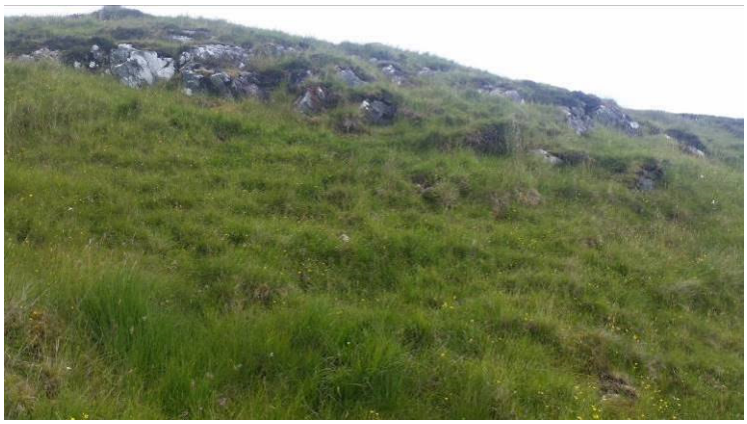
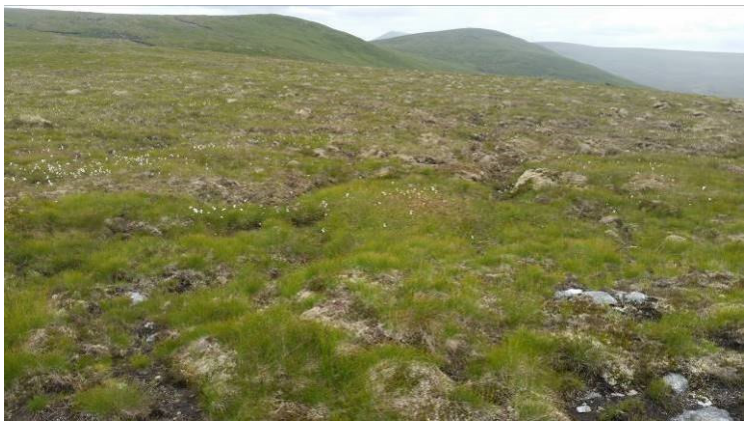
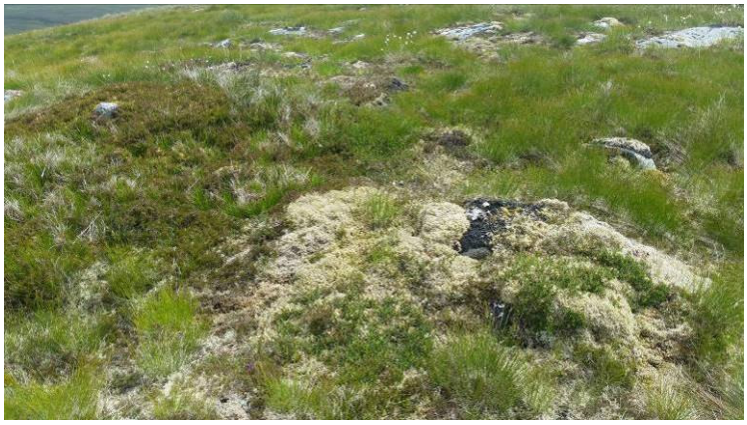
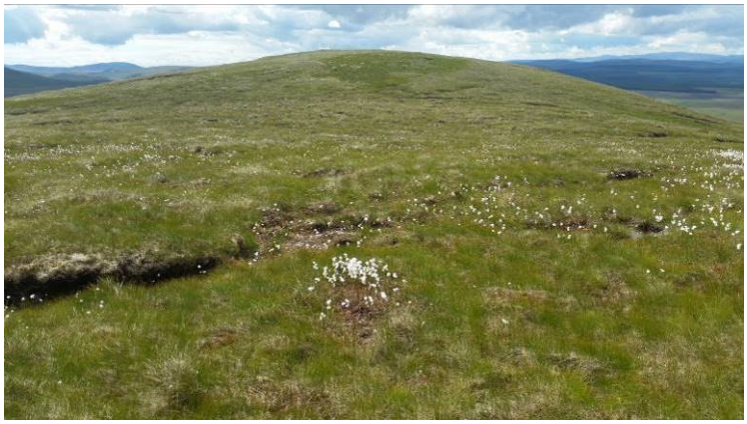
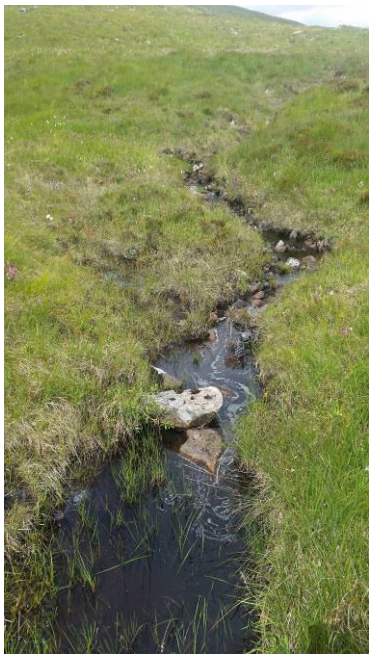
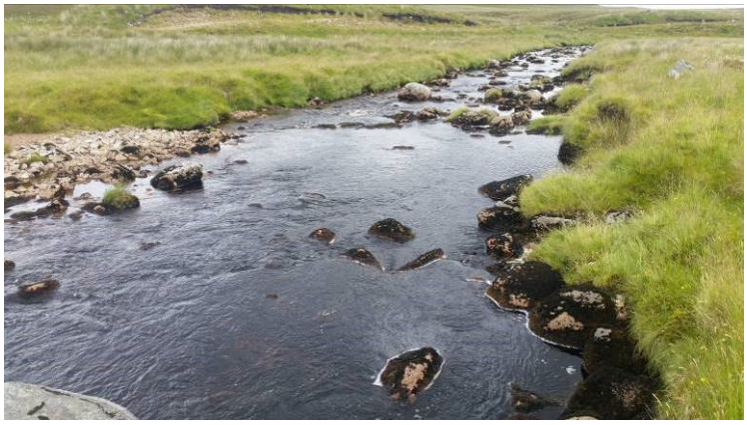
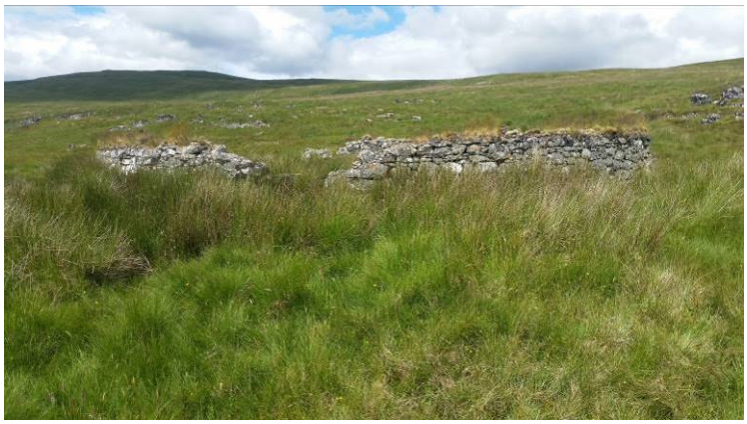
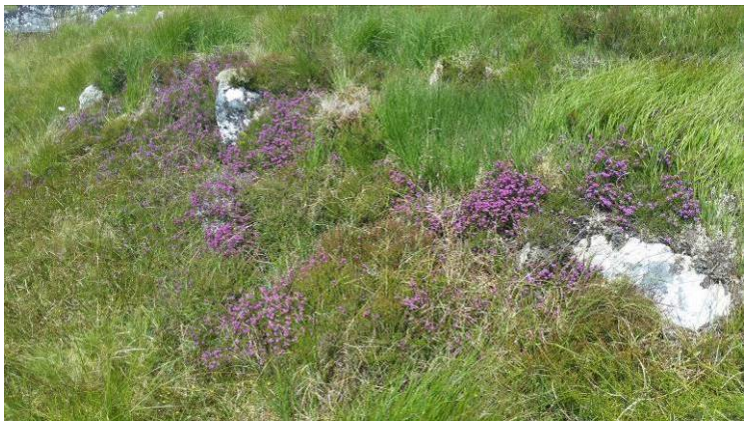
	**Photo 4** TN3
	**Photo 5** TN4
	**Photo 6** TN5
	**Photo 7** TN6

	**Photo 8** TN7
	**Photo 9** TN8
	**Photo 10** TN9

	**Photo 11** TN10
	**Photo 12** TN11
	**Photo 13** TN12
	**Photo 14** TN13

	**Photo 15** TN14
	**Photo 16** TN15
	**Photo 17** TN16

	**Photo 18** TN17
	**Photo 19** TN18
	**Photo 20** TN19
	**Photo 21** TN20
NVC Communities	

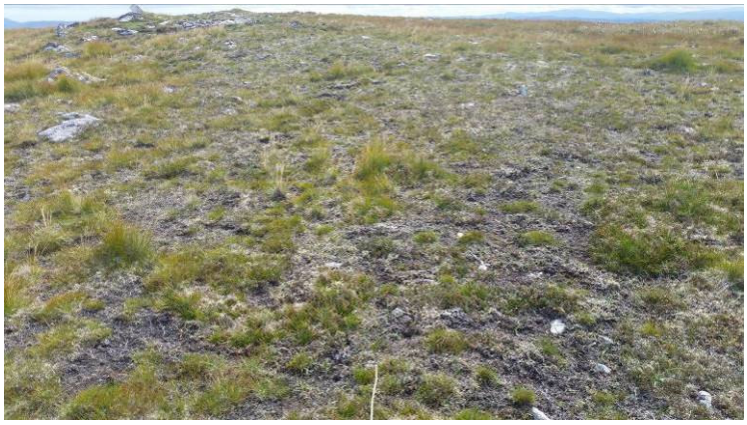
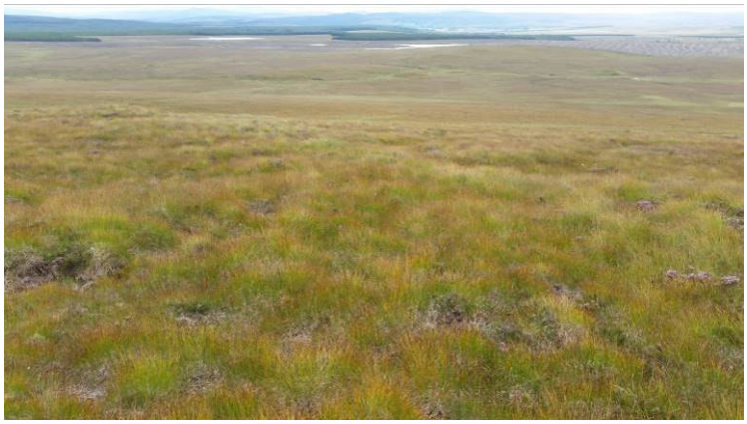
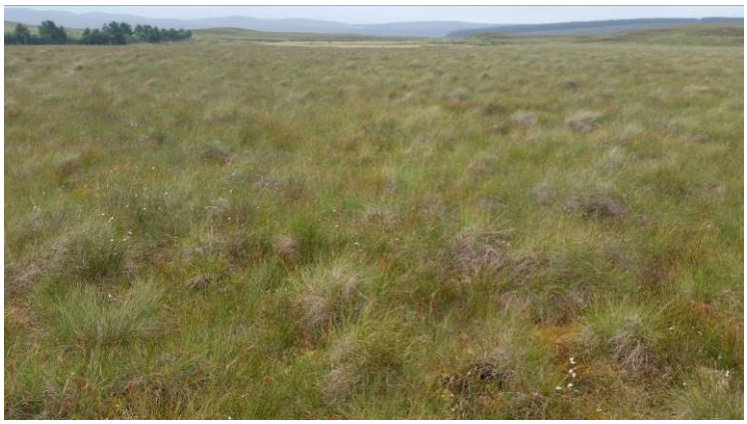
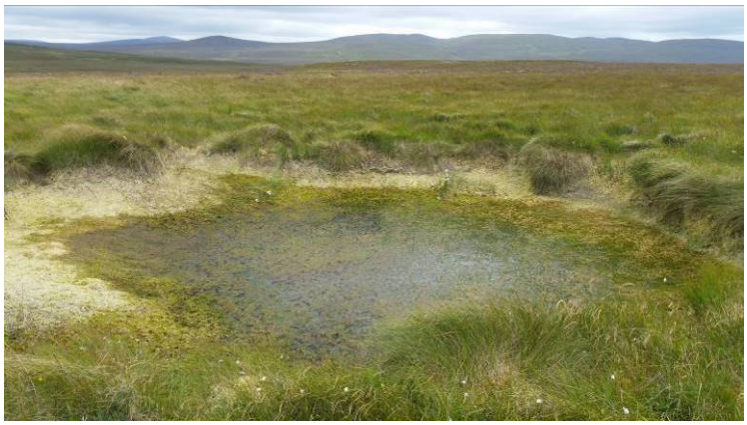
	**Photo 22** H14
	**Photo 23** M15
	**Photo 24** M17a
	**Photo 25** M2

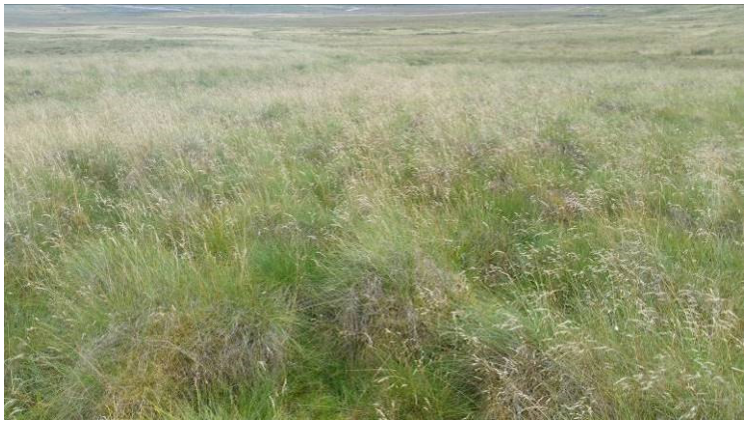
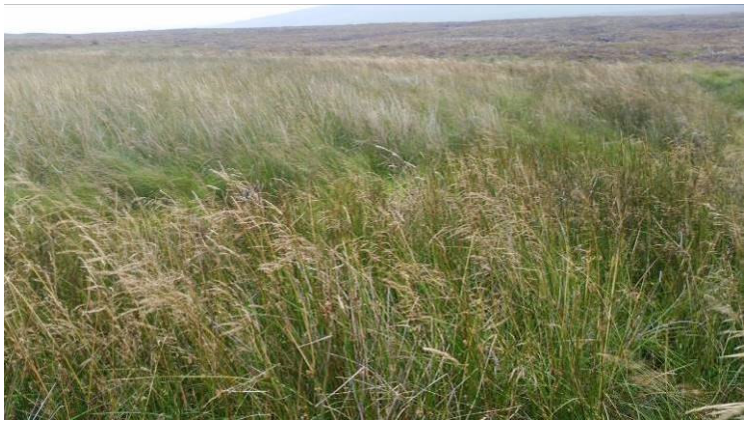
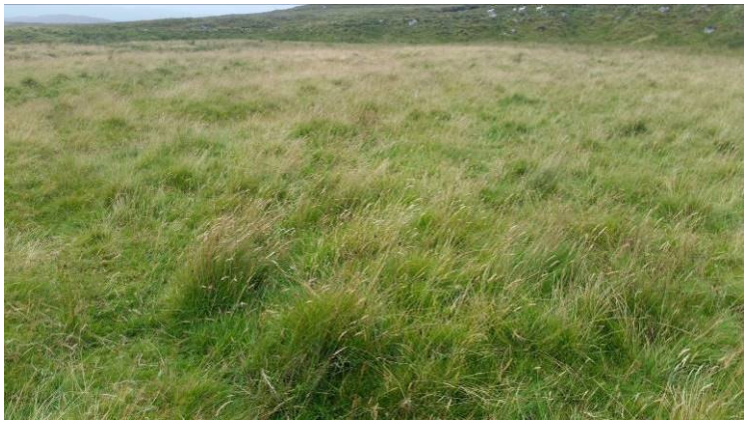
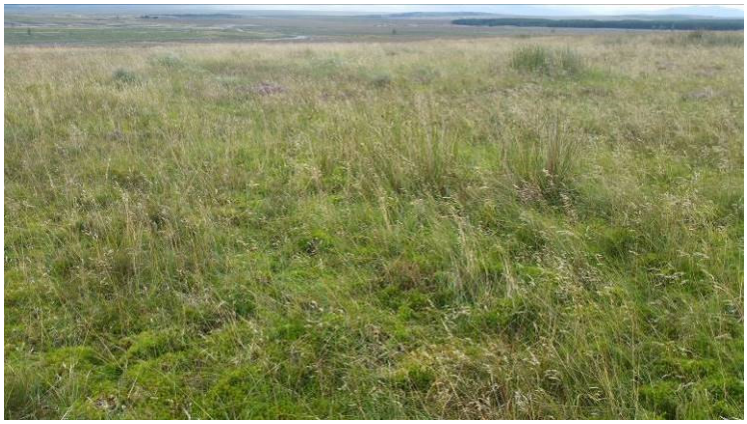
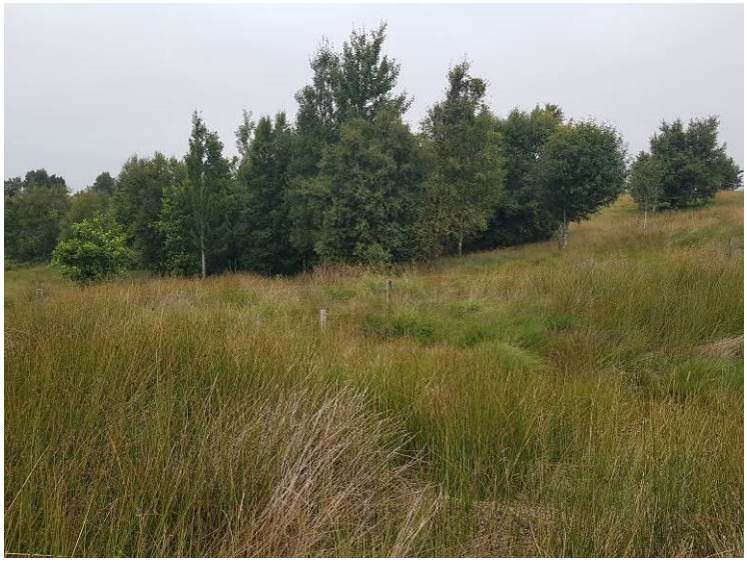
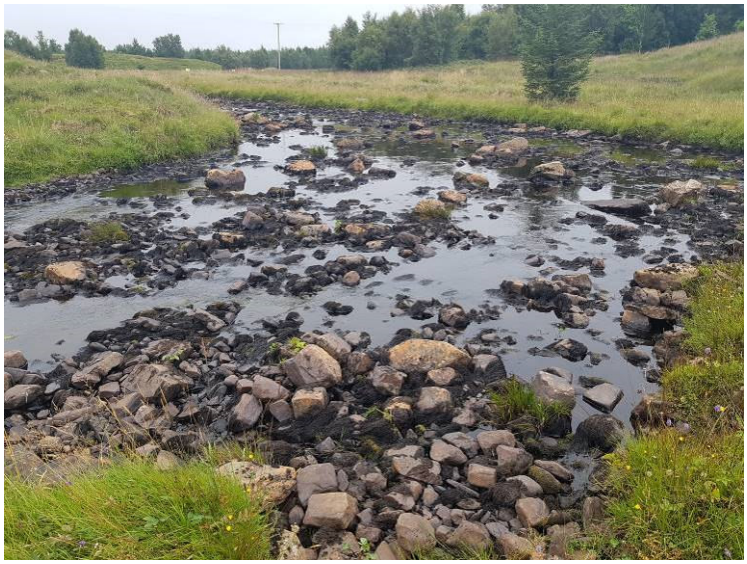
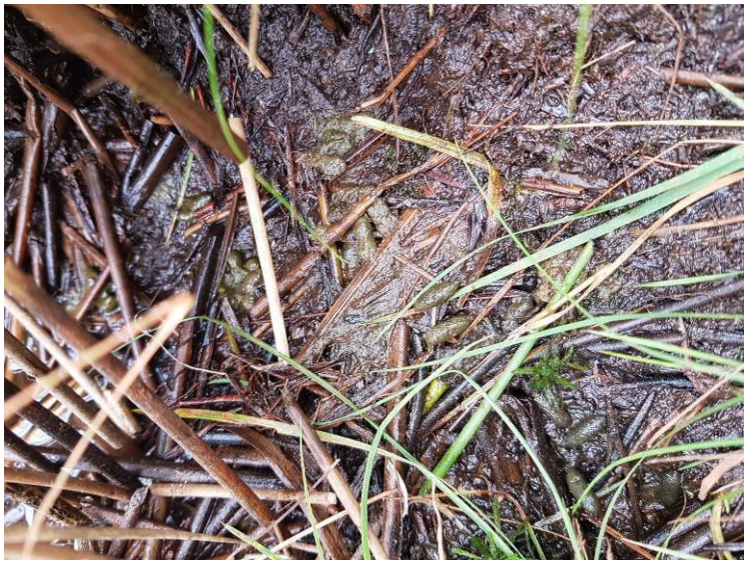
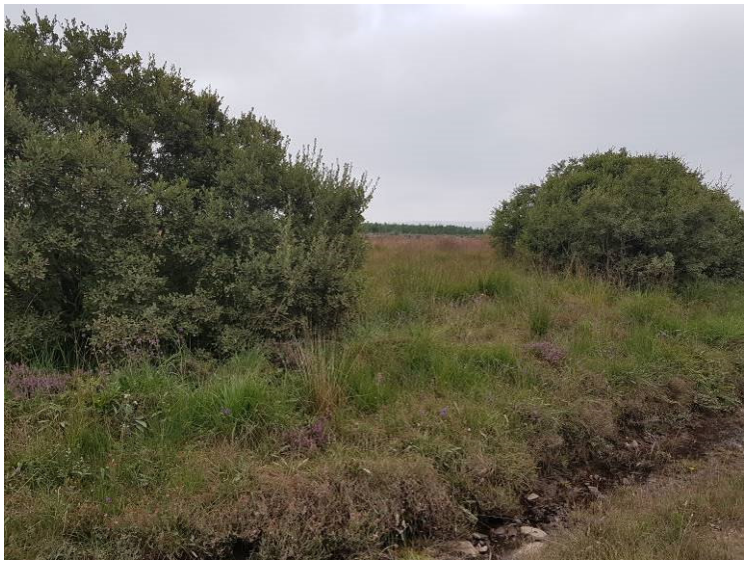
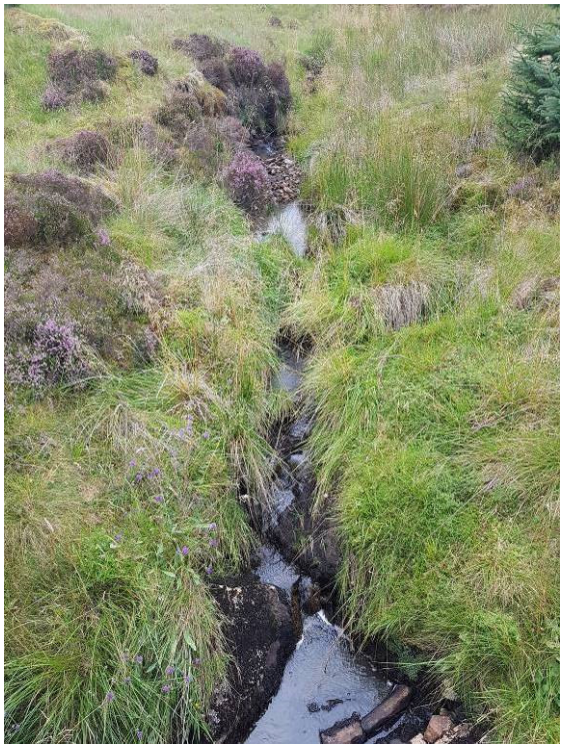
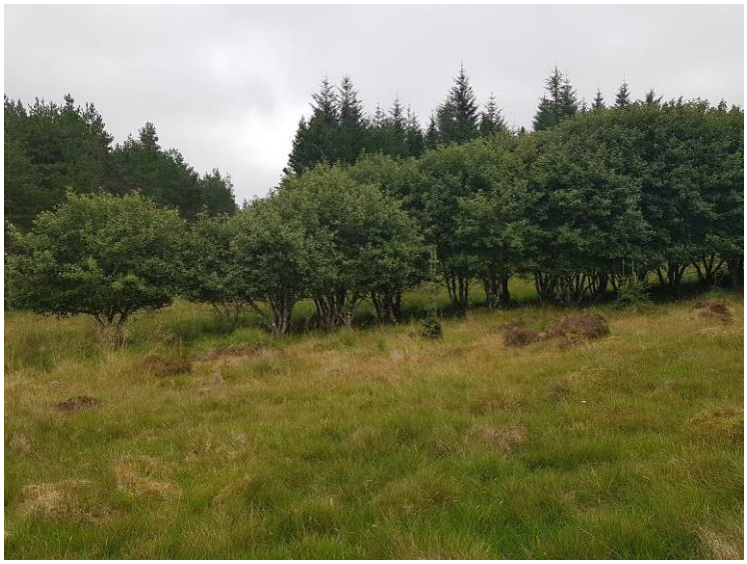
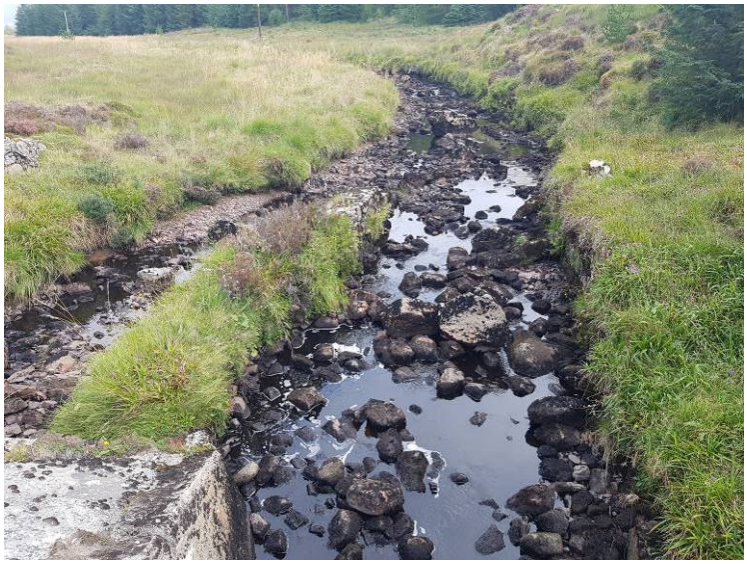
	**Photo 26** M3
	**Photo 27** M20
	**Photo 28** M25

	**Photo 29** M6
	**Photo 30** M23b
	**Photo 31** S9

	**Photo 32** U4
	**Photo 33** U6c
Access Area Target Notes	
	**Photo 34** TN21

	**Photo 35** TN22
	**Photo 36** TN23
	**Photo 37** TN24

	**Photo 38** TN25
	**Photo 39** TN26

	**Photo 40** TN27