Glentarken Wind Farm

National Vegetation Classification & Habitats Survey Report

Technical Appendix 7.1

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1 INTRODUCTION

MacArthur Green was commissioned by SSE Generation Ltd (the Applicant) to carry out a National Vegetation Classification (NVC) and habitats survey, with subsequent peatland condition assessment (PCA) and notes on general habitat condition, at the proposed Glentarken Wind Farm, near Lochearnhead, Perth and Kinross, (hereafter referred to as the 'Proposed Development').

The aim of the NVC survey is to identify and map the vegetation communities present within the Site in order to identify those areas of greatest ecological interest (i.e., Annex I habitats[1]; potential Groundwater Dependent Terrestrial Ecosystems (GWDTE)[2]; and Scottish Biodiversity List (SBL) priority habitats[3]). The PCA survey aims to provide additional information and context with regards peatlands, and to identify and map the condition of peatland habitats within the Site. This information is used to inform the wind farm design process and the ecological assessment for the Glentarken Environmental Impact Assessment Report (EIAR).

This report details the findings of the NVC and PCA surveys together with an evaluation of those communities described.

2 THE SITE AND SURVEY AREA

2.1 Overview

The Proposed Development is located approximately 2.8 km east of Lochearnhead, 15.5 km west of Crieff, 35 km north of Stirling, and 45 km west of Perth. The Site comprises an area of approximately 1,103 hectares (ha). The Proposed Development is set within grazed open moorland, heathland and areas of young commercial forestry due to the recent Ardveich Planting Scheme. There are several minor watercourses on and around the Site and a small number of lochans. The Proposed Development is fully described within **Chapter 2: Development Description** of the EIAR.

This Technical Appendix reports on the habitats recorded within the Survey Area, i.e., the entire area covered by NVC field surveys, covering a total of 1,742 ha. The Survey Area in many areas extends well beyond the Site boundary, which covers an area of 1,103 ha; a reflection of the iterative design process refining the Site boundary (see **Chapter 3: Evolution of Design and Alternatives, EIAR Volume 1**), and also to provide sufficient survey buffers to account for the possible presence of potential GWDTE. The Survey Area and its juxtaposition with the Site boundary is shown in **Figure 7.3** (**EIAR Volume 2**). The appropriate scale and 'Study Area' for the assessment of effects with regards habitat loss has been deemed to be the Site boundary (as defined in **Chapter 7: Ecology** (**EIAR Volume 1**).

[1] As defined by the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora – the 'Habitats Directive'.

2 As per SEPA (2017a). Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3. Issue date: 11/09/2017 and SEPA (2017b). Land Use Planning System SEPA Guidance Note 4: Planning guidance on on-shore windfarm developments. Version 3. Issue date: 11/09/2017.

3 https://www.nature.scot/scotlands-biodiversity/habitat-definitions. (accessed September 2024)

2.2 Designated Sites

There are six designated sites containing habitat related, or botanical, qualifying features within 5 km of the Site boundary. The details of, and relevant qualifying features for, each designation relevant to this Technical Appendix are detailed in **Table 2-a**; see also **Figure 7.1** (**EIAR Volume 2**).

Table 2-a Designated sites with botanical qualifying features within 5 km of the Site

Designated Site	Distance from Site boundary	Qualifying Feature	Last Assessed Condition & Date
Dalveich Meadow Site of Special Scientific Interest (SSSI)	0.3 km	Lowland calcareous grassland	Unfavourable Declining 30 July 2019
		Lowland neutral grassland	Unfavourable Declining 25 July 2019
Coille Chriche SSSI	1.1 km	Wet woodland	Unfavourable Declining 25 September 2001[4]
Edinample Meadow SSSI	2.1 km	Lowland neutral grassland	Unfavourable No change 1 August 2013[4]
Edinchip Wood SSSI	3.3 km	Upland oak woodland	Unfavourable Declining 2 September 2014
		Wet woodland	Favourable Maintained 23 July 2008
Cambusurich Wood SSSI	3.7 km	Upland mixed ash woodland	Unfavourable Declining 27 September 2017
		Upland oak woodland	Unfavourable No change 14 April 2014
		Wet woodland	Unfavourable No change 8 May 2008
		Vascular plant assemblage	Favourable Maintained 30 August 2006
River Tay Special Area of Conservation (SAC)	4.3 km	Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels	Favourable Maintained 12 August 2009

2.3 Ancient Woodland

There are several areas of ancient woodland (as present on the Ancient Woodland Inventory (AWI)) within 5 km of the Site boundary. There is one stand of ancient woodland within the Site boundary, being located in the riparian zone/gully of the lower Beich Burn and around the access track by Glen Beich (see **Figure 7.1** (**EIAR Volume 2**)).

[4] Management measures are in place that should, in time, improve the feature to Favourable condition (Unfavourable Recovering Due to Management).

The definition of ancient woodland is land that is currently wooded and has been continually wooded at least since 1750. It is not related to the age of the trees that are currently growing there and they do not have to be ancient or elderly, as it is the historical continuity of the woodland habitat that makes a woodland ancient. The AWI holds information on the location and extent of ancient woodland within Scotland, and categorises each stand as follows:

- **Ancient Woodland (1a and 2a)** - Interpreted as semi-natural woodland from maps of 1750 (1a) or 1860 (2a) and continuously wooded to the present day. If planted with non-native species during the 20th century they are referred to as Plantations on Ancient Woodland Sites (PAWS);
- **Long-established woodlands of plantation origin (LEPO) (1b and 2b)** - Interpreted as plantation from maps of 1750 (1b) or 1860 (2b) and continuously wooded since. Many of these sites have developed semi-natural characteristics, especially the oldest stands, which may be as rich as ancient woodland; and
- **Other woodlands on Roy maps (3)** - Shown as un-wooded on the 1st Edition of the Ordnance Survey maps (produced in circa 1850) but as woodland on the Roy maps (produced in circa 1750). Such sites have, at most, had only a short break in continuity of woodland cover and may still retain features of ancient woodland.

The small area of ancient woodland within the Site is categorised as Ancient (of semi-natural origin).

2.4 Carbon and Peatland Map 2016

The Carbon and Peatland Map 2016[5] was consulted to determine likely peatland classes present within the Site. The map is a predictive tool that provides an indication of the likely presence of peat at a coarse scale. The Carbon and Peatland map has been developed as a high-level planning tool and identifies areas of nationally important carbon-rich soils, deep peat and priority peatland habitat[6] as Class 1 and Class 2 peatlands.

Figure 7.2 (**EIAR Volume 2**) indicates that, according to this predictive tool and map, there are areas of Class 1 peatland within the Site in the area around Loch Eas Domhain to the north and towards Creag Dhubh to the south-west; there is other Class 1 peatland adjacent to the Site to the north and east, and to the west within 1 km of the Site. There are no areas of Class 2 peatland within the Site; there is other Class 2 peatland within 1 km of the Site. There is a small area of Class 3[7] peatland and Class 5[8] soil, with much of the Site and surrounding area is underlain by Class 0[9] (mineral) soils (see **Figure 7.2** (**EIAR Volume 2**)).

[5] SNH. (2016) Carbon and Peatland 2016 map. Available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/soils/carbon-and-peatland-2016-map
[6] Priority peatland habitat is land covered by peat-forming vegetation or vegetation associated with peat formation.
[7] Class 3 - Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat. Indicative soil = Predominantly peaty soil with some peat soil. Indicative vegetation = Peatland with some heath.
[8] Class 5 - Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat. Indicative soil = Peat soil. Indicative vegetation = No peatland vegetation.
[9] Class 0 - Mineral soil - Peatland habitats are not typically found on such soils. No peatland vegetation.

3 METHODOLOGY

3.1 National Vegetation Classification (NVC)

The vegetation was surveyed by suitably qualified and experienced botanical surveyors using the NVC scheme (Rodwell, 1991-2000; 5 volumes) and in accordance with NVC survey guidelines (Rodwell, 2006). The NVC scheme provides a standardised system for classifying and mapping semi-natural habitats and ensures that surveys are carried out to a consistent level of detail and accuracy.

Homogeneous stands and mosaics of vegetation were identified and mapped by eye and drawn as polygons on high resolution aerial imagery field maps. These polygons were surveyed qualitatively to record dominant and constant species, sub-dominant species and other notable species present. The surveyors worked progressively across the Survey Area to ensure that no areas were missed, and that mapping was accurate. NVC communities were attributed to the mapped polygons using surveyor experience and matching field data against published floristic tables (Rodwell, 1991-2000). Stands were classified to sub-community level where possible, although in many cases the vegetation was mapped to community level only because the vegetation was too species-poor or patches were too small to allow meaningful sub-community determination; or because some areas exhibited features or fine-scale patterns of two or more sub-communities.

Quadrat sampling was not used in this survey because experienced NVC surveyors do not need to record quadrats in order to reliably identify NVC communities and sub-communities (Rodwell, 2006). Notes were made about the structure and flora of larger areas of vegetation in many places (such as the abundance and frequency of species, and in some cases condition and evident anthropogenic impacts). It can be better to record several larger scale qualitative samples than one or two smaller quantitative samples; furthermore, qualitative information from several sample locations can be vital for understanding the dynamics and trends in local (Survey Area/Study Area) vegetation patterns (Rodwell, 2006).

Due to small scale vegetation and habitat variability and numerous zones of habitat transitional between similar NVC communities, many polygons can represent complex mosaics of two or more NVC communities. Where polygons have been mapped as mosaics an approximate percentage cover of each NVC community within the polygon is given so that the dominant community and character of the vegetation could still be ascertained.

3.2 Phase 1 Habitat Characterisation

The NVC and mapping data was also correlated to their equivalent habitats according to the Phase 1 habitat classification (JNCC, 2010), considering the species composition and habitat quality. The Phase 1 characterisation has been utilised to allow a broader visual representation of the habitats within the Survey Area. Polygons or areas where there are mosaic NVC communities have generally been assigned a single Phase 1 classification based on the dominant NVC type (despite some polygons containing multiple Phase 1 types, often in low percentages). Therefore, the Phase 1 characterisation is generally a broader overview, and the NVC data should be referred to for further detail in any specific area.

Botanical nomenclature in this report follows that of Stace (2019) for vascular plants, Atherton *et al.* (2010) for bryophytes and Smith *et al.* (2009) for lichens.

4 SURVEY DETAILS & LIMITATIONS

NVC and habitat surveys were undertaken within the NVC Survey Area as follows:

- July, August and September 2023 (majority of Survey Area); and
- June 2024 (small area around Ardveich filling a data gap created by iterative design).

Surveys were therefore carried out during the optimal season for habitat surveys. The weather conditions were amenable to survey; bright, with broken cloud and relatively light to moderate winds, and with infrequent showers.

Following surveys in 2023 a woodland planting scheme was realised in the area around Ardveich and the valley north of this location; the surveys in 2024 confirmed this area had been planted. The relevant GIS shapefiles of the planting scheme were sourced and the mapping data in relevant areas has been updated to reflect the locations and extent of new young broadleaved and conifer plantation.

The NVC system does not cover all possible semi-natural vegetation or habitat types that may be found. Since the NVC was adopted for use in Britain in the 1980's further survey work and an increased knowledge of vegetation communities has led to additional communities being described that do not fall within the NVC system (e.g., see Rodwell *et al.*, 2000; Averis *et al.*, 2004; Mountford, 2011; and Averis and Averis, 2020). Where such communities are found and recorded they are given a non-NVC community code and are described.

It should be noted that the results from this survey, and the matches made in describing communities, represent a current community evaluation at the time of survey (as opposed to one seeking to describe what the community was before any human interference, or what it might become in the future). In light of this, a clear constraint of the vegetation survey and evaluation process as used in this, and other surveys is that it offers only a snapshot of the vegetation communities present and should not be interpreted as a static long-term reference.

Ecological surveys are limited by factors which affect the presence of plants such as the time of year and weather. The ecological surveys undertaken to inform this project have not therefore produced a complete list of plants and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, the results of these surveys have been reviewed and are considered to be sufficient to undertake the assessment.

5 RESULTS

5.1 Summary of Habitat Types & NVC Communities

35 NVC communities and 11 non-NVC communities were recorded within the Survey Area, and these corresponded to 28 Phase 1 habitat types. These communities and habitat types, and their respective Site-specific correlations are summarised below in **Table 5-a**.

Table 5-a Phase 1 habitat type equivalents of NVC communities and other habitats recorded

Phase 1 Habitats	NVC Communities & Other Non-NVC Habitats/Features Recorded
A1.1.1 Broadleaved Semi-Natural Woodland	W4 *Betula pubescens – Molinia caerulea* woodland W7 *Alnus glutinosa – Fraxinus excelsior – Lysimachia nemoreum* woodland W8 *Fraxinus excelsior – Acer campestre – Mercurialis perennis* woodland W10 *Quercus robur – Pteridium aquilinum - Rubus fruticosus* woodland W11 *Quercus petraea – Betula pubescens – Oxalis acetosella* woodland
A1.1.2 Broad-Leaved Plantation Woodland	YBP Young Broadleaved Plantation (non-NVC type)
A1.2.2 Coniferous Plantation Woodland	CP Coniferous Plantation and YCP Young Coniferous Plantation (non-NVC type)
A2.1 Scrub – Dense/Continuous	W23 *Ulex europaeus – Rubus fruticosus* scrub
A3.1 Scattered Broadleaved Tree	SBT (non-NVC type)
B1.1 Unimproved Acid Grassland	U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland U5 *Nardus stricta – Galium saxatile* grassland U6 *Juncus squarrosus – Festuca ovina* grassland
B1.2 Semi-Improved Acid Grassland	U4b *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland *Holcus lanatus – Trifolium repens* sub-community
B3.1 Unimproved Calcareous Grassland	CG10 *Festuca ovina – Agrostis capillaris – Thymus polytrichus* grassland
B4 Improved Grassland	MG6 *Lolium perenne – Cynosurus cristatus* grassland
B5 Marsh/Marshy Grassland	MG10 *Holcus lanatus – Juncus effusus* rush-pasture M23 *Juncus effusus/acutiflorus – Galium palustre* rush-pasture M25 *Molinia caerulea – Potentilla erecta* mire Je *Juncus effusus* acid grassland community (non-NVC type) Ja *Juncus acutiflorus* acid grassland community (non-NVC type)
C1.1/C1.2 Bracken – Continuous / Scattered	U20 *Pteridium aquilinum – Galium saxatile* community
C3.1 Tall Herb & Fern: Tall Ruderal	OV25 *Urtica dioica – Cirsium arvense* community W24 *Rubus fruticosus – Holcus lanatus* underscrub
D1.1 Dry Dwarf Shrub Heath - Acid	H9 *Calluna vulgaris – Avenella flexuosa* heath H10 *Calluna vulgaris – Erica cinerea* heath H12 *Calluna vulgaris – Vaccinium myrtillus* heath H18 *Vaccinium myrtillus – Avenella flexuosa* heath H21 *Calluna vulgaris – Vaccinium myrtillus – Sphagnum capillifolium* heath
D2 Wet Dwarf Shrub Heath	M15 *Trichophorum germanicum – Erica tetralix* wet heath
D3 Lichen/Bryophyte Heath	H14 *Calluna vulgaris – Racomitrium lanuginosum* heath

Phase 1 Habitats	NVC Communities & Other Non-NVC Habitats/Features Recorded
D5 Dry Heath/Acid Grassland Mosaic	Mosaics of D1 and B1 communities
D6 Wet Heath/Acid Grassland Mosaic	Mosaics of D2 and B1 communities
E1.6.1 Blanket Bog	M2 *Sphagnum cuspidatum/fallax* bog pool community M3 *Eriophorum angustifolium* bog pool community M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire
E1.7 Wet Modified Bog	M20 *Eriophorum vaginatum* blanket mire M25a^ *Molinia caerulea – Potentilla erecta* mire *Erica tetralix* sub-community
E2.1 Acid/Neutral Flush/Spring	M4 *Carex rostrata - Sphagnum fallax* mire M6 *Carex echinata - Sphagnum fallax/denticulatum* mire M32 *Philonotis fontana – Saxifraga stellaris* spring
E2.2 Basic Flush/Spring	M10 *Carex dioica - Pinguicula vulgaris* mire
E4 Bare Peat	ExP Exposed peat (non-NVC type)
F1 Swamp	S9 *Carex rostrata* swamp S10 *Equisetum fluviatile* swamp
G1 Open Water	SW Standing Water (non-NVC type)
G2 Running Water	RW Running Water (non-NVC type)
I1.4.1 Other rock exposure - acid	RK Rock (non-NVC type)
J4 Bare Ground	BG Bare Ground, Tracks, Hardstandings etc (non-NVC type)
J5 Other Habitat	MB Muirburn (non-NVC type)

The following sections describe each of these Phase 1 habitat types and the communities underpinning these within the Survey Area. Habitats are described in the order they appear within the Phase 1 classification. The survey results are displayed in **Figures 7.3.1 – 7.3.16 (EIAR Volume 2**) which combines Phase 1 symbology with NVC data.

Target notes (TNs) were made during surveys, to pinpoint areas or species of special interest. These target notes are shown in **Figure 7.3** (**EIAR Volume 2**) and detailed within **Annex A**; target note photographs are included within **Annex B**. Further photographs of typical habitat types found within the Survey Area are provided within **Annex C**.

5.2 Woodland & Scrub

5.2.1 A1.1.1 Broadleaved Semi-Natural Woodland& A3.1 Scattered Broadleaved Tree

Semi-natural broadleaved woodland is relatively uncommon within the Survey Area, being restricted to a few relatively small areas generally around the existing access tracks. The largest and most continuous stands are associated with Glenbeich Lodge and along the Beich Burn in the

west. The stand of woodland described along Beich Burn is also ancient woodland (see **Section 2.3** and **Figure 7.1** (**EIAR Volume 2**)).

The majority of woodland recorded in the Survey Area and also within the Site is W11 *Quercus petraea – Betula pubescens – Oxalis acetosella woodland,* however there are also smaller and scattered areas of *W7 Alnus glutinosa – Fraxinus excelsior – Lysimachia nemoreum woodland, W10 Quercus robur – Pteridium aquilinum - Rubus fruticosus woodland and W4 Betula pubescens – Molinia caerulea* woodland. A very small patch of W8 *Fraxinus excelsior – Acer campestre – Mercurialis perennis* woodland was recorded in woodland mosaics along the existing access track east of Ardveich.

The W11 is generally comprised of *Quercus petraea*, *Betula pendula* and *Sorbus aucuparia*, the ground flora contains a typical acid grassland flora reflecting U4 grassland compositions as well as the frequent presence of *Pteridium aquilinum*. Other small patches of W11 also had additional records of *Fraxinus excelsior*.

The W7 recorded often comprised *Betula* spp., *Fraxinus excelsior, Alnus glutinosa* and *Salix cinerea*, with occasional *Sorbus aucuparia* and *Quercus petraea,* with a field layer characterised by *Deschampsia cespitosa, Juncus effusus* and *Holcus mollis*. The sub-community W7a field layer was dominated by *Lotus corniculatus, Ranunculus acris, Filipendula ulmaria, Chrysosplenium oppositifolium, Urtica dioica* and *Galium aparine*. The sub-community W7c field layer was dominated by *D. cespitosa*.

Patches of W10 recorded were usually dominated by a mix of *Fraxinus excelsior, Acer pseudoplatanus, Quercus* spp., *Betula* spp., and *Corylus avellana*, with more occasional species including *Crataegus monogyna, Sorbus aucuparia*, *Fagus sylvatica* and *Ulmus glabra*. The understorey and field flora often included various neutral grasses, *Urtica dioica, Rumex obtusifolius* and *Rubus fruticosus*. The sub-community W10a field layer was dominated by *U. dioica, Rumex acetosa, Cirsium arvense, Agrostis* spp., and *Lolium perenne.* W10 often forms the narrow strips of woodland or field boundaries surrounding the more improved areas in the south of the Survey Area.

The areas of W4 consisted of mixes of *Betula* spp., *Alnus glutinosa* and *Salix* spp., over a *Juncus effusus* and mire species dominated field layer, including Sphagna.

A very small patch of W8 was recorded along the existing access track east of Ardveich within woodland mosaics, with canopy species including *Fraxinus excelsior*, *Corylus avellana* and *Sambucus nigra*, the presence of W8 indicated by a dense herbaceous ground cover including abundant *Geum urbanum* and *Circaea lutetiana*.

Occasionally some habitats have individual or low numbers of scattered broadleaved trees (SBT) that would not constitute a woodland community, these scattered trees here often tend to be *Betula* spp. *or Sorbus aucuparia.*

A number of *Fraxinus excelsior* in the south of the survey area may have been affected by ash dieback.

5.2.2 A1.1.2 Broadleaved Plantation Woodland

There are several strands of young broadleaved plantation (YBP) along the access track and along Glen Beich to the west. This is part of the Ardveich Planting Scheme. As this plantation has only been recently planted, there are no defining characteristics.

5.2.3 A1.2.2 Coniferous Plantation Woodland

The Survey Area includes several large areas of recently planted commercial young coniferous plantation woodland (YCP), which are located in the western part of the Site, along the access track and Glen Beich. These plantation woodlands are mostly dominated by *Picea sitchensis* although there are some coupes that contain *Pseudotsuga menziesii, Picea abies* and *Pinus sylvestris*.

When mature, these types of typically dense plantation woodlands are of negligible botanical and ecological value due to over-shading and loss of the field flora.

5.2.4 A2.1 Dense/Continuous Scrub

Scrub is sparse and of low cover within the Survey Area and Site, with the main but small stand found in the north-east of Ardveich.

The scrub present is a small patch of W23 *Ulex europaeus – Rubus fruticosus* scrub within a mosaic of *Pteridium aquilinum*, and it is characteristically dominated by *Ulex europaeus*.

5.3 Grasslands & Marsh

5.3.1 B1.1 Unimproved Grassland

Unimproved acid grassland was found scattered throughout the Survey Area with the largest stands found on thin mineral soils and often intensively grazed and sloping ground in the west of the Site. Outwith this core area of acid grassland, it tends to be found in small, fragmented patches scattered across the Site.

The majority of unimproved acid grassland in the survey area is U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland, often of the U4a Typical sub-community. There are also relatively common patches of U5 *Nardus stricta – Galium saxatile* grassland, including the U5a, U5b and U5d sub-communities and U6 *Juncus squarrosus – Festuca ovina* grassland, including the U6a, U6b and U6c sub-communities scattered through the Survey Area.

The U4 community often contained a variable mix of *Agrostis capillaris*, *Festuca ovina* and *Anthoxanthum odoratum*. The herbs *Potentilla erecta* and *Galium saxatile* are common, and in some stands there can also be smaller quantities of other vascular species such as *Holcus lanatus, Nardus stricta, Avenella flexuosa, Cynosurus cristatus, Juncus squarrosus, Prunella vulgaris, Ranunculus repens, Cerastium fontanum, Achillea millefolium, Trifolium repens, Luzula* spp., and *Cirsium* spp. Mosses are frequent, especially *Pleurozium schreberi* and *Rhytidiadelphus squarrosus*.

Many of the grassland species found within the U5 and U6 communities replicate many of the species found within U4 as described above, but with *Nardus stricta* (U5) and *Juncus squarrosus* (U6) being obviously the dominant and most characteristic species. Some areas of U6 were also

noted to contain *Vaccinium myrtillus* and the mosses *Plagiothecium undulatum, Aulacomnium palustre* and *Polytrichum commune*.

5.3.2 B1.2 Semi-Improved Acid Grassland

Areas of semi-improved acid grassland are characterised by the U4b *Holcus lanatus - Trifolium repens* sub-community only. This was recorded only a few times towards Ardveich Farm, mainly along the access track.

The areas of U4b are generally more intensively grazed with a very short sward and only occasional and more sparse acid indicator species. The sward is mainly comprised of *Holcus lanatus, Agrostis* spp., *Festuca* spp., *Cynosurus cristatus* and *Trifolium repens* with the more occasional to rare species including *Anthoxanthum odoratum, Lolium perenne, Juncus effusus, Plantago lanceolata,* and *Cirsium* sp. The moss *Rhytidiadelphus squarrosus* is scattered in patches.

5.3.3 B3.1 Unimproved Calcareous Grassland

Unimproved calcareous grassland is not present within the Site, but a small area was found in the wider Survey Area.

This grassland patch was in a habitat mosaic and comprised of the CG10 *Festuca ovina – Agrostis capillaris – Thymus polytrichus* grassland community.

5.3.4 B4 Improved Grassland

Improved grasslands are found mostly in the Ardveich Farm area to the south-west of the Site, with many of the enclosed and improved fields used for livestock grazing. These areas are characterised by MG6 *Lolium perenne – Cynosurus cristatus* grassland and recorded as the MG6a Typical sub-community.

These fields and communities are all dominated by *Lolium perenne*. Where other species appear scattered through the *L. perenne* sward these include *Cynosurus cristatus, Trifolium repens, Holcus lanatus, Poa annua, Bellis perennis, Ranunculus repens, Plantago lanceolata* and *Cerastium fontanum.*

5.3.5 B5 Marsh/Marshy Grassland

Marshy grassland is habitat that includes several different sward types in which *Molinia caerulea*, *Juncus* spp. and/or *Carex* spp. can be prominent. This habitat type is relatively uncommon within the Site, with the largest area concentrated in the west of the Site.

Within the Survey Area, the M23 (a & b), M25 (a & b) and MG10a NVC communities are included within its limits along with the non-NVC communities 'Je' and 'Ja'. In the Phase 1 methodology MG10 can fall within either marshy grassland or neutral grassland classifications, however here due to the abundance of *Juncus* spp. it has been included within marshy grassland. These communities also commonly form mosaics and transitional areas with each other, in particular the rushy areas, and also with adjoining grassland and mire communities. M23a is the most abundant and extensive marshy grassland community within the Survey Area.

The rush dominated communities present are M23a *Juncus effusus/acutiflorus – Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community, M23b *Juncus effusus/acutiflorus – Galium palustre* rush-pasture, *Juncus effusus* sub-community, MG10a *Holcus lanatus – Juncus effusus* rush-pasture,

typical sub-community and the non-NVC types *Juncus acutiflorus* acid grassland (Ja) and *Juncus effusus* acid grassland (Je).

The areas of M23 are often species poor with *Juncus* spp. being the dominant species, and it regularly grades in and out of MG10, Ja or Je (see below). Generally, areas of M23 are dominated by mixtures of *Juncus acutiflorus* and/or *Juncus effusus* with patches of a low diversity of grasses such as *Holcus lanatus, Anthoxanthum odoratum, Molinia caerulea* and *Agrostis* spp. Within the sward, a variety of other graminoids and herbs are more occasional to rare and included *Cirsium palustre, Rumex acetosa, Ranunculus repens, Potentilla erecta* and *Carex* spp. Occasional *Nardus stricta* and *Calluna vulgaris* were recorded. Wefts of mosses are also common in M23 between these species, including *Calliergonella cuspidata, Kindbergia praelonga* and *Rhytidiadelphus squarrosus.*

The M25 NVC community was classified as marsh/marshy grassland where it was present at the community level, the M25a *Erica tetralix* (when likely on shallow peaty soil) and M25b *Anthoxanthum odoratum* sub-communities. These were areas either wholly dominated by *Molinia caerulea* (M25) or where *Molinia caerulea* was accompanied by a mixture of heath species (M25a) or grassland species (M25b). Other species recorded in M25a included lesser amounts of *Trichophorum germanicum, Erica tetralix, Calluna vulgaris, Narthecium ossifragum, Potentilla erecta, Galium saxatile* and *Vaccinium myrtillus*; the basal layer often included *Sphagnum fallax, S. capillifolium, Polytrichum commune* and *Pleurozium schreberi*. The M25b was dominated by *Molinia caerulea* and was found to form mosaics with the other marshy grassland and acid grassland communities. In some places where the *Molinia caerulea* was not purely dominant, species included variable abundances of *Potentilla erecta, Galium saxatile, Anthoxanthum odoratum, Holcus lanatus, Rumex acetosa, Agrostis capillaris, Juncus squarrosus, Juncus effusus* and *Juncus acutiflorus;* the mosses *Hylocomium splendens, Polytrichum commune* and *Pleurozium schreberi* are also common. M25a and M25b areas tend to be found on shallow peaty/organo-mineral soils.

MG10 is less common in the Survey Area than the other marshy grassland communities, and where it is present it is typical of the MG10a Typical sub-community and is characterised by a sward of *Juncus effusus* and *Holcus lanatus* with some scattered *Rumex acetosa* and *Ranunculus repens*.

The 'Ja' and 'Je' non-NVC grassland communities are present here as patches of a *Juncus* spp. dominated calcifuge grassland, at times found as extensive areas or as a small component of a wider mosaic with other grassland and mire communities. This is vegetation in which dominant and tall *Juncus effusus* or *Juncus acutiflorus* grow abundantly among a few shorter 'acid grassland' swards including frequent to occasional *Agrostis capillaris, Holcus lanatus, Rumex acetosa, Potentilla erecta* and *Galium saxatile*. Other occasional species include *Carex nigra, Molinia caerulea* and *Ranunculus repens*. Mosses typical of acid communities are also abundant, the most common mosses are *Hylocomium splendens, Pleurozium schreberi, Polytrichum commune, Pseudoscleropodium purum* and *Rhytidiadelphus squarrosus*. This vegetation does not fit into any NVC community as it lacks the wetland element and key indicators of M6 and M23 *Juncus* spp. mires and has a more acidophilous flora than MG10 *Juncus effusus* rush-pasture; it is therefore classed separately.

5.4 Tall Herb & Fern

5.4.1 C1.1/C1.2 Bracken: Continuous / Scattered

Several areas of bracken (*Pteridium aquilinum*) are scattered across the Site and Survey Area, particularly in the south-west around Ardveich Farm. The habitat was recorded as the U20 *Pteridium aquilinum – Galium saxatile* NVC community and where a sub-community was assigned this was generally either U20a *Anthoxanthum odoratum* sub-community or U20b *Vaccinium myrtillus - Dicranum scoparium* sub-community. *Pteridium aquilinum* dominates entirely with few other species being present. Within the U20a sub-community the *P. aquilinum* is accompanied by a grassland species assemblage reflecting close affinities to the U4 grassland (see **Section 5.3.1**).

5.4.2 C3.1 Tall Ruderal

This habitat type within the Survey Area covers a very small total area, being made up of OV25 *Urtica dioica – Cirsium* arvense community, usually associated with patches of *Urtica dioica* on waste or neglected ground or as part of trackside verges and comprising their characteristic community dominants. W24 *Rubus fruticosus – Holcus lanatus* underscrub was also recorded in small patches.

5.5 Heathland

5.5.1 D1.1 Dry Dwarf Shrub Heath – Acid

Acid dry dwarf shrub heath is widespread and relatively extensive within the Survey Area. Many areas have been subjected to muirburn, with extensive evidence of muirburn over a long period resulting in a patchwork of dry heaths in various stages of recovery. Areas more recently subjected to muirburn and that could not be assigned a NVC community were recorded as 'MB'; see **Section 5.10.2**

The majority of dry heath present is H12 *Calluna vulgaris – Vaccinium myrtillus* heath, with the H12b *Vaccinium vitis-idaea – Cladonia portentosa* sub-community being most prominent, as well as the H12a *Calluna vulgaris* sub-community, although there are areas of the sparser and grassier H12c *Galium saxatile - Festuca ovina* sub-community also present. H10 *Calluna vulgaris - Erica cinerea* heath is also prominent. There are some smaller patches of H9 *Calluna vulgaris – Avenella flexuosa* heath, H21 *Calluna vulgaris - Vaccinium myrtillus - Sphagnum capillifolium* heath, and H18 *Vaccinium myrtillus – Avenella flexuosa* heath.

H12 has the typical species assemblage of *Calluna vulgaris* with frequent *Vaccinium myrtillus*, with the sward also containing frequent to occasional *Potentilla erecta, Galium saxatile, Agrostis capillaris, Anthoxanthum odoratum, Nardus stricta, Festuca ovina, Avenella flexuosa, Blechnum spicant, Polystichum* sp., *Empetrum nigrum, Vaccinium vitis-idaea* (in H12b) and the mosses *Hylocomium splendens, Rhytidiadelphus loreus, Rhytidiadelphus squarrosus, Pleurozium schreberi* and *Hypnum jutlandicum*. The H12a *Calluna vulgaris* sub-community, H12b *Vaccinium vitis-idaea-Cladonia impexa* sub-community and H12c *Galium saxatile - Festuca ovina* sub-community were recorded as present.

The H10 *Calluna vulgaris - Erica cinerea* heath here includes the H10a typical sub-community and the H10b *Racomitrium lanuginosum* sub-community. H10 has the typical species assemblage of being co-dominated by *Calluna vulgaris* and *Erica cinerea*, with other associates as for H12 above.

Small areas contain H9 *Calluna vulgaris - Avenella flexuosa* heath, and includes H9a *Hypnum cupressiforme* sub-community, the H9c species-poor sub-community and H9d *Galium saxatile* sub-community. Commonly species include *Calluna vulgaris, Avenella flexuosa* and *Pohlia nutans*. These were often recorded as a part of a mosaic where *Calluna vulgaris* is overly dominant.

The small areas of H21 to the east of the Survey Area are a typical assemblage of *Calluna vulgaris* and *Vaccinium myrtillus* with some ferns over a moss layer with abundant *Sphagnum capillifolium*.

The H18 *Vaccinium myrtillus – Avenella flexuosa* heath is generally present within mosaics or formed from previous muir burning where *Vaccinium myrtillus* is very dominant. Common species include *Avenella flexuosa, Galium saxatile* and the mosses *Pleurozium schreberi, Dicranum scoparium, Hylocomium splendens* and *Hypnum jutlandicum.* The H18a *Hylocomium splendens – Rhytidiadelphus loreus* sub-community is the most common and typical community recorded.

5.5.2 D2 Wet Dwarf Shrub Heath

Wet heath within the Site and Survey Area is all the M15 *Trichophorum germanicum – Erica tetralix* wet heath community. The majority of the wet heath present is of the M15b Typical sub-community, however the M15a *Carex panicea* sub-community and M15d *Vaccinium myrtillus* sub-community are also scattered throughout, with only a small area of the M15c *Cladonia* spp. sub-community recorded.

The wet heath in the Survey Area is predominantly concentrated in the south-east (outwith the Site) and within the Site along the proposed access track to the west (albeit more patchily). The M15b wet heath present is generally at the drier end of the spectrum, has a very short sward created and maintained by grazing, and is considered to be in a fairly poor and degraded condition, and frequently mosaics and transitions in and out of acid grassland. The areas of M15b were generally a co-dominant mixture of *Calluna vulgaris* and *Molinia caerulea, with Potentilla erecta, Galium saxatile* and occasional *Erica tetralix, Erica cinerea, Eriophorum angustifolium, Trichophorum germanicum*, *Narthecium ossifragum, Juncus squarrosus, Vaccinium myrtillus* and *Polygala serpyllifolia*. The mosses *Hypnum* sp., and *Pleurozium schreberi* dominate with *Sphagnum capillifolium* appearing within the wetter patches of ground, and rarely *Sphagnum papillosum*. The M15a *Carex panicea* sub-community present is over wet peaty ground and commonly contains *Carex panicea, C. echinata, Juncus squarrosus, J. effusus, J. acutiflorus,* and *Drosera rotundifolia.* The M15d assemblage here contains a sward with a dominance of *Trichophorum germanicum* with heavily grazed *Calluna vulgaris* and *Vaccinium myrtillus*. Occasional *Erica tetralix, Molinia caerulea, Narthecium ossifragum, Agrostis capillaris, Nardus stricta, Empetrum nigrum, Juncus squarrosus, Euphrasia* spp., *Galium saxatile* and *Potentilla erecta* make up much of the remainder of the sward. Sphagna are only occasional in small patches and tend to be *Sphagnum capillifolium*. Mosses are predominantly pleurocarpous with *Pleurozium schreberi, Rhytidiadelphus* spp. and *Hylocomium splendens* common. One small area of M15c was present and contained a higher abundance of *Cladonia* spp.

5.5.3 D3 Lichen/Bryophyte Heath

Lichen/bryophyte heath is very sparsely scattered throughout the highest parts of the Survey Area, it is generally found as small stands as part of mosaics and the total cover within the Survey Area is low. The lichen/bryophyte heath recorded was all of the H14b *Calluna vulgaris – Racomitrium lanuginosum* heath *Empetrum nigrum ssp. hermaphroditum* sub-community and characterised by a short wind-clipped sward of *Calluna vulgaris* along with *Empetrum* and abundant lichens including *Cetraria islandica, Cladonia* spp., and *Ochrolechia frigida*.

5.5.4 D5 Dry Heath/Acid Grassland Mosaic

Mapped mosaics of D1.1 (**Section 5.5.1**) and B1.1 (**Section 5.3.1**) communities.

5.5.5 D6 Wet Heath/Acid Grassland Mosaic

Mapped mosaics of D2 (**Section 5.5.2**) and B1.1 (**Section 5.3.1**) communities.

5.6 Mire

5.6.1 E1.6.1 Blanket Bog

Blanket bog is extensive within the Site and Survey Area; see **Figures 7.3.1 – 7.3.16** (**EIAR Volume 2**).

Much of the blanket bog present is M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire, as well as some areas of M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire. Occasionally, there are small M2 *Sphagnum cuspidatum/fallax* and M3 *Eriophorum angustifolium* bog pools within areas of blanket bog. In some areas M19 and M17 form mosaics and transitional areas with overlap between each other, and with wet modified bog (**Section 5.6.2**).

The M19 community is the most frequently found community within this blanket bog habitat, occurring on peat-covered level to gently sloping ground. M19 was often recorded at community level, however all three sub-communities were also recorded within the Survey Area: i.e., M19a *Erica tetralix* sub-community, M19b *Empetrum nigrum* sub-community and M19c *Vaccinium vitis-idaea - Hylocomium splendens* sub-community (M19a being the most common and abundant within the Survey Area). The M19 community is generally distinctive with the bulk of the vegetation consisting of a mixture of *Calluna vulgaris* and *Eriophorum vaginatum*. There is commonly at least frequent to occasional *Erica tetralix*, *Eriophorum angustifolium, Narthecium ossifragum, Trichophorum germanicum*, *Vaccinium myrtillus*, *Empetrum nigrum*, *Potentilla erecta* and *Avenella flexuosa*. Also present in places are *Nardus stricta* and *Molinia caerulea*. Areas of M19b contained a notable abundance of *Empetrum nigrum*, whereas areas of M19c contained frequent *Vaccinium vitis-idaea.* The mosses *Hylocomium splendens*, *Aulacomnium palustre*, *Polytrichum commune, Pleurozium schreberi*, *Hypnum jutlandicum, Dicranum scoparium, Sphagnum fallax* and *S. capillifolium* are collectively abundant, with *S. papillosum* and *S. palustre* occasional. *Cladonia* spp. (lichens) are also present, particularly in M19c.

M17 was recorded at the community level and also as the M17a *Drosera rotundifolia - Sphagnum* spp. sub-community and M17b *Cladonia* spp. sub-community. Within M17, overall, there is a mix of *Trichophorum germanicum* and *Eriophorum vaginatum*, although the densities can be variable in places. The sward also contains a mix of other species ranging from frequent and occasional, to

locally abundant, species present include *Erica tetralix*, *Eriophorum angustifolium*, *Molinia caerulea*, *Calluna vulgaris*, and *Drosera rotundifolia* (in M17a). *Myrica gale* was recorded in some patches. The basal layer includes *Sphagnum papillosum*, *S. medium* (rare), *S. fallax*, *S. palustre*, *S. cuspidatum* and *S. capillifolium* as well as typical pleurocarpous mosses. With M17b the moss *Racomitrium lanuginosum* is a notable presence and distinguishing species, along with *Cladonia* spp (lichens).

The areas of M2 recorded were found as minor components within more extensive peatland communities, usually present as a small pool or in an occluded hollow or part of ditch. This community is represented by the abundance of *S. fallax* and *S. cuspidatum*. The M3 community is species-poor, generally characterised by colonising *Eriophorum angustifolium* on bare peat.

Following completion of NVC surveys and the identification of priority peatland habitats on-site, according to NatureScot Guidance[10], further peatland condition surveys were undertaken for the Proposed Development – these are fully detailed and discussed within **Annex D**.

5.6.2 E1.7 Wet Modified Bog

Wet modified bog is mainly found in the north-west of the Site and is mostly represented by the M20 *Eriophorum vaginatum* blanket mire community, with a small area of the M25a^ *Molinia caerulea – Potentilla erecta* mire *Erica tetralix* sub-community. M25a^ being classified as wet modified bog and not marshy grassland here due to generally appearing on peat of greater than 0.5 m in depth (c.f. **Section 5.3.5**) or containing more, or higher cover of, species with affinities to blanket bog vegetation (e.g., *Eriophorum vaginatum*). In these circumstances, the M25a is denoted with a caret (i.e., M25a^).

The M25a^ area was identified due to *Molinia* overwhelmingly dominating the sward but with an associated flora containing some mire species. The majority of the subordinate and associate species found within this M25a^ assemblage were occasional *Calluna vulgaris, Erica tetralix, Vaccinium myrtillus, Eriophorum vaginatum* and occasional patches of *Sphagna*.

M20 *Eriophorum vaginatum* blanket mire areas were recorded both at community level and as the M20a Species-poor sub-community and M20b *Calluna vulgaris – Cladonia* species sub-community. For M20a, this can be identified by *Eriophorum vaginatum* and *E. angustifolium*, with some *Avenella flexuosa*. The M20b species assemblage can be identified by the dominant tussocks of *Eriophorum vaginatum*, along with some *Calluna vulgaris, Trichophorum germanicum, Vaccinium myrtillus* and *Empetrum nigrum*. Grasses found include *Anthoxanthum odoratum, Agrostis capillaris, Nardus stricta* and *Avenella flexuosa*. The basal layer in these areas generally lacks abundant *Sphagna* although often some wetter patches contain *Sphagnum capillifolium* and *S. fallax*, however overall, the basal layer is dominated by *Polytrichum commune* and common and typical pleurocarpous and hypnoid mosses.

5.6.3 E2.1 Acid/Neutral Flush/Spring

Acid/neutral flushes are common and appear in several areas across the Survey Area, however much of the extent is out with the Site – see **Figure 7.3** (EIAR Volume 2). These flushes tend to be relatively small patches of habitat and usually following the route of watercourses; they are

[10] https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management (accessed September 2024).

particularly common in the valley of the Glentarken Burn, and they commonly form mosaics and transitional areas with the *Juncus* spp. dominated marshy grassland communities (**Section 5.3.5**). The majority of this habitat is represented by M6 *Carex echinata – Sphagnum fallax/denticulatum* mire. The M6 on-site is predominately of the M6d *Juncus acutiflorus* sub-community, however there is frequent patches but lesser amounts of the M6c *Juncus effusus* sub-community. There are also small extents of the M6a *Carex echinata* sub-community and M6b *Carex nigra - Nardus stricta* sub-community. The M4 *Carex rostrata - Sphagnum fallax* mire community was also recorded rarely in the Site. Additionally, M32a *Philonotis fontana – saxifraga stellaris, Sphagnum denticulatum* sub-community springs were recorded five times within the Site (see **Annex A**).

The M6c and M6d communities are rush mires on wet ground, often following the lines of watercourses. A tall sward of *J. effusus* over a species-poor lawn of *Sphagnum fallax, S. palustre* and *Polytrichum commune* indicates the M6c sub-community; *J. acutiflorus* dominates in M6d. In many stands its extent encompasses little more than these species listed. Where other species were recorded, they tended to be of very low cover, and included typical species such as *Rumex acetosa, Molinia caerulea, Myosotis secunda, Ranunculus repens, Equisetum fluviatile, Cirsium palustre* and *Carex* spp. The small extent of M6a lacks the *Juncus* spp. of M6c and M6d, and instead contains abundant *Carex echinata* over a similar basal layer. M6b is included in a small parcel and the sward is commonly made up of *Carex nigra, C. panicea, Eriophorum angustifolium, Juncus squarrosus* and *Nardus stricta.*

The areas of M4 are characterised by *Carex rostrata* with a basal layer composed of *Sphagnum fallax*. More occasional species recorded in the stands of M4 included *Carex nigra, C. echinata, Juncus effusus, Potentilla erecta, Viola palustris* and *Sphagnum capillifolium*.

The M32 springs contained typical vegetation for the community and had an abundance of *Philonotis fontana*.

5.6.4 E2.2 Basic Flush/Spring

Several basic stony flushes were found within the Site and recorded as target notes (see **Annex A**). These flushes are represented by the M10 *Carex dioica – Pinguicula vulgaris* mire community and M10a *Carex viridula* ssp. *oedocarpa – Juncus bulbosus* sub-community.

The M10 vegetation present includes a sward of small *Carex* spp. with *Pinguicula vulgaris, Narthecium ossifragum, Drosera rotundifolia, Eriophorum angustifolium, Trichophorum germanicum* and the community characteristic 'brown mosses'.

5.6.5 E4 Bare Peat

Bare peat (ExP) is a non-NVC community within the Survey Area, often found in areas of peat hagging or peat pans, or peatland areas devoid of vegetation through erosion.

5.7 Swamp, Marginal & Inundation Habitats

5.7.1 F1 Swamp

Two very small patches of S9a *Carex rostrata* swamp were recorded by Lochan na Creige Ruaidhe, which comprised a pure stand of *Carex rostrata* in shallow standing water. S10 *Equisetum fluviatile* swamp was also recorded in this area.

5.8 Open Water

5.8.1 G1 Standing Water

There are a number of Standing Waterbodies (SW) within the Survey Area with the larger of which being Lochan na Creige Ruaidhe, south-east of Creag Ruadh and Lochan Eas Domhain to the south-east of Coire an Daimh.

5.8.2 G2 Running Water

Several watercourses (RW) are present within the within the Survey Area and surrounding area, including many named burns, the largest of which is Glentarken Burn in the south.

5.9 Rock Exposure & Waste

5.9.1 I1.4.1 Natural Other exposure – Acid/Neutral

One area of exposed rock was recorded within the Survey Area. These surfaces generally almost entirely lack in vegetation.

5.10 Miscellaneous

5.10.1 J4 Bare Ground

Bare ground (BG) is a non-NVC community within the Survey Area and includes existing tracks, hardstandings and roads. Any areas that were devoid of vegetation and that could not be classified as any other habitat are also included here.

5.10.2 J5 Other Habitat

Other habitat is a non-NVC community used here where there is muirburn (MB) within the Survey Area, where the burning was very recent or of a degree that the parent or likely habitat type could not be easily determined.

5.11 Invasive Non-Native Species

An area of *Rhododendron ponticum* was recorded as an invasive non-native species (INNS) (see **Annex A** below).

5.12 Notable Species

No notable or rare species were incidentally recorded during the habitat surveys; however, this does not preclude their presence from the Survey Area.

6 EVALUATION OF BOTANICAL INTEREST

6.1 Overview

NVC communities can be compared with a number of habitat classifications in order to help in the assessment of the sensitivity and conservation interest of certain areas. The following sections compare the survey results and the NVC communities identified against three classifications:

- SEPA guidance on Groundwater Dependent Terrestrial Ecosystems (GWDTEs);

- Habitats Directive (92/43/EEC) Annex I habitats; and
- Scottish Biodiversity List (SBL) priority habitats.

6.2 Groundwater Dependent Terrestrial Ecosystems (GWDTE)

SEPA has classified a number of NVC communities as potentially dependent on groundwater (SEPA, 2017a & 2017b).. Many of the NVC communities on the list are very common habitat types across Scotland, and some are otherwise generally of low ecological value. Furthermore, some of the NVC communities may be considered GWDTE only in certain hydrogeological settings.

Designation as a potential GWDTE does not therefore infer an intrinsic biodiversity value, and GWDTE status has not been used as criteria to determine a habitats respective conservation importance. There is however a statutory requirement to consider GWDTEs and the data gathered during the NVC surveys has been used to inform this assessment (see **Chapter 8: Geology, Peat, Hydrology and Hydrogeology, EIAR Volume 1**).

Using SEPA's guidance, **Table 6-a** shows which communities recorded within the Survey Area may be considered potential GWDTE. Those communities which may have limited (moderate) dependency on groundwater in certain settings are marked in yellow and NVC communities recorded that may be considered high, or sensitive GWDTE in certain hydrogeological settings, are highlighted in red.

Table 6-a Communities within the Survey Area which may potentially be classified as GWDTE

NVC Code	NVC Community Name
M15	*Trichophorum germanicum – Erica tetralix* wet heath
M25	*Molinia caerulea – Potentilla erecta* mire
MG10	*Holcus lanatus – Juncus effusus* rush pasture
U6	*Juncus squarrosus – Festuca ovina* grassland
Je/Ja[11]	*Juncus effusus* acid grassland
W4	*Betula pubescens – Molinia caerulea* woodland
W7	*Alnus glutinosa – Fraxinus excelsior – Lysimachia nemoreum* woodland
CG10	*Festuca ovina – Agrostis capillaris – Thymus polytrichus* grassland
M6	*Carex echinata – Sphagnum fallax/denticulatum* mire
M10	*Carex dioica - Pinguicula vulgaris* mire
M23	*Juncus effusus/acutiflorus – Galium palustre* rush pasture
M32	*Philonotis fontana – Saxifraga stellaris* spring

[11] In light of the SEPA classification on potential GWDTEs the non NVC types 'Je' and 'Ja' should also qualify for potential GWDTE status. The classification of moderate sensitivity is keeping in line with other similar *Juncus* spp. dominated grassland communities (e.g. MG10).

The location and extent of all identified potential GWDTE are provided on an appropriate NVC map; see **Figure 7.4** (**EIAR Volume 2**).

Within **Figures 7.4.1 – 7.4.16** (**EIAR Volume 2**) the potential GWDTE sensitivity of each polygon containing a potential GWDTE is classified on a four-tier approach as follows:

- 'Highly – dominant' where potential high GWDTE(s) dominate the polygon
- 'Highly - sub-dominant' where potential high GWDTE(s) make up a sub-dominant percentage cover of the polygon
- 'Moderately – dominant' where potential moderate GWDTE(s) dominate the polygon and no potential high GWDTEs are present
- 'Moderately - sub-dominant' where potential moderate GWDTE(s) make up a sub-dominant percentage cover of the polygon and no potential high GWDTEs are present.

Where a potential high GWDTE exists in a polygon it outranks any potential moderate GWDTE communities within that same polygon.

Potential GWDTE sensitivity has been assigned solely on the SEPA listings (SEPA, 2017a & 2017b). However, depending on a number of factors such as geology, superficial geology, presence of peat and topography, many of the potential GWDTE communities recorded may in fact not be dependent on groundwater. Determining the actual groundwater dependency of particular areas or habitat requires further assessment (see **Chapter 8: Geology, Peat, Hydrology and Hydrogeology, EIAR Volume 1**).

6.3 Annex I Habitats

6.3.1 Overview

A number of NVC communities can also correlate to various Annex I habitat types. However, the fact that an NVC community can be attributed to an Annex I type does not necessarily mean all instances of that NVC community constitute Annex I habitat. Its Annex I status can depend on various factors such as quality, extent, species assemblages, geographical setting and substrates.

Using the JNCC Annex I habitat listings and descriptions[12], which have then been compared with survey results and field observations, the following NVC communities within the Survey Area which constitute Annex I habitat are shown in **Table 6-b.**

Table 6-b Annex I Habitats and Corresponding NVC Communities

Annex I Habitat	Corresponding NVC Communities & Other Non-NVC Habitats/Features Recorded
4010 North Atlantic wet heaths with *Erica tetralix*	M15 *Trichophorum germanicum – Erica tetralix* wet heath
4030 European dry heaths	H9 *Calluna vulgaris – Avenella flexuosa* heath H10 *Calluna vulgaris - Erica cinerea* heath H12 *Calluna vulgaris – Vaccinium myrtillus* heath

[12] https://sac.jncc.gov.uk/habitat/ (accessed September 2024)

Annex I Habitat	Corresponding NVC Communities & Other Non-NVC Habitats/Features Recorded
	H18 *Vaccinium myrtillus – Deschampsia flexuosa* heath H21 *Calluna vulgaris – Vaccinium myrtillus – Sphagnum capillifolium* heath
4060 Alpine and boreal heaths	H14 *Calluna vulgaris – Racomitrium lanuginosum* heath
6230 Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe)	CG10 *Festuca ovina – Agrostis capillaris – Thymus polytrichus* grassland
7130 Blanket bog	M2 *Sphagnum cuspidatum/fallax* bog pool community M3 *Eriophorum angustifolium* bog pool community M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire M20 *Eriophorum vaginatum* blanket mire M25a^ *Molinia caerulea – Potentilla erecta* mire, *Erica tetralix* sub-community
7140 Transition mires and quaking bogs	M4 *Carex rostrata - Sphagnum fallax* mire
7230 Alkaline fens	M10 *Carex dioica - Pinguicula vulgaris* mire

Further details on the inclusion or omission of certain NVC communities/sub-communities and/or Annex I types are also provided below.

6.3.2 7130 Blanket bog

The blanketing of the ground with a variable depth of peat gives the habitat type its name and results in the various morphological types according to their topographical position. Blanket bogs show a complex pattern of variation related to climatic factors, particularly illustrated by the variety of patterning of the bog surface in different parts of the UK. Such climatic factors also influence the floristic composition of bog vegetation.

'Active' bogs are defined as supporting a significant area of vegetation that is normally peat-forming. Typical species include the important peat-forming species, such as *Sphagnum* spp. and *Eriophorum* spp., or *Molinia caerulea* in certain circumstances, together with *Calluna vulgaris* and other ericaceous species. The most abundant NVC blanket bog types are M17, M18, M19, M20 and M25.

Annex I type 7130 Blanket bog therefore correlates directly with a number of NVC communities within the Survey Area such as the M17, M19 and M20 mires. However, 7130 Blanket bog can also include bog pool communities (M1-M3) where these occur within blanket mires such as M17-M20. As such M2 and M3 within the Survey Area are also assigned to the blanket bog Annex I type, as they are often associated with areas of M17, M19 and M20 mire.

As noted above, M25 mire can also fall within the 7130 blanket bog Annex I type where the underlying peat depth is greater than 0.5 m and the associated flora includes typical bog and peat forming vegetation. These areas (denoted here as M25a^ - see **Section 5.6.2**) have also been classified as potential Annex I blanket bog, to represent a worst-case scenario.

Further surveys of the peatland and a peatland condition assessment were also carried out for the Proposed Development – see **Annex D**.

6.3.3 7140 Transition mires and quaking bogs

All examples of M4 *Carex rostrata - Sphagnum fallax* mire within the Survey Area were assigned to the Annex I type Transition mires and quaking bogs. The term 'transition mire' relates to vegetation that in floristic composition and general ecological characteristics is intermediate between acid bog and alkaline fen.

6.3.4 7230 Alkaline fens

Alkaline fens consist of a complex assemblage of vegetation types characteristic of sites where there is tufa and/or peat formation with an elevated water table and a calcareous base-rich water supply. The core vegetation is short sedge mire. All examples of M10 mire in the Survey Area fall within this Annex I habitat type.

6.3.5 4010 Northern Atlantic wet heaths with *Erica tetralix*

Wet heath usually occurs on acidic, nutrient-poor substrates, such as shallow peats or sandy soils with impeded drainage. The vegetation is typically dominated by mixtures *Erica tetralix*, *Calluna vulgaris*, grasses, sedges and *Sphagnum* bog-mosses. All examples of M15 wet heath were included within the 4010 Northern Atlantic wet heaths category.

6.3.6 4030 European dry heaths

European dry heaths typically occur on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf shrubs dominate the vegetation. The most common dwarf shrub is *Calluna vulgaris*.

The dry heath communities recorded – H9, H10, H12, H18 and H21 – all fall within this Annex I type. These NVC types can also be included within the Annex I type H4060 Alpine and Boreal heaths, but only where they are at higher altitudes and include arctic-alpine floristic elements. These communities within the Survey Area are lower altitudinal examples so they all fall under the 4030 European dry heaths Annex I type.

The most common forms of dry heath in the Survey Area, as noted in the community descriptions above, are species-poor, relatively botanically impoverished forms of *Calluna* dominated heath.

6.3.7 4060 Alpine and boreal heaths

Alpine heaths develop above the natural altitudinal tree-line, and boreal heaths below the tree-line in gaps among scrubby high-altitude woods or as replacements for those subalpine woods historically lost due to grazing and burning. On lower slopes, boreal heaths grade into floristically-similar 4030 European dry heaths. The dominant plants are usually dwarf-shrubs such as *Calluna*

vulgaris, *Vaccinium myrtillus* or *Juniperus communis*, which are low-growing or prostrate owing to exposure to high winds or prolonged snow cover at moderately high altitudes.

Alpine and boreal heaths occur on acid rocks on mountains, both on exposed lower summits and ridges and on sheltered slopes. Exposure or snow-lie, which suppress the growth of dwarf-shrubs, also favours the growth of characteristic lichens and bryophytes. Some of these heath types are particularly susceptible to disturbance, especially by fire or trampling.

The H14 heath within the Survey Area falls into alpine and boreal heaths Annex I type.

6.3.8 6230 Species-rich Nardus grassland, on siliceous substrates in mountain areas

Species-rich *Nardus* grasslands on siliceous substrates in mountain areas (and submountain areas in continental Europe) tend to develop where there is flushing through base-rich strata on siliceous bedrock. These may include moderately base-rich metamorphic and igneous rocks. Species-rich *Nardus* grasslands on limestone are excluded from the definition of this Annex I habitat because limestone lacks silica. Two main types of grassland belonging within the species-rich *Nardus* grassland Annex I habitat occur in the UK: CG10 *Festuca ovina – Agrostis capillaris – Thymus polytrichus* grassland and CG11 *Festuca ovina – Agrostis capillaris – Alchemilla alpina* grassland. This Annex I type is of very low and restricted cover within the Survey Area and is accounted for by some very small areas of CG10 (see **Section 5.3.3**).

6.4 Scottish Biodiversity List Priority Habitats

The SBL is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. The SBL was published in 2005 to satisfy the requirement under Section 2(4) of The Nature Conservation (Scotland) Act 2004.

The SBL identifies habitats which are the highest priority for biodiversity conservation in Scotland: these are termed 'priority habitats'. Some of these priority habitats are quite broad and can correlate to many NVC types.

The relevant SBL priority habitat types (full descriptions of which can be found on the NatureScot website[13]), and associated NVC types recorded within the Survey Area are as follows:

- Wet woodland: W7;
- Upland oakwoods: W11 (where oak forms >30% of canopy cover);
- Lowland mixed deciduous woodland: W8 and W10 (where the canopy is not primarily coniferous);
- Blanket bog: M17, M19, M20, and M2 & M3 (M2 & M3 were associated with M17-M20), and M25a^ where peat depth is greater than 0.5 m;
- Upland flushes, fens, and swamps: M4, M6, M10, M23a, M32, S9 and S10;
- Mountain heaths and willow scrub: H14;

[13] https://www.nature.scot/scotlands-biodiversity/habitat-definitions (accessed September 2024)

- Upland heathland: M15, H9, H10, H12, H18 and H21; and
- Upland calcareous grassland: CG10.

These SBL priority habitats correspond with UK Biodiversity Action Plan (BAP) Priority Habitats[14].

6.5 Sensitivity Summary

Table 6-c provides a summary of all the NVC communities and non-NVC types recorded within the Survey Area and any associated habitat sensitivities as described in the sections above.

Table 6-c Summary of Study Area communities and sensitivities

NVC/Non-NVC Codes Recorded	Potential GWDTE Status	Annex I Habitat	SBL Priority Habitat Type
Mires & Wet Heath			
M2	n/a	7130 Blanket bogs (examples associated with M17-M20)	Blanket bog
M3	n/a	7130 Blanket bogs (examples associated with M17-M20)	Blanket bog
M4	n/a	7140 Transition mires and quaking bogs	Upland flushes, fens and swamps
M6a, M6b, M6c, M6d	High	n/a	Upland flushes, fens and swamps
M10, M10a	High	7230 Alkaline fens	Upland flushes, fens and swamps
M15a, M15b, M15c, M15d	Moderate	4010 Northern Atlantic wet heaths with *Erica tetralix*	Upland heathland
M17, M17a, M17b	n/a	7130 Blanket bogs	Blanket bog
M19, M19a, M19b, M19c	n/a	7130 Blanket bogs	Blanket bog
M20, M20a, M20b	n/a	7130 Blanket bogs	Blanket bog
M23a, M23b	High	n/a	Upland flushes, fens and swamps (applies to M23a only)
M25a, M25^ M25b	Moderate	7130 Blanket bogs (applies to M25a^ where peat depth >0.5 m)	Blanket bogs (applies to M25a^ where peat depth >0.5 m)
M32a	High	n/a	Upland flushes, fens and swamps
Dry Heaths			
H9, H9a, H9c, H9d	n/a	4030 European dry heaths	Upland heathland

[14] http://jncc.defra.gov.uk/page-5718 (accessed September 2024)

NVC/Non-NVC Codes Recorded	Potential GWDTE Status	Annex I Habitat	SBL Priority Habitat Type
H10, H10a, H10b, H10c	n/a	4030 European dry heaths	Upland heathland
H12, H12a, H12b, H12c	n/a	4030 European dry heaths	Upland heathland
H14	n/a	4060 Alpine and Boreal heaths	Mountain heaths and willow scrub
H18, H18a	n/a	4030 European dry heaths	Upland heathland
H21, H21a	n/a	4030 European dry heaths	Upland heathland
Calcicolous Grasslands			
CG10	n/a	6230 Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental	Upland calcareous grassland
Calcifugous Grasslands & Ferns			
U4, U4a	n/a	n/a	n/a
U5, U5a, U5b, U5d	n/a	n/a	n/a
U6, U6a, U6b, U6c	Moderate	n/a	n/a
U20, U20a, U20b	n/a	n/a	n/a
Mesotrophic Grasslands			
MG6, MG6a	n/a	n/a	n/a
MG10a	Moderate	n/a	n/a
Woodland & Scrub			
W4, W4c	n/a	n/a	n/a
W7, W7a, W7c	High	n/a	Wet woodland
W8	n/a	n/a	Lowland mixed deciduous woodland
W10, W10a	n/a	n/a	Lowland mixed deciduous woodland
W11	n/a	n/a	Upland oakwoods[15]
W23	n/a	n/a	n/a
W24	n/a	n/a	n/a
Swamps & Tall-Herb Fens			
S9a	n/a	n/a	Upland flushes, fens and swamps
S10	n/a	n/a	Upland flushes, fens and swamps

[15] where oak forms >30% of canopy cover.

NVC/Non-NVC Codes Recorded	Potential GWDTE Status	Annex I Habitat	SBL Priority Habitat Type
Vegetation of Open Habitats			
OV25	n/a	n/a	n/a
Non-NVC Types			
BG	n/a	n/a	n/a
CP & YCP	n/a	n/a	n/a
ExP	n/a	n/a	n/a
Je	Moderate	n/a	n/a
Ja	Moderate	n/a	n/a
MB	n/a	n/a	n/a
RK	n/a	n/a	n/a
RW	n/a	n/a	n/a
SBT	n/a	n/a	n/a
SW	n/a	n/a	n/a
YBP	n/a	n/a	n/a

7 SUMMARY

MacArthur Green carried out NVC and habitat surveys within the Survey Area on 31st July 2023, 1st to 4th August 2023, 14th to 16th August 2023, 31st August 2023, 2nd September 2023 and 12th June 2024 in order to identify those areas of vegetation communities with the greatest ecological or conservation interest.

In total 35 NVC communities were recorded within the respective Survey Area along with various associated sub-communities; several non-NVC habitat types are also present.

The Survey Area is mainly open upland habitats, the most common and widespread making up the bulk of the landscape is blanket bog of the M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire NVC community and acid dry dwarf shrub heath of the H12 *Calluna vulgaris-Vaccinium myrtillus* heath NVC community. Breaking up the expanses of mire and heath are patches and pockets of other habitat types such as acid grassland, marshy grassland, wet dwarf shrub heath, wet modified bog and acid/neutral flushes.

Although some large relatively homogeneous stands of vegetation occur, most of the communities often form complex mosaics and transitional areas across the Survey Area.

The survey results have also been compared to a number of sensitivity classifications, indicating the presence of Annex I, SBL and potential GWDTE habitats, as summarised in **Table 6-c.**

8 REFERENCES

Atherton, I., Bosanquet, S. & Lawley, M. (2010). Mosses and Liverworts of Britain and Ireland: a field guide. British Bryological Society.

Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D., & Yeo, M. (2004). An Illustrated Guide to British Upland Vegetation. JNCC, Peterborough. ISBN 1 86107 553 7.

Averis, B and Averis, A. (2020). Plant Communities found in surveys by Ben and Alison Averis but not described in the UK National Vegetation Classification. http://www.benandalisonaveris.co.uk/wp/wp-content/uploads/2020/11/non-nvc_vegetation_types_found_by_ben_and_alison_averis_2020-06__version_with_image_resolution_reduced_.pdf

Clymo, R.S. (1963). Ion exchange in Sphagnum and its relation to bog ecology. Annals of Botany, New Series, 27, 309-324.

Clymo, R.S. (1983). Peat. In Gore, A.J.P. (Ed). Ecosystems of the World 4A Mires: Swamp, Bog, Fen and Moor. Elsevier, Oxford, pp. 159-224.

Clymo, R.S. (1997). The Roles of Sphagnum in Peatlands. In Parkyn, L., Stoneman, R.E. and Ingram, H.A.P. (Eds). Conserving Peatlands. CAB International, Wallingford, pp. 95-102.

Joint Nature Conservancy Council (JNCC). (1994). Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 8 Bogs. JNCC, Peterborough https://hub.jncc.gov.uk/assets/20534790-bb45-4f33-9a6c-2fe795fb48ce

JNCC. (2010). Handbook for phase 1 habitat survey – a technique for environmental audit. JNCC, Peterborough.

Lindsay, R. (1995) Bogs: The Ecology, Classification and Conservation of Ombrotrophic Mires. SNH, Battleby, Perth.

MacDonald, A., Stevens, P., Armstrong, H., Immirzi, P. and Reynolds, P. (1998). A Guide to Upland Habitats, Surveying Land Management Impacts. Volume 2 - The Field Guide. Scottish Natural Heritage, Battleby.

Mountford, E. (2011). A compilation of proposed additions and revisions to vegetation types in the National Vegetation Classification, JNCC Report No. 448. JNCC, Peterborough, ISBN 0963-8091

Rodwell, J.S. (Ed), *et al*. (1991 – 2000). British Plant Communities (5 volumes). Cambridge University Press, Cambridge.

Rodwell, J., Dring, J.C., Averis, A.B.G., Proctor, M.C.F., Malloch, AJ.C., Schaminee, J.H.J. and Dargie, T.C.D. (2000). Review of coverage of the National Vegetation Classification. JNCC Report, No. 302. JNCC, Peterborough.

Rodwell, J.S. (2006). NVC Users' Handbook. ISBN 978 1 86107 574 1.

SEPA. (2017a). Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3. Issue date: 11/09/2017.

SEPA. (2017b). Land Use Planning System SEPA Guidance Note 4: Planning guidance on on-shore windfarm developments. Version 3. Issue date: 11/09/2017.

Smith, C.W., Aptroot, A., Coppins, B.J., Fletcher, A., Gilbert, O.L., James, P.W. & Wolseley, P.A. (Eds.) (2009). The Lichens of Great Britain and Ireland. The British Lichen Society.

Stace, C.A. (2019). New Flora of the British Isles. 4th Edition. Cambridge University Press.

Wheeler, B.D., and Shaw, S.C. (1995) Restoration of Damaged Peatlands. Department of the Environment. HMSO, London.

ANNEX A. NVC TARGET NOTES

A number of target notes were also made during surveys, often to pinpoint springs/flushes, or an area or species of interest, these target notes are shown on **Figures 7.3.1 – 7.3.16** (**EIAR Volume 2**) and detailed within **Table A-1** below. A representative sample of corresponding target note photographs is provided in **Annex B**.

Table A-1 Survey Area Target Notes

Target Note ID	Easting	Northing	NVC Community	Description	Photo Reference
1	261945	724434	N/A	INNS - *Rhododendron ponticum*.	
2	262549	727456	N/A	Three mature *Alnus glutinosa* trees within field.	
3	264837	729806	M2	Bog pool dominated by *Sphagnum cuspidatum* and *S. papillosum* and occasionally *Eriophorum angustifolium, E. vaginatum* and *Drosera rotundifolia.*	B-1
4	264836	729774	N/A	Deep peat hagging over 2 m in height in sections.	
5	264673	729522	N/A	Potential for peatland restoration works or enhancement. Peat haggs in an area that has intensive grazing from deer and sheep.	
6	264583	729413	N/A	Examples of extent of erosion by looking at the grouse butts and how some have become isolated due to the erosion around them.	
7	264561	729396	N/A	Depth of peat haggs shown in photo with walking pole 1.12 m in height to show scale. Erosion extends down to the underlying substrate in places.	
8	264679	729087	M10	Flush dominated by *Pinguicula vulgaris, Narthecium ossifragum, Carex nigra, C. echinata, Erica tetralix,* and the moss *Pleurozia purpurea.*	
9	264664	728586	M2	Bog pool dominated by *Sphagnum cuspidatum, S. fallax, S. papillosum, S. capillifolium* and *Eriophorum vaginatum.*	
10	264705	728785	N/A	Area of peat hagging.	
11	264902	729320	N/A	Old drainage channels in exposed peat area.	
12	265244	729695	N/A	Drainage channels within this area, many of which contain *Eriophorum vaginatum* and *Sphagna.*	

Target Note ID	Easting	Northing	NVC Community	Description	Photo Reference
13	265170	729961	M3	Bog pool dominated by *Eriophorum angustifolium* along with *Sphagnum cuspidatum* and *S. fallax.*	
14	265509	729593	M2	Bog pool dominated by *Eriophorum vaginatum* with *Sphagna* and *Drosera rotundifolia.*	
15	264821	728591	N/A	Peat erosion along summit ridge of Creag Dubh.	
16	264605	728125	M3	Bog pool.	
17	265368	727648	N/A	Mature *Sorbus aucuparia* tree.	
18	265942	728837	N/A	Peat hagging.	
19	266085	729332	N/A	High degree of peat erosion with areas of exposed peat along with exposure of the underlying substrate in certain areas.	
20	266255	729282	M2	Bog pool.	
21	266416	729517	N/A	Peat hagging and erosion down to underlying substrate.	
22	266191	728146	N/A	Mature *Sorbus aucuparia* tree.	
23	266546	728824	N/A	Area contains bog pools but most of them have a stony substrate with no *Sphagna*.	
24	266827	729088	M10a	Flush.	B-2
25	267018	729456	M32a	*Philonotis fontana* moss abundant in M32a.	B-3
26	267015	729464	M32a	Spring.	
27	266875	729670	N/A	Extensive peat erosion with bare peat and hagging however the channels remain wet and able to support *Sphagna* and *Eriophorum vaginatum* indicating some recolonisation.	
28	266545	730509	M2	Bog pool dominated by *Eriophorum angustifolium* and *Sphagnum cuspidatum*.	
29	267342	729479	N/A	Extensive deep peat haggs.	
30	267740	729117	M32a	Flush where the mosses *Philonotis fontana* and *Pleurozia purpurea* feature strongly.	
31	267704	728764	M2	Bog pool dominated by *Sphagnum cuspidatum* and *S. fallax*.	
32	267583	728482	N/A	Extensive peat hagging in this area.	

Target Note ID	Easting	Northing	NVC Community	Description	Photo Reference
33	267551	728133	N/A	Example of muirburn across the Site.	
34	267508	727302	M2	Bog pool.	
35	268246	727161	M10a	Flush.	
36	270053	727023	M10a	Flush.	
37	270189	727088	N/A	Extensive peat erosion within this area and down to underlying substrate in certain places.	
38	271023	727065	M32a	Flush.	
39	270860	727023	M2	Bog pool.	
40	270509	726999	M10a/M32a	M10a (80%)/M32a (20%)	
41	264940	727859	M4	Flushed area with *Carex rostrata* and *Carex echinata*, around 2x5 m in area.	B-4
42	266228	727405	M2	Bog pool - around 2x6 m in area.	
43	267422	726624	M2	Bog pool - around 2x2 m in area.	
44	267714	726713	M4	*Carex rostrata* abundant in flushed area along watercourse, around 2x6 m in area.	
45	267983	726283	M3	Flush dominated by *Eriophorum angustifolium*, around 3x10 m in area.	B-5
46	268019	726567	M2	Large bog pool in area of M17.	
47	268574	727205	M10	Flush exposed rock with *Pinguicula vulgaris* and *Drosera rotundifolia*, around 1x6 m in area.	
48	268560	727329	M6a	Flush - *Carex rostrata, Carex echinata, Carex nigra* over *Sphagna*, around 1x6| m in area.	
49	268685	727501	M2	Bog pool - around 2x3 m in area.	
50	268475	727722	M2	Two adjacent large bog pools, both around 2x5 m in area.	
51	268681	727502	M2	Bog pool - around 2x3 m in area.	
52	269403	726544	M2	Bog pool within area of M19, around 1x8 m in area.	

ANNEX B. TARGET NOTE PHOTOGRAPHS

The following photographs correlate to the target notes described within **Annex A, Table A-1**. Photographs are not provided here for all target notes, due to the similarity in many photographs.

Figure B-1 Target Note 3 – M2 Bog Pool

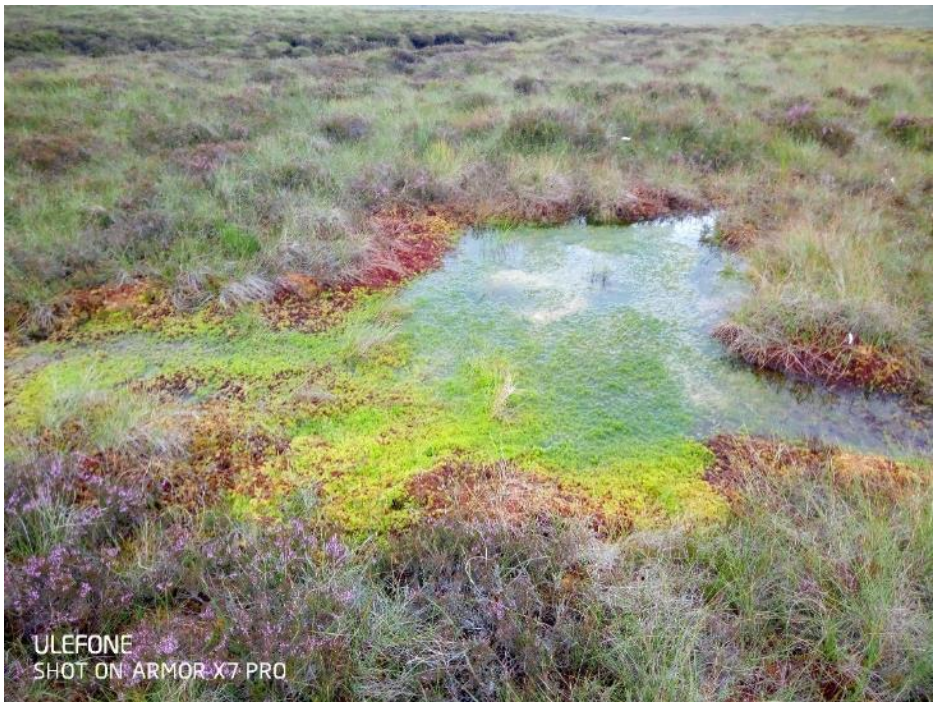


Figure B-2 Target Note 24 – M10a Flush

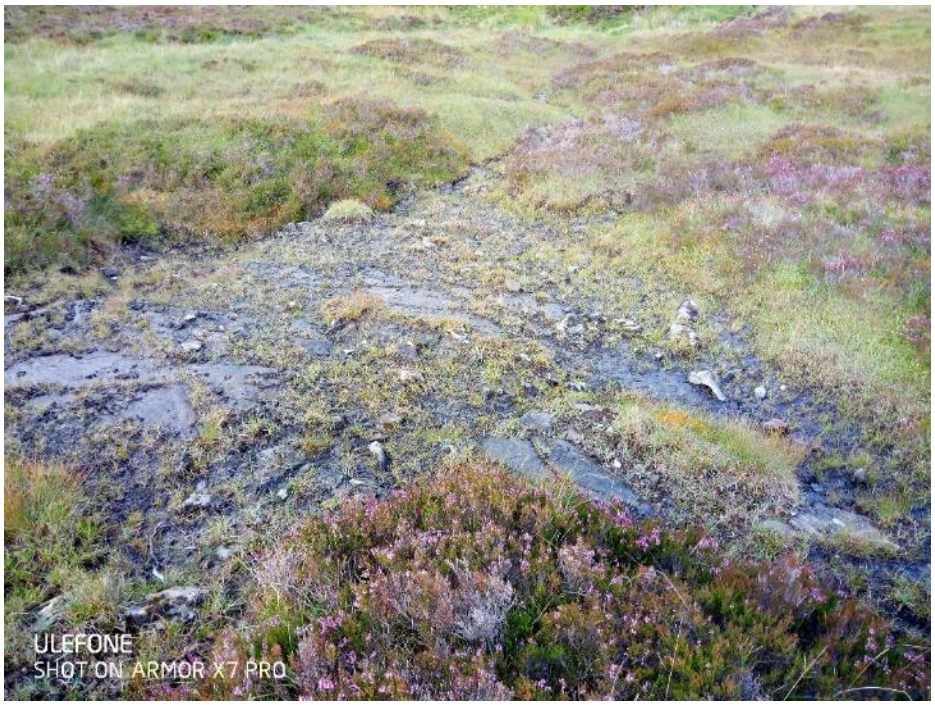


Figure B-3 Target Note 25 – M32a Spring

Figure B-4 Target Note 41 – M4 Flush

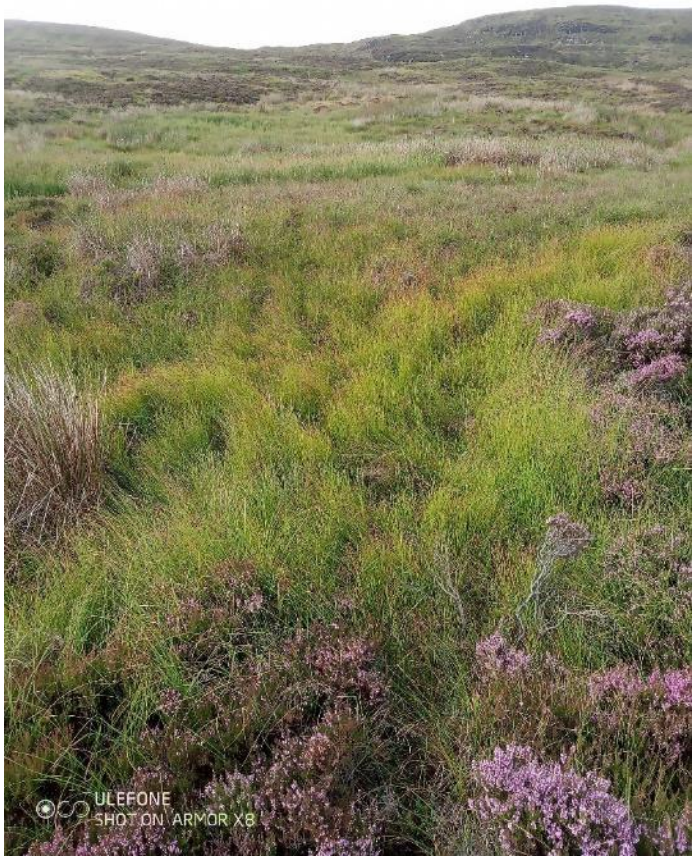
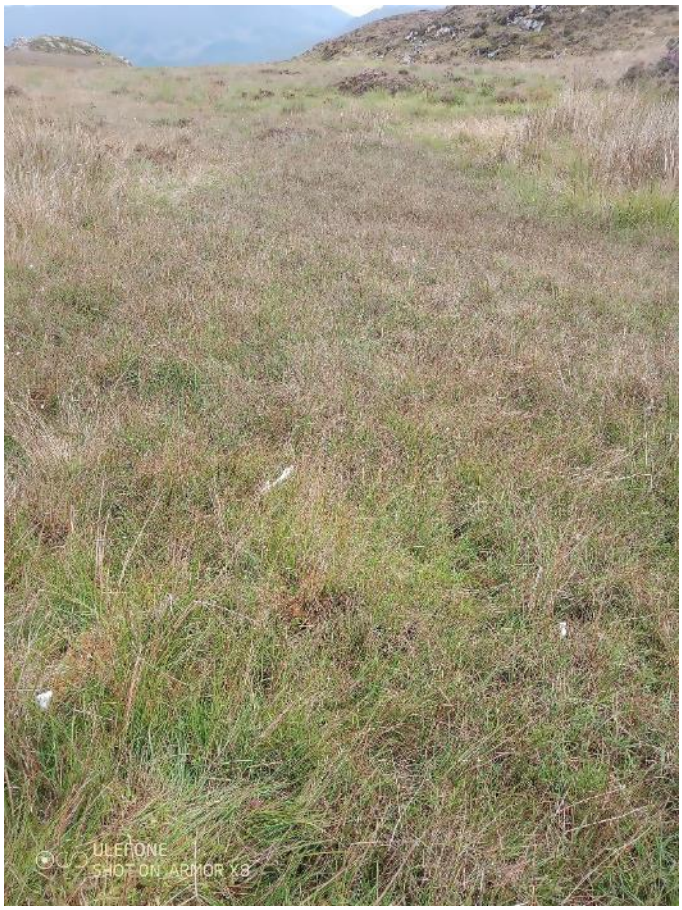


Figure B-5 Target Note 45 – M3



ANNEX C. GENERAL COMMUNITY PHOTOGRAPHS

The following selected photographs are provided to give a visual representation to a number of the community types and peatland erosion features present within the Survey Area.

Photo C-1: M19 blanket bog typical of the Survey Area

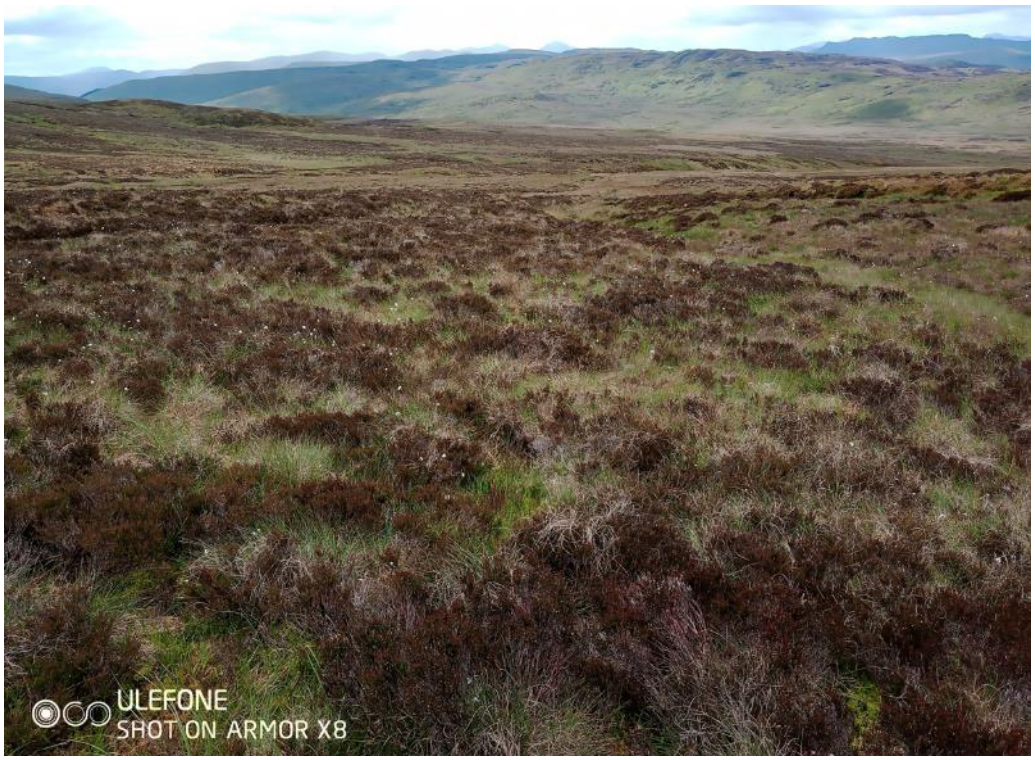


Photo C-2: M19 blanket bog in foreground giving way to dry heath and acid grassland on higher ground in distance

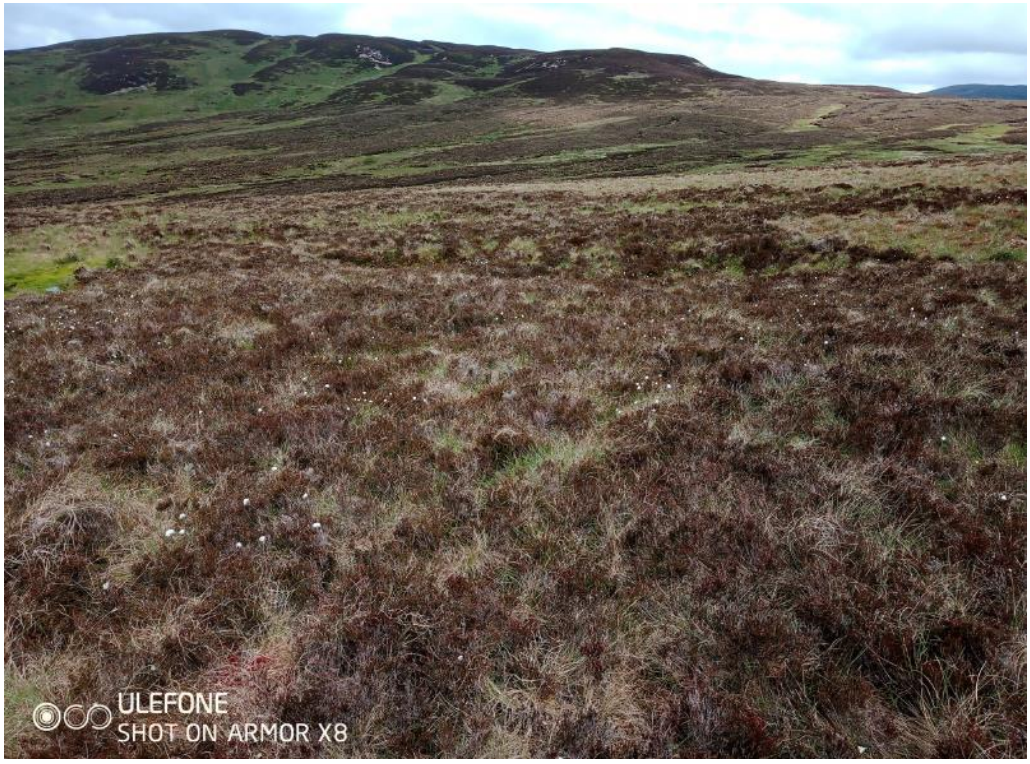


Photo C-3: Tussocky M19 on slope

Photo C-4: M20 mire in foreground (faint moor drainage lines visible), with distant steep slopes with mixes of dry heath and acid grassland

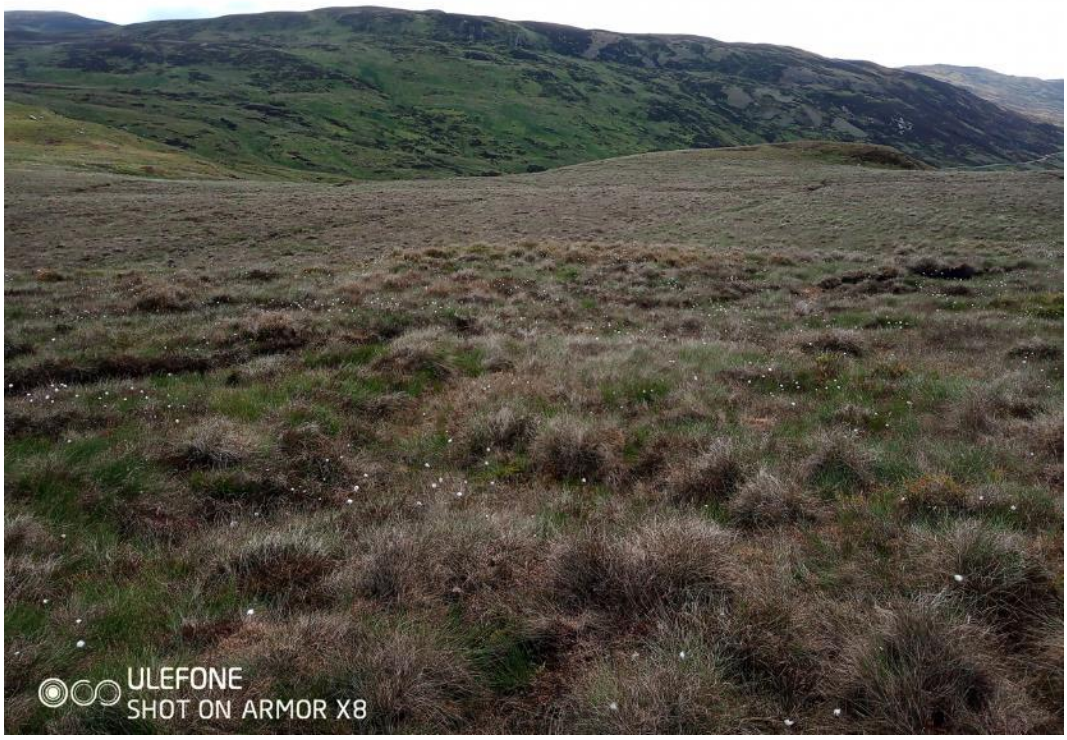


Photo C-5: Dry heath with patches of acid grassland in foreground, giving way to flatter area of blanket bog with erosion scars

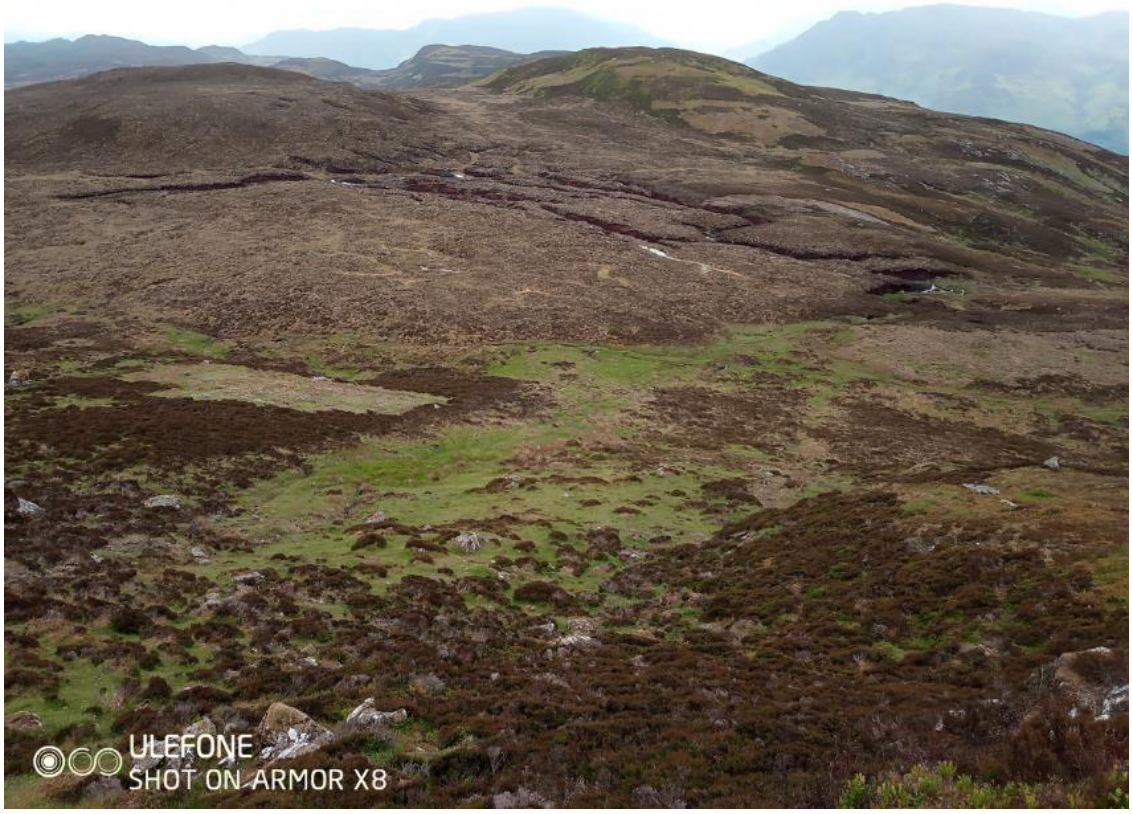


Photo C-6: M17 with peat hagging/gullying

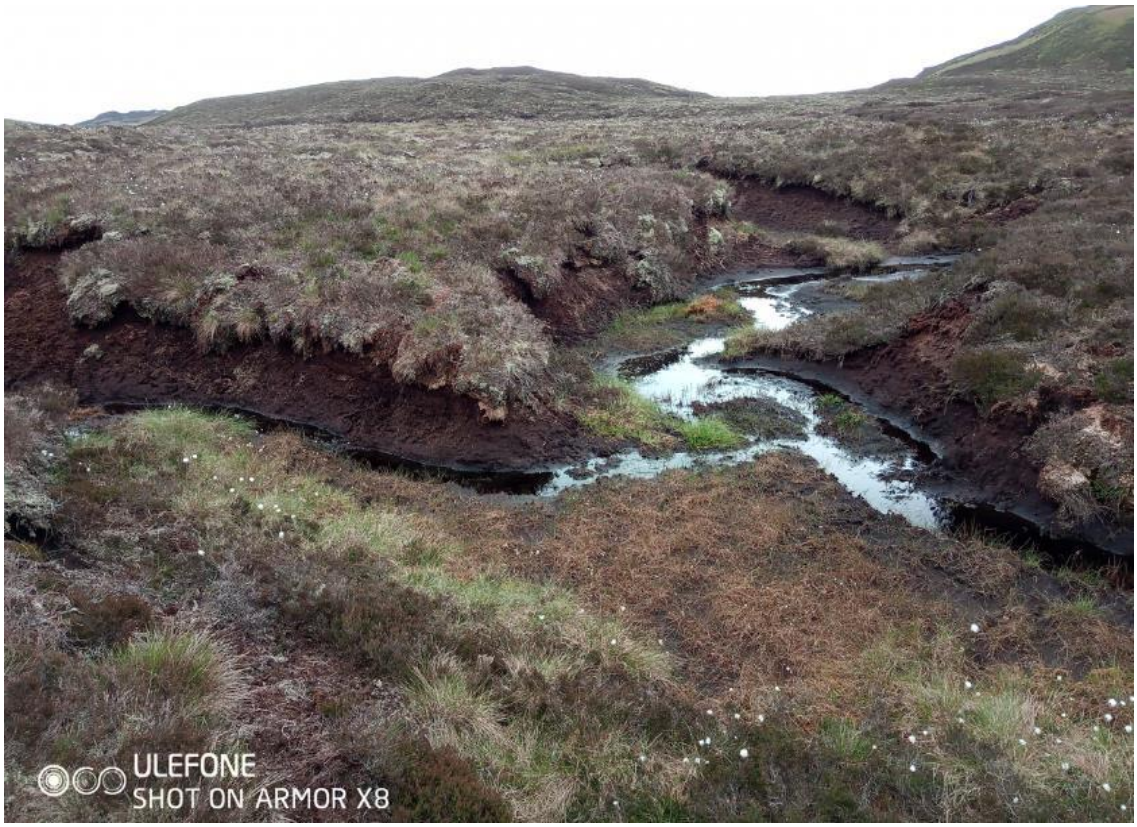


Photo C-7: Example of gully erosion of peatland through to substrate within the Site

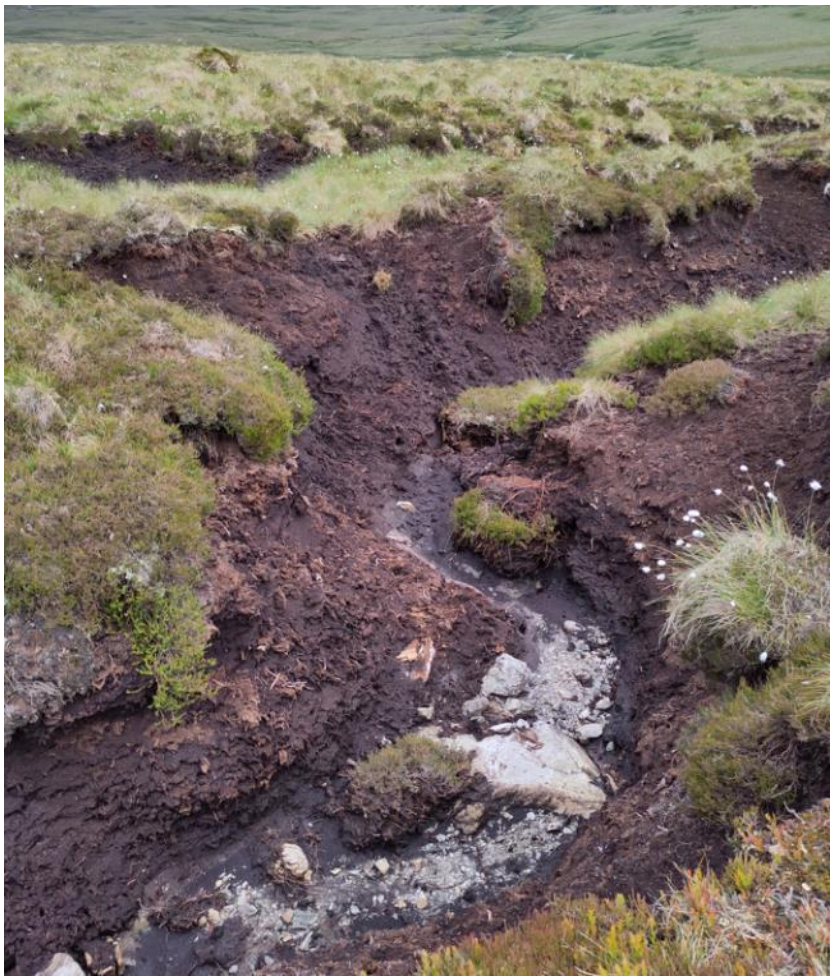


Photo C-8: Further example of gully erosion of peatland through to substrate

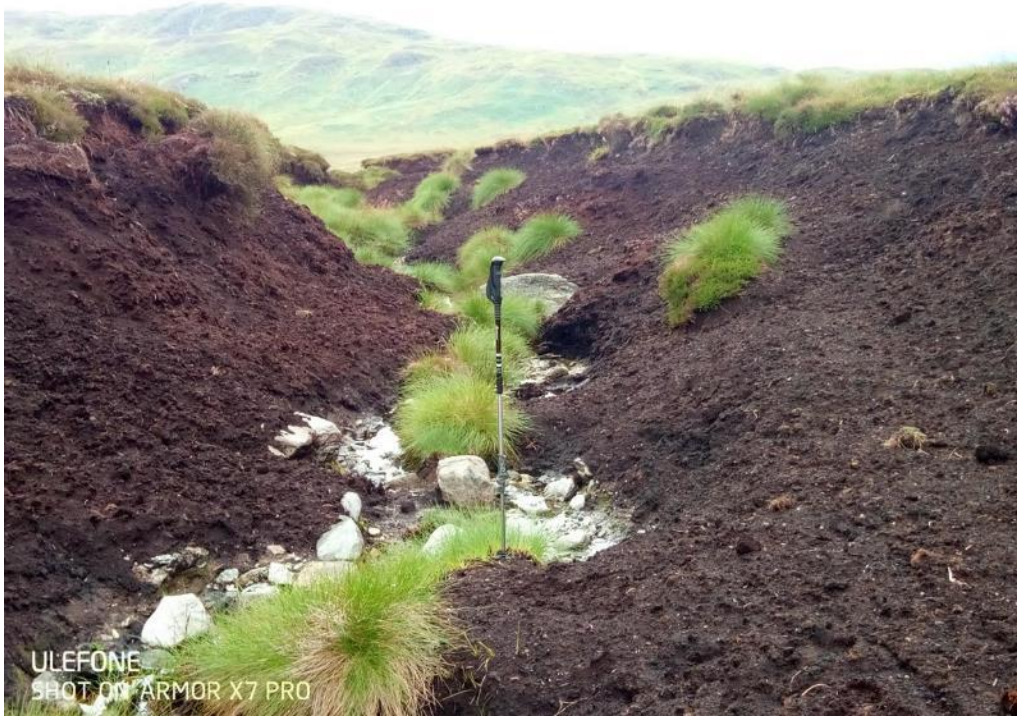


Photo C-9: Peat erosion banks

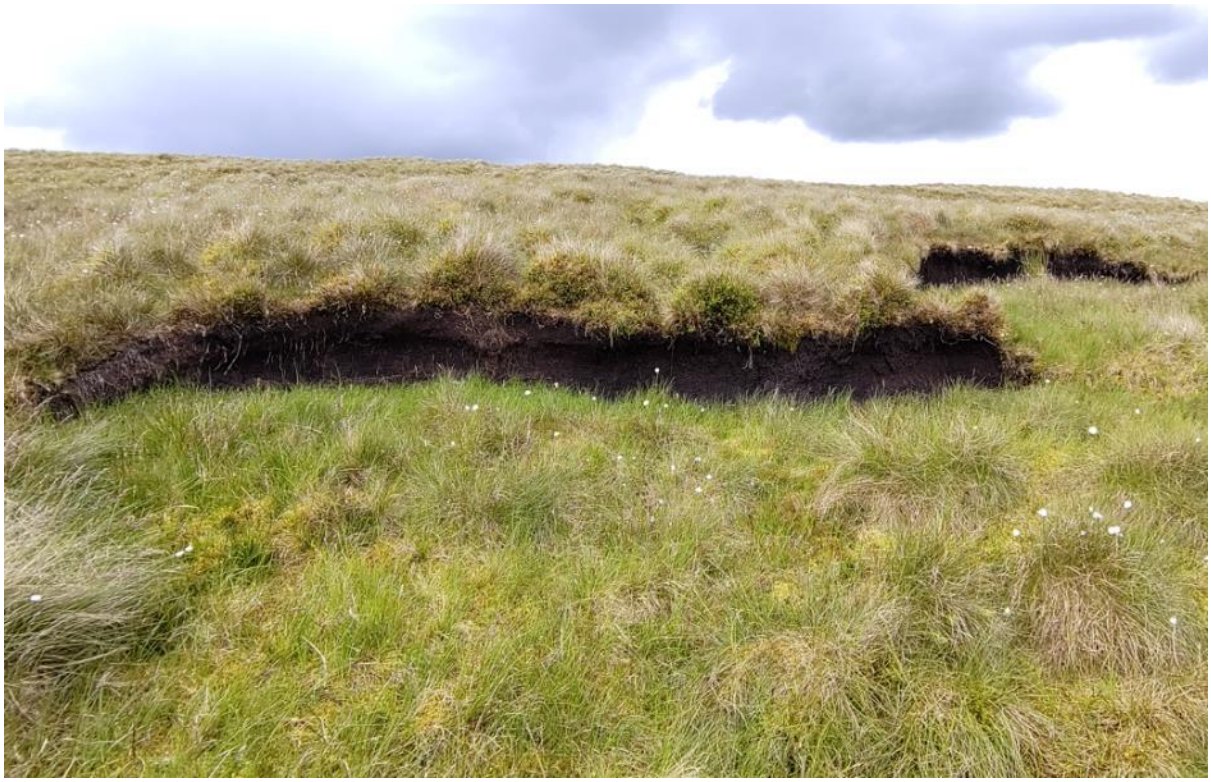


Photo C-10: Peatland surface micro-erosion

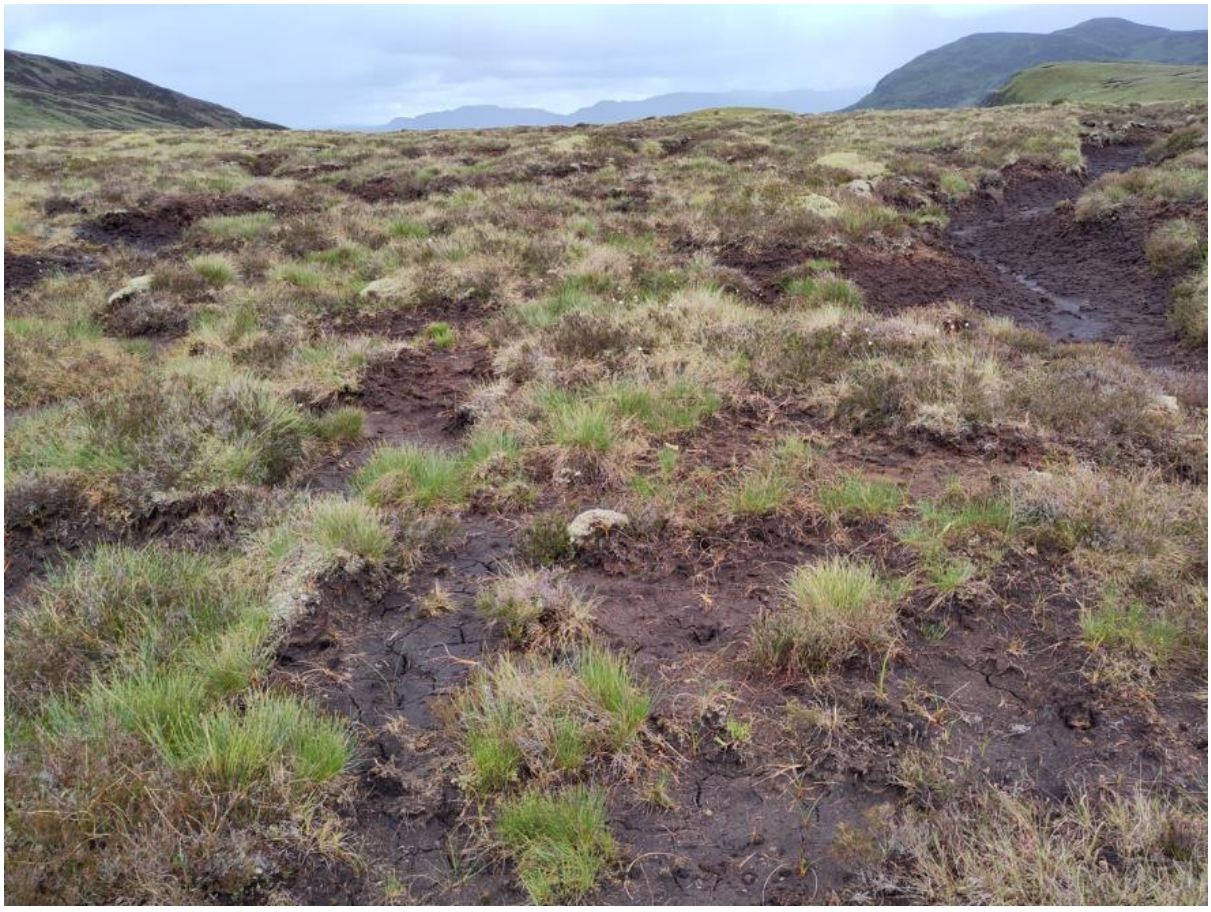


Photo C-11: Peat pan erosion

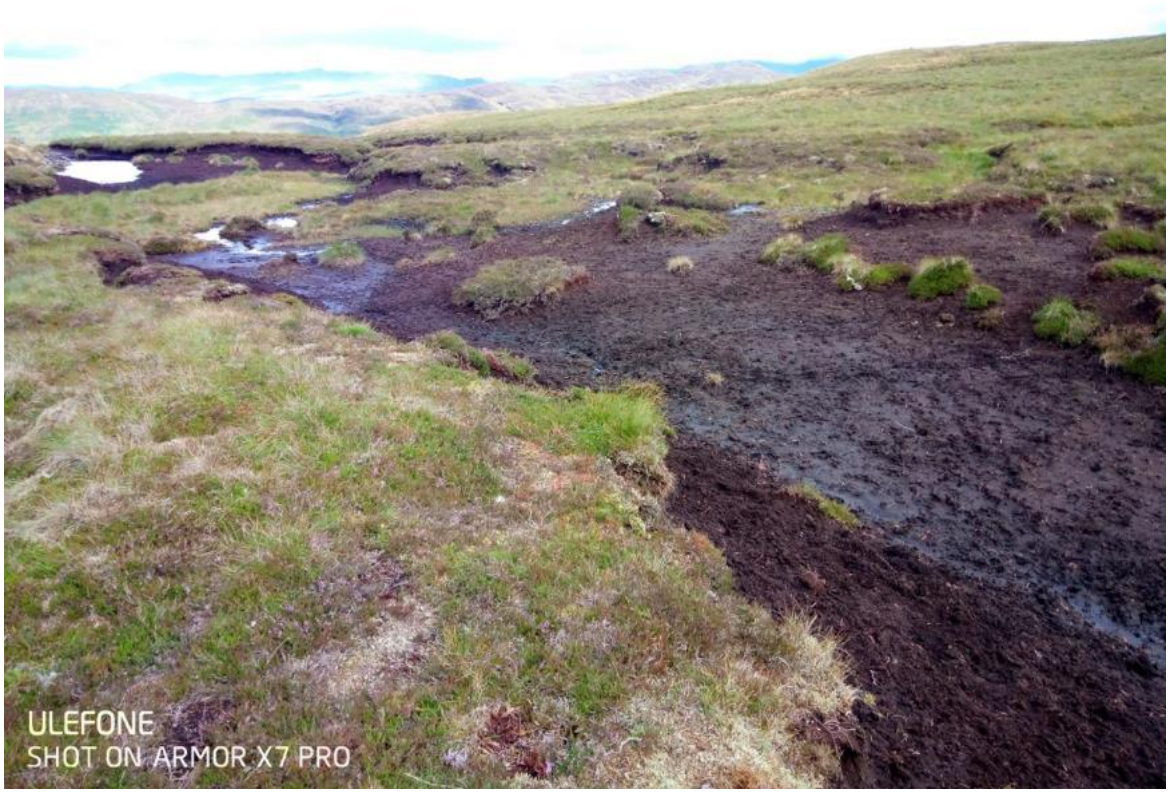


Photo C-12: Example of active moor grip drains within the Site

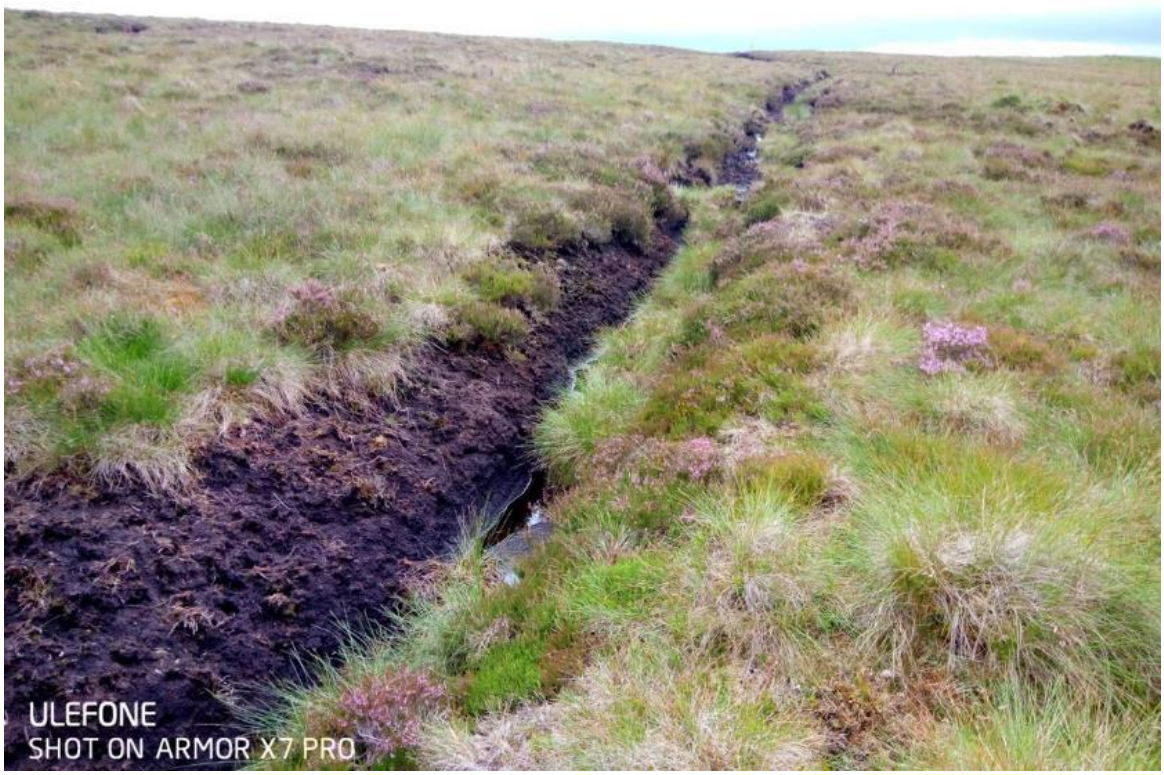


Photo C-13: Extensive surface erosion

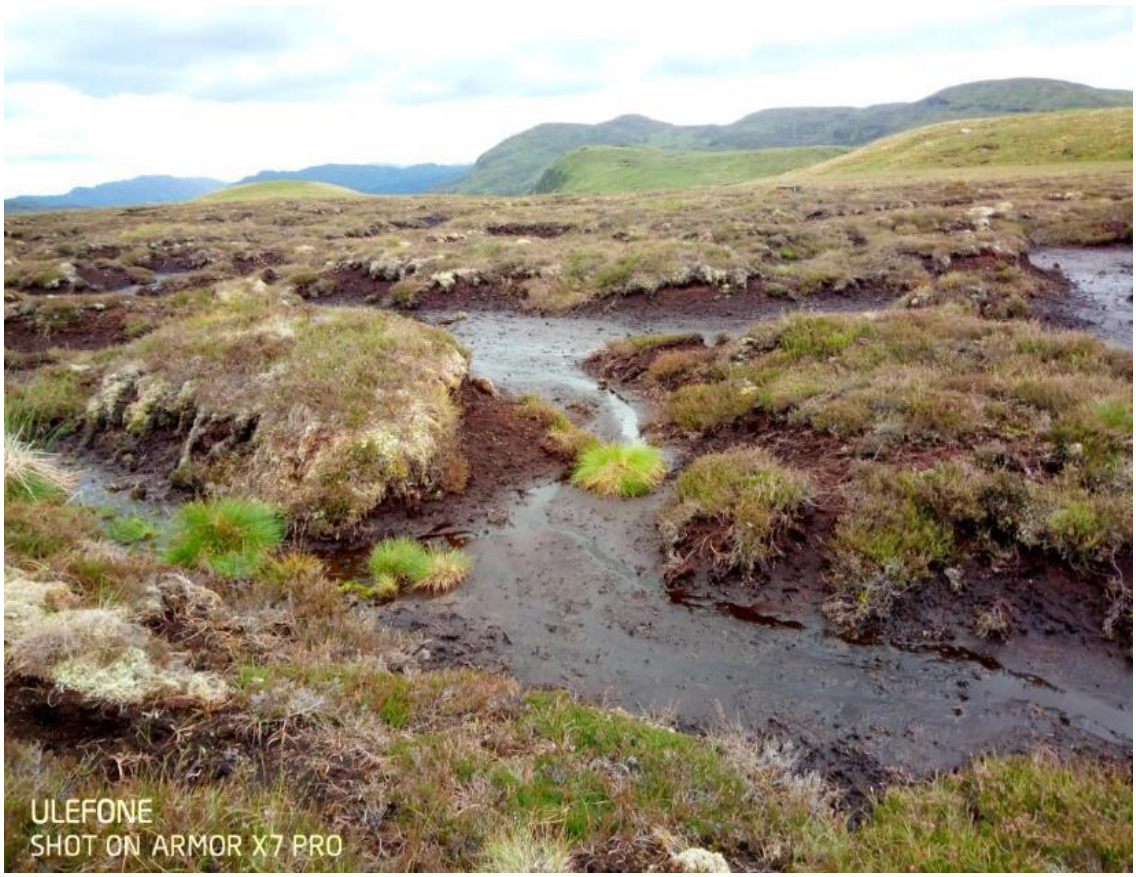


Photo C-14: M2 Sphagna filled pool within M17 bog, peat erosion just beyond

Photo C-15: H12 dry heath

Photo C-16: Dry heath (H12) with varying aged muirburn patches

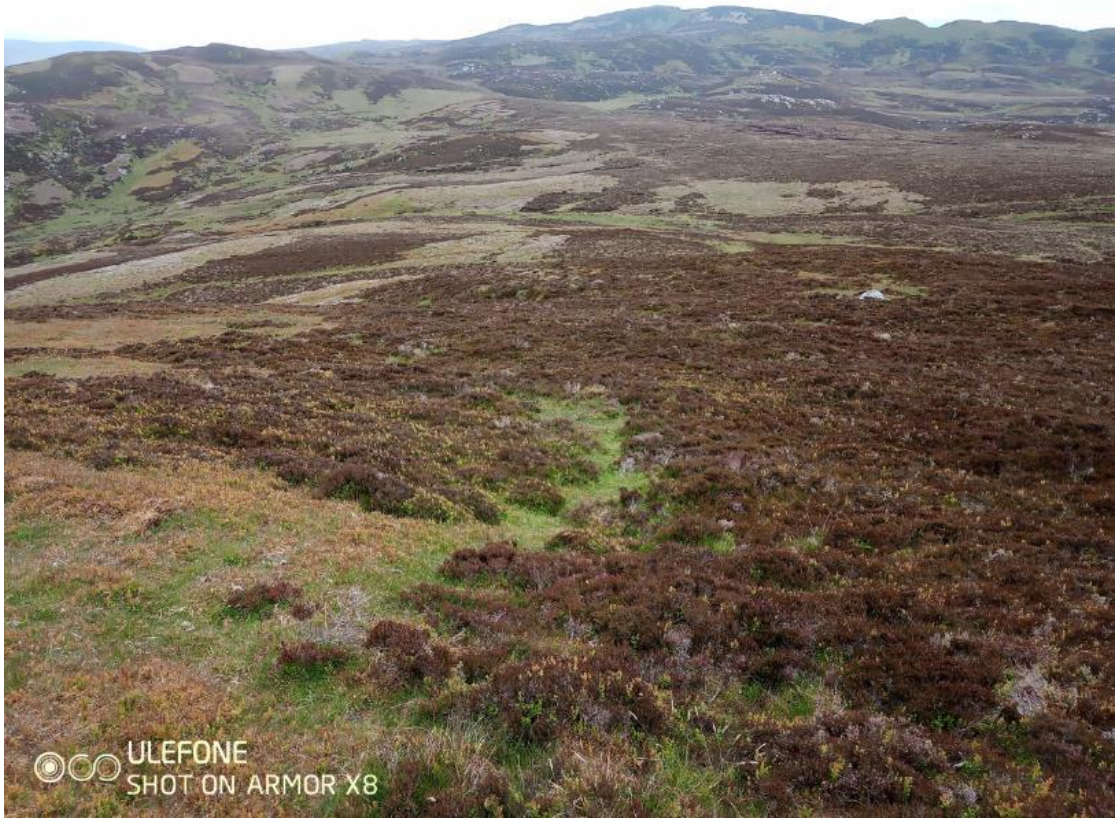


Photo C-17: Expanse of dry heath with patches of varying aged muirburn and bracken

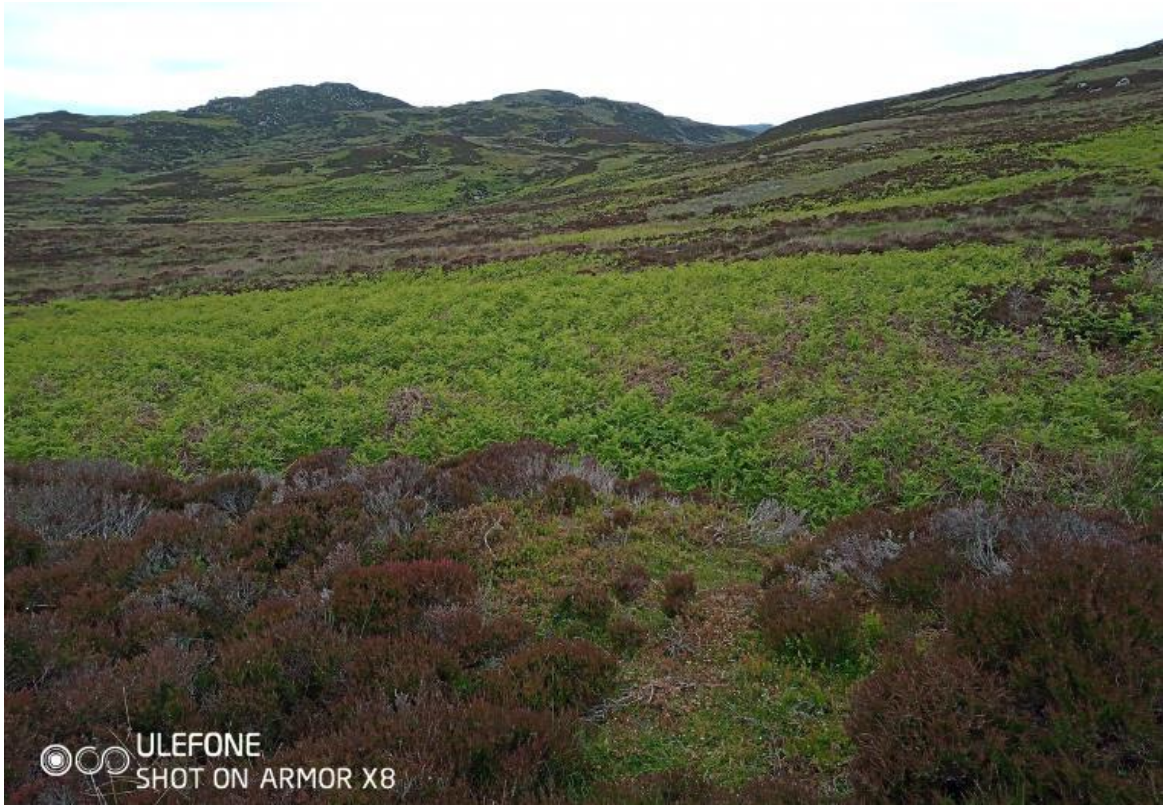


Photo C-18: M6d/M23a mosaic in foreground, surrounded by acid grassland/dry heath mosaic on slopes

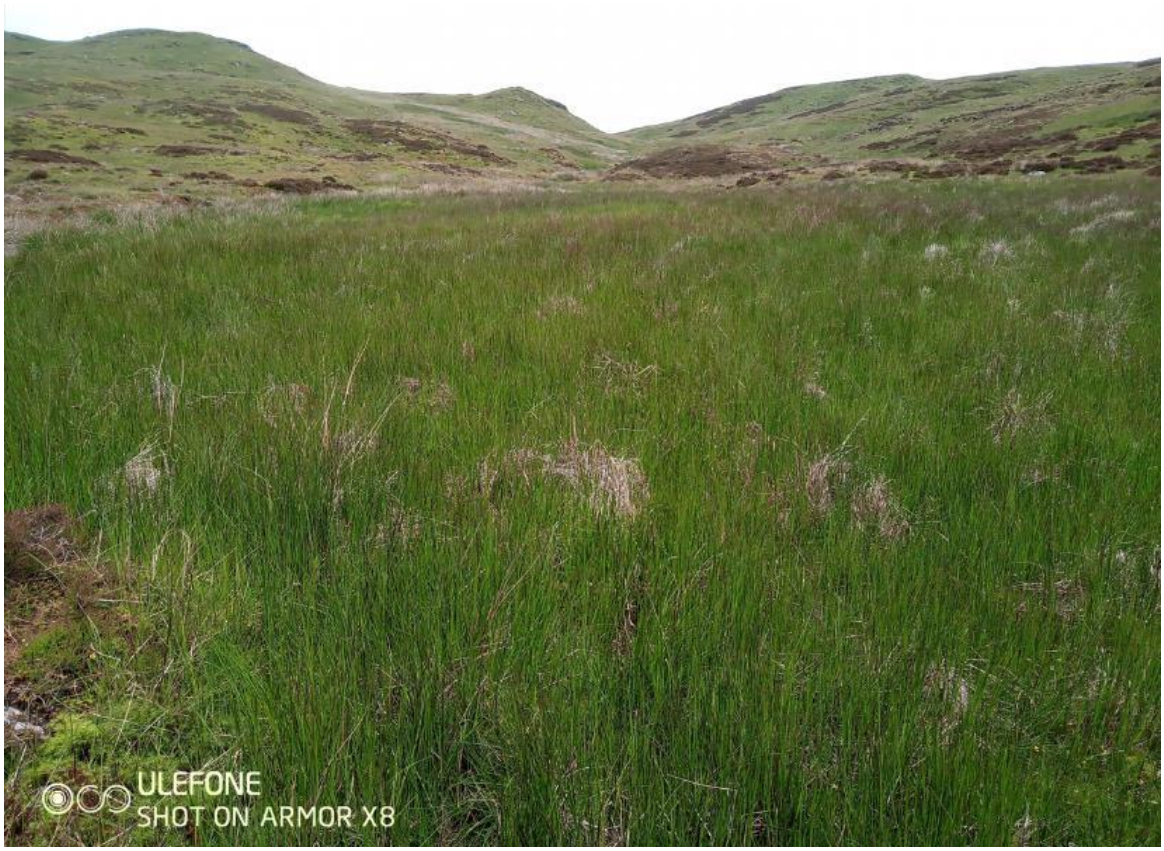


Photo C-19: Small area of M4 mire

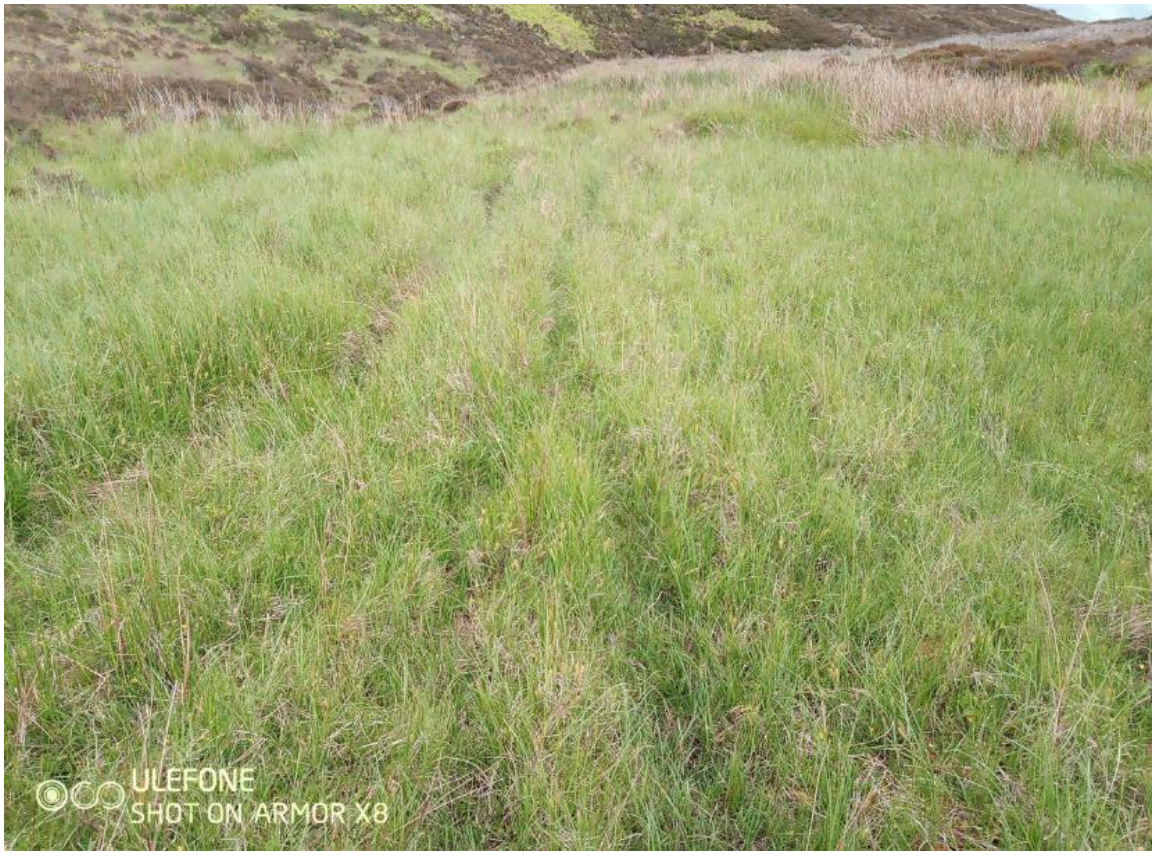
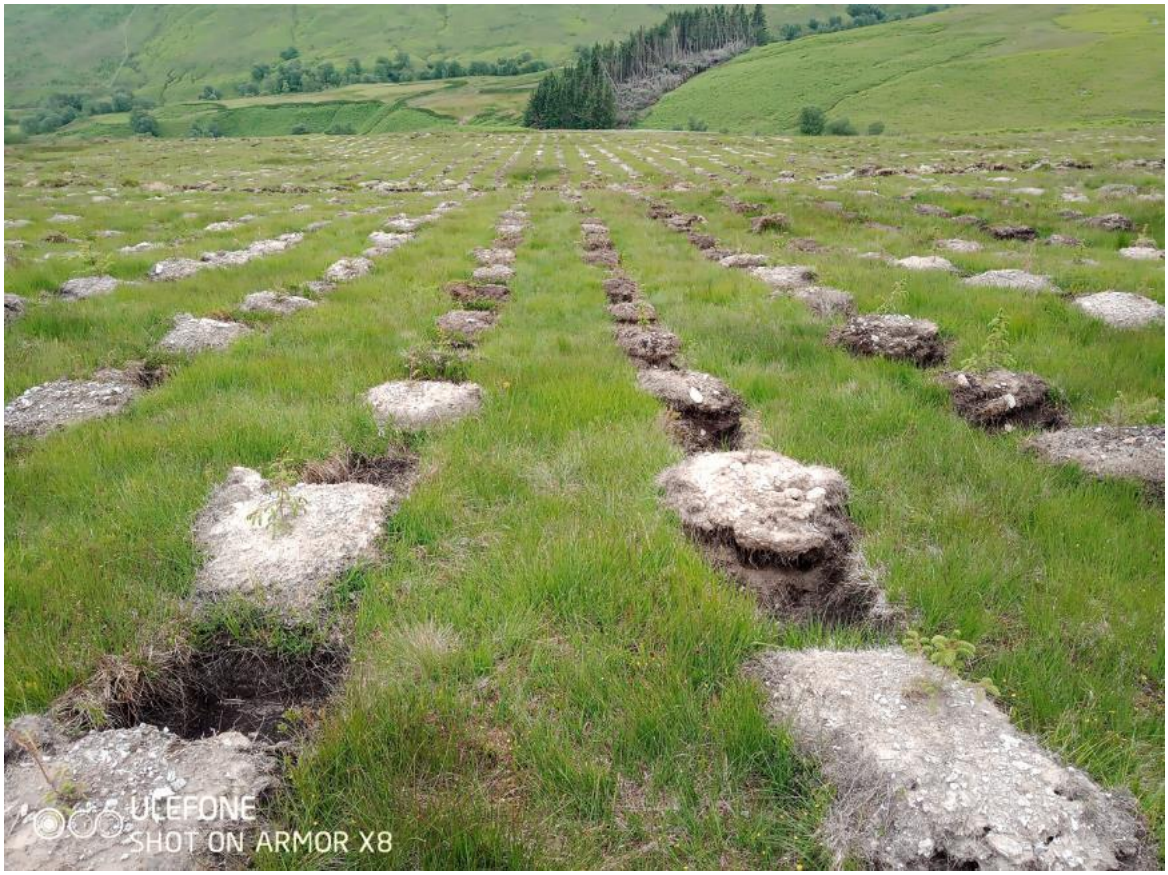


Photo C-20: Recently planted conifers in area of degraded wet heath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ANNEX D. PEATLAND CONDITION ASSESSMENT

Introduction

Following completion of NVC surveys and the identification of priority peatland communities on-site, according to NatureScot Guidance[16], further peatland condition assessment (PCA) surveys were undertaken for the Proposed Development.

Study Area

The PCA Survey Area covered areas mapped from the habitat surveys as E1.6.1 blanket bog, E1.7 wet modified bog, D2 wet dwarf shrub heath, D1.1 dry dwarf shrub heath, E2.1 acid/neutral flush, and mosaics containing these same habitat types (see **Figure 7.5** (**EIAR Volume 2**) for the area surveyed).

Sampling Strategy

Sampling and survey locations were distributed as follows:

- on a 200 m grid across the PCA Survey Area;
- a sample at each turbine location, borrow pit, or other construction or substation compounds regardless of prevailing habitat type; and
- a sample every 250 m along proposed new tracks within the PCA study area.

This resulted in the generation of a total of 330 PCA sample locations, as shown on **Figure 7.5** (EIAR Volume 2).

Survey Methodology

MacArthur Green has developed a bespoke PCA methodology to gather a range of pertinent data relating to peatland condition, taking cognisance of NatureScot's relevant guidance and template for assessment of peatlands[17], Peatland Action condition criteria and guidance[17], JNCC guidelines on the selection of biological SSSIs[18], and other likely relevant variables from professional judgement and experience.

At each sample location the following data was collected:

1. The most applicable or best-fit category of the ten Peatland Action Peatland Condition Categories[17];
2. In a 30 m sample area around the survey location the following data was collected:
    a. Presence/absence of manmade drains, if present then:
        i. Whether they are open or occluded; and

[16] https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management (accessed September 2024).
[17] https://www.nature.scot/doc/peatland-action-peat-depth-and-peat-condition-survey-guidance-and-recording-form-guidance (accessed September 2024).
[18] JNCC (1994). Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 8 Bogs. JNCC, Peterborough https://hub.jncc.gov.uk/assets/20534790-bb45-4f33-9a6c-2fe795fb48ce

ii. If they have eroded through to the underlying substrate.

b. Presence/absence of peat cutting;

c. Presence/absence of a natural surface pattern;

d. Presence/absence of wood/scrub invasion;

e. Presence/absence of Sphagna-rich ridges, if present then:

i. DAFOR[19] scale to indicate abundance.

f. Presence/absence of *Sphagnum-Betula nana* ridges;

g. Presence/absence of *Sphagnum fuscum / S. austinii* hummocks;

h. Presence/absence of peat mounds;

i. Presence/absence of *Rhynchospora fusca*;

j. Presence/absence of bog pools;

k. Presence/absence of muirburn, if present then:

i. Severity of muirburn – High, Moderate or Low.

l. Presence of bare peat in m^2 (0, 0-0.5, 0.5-2, or >2);

m. Presence/absence of peat haggs and/or gullies, if present then:

i. Is there erosion through to the underlying substrates.

n. Presence/absence of peat pans;

o. Evidence of large herbivore grazing, trampling or ground poaching;

p. Impact level of any *Calluna vulgaris*/other dwarf shrub browsing – High, Moderate or Low.

3. To determine the cover of peat forming species, or other particular indicator species, at each sample a 2 m x 2 m quadrat was sampled to determine the following:

a. Approximate percentage cover of the following species – *Calluna vulgaris, Eriophorum vaginatum, Eriophorum angustifolium, Trichophorum germanicum, Molinia caerulea, Vaccinium myrtillus, Juncus* spp., and grasses;

b. The presence/absence of *Erica tetralix, Empetrum nigrum, Vaccinium vitis-idaea, Vaccinium oxycoccos, Drosera* spp., *Rubus chamaemorus* and *Betula nana*;

c. In the basal layer the approximate percentage cover of the following – bare ground/peat, Sphagna, *Cladonia* spp. lichens, *Racomitrium lanuginosum, Polytrichum commune*, and other non-*Sphagnum* mosses; and

d. *Sphagnum* spp. present.

4. Notes – any further notes or sample location specific information relevant to peatland condition.

[19] DAFOR = **D**ominant, **A**bundant, **F**requent, **O**ccasional, **R**are.

Survey Dates

PCA surveys were undertaken from 10 June 2024 to 13 June 2024 inclusive.

Results and Discussion

Peatland Action Peatland Condition

Table D-1 details the number of survey samples that fell within each Peatland Action Condition Category recorded during surveys (N.B. only categories that were recorded are shown). The results are also displayed on **Figure 7.5** (EIAR Volume 2).

Table D-1 Peatland Action Condition Category

Peatland Action Condition Category	Number of Samples	% of Samples
Actively Eroding: Flat Bare	1	0.30
Actively Eroding: Hagg/Gully	21	6.36
Drained: Artificial	40	12.12
Drained: Hagg/Gully	50	15.15
Modified	119	36.06
N/A (not peatland)	99	30.00
TOTAL	**330**	**99.99**[20]

As can be seen from **Table D-1**, the most common peatland condition category within the Site is 'Modified'. However, collectively the drained and actively eroding categories account for a significant number of peatland samples (n = 112), indicating much of the peatland within the Site is degraded, drained or actively eroding (see also Photographs in **Annex C** above). No 'Near-natural' peatland was recorded. Further information on the nature of the peatland present.

Peatland Condition Variables

Of the 330 survey locations sampled in the PCA survey, 99 were not regarded as being present on peatland and are therefore excluded from the following analyses. Of the 231 peatland samples the following summary information has been gathered from the data:

- Manmade drains were recorded at 41 sample locations and mostly in the western part of the Survey Area, with obvious and systematic intensive historic moor grip drainage evident. Of these 41 drains, 14 were considered open and 27 were occluded. Eight of the 14 open drains were cut through to the underlying substrates.
- There is no evidence of peat cutting within the Survey Area.
- Two sample locations were considered to have a natural surface pattern (as per JNCC, (1994)).
- There is no evidence of woodland and scrub invasion.
- Sphagna-rich ridges were considered present at 178 of the 231 peatland samples. However, when present they were not abundant nor extensive, but were often comprised of a single

[20] Due to rounding, the percentage total may not add to 100%.

common species (see further analysis below regarding *Sphagnum* ssp.). In terms of abundance the following additional data was recorded at each relevant sample location using the DAFOR scale, indicating the general lack of abundant Sphagna-rich ridges:

  - Dominant – 0 samples;
  - Abundant – 11 samples;
  - Frequent – 47 samples;
  - Occasional – 68 samples; and
  - Rare – 52 samples.

- None of the following were recorded at sample locations or incidentally throughout the Survey Area - *Sphagnum-Betula nana* ridges, *Sphagnum fuscum* / *S. austinii* hummocks, peat mounds, or *Rhynchospora fusca*.
- Bog pools were recorded at 17 of the 231 peatland sample locations. As noted in **Section 5.6.1** above, rarely some isolated M2 and M3 bog pools were recorded during the NVC surveys.
- Muirburn was recorded at 32 sample locations throughout the Survey Area (one sample of High impact, 16 samples Moderate impact and 15 samples Low impact).
- Bare peat was recorded at 121 sample locations (51 samples of 0-0.5 m^2, 25 samples 0.5-2 m^2 and 45 samples >2 m^2); see also **Figure 7.6** (**EIAR Volume 2**) for distribution.
- Peat haggs and/or gully was recorded at 88 sample locations (15 samples are through to underlying substrate).
- Peat pans were recorded at six sample locations.
- Evidence of grazing, trampling or poaching by large herbivores (i.e., deer and sheep) was present throughout the Survey Area, with this impact recorded at 174 (75%) of the 231 peatland sample locations. Where *Calluna vulgaris* or other dwarf shrubs were present at a sample location (n = 164) an assessment was made as to the level of browsing impact (using several criteria contained within MacDonald *et al.* (1998)). The results indicated that grazing impact was **High** at eight samples, **Moderate** at 47 samples and **Low** at 109 samples (N.B. grazing impacts where generally high in the non-peatland samples as these areas tend to be areas of habitats such as acid grassland and dry heaths which are more suitable for grazing and tend to be preferentially grazed by livestock in comparison to peatland/bog habitats). The distribution of grazing impact levels is shown on **Figure 7.7** (**EIAR Volume 2**).

Peat Forming Vegetation & Indicator Species

Table D-2 below presents the data on certain species abundance and cover as per part 3a of the survey methodology described above; **Table D-3** summarises the data collected as part of 3b, **Table D-4** presents the information gathered as part of 3c, and **Table D-5** summarises the data collected as part of 3d of the above methodology.

The abundance and distribution of some of the key and most common peatland vascular species, i.e., *Calluna vulgaris, Eriophorum vaginatum*, *Trichophorum germanicum* and *Molinia caerulea* is shown in **Table D-2**. *Calluna vulgaris* is generally of high abundance and cover within the Site. It was recorded at 177 of 231 quadrats, with 63 quadrats recorded 50% cover or more. *Eriophorum*

vaginatum was recorded at 187 of 231 quadrats, again cover was often relatively high, with 53 quadrats with an estimated cover of 50% or more. Areas with higher abundance of *Eriophorum vaginatum* generally corresponded to the areas of M20 mire. *Trichophorum germanicum* was recorded at 98 of 231 quadrats, with 14 quadrats recorded 30% cover or more. *Molinia caerulea* was recorded at 21 of 231 quadrats. Other typical mire species such as *Eriophorum angustifolium* were generally frequently present and in low-moderate cover (**Table D-2**).

As per **Table D-3**, *Vaccinium oxycoccos* and *Betula nana* were not recorded in the Survey Area. *Drosera* spp., was only recorded at 13 quadrats (5.6% of peatland samples), with *Rubus chamaemorus* and *Vaccinium vitis-idaea* recorded at 33 and 34 quadrats (14.3% and 14.7% of peatland samples, respectively). *Empetrum nigrum* and *Erica tetralix* were more frequent across the Survey Area, being recorded at 61 and 82 quadrats (26.4% and 35.5% of peatland samples, respectively).

Figures 7.8.1 – 7.8.3 (**EIAR Volume 2**) shows the distribution and abundance of Sphagna. Sphagna are of great importance to the development and maintenance of many mires. They are often the major peat-forming species due to their high resistance to decomposer microbes (Lindsay, 1995) and they also help to create the characteristically acidic environment of mires (Clymo, 1963). They also contribute to the regulation of the water balance of a mire's surface, through the storage of water and a 'mulching' effect during dry periods with a capacity for 'bleaching' when drought-stressed which helps to reflect solar radiation (Wheeler and Shaw, 1995). Sphagna are adapted to various ecological niches, particularly in relation to the water table. For instance, *Sphagnum capillifolium* commonly grows some way above the water table and can persist in relatively dry situations, *Sphagnum papillosum* and *Sphagnum medium* grow just above the water table are indicative of better-quality mire habitat due to their low tolerance to dry conditions and requirement to be close to the water table throughout the year, and species such as *Sphagnum cuspidatum* usually grow in the water or close to it (Clymo, 1983). *Sphagnum papillosum* is the least resistant to desiccation and generally requires a persistently wet mire surface (Clymo, 1997). The presence and abundance of *Sphagnum fallax* in blanket bog can also indicate the effects of disturbance. Sphagna were recorded at 214 (92.6 %) of peatland sample locations, with the most common and abundant species being *S. capillifolium* and *S. fallax*, recorded at 62.3% and 55.0% of samples, respectively (**Table D-5**). The good mire indicator and important peat-forming species *S. papillosum* was only recorded at 27 (11.7%) of sample locations, with *Sphagnum medium* only recorded at two (0.9%) sample locations, indicating that in general the water table is too far below the surface, or not close to the surface enough of the year, for these species to thrive. Other *Sphagnum* species were of rare occurrence (**Table D-5**). Sphagna abundance was generally relatively high, with 127 quadrats (54.9%) with a 30% or more basal coverage of Sphagna, however as per above these tend to be of *S. capillifolium* and *S. fallax* and therefore more tolerant of drier conditions and disturbance. As per **Figures 7.8.1 – 7.8.3** (**EIAR Volume 2**), Sphagna abundance is lower throughout the south of the Site (where the topography is generally sloping and peatland less extensive) and is generally higher in the north of the Site, with areas of relatively higher *Sphagnum* spp. cover being found along the plateau peatland ridge around Coire an Daimh, Creag Ruadh and Meall Reamhar.

Polytrichum commune was recorded at 105 (46.8%) peatland sample locations, occasionally in relatively high cover (19 samples with 30% or more cover of *P. commune*; **Table D-4**). *Polytrichum commune* is often associated with some of disturbance and negative influences on mire vegetation, e.g., trampling or some nutrient enrichment. The cover of other non-*Sphagnum* mosses

is also generally high across the Survey Area (**Table D-4**), indicating the relatively dry surface nature of much of the mire present.

Summary

PCA surveys undertaken for the Proposed Development have shown the peatland within the Survey Area to comprise a patchwork of Modified bog along with extensive drained or actively eroding peatland (**Figures 7.5.1 – 7.5.2** (**EIAR Volume 2**)).

The various data collected, and summarised above, generally indicates the peatland on-site lacks many of the key positive or desirable indicators that would suggest the priority peatland communities present are of national interest, as per NatureScot's template for assessment of peatland provided in the respective guidance[10]. Whilst there are variable amounts of peatland with peat forming species present, there are various indicators of negative impact as well, for instance the levels of drainage and peat hagging/gulling present and active erosion, muirburn, grazing, and areas of bare peat. The PCA data collected, and the consideration of peatland condition, influencing factors, and distribution has indicated there is potential for peatland restoration measures at the Site, and the PCA has helped to inform certain proposals and prescriptions within the Outline Biodiversity Enhancement and Management Plan (OBEMP) (see **Technical Appendix 7.7** (**EIAR Volume 4**)).

Table D-2 Foliar Cover

Sample ID[21]	Sample Type[22]	*C. vulgaris*	*E. vaginatum*	*E. angustifolium*	*T. germanicum*	*M. caerulea*	*V. myrtillus*	*Juncus* spp.	Grasses
001	Grid/General Survey Area	0	0	0	0	0	0	80	5
002	Grid/General Survey Area	40	0	0	20	0	0	2	5
003	Grid/General Survey Area	0	0	0	30	0	2	0	65
004	Track	1	0	0	35	40	5	1	1
005	Track	4	0	2	50	5	0	0	2
006	Grid/General Survey Area	0	0	0	10	5	0	0	90
007	Grid/General Survey Area	0	0	30	40	0	2	0	40
008	Grid/General Survey Area	0	0	0	60	0	0	0	90
009	Track	1	0	0	5	5	0	0	5
010	Infrastructure	2	0	0	15	10	10	5	5
011	Track	2	0	2	15	10	0	5	5
012	Track	5	0	2	30	10	5	5	5
013	Grid/General Survey Area	10	0	0	15	0	0	0	85
014	Grid/General Survey Area	30	0	20	10	0	5	5	20
015	Grid/General Survey Area	0	0	0	0	0	0	60	10
016	Grid/General Survey Area	0	0	0	0	0	0	80	5
017	Grid/General Survey Area	0	0	0	0	0	0	70	10
018	Track	0	0	0	0	0	0	95	2
019	Track	0	5	0	5	5	2	20	15
020	Grid/General Survey Area	0	0	0	0	0	0	70	10
021	Grid/General Survey Area	0	0	0	0	0	0	90	5
022	Grid/General Survey Area	0	40	0	40	0	30	0	15
023	Grid/General Survey Area	0	30	10	0	0	0	40	10
024	Grid/General Survey Area	0	0	0	0	0	0	35	85
025	Track	0	0	0	0	0	0	25	25
026	Grid/General Survey Area	5	15	0	70	5	0	2	30
027	Grid/General Survey Area	0	80	5	0	0	0	0	15
028	Grid/General Survey Area	0	0	0	0	0	0	80	0
029	Grid/General Survey Area	0	5	0	0	0	0	60	20
030	Track	0	20	0	0	0	0	60	10
031	Grid/General Survey Area	2	60	5	0	0	0	10	15
032	Grid/General Survey Area	0	40	10	35	0	0	0	5
033	Grid/General Survey Area	5	20	60	5	0	0	0	20

[21] Sample ID can be cross-referenced to **Figure 7.5 (EIAR Volume 2**) for location.

[22] The sample type refers to whether the survey location was a grid/general Survey Area sample or specific to an infrastructure location, such as turbine, track, or other ancillary infrastructure.

Sample ID[21]	Sample Type[22]	*C. vulgaris*	*E. vaginatum*	*E. angustifolium*	*T. germanicum*	*M. caerulea*	*V. myrtillus*	*Juncus* spp.	Grasses
034	Track	0	75	0	10	0	0	0	10
035	Grid/General Survey Area	0	15	5	0	0	0	60	10
036	Grid/General Survey Area	0	65	0	0	0	0	5	10
037	Grid/General Survey Area	0	50	2	0	0	0	0	15
038	Grid/General Survey Area	0	70	5	0	0	0	5	10
039	Grid/General Survey Area	0	0	0	0	0	0	5	80
040	Grid/General Survey Area	0	75	0	15	0	3	0	15
041	Grid/General Survey Area	0	40	40	20	0	0	0	10
042	Grid/General Survey Area	2	70	5	10	0	0	2	10
043	Grid/General Survey Area	0	0	0	30	0	0	60	30
044	Grid/General Survey Area	0	0	0	0	0	0	80	0
045	Grid/General Survey Area	0	70	1	5	0	0	10	10
046	Grid/General Survey Area	0	55	5	0	0	0	10	10
047	Grid/General Survey Area	0	45	5	0	0	0	5	5
048	Grid/General Survey Area	0	30	10	0	0	0	15	10
049	Grid/General Survey Area	0	20	60	5	0	0	0	10
050	Grid/General Survey Area	0	0	0	0	0	0	5	95
051	Grid/General Survey Area	0	0	0	0	0	5	0	90
052	Grid/General Survey Area	2	0	0	0	0	10	5	10
053	Grid/General Survey Area	5	35	0	10	0	5	2	1
054	Grid/General Survey Area	0	75	5	3	0	5	0	5
055	Grid/General Survey Area	0	60	0	20	0	5	0	10
056	Grid/General Survey Area	0	40	2	40	0	1	3	40
057	Grid/General Survey Area	0	80	0	0	0	5	0	3
058	Grid/General Survey Area	0	35	1	10	2	0	12	15
059	Grid/General Survey Area	0	40	2	0	0	15	25	5
060	Grid/General Survey Area	5	60	2	0	0	0	0	15
061	Grid/General Survey Area	15	20	2	0	0	45	2	5
062	Track	2	70	1	30	0	2	0	10
063	Infrastructure	0	70	0	2	0	5	1	10
064	Turbine	1	55	0	2	0	25	0	5
065	Track	5	70	10	5	0	0	0	5
066	Grid/General Survey Area	5	70	10	0	0	0	0	5
067	Grid/General Survey Area	5	60	5	5	0	0	0	0
068	Grid/General Survey Area	0	10	20	10	0	0	30	5
069	Grid/General Survey Area	30	70	0	5	0	0	2	5
070	Grid/General Survey Area	20	0	0	0	0	60	2	5
071	Grid/General Survey Area	5	20	1	30	0	2	0	0
072	Grid/General Survey Area	2	10	50	15	0	0	0	0

Sample ID[21]	Sample Type[22]	*C. vulgaris*	*E. vaginatum*	*E. angustifolium*	*T. germanicum*	*M. caerulea*	*V. myrtillus*	*Juncus* spp.	Grasses
073	Grid/General Survey Area	5	40	5	30	0	0	0	2
074	Grid/General Survey Area	5	60	0	0	0	0	2	2
075	Grid/General Survey Area	12	25	0	15	0	4	0	20
076	Grid/General Survey Area	2	50	1	2	0	0	8	15
077	Grid/General Survey Area	40	10	2	5	0	10	0	5
078	Grid/General Survey Area	30	15	0	0	0	5	0	15
079	Track	20	65	0	4	0	0	0	0
080	Grid/General Survey Area	60	10	0	0	0	5	0	5
081	Grid/General Survey Area	85	0	0	0	0	2	0	10
082	Grid/General Survey Area	40	60	0	0	0	10	5	5
083	Grid/General Survey Area	2	45	2	0	0	50	5	10
084	Grid/General Survey Area	30	0	0	0	0	50	0	85
085	Grid/General Survey Area	0	0	0	0	0	0	30	90
086	Grid/General Survey Area	5	75	10	15	0	0	0	2
087	Grid/General Survey Area	5	70	5	0	0	1	5	5
088	Grid/General Survey Area	25	55	0	5	0	0	0	0
089	Grid/General Survey Area	10	15	0	2	0	10	1	5
090	Grid/General Survey Area	5	60	4	5	0	0	1	16
091	Grid/General Survey Area	0	0	0	0	0	0	70	10
092	Grid/General Survey Area	5	15	2	3	0	0	2	5
093	Grid/General Survey Area	2	0	0	0	2	0	25	5
094	Grid/General Survey Area	0	0	0	10	0	0	10	95
095	Grid/General Survey Area	90	0	0	0	0	10	0	60
096	Grid/General Survey Area	40	0	0	0	0	30	0	90
097	Grid/General Survey Area	90	0	0	2	0	60	0	10
098	Grid/General Survey Area	0	0	0	0	0	0	90	40
099	Grid/General Survey Area	3	0	0	0	0	55	4	30
100	Grid/General Survey Area	0	0	0	0	0	0	75	10
101	Grid/General Survey Area	60	0	0	0	0	60	5	30
102	Grid/General Survey Area	0	90	0	1	1	1	1	0
103	Grid/General Survey Area	5	35	1	2	0	0	0	4
104	Grid/General Survey Area	50	10	0	0	2	1	1	30
105	Grid/General Survey Area	0	25	0	0	0	10	15	15
106	Grid/General Survey Area	0	40	0	0	0	60	0	5
107	Track	0	80	0	0	2	0	0	5
108	Turbine	0	30	5	0	0	1	0	10
109	Grid/General Survey Area	30	0	0	0	0	2	1	60
110	Grid/General Survey Area	80	0	0	0	0	3	1	5
111	Grid/General Survey Area	30	0	0	0	0	0	20	40

Sample ID[21]	Sample Type[22]	*C. vulgaris*	*E. vaginatum*	*E. angustifolium*	*T. germanicum*	*M. caerulea*	*V. myrtillus*	*Juncus* spp.	Grasses
112	Grid/General Survey Area	70	0	0	0	0	30	0	20
113	Grid/General Survey Area	2	20	10	40	0	0	5	10
114	Grid/General Survey Area	8	85	1	0	0	0	1	0
115	Grid/General Survey Area	20	10	0	5	12	0	0	10
116	Grid/General Survey Area	3	45	0	0	0	0	0	20
117	Turbine	55	25	0	0	0	2	1	5
118	Infrastructure	40	25	2	5	0	0	1	4
119	Grid/General Survey Area	80	0	0	0	0	2	0	10
120	Grid/General Survey Area	70	0	0	0	0	50	0	5
121	Grid/General Survey Area	15	30	5	0	0	0	5	2
122	Grid/General Survey Area	10	60	1	10	0	0	0	0
123	Grid/General Survey Area	15	35	0	5	0	1	2	3
124	Grid/General Survey Area	25	3	0	0	0	10	8	35
125	Infrastructure	25	15	2	5	1	0	2	3
126	Grid/General Survey Area	2	0	0	0	0	10	0	90
127	Grid/General Survey Area	50	0	0	0	0	4	0	40
128	Grid/General Survey Area	35	0	0	0	0	0	0	60
129	Grid/General Survey Area	10	50	10	0	0	5	0	10
130	Grid/General Survey Area	70	15	0	2	0	1	0	0
131	Grid/General Survey Area	15	20	0	0	2	2	5	20
132	Grid/General Survey Area	50	2	0	0	1	4	8	15
133	Track	10	15	5	5	0	0	20	0
134	Turbine	60	20	0	0	0	4	0	0
135	Turbine	65	20	0	0	0	5	0	0
136	Turbine	65	15	0	3	0	2	3	0
137	Grid/General Survey Area	40	0	0	0	0	0	0	60
138	Grid/General Survey Area	80	0	0	0	0	10	0	3
139	Grid/General Survey Area	65	20	0	2	0	2	0	0
140	Grid/General Survey Area	55	35	0	0	0	1	5	0
141	Grid/General Survey Area	3	0	0	0	0	75	15	2
142	Grid/General Survey Area	75	20	1	0	0	3	0	0
143	Grid/General Survey Area	65	30	1	0	0	5	0	0
144	Grid/General Survey Area	10	25	2	0	2	0	3	2
145	Grid/General Survey Area	10	40	2	10	0	0	0	0
146	Turbine	55	10	1	0	0	10	3	0
147	Turbine	0	0	0	0	0	0	75	5
148	Grid/General Survey Area	70	0	0	0	0	0	0	40
149	Grid/General Survey Area	60	0	0	0	0	25	5	10
150	Grid/General Survey Area	30	40	0	0	0	10	0	0

Sample ID[21]	Sample Type[22]	*C. vulgaris*	*E. vaginatum*	*E. angustifolium*	*T. germanicum*	*M. caerulea*	*V. myrtillus*	*Juncus* spp.	Grasses
151	Grid/General Survey Area	75	10	0	0	0	15	1	0
152	Grid/General Survey Area	65	0	0	0	0	20	5	5
153	Grid/General Survey Area	80	0	0	0	0	5	2	0
154	Grid/General Survey Area	20	50	0	1	0	15	0	0
155	Grid/General Survey Area	25	40	2	0	0	0	0	0
156	Grid/General Survey Area	60	30	0	0	0	15	0	0
157	Grid/General Survey Area	25	35	0	20	0	0	0	0
158	Turbine	85	0	0	0	0	3	1	0
159	Turbine	0	5	1	0	0	0	0	90
160	Turbine	70	40	2	0	0	0	5	0
161	Infrastructure	65	30	2	0	0	10	0	0
162	Infrastructure	55	50	5	0	0	10	0	0
163	Grid/General Survey Area	95	0	0	0	0	20	0	0
164	Grid/General Survey Area	10	0	0	0	0	0	15	25
165	Grid/General Survey Area	55	0	0	0	0	35	0	0
166	Grid/General Survey Area	85	0	0	0	0	15	0	0
167	Grid/General Survey Area	60	0	5	0	0	0	15	0
168	Grid/General Survey Area	40	0	5	0	0	5	40	0
169	Grid/General Survey Area	40	40	25	0	0	5	2	0
170	Grid/General Survey Area	50	55	5	0	0	0	0	0
171	Grid/General Survey Area	60	25	1	5	0	5	20	0
172	Grid/General Survey Area	40	0	0	0	0	20	10	40
173	Track	40	10	2	0	0	0	0	0
174	Grid/General Survey Area	25	0	2	5	0	0	0	30
175	Grid/General Survey Area	20	0	5	3	0	0	0	5
176	Grid/General Survey Area	50	0	0	0	0	0	0	0
177	Grid/General Survey Area	90	0	0	0	0	10	0	0
178	Grid/General Survey Area	55	30	0	0	0	0	0	0
179	Grid/General Survey Area	60	20	2	0	0	0	30	5
180	Grid/General Survey Area	60	15	20	0	0	0	0	0
181	Grid/General Survey Area	95	0	1	0	0	10	2	0
182	Grid/General Survey Area	50	25	2	0	0	10	1	2
183	Grid/General Survey Area	40	45	1	0	0	1	0	0
184	Grid/General Survey Area	65	0	10	15	0	1	5	0
185	Grid/General Survey Area	70	25	1	0	0	15	0	0
186	Grid/General Survey Area	75	35	1	0	0	20	0	0
187	Track	50	20	15	0	0	2	0	0
188	Turbine	15	40	1	0	0	1	0	0
189	Track	0	0	0	0	0	0	75	5

Sample ID[21]	Sample Type[22]	*C. vulgaris*	*E. vaginatum*	*E. angustifolium*	*T. germanicum*	*M. caerulea*	*V. myrtillus*	*Juncus* spp.	Grasses
190	Track	50	40	2	0	0	0	0	0
191	Grid/General Survey Area	15	5	20	3	0	0	2	10
192	Grid/General Survey Area	15	0	0	0	0	0	0	70
193	Grid/General Survey Area	5	5	15	2	0	0	3	10
194	Grid/General Survey Area	8	5	3	0	0	0	2	2
195	Grid/General Survey Area	12	15	8	12	0	0	2	5
196	Grid/General Survey Area	40	8	2	1	0	0	1	1
197	Grid/General Survey Area	60	12	2	0	0	0	2	2
198	Grid/General Survey Area	50	20	2	3	0	0	5	4
199	Grid/General Survey Area	20	5	8	2	0	0	0	3
200	Grid/General Survey Area	30	50	0	0	0	5	0	0
201	Grid/General Survey Area	70	25	1	0	0	10	0	0
202	Turbine	75	0	15	1	0	5	0	0
203	Infrastructure	95	0	0	0	0	2	2	1
204	Grid/General Survey Area	50	0	2	0	0	2	0	40
205	Grid/General Survey Area	65	0	0	0	0	10	1	30
206	Grid/General Survey Area	60	0	0	0	0	0	3	30
207	Grid/General Survey Area	25	3	5	5	0	0	10	2
208	Grid/General Survey Area	0	1	0	0	0	0	65	1
209	Grid/General Survey Area	0	1	0	0	0	0	20	2
210	Grid/General Survey Area	65	2	5	0	0	0	0	0
211	Grid/General Survey Area	20	18	0	0	0	0	0	2
212	Turbine	25	0	2	20	0	0	5	10
213	Infrastructure	15	20	8	0	0	4	0	3
214	Infrastructure	3	2	18	10	0	0	12	15
215	Grid/General Survey Area	2	0	0	0	0	0	2	60
216	Grid/General Survey Area	25	0	0	0	0	12	0	1
217	Grid/General Survey Area	5	1	0	0	0	75	2	2
218	Grid/General Survey Area	35	15	0	2	0	8	10	3
219	Grid/General Survey Area	12	10	4	0	2	1	1	3
220	Grid/General Survey Area	5	3	0	0	0	12	1	3
221	Grid/General Survey Area	30	0	1	0	0	12	1	2
222	Grid/General Survey Area	65	3	0	0	0	2	3	20
223	Grid/General Survey Area	70	1	1	0	0	8	0	1
224	Infrastructure	10	5	2	0	0	1	2	1
225	Infrastructure	20	12	1	8	0	2	2	4
226	Grid/General Survey Area	95	0	0	0	0	10	0	0
227	Grid/General Survey Area	60	0	0	0	0	5	5	
228	Grid/General Survey Area	35	45	0	10	0	0	10	0

Sample ID[21]	Sample Type[22]	*C. vulgaris*	*E. vaginatum*	*E. angustifolium*	*T. germanicum*	*M. caerulea*	*V. myrtillus*	*Juncus* spp.	Grasses
229	Grid/General Survey Area	20	0	0	0	0	70	5	0
230	Grid/General Survey Area	60	50	5	0	0	0	0	0
231	Grid/General Survey Area	85	0	0	0	0	2	0	0
232	Grid/General Survey Area	70	35	0	0	0	10	0	0
233	Grid/General Survey Area	70	0	0	0	0	10	0	3
234	Grid/General Survey Area	25	0	0	0	3	5	1	40
235	Infrastructure	2	1	0	0	0	10	0	1
236	Turbine	25	15	3	10	0	5	0	2
237	Track	15	50	0	25	0	0	0	0
238	Turbine	50	40	5	0	0	0	0	0
239	Grid/General Survey Area	15	70	0	5	0	0	0	0
240	Grid/General Survey Area	60	5	0	10	0	2	45	0
241	Grid/General Survey Area	90	0	0	0	0	10	0	55
242	Grid/General Survey Area	0	0	0	0	0	0	80	20
243	Grid/General Survey Area	65	0	2	0	0	15	2	20
244	Grid/General Survey Area	60	0	0	0	0	10	0	20
245	Grid/General Survey Area	55	40	5	0	0	0	0	0
246	Grid/General Survey Area	100	0	0	0	0	5	0	0
247	Grid/General Survey Area	60	5	45	0	0	0	0	0
248	Grid/General Survey Area	15	0	0	0	0	15	3	3
249	Grid/General Survey Area	25	1	1	1	0	5	0	30
250	Track	20	0	0	0	0	30	0	50
251	Turbine	20	70	0	0	0	0	5	0
252	Infrastructure	35	0	0	0	2	3	10	40
253	Track	60	40	5					
254	Track	70	40	0	5	0	2	0	0
255	Track	45	70	0	0	0	5	0	0
256	Turbine	50	55	5	2	0	0	0	0
257	Grid/General Survey Area	25	0	0	0	0	0	0	15
258	Grid/General Survey Area	100	0	0	0	0	5	0	0
259	Grid/General Survey Area	40	0	0	0	0	10	5	40
260	Grid/General Survey Area	70	0	0	0	0	10	0	0
261	Grid/General Survey Area	60	40	5	0	0	0	0	0
262	Grid/General Survey Area	55	30	5	0	0	2	0	0
263	Grid/General Survey Area	35	0	40	0	0	0	5	0
264	Grid/General Survey Area	50	50	0	0	0	2	0	0
265	Grid/General Survey Area	85	0	0	0	0	5	0	0
266	Grid/General Survey Area	95	0	0	0	0	3	0	0
267	Turbine	90	0	0	0	0	4	1	0

Sample ID[21]	Sample Type[22]	*C. vulgaris*	*E. vaginatum*	*E. angustifolium*	*T. germanicum*	*M. caerulea*	*V. myrtillus*	*Juncus* spp.	Grasses
268	Infrastructure	25	40	1	2	0	2	1	3
269	Grid/General Survey Area	8	0	0	0	0	20	2	30
270	Grid/General Survey Area	15	0	0	0	0	2	10	40
271	Grid/General Survey Area	70	5	0	0	0	6	2	5
272	Grid/General Survey Area	50	30	0	1	0	6	0	1
273	Grid/General Survey Area	55	35	0	0	0	2	0	0
274	Grid/General Survey Area	95	0	0	0	0	6	0	1
275	Turbine	85	0	0	0	0	2	4	0
276	Grid/General Survey Area	10	0	0	0	0	5	5	70
277	Grid/General Survey Area	65	0	0	0	0	12	5	15
278	Grid/General Survey Area	3	0	0	0	0	35	0	5
279	Grid/General Survey Area	3	35	1	0	0	20	2	5
280	Grid/General Survey Area	35	25	0	3	0	2	0	5
281	Grid/General Survey Area	2	0	1	2	0	0	0	5
282	Grid/General Survey Area	5	0	0	0	0	20	0	3
283	Grid/General Survey Area	50	0	0	0	0	10	0	30
284	Grid/General Survey Area	70	15	0	0	0	10	0	2
285	Grid/General Survey Area	5	35	5	3	2	0	5	5
286	Grid/General Survey Area	25	0	0	0	0	20	5	20
287	Grid/General Survey Area	5	0	0	0	10	0	45	25
288	Grid/General Survey Area	15	20	1	2	0	3	0	3
289	Grid/General Survey Area	15	25	3	8	0	0	0	2
290	Grid/General Survey Area	15	10	3	3	4	0	12	35
291	Grid/General Survey Area	0	0	0	0	0	0	2	80
292	Grid/General Survey Area	60	0	0	0	0	10	0	25
293	Grid/General Survey Area	2	0	0	0	0	20	0	1
294	Grid/General Survey Area	90	0	0	0	0	2	0	4
295	Grid/General Survey Area	25	3	0	0	0	1	1	20
296	Grid/General Survey Area	75	1	0	0	0	0	5	2
297	Grid/General Survey Area	50	0	10	0	0	0	3	15
298	Grid/General Survey Area	5	0	0	0	0	40	2	20
299	Grid/General Survey Area	10	15	2	12	0	0	20	5
300	Grid/General Survey Area	40	0	0	0	0	30	0	70
301	Grid/General Survey Area	40	50	0	0	0	10	0	0
302	Grid/General Survey Area	60	20	5	5	0	0	0	0
303	Grid/General Survey Area	15	0	0	0	0	0	0	95
304	Grid/General Survey Area	60	50	0	0	0	10	0	10
305	Grid/General Survey Area	50	0	0	0	0	0	2	5
306	Grid/General Survey Area	40	80	10	0	0	0	0	0

Sample ID[21]	Sample Type[22]	*C. vulgaris*	*E. vaginatum*	*E. angustifolium*	*T. germanicum*	*M. caerulea*	*V. myrtillus*	*Juncus* spp.	Grasses
307	Grid/General Survey Area	30	60	5	0	0	5	0	5
308	Grid/General Survey Area	80	0	0	0	0	5	0	70
309	Grid/General Survey Area	50	60	0	0	0	2	0	3
310	Grid/General Survey Area	40	70	0	0	0	0	0	0
311	Grid/General Survey Area	10	15	4	5	0	0	5	10
312	Grid/General Survey Area	5	0	0	0	0	15	0	2
313	Grid/General Survey Area	12	35	5	3	0	2	0	10
314	Grid/General Survey Area	60	0	0	0	0	25	0	1
315	Grid/General Survey Area	75	0	1	0	0	10	0	1
316	Grid/General Survey Area	70	40	0	0	0	0	0	10
317	Grid/General Survey Area	5	2	4	1	0	0	3	10
318	Grid/General Survey Area	25	30	2	3	0	5	0	3
319	Grid/General Survey Area	0	0	0	4	0	3	60	25
320	Grid/General Survey Area	2	0	0	0	0	5	0	3
321	Grid/General Survey Area	30	30	1	4	0	5	0	2
322	Grid/General Survey Area	20	35	1	3	0	8	1	2
323	Grid/General Survey Area	45	0	0	0	0	30	0	55
324	Grid/General Survey Area	40	0	0	0	0	45	5	40
325	Grid/General Survey Area	50	55	0	0	0	10	2	0
326	Grid/General Survey Area	70	0	10	0	0	0	15	15
327	Grid/General Survey Area	75	0	0	0	0	5	0	0
328	Grid/General Survey Area	60	50	0	0	0	5	0	0
329	Grid/General Survey Area	75	0	0	0	0	25	0	10
330	Grid/General Survey Area	75	6	0	0	0	10	1	0

Table D-3 Other Peatland Species Presence/Absence[23]

Species	No. Samples Present	No. Samples Absent
Erica tetralix	82	149
Empetrum nigrum	61	170
Vaccinium vitis-idaea	34	197
Vaccinium oxycoccos	0	231
Drosera spp.	13	218
Rubus chamaemorus	33	198
Betula nana	0	231

Table D-4 Basal Cover

Sample ID[21]	Sample Type[22]	Bare ground /peat	Sphagna	*Cladonia* spp. lichens	*Racomitrium lanuginosum*	*Polytrichum commune*	Other Non-Sphagnum mosses
001	Grid/General Survey Area	0	70	0	0	0	5
002	Grid/General Survey Area	0	60	0	0	0	10
003	Grid/General Survey Area	0	30	0	0	0	70
004	Track	0	10	0	0	1	1
005	Track	10	15	0	0	0	5
006	Grid/General Survey Area	0	0	0	0	0	70
007	Grid/General Survey Area	0	40	0	0	0	20
008	Grid/General Survey Area	0	0	0	0	0	10
009	Track	5	2	2	0	0	20
010	Infrastructure	30	0	0	0	0	5
011	Track	0	8	0	0	0	15
012	Track	0	10	0	0	0	5
013	Grid/General Survey Area	0	0	0	0	0	60
014	Grid/General Survey Area	0	15	0	0	10	60
015	Grid/General Survey Area	0	80	0	0	60	10
016	Grid/General Survey Area	0	50	0	0	70	10
017	Grid/General Survey Area	0	15	0	0	90	20
018	Track	10	0	0	0	0	0
019	Track	15	0	0	0	25	5

[23] Only peatland samples included (n = 231).

Sample ID[21]	Sample Type[22]	Bare ground /peat	Sphagna	*Cladonia* spp. lichens	*Racomitrium lanuginosum*	*Polytrichum commune*	Other Non-Sphagnum mosses
020	Grid/General Survey Area	0	70	0	0	0	20
021	Grid/General Survey Area	0	60	0	0	0	80
022	Grid/General Survey Area	0	15	0	0	5	90
023	Grid/General Survey Area	0	60	0	0	70	10
024	Grid/General Survey Area	0	0	0	0	70	30
025	Track	20	0	0	0	40	20
026	Grid/General Survey Area	0	20	0	0	0	60
027	Grid/General Survey Area	0	60	0	0	15	70
028	Grid/General Survey Area	0	90	0	0	0	0
029	Grid/General Survey Area	0	80	0	0	20	20
030	Track	0	70	0	0	0	20
031	Grid/General Survey Area	0	40	0	0	70	60
032	Grid/General Survey Area	0	60	0	0	0	20
033	Grid/General Survey Area	0	20	0	0	0	20
034	Track	0	30	0	0	20	30
035	Grid/General Survey Area	0	80	0	0	0	10
036	Grid/General Survey Area	0	25	0	0	15	70
037	Grid/General Survey Area	0	5	0	0	35	5
038	Grid/General Survey Area	0	66	0	0	0	60
039	Grid/General Survey Area	0	0	0	0	5	75
040	Grid/General Survey Area	0	5	0	0	2	80
041	Grid/General Survey Area	0	70	0	0	15	5
042	Grid/General Survey Area	0	40	0	0	60	40
043	Grid/General Survey Area	0	75	0	0	25	55
044	Grid/General Survey Area	0	75	0	0	70	0
045	Grid/General Survey Area	0	60	0	0	25	15
046	Grid/General Survey Area	5	25	0	0	2	20
047	Grid/General Survey Area	0	15	0	0	35	30
048	Grid/General Survey Area	0	45	0	0	20	15
049	Grid/General Survey Area	0	30	0	0	0	20
050	Grid/General Survey Area	0	0	0	0	0	30
051	Grid/General Survey Area	0	0	0	0	20	60
052	Grid/General Survey Area	0	5	0	0	40	60
053	Grid/General Survey Area	0	40	0	0	10	20
054	Grid/General Survey Area	0	70	0	0	5	40
055	Grid/General Survey Area	0	80	0	0	20	0
056	Grid/General Survey Area	0	2	0	0	30	5
057	Grid/General Survey Area	0	40	0	0	30	5
058	Grid/General Survey Area	0	20	0	0	25	15

Sample ID[21]	Sample Type[22]	Bare ground /peat	Sphagna	*Cladonia* spp. lichens	*Racomitrium lanuginosum*	*Polytrichum commune*	Other Non-Sphagnum mosses
059	Grid/General Survey Area	0	65	0	0	10	20
060	Grid/General Survey Area	0	20	0	0	35	15
061	Grid/General Survey Area	0	55	0	0	2	25
062	Track	5	30	2	0	0	2
063	Infrastructure	0	30	0	0	0	20
064	Turbine	0	5	0	0	10	45
065	Track	0	70	0	0	5	5
066	Grid/General Survey Area	0	30	0	0	10	60
067	Grid/General Survey Area	0	0	0	0	0	0
068	Grid/General Survey Area	5	60	0	0	5	0
069	Grid/General Survey Area	5	20	0	0	0	40
070	Grid/General Survey Area	0	5	0	0	75	60
071	Grid/General Survey Area	0	50	0	0	2	10
072	Grid/General Survey Area	60	5	2	0	0	5
073	Grid/General Survey Area	20	10	2	5	0	2
074	Grid/General Survey Area	0	3	0	0	2	15
075	Grid/General Survey Area	0	15	0	0	2	60
076	Grid/General Survey Area	0	30	0	0	0	25
077	Grid/General Survey Area	0	40	0	0	2	30
078	Grid/General Survey Area	0	2	0	0	15	40
079	Track	0	10	2	5	0	0
080	Grid/General Survey Area	0	80	0	0	20	20
081	Grid/General Survey Area	0	0	0	0	0	90
082	Grid/General Survey Area	0	60	0	0	0	60
083	Grid/General Survey Area	0	5	0	0	10	70
084	Grid/General Survey Area	0	0	0	0	20	40
085	Grid/General Survey Area	0	0	0	0	0	20
086	Grid/General Survey Area	0	10	0	0	0	5
087	Grid/General Survey Area	0	10	0	0	2	2
088	Grid/General Survey Area	2	40	2	15	0	5
089	Grid/General Survey Area	0	75	0	0	10	15
090	Grid/General Survey Area	0	85	0	0	10	5
091	Grid/General Survey Area	0	60	0	0	15	20
092	Grid/General Survey Area	0	35	0	0	2	0
093	Grid/General Survey Area	0	75	0	0	10	15
094	Grid/General Survey Area	0	0	0	0	0	70
095	Grid/General Survey Area	0	0	0	0	0	60
096	Grid/General Survey Area	0	0	0	0	0	70
097	Grid/General Survey Area	0	0	0	0	5	85

Sample ID[21]	Sample Type[22]	Bare ground /peat	Sphagna	*Cladonia* spp. lichens	*Racomitrium lanuginosum*	*Polytrichum commune*	Other Non-Sphagnum mosses
098	Grid/General Survey Area	0	90	0	0	0	10
099	Grid/General Survey Area	0	0	0	0	2	80
100	Grid/General Survey Area	0	90	0	0	0	10
101	Grid/General Survey Area	0	0	0	0	0	30
102	Grid/General Survey Area	2	10	0	0	10	2
103	Grid/General Survey Area	0	90	0	0	10	0
104	Grid/General Survey Area	0	20	0	0	15	45
105	Grid/General Survey Area	0	20	0	0	20	40
106	Grid/General Survey Area	0	10	0	0	15	55
107	Track	0	1	0	0	90	2
108	Turbine	0	40	0	0	30	10
109	Grid/General Survey Area	0	0	0	0	0	60
110	Grid/General Survey Area	0	0	0	0	0	50
111	Grid/General Survey Area	0	0	0	0	0	15
112	Grid/General Survey Area	0	0	0	0	2	70
113	Grid/General Survey Area	0	20	0	0	0	0
114	Grid/General Survey Area	2	10	0	0	5	2
115	Grid/General Survey Area	0	30	0	0	0	50
116	Grid/General Survey Area	0	45	0	0	10	40
117	Turbine	0	85	0	0	0	10
118	Infrastructure	0	70	1	0	0	20
119	Grid/General Survey Area	0	0	0	0	0	60
120	Grid/General Survey Area	0	0	0	0	0	90
121	Grid/General Survey Area	0	70	0	0	5	0
122	Grid/General Survey Area	2	80	1	0	0	0
123	Grid/General Survey Area	0	80	2	0	0	10
124	Grid/General Survey Area	0	0	0	0	15	70
125	Infrastructure	0	85	0	0	5	5
126	Grid/General Survey Area	0	0	0	0	0	25
127	Grid/General Survey Area	0	0	0	0	0	35
128	Grid/General Survey Area	0	0	0	0	0	35
129	Grid/General Survey Area	0	35	0	0	5	30
130	Grid/General Survey Area	0	10	0	0	0	20
131	Grid/General Survey Area	0	15	0	0	15	60
132	Grid/General Survey Area	2	5	0	0	10	70
133	Track	0	60	0	0	0	2
134	Turbine	0	5	0	0	0	70
135	Turbine	0	3	0	0	0	30
136	Turbine	2	10	2	0	0	50

Sample ID[21]	Sample Type[22]	Bare ground /peat	Sphagna	*Cladonia* spp. lichens	*Racomitrium lanuginosum*	*Polytrichum commune*	Other Non-Sphagnum mosses
137	Grid/General Survey Area	0	0	0	0	0	45
138	Grid/General Survey Area	0	0	0	0	0	50
139	Grid/General Survey Area	0	5	0	0	0	10
140	Grid/General Survey Area	0	50	0	0	0	2
141	Grid/General Survey Area	3	0	0	0	0	70
142	Grid/General Survey Area	0	5	0	0	0	30
143	Grid/General Survey Area	0	30	0	0	1	20
144	Grid/General Survey Area	0	30	0	0	0	5
145	Grid/General Survey Area	0	40	0	0	0	10
146	Turbine	0	5	0	0	0	60
147	Turbine	0	80	0	0	0	0
148	Grid/General Survey Area	0	0	0	0	0	65
149	Grid/General Survey Area	0	0	0	0	0	25
150	Grid/General Survey Area	0	25	1	0	0	30
151	Grid/General Survey Area	0	3	0	0	0	65
152	Grid/General Survey Area	0	0	0	0	0	50
153	Grid/General Survey Area	3	0	2	0	0	65
154	Grid/General Survey Area	3	10	0	0	0	20
155	Grid/General Survey Area	0	30	0	0	2	10
156	Grid/General Survey Area	0	1	1	0	0	90
157	Grid/General Survey Area	0	75	0	0	0	1
158	Turbine	0	0	1	0	0	20
159	Turbine	0	3	0	0	0	25
160	Turbine	2	45	0	0	0	30
161	Infrastructure	0	45	0	0	0	35
162	Infrastructure	2	5	1	3	0	50
163	Grid/General Survey Area	0	0	0	0	0	90
164	Grid/General Survey Area	50	0	0	0	0	10
165	Grid/General Survey Area	25	0	0	0	0	75
166	Grid/General Survey Area	0	85	0	0	0	10
167	Grid/General Survey Area	0	45	0	0	0	40
168	Grid/General Survey Area	30	30	0	0	0	25
169	Grid/General Survey Area	5	30	1	0	0	65
170	Grid/General Survey Area	0	50	1	0	0	35
171	Grid/General Survey Area	0	45	1	0	0	50
172	Grid/General Survey Area	0	0	0	0	5	65
173	Track	0	45	0	0	0	10
174	Grid/General Survey Area	5	0	0	0	0	55
175	Grid/General Survey Area	0	65	0	0	2	2

Sample ID[21]	Sample Type[22]	Bare ground /peat	Sphagna	*Cladonia* spp. lichens	*Racomitrium lanuginosum*	*Polytrichum commune*	Other Non-Sphagnum mosses
176	Grid/General Survey Area	2	0	0	0	0	90
177	Grid/General Survey Area	0	0	0	0	2	70
178	Grid/General Survey Area	0	15	0	0	10	60
179	Grid/General Survey Area	0	25	0	0	0	30
180	Grid/General Survey Area	15	25	0	0	5	5
181	Grid/General Survey Area	5	0	0	0	2	75
182	Grid/General Survey Area	0	30	0	0	0	40
183	Grid/General Survey Area	0	65	1	0	0	25
184	Grid/General Survey Area	0	25	0	0	0	40
185	Grid/General Survey Area	0	40	0	0	0	40
186	Grid/General Survey Area	0	35	0	0	0	40
187	Track	5	15	0	0	2	50
188	Turbine	30	20	0	0	2	10
189	Track	0	85	0	0	1	2
190	Track	0	35	1	0	2	20
191	Grid/General Survey Area	0	40	0	0	3	30
192	Grid/General Survey Area	0	0	0	0	10	80
193	Grid/General Survey Area	0	85	0	0	15	0
194	Grid/General Survey Area	20	5	0	0	5	20
195	Grid/General Survey Area	0	80	5	5	0	2
196	Grid/General Survey Area	0	50	0	0	0	35
197	Grid/General Survey Area	0	10	0	0	5	70
198	Grid/General Survey Area	0	60	0	0	0	20
199	Grid/General Survey Area	35	5	10	0	0	20
200	Grid/General Survey Area	0	30	0	0	0	30
201	Grid/General Survey Area	2	20	1	0	0	40
202	Turbine	25	0	0	0	5	65
203	Infrastructure	2	0	5	0	2	10
204	Grid/General Survey Area	0	0	0	0	2	75
205	Grid/General Survey Area	0	0	0	0	8	70
206	Grid/General Survey Area	0	0	0	0	2	65
207	Grid/General Survey Area	2	40	0	0	5	30
208	Grid/General Survey Area	0	80	0	0	5	0
209	Grid/General Survey Area	0	35	0	0	40	15
210	Grid/General Survey Area	25	2	1	0	0	35
211	Grid/General Survey Area	25	40	3	0	0	20
212	Turbine	0	85	0	0	0	5
213	Infrastructure	15	15	5	0	0	25
214	Infrastructure	0	70	0	0	5	10

Sample ID[21]	Sample Type[22]	Bare ground /peat	Sphagna	*Cladonia* spp. lichens	*Racomitrium lanuginosum*	*Polytrichum commune*	Other Non-Sphagnum mosses
215	Grid/General Survey Area	0	0	0	0	0	50
216	Grid/General Survey Area	10	0	0	0	0	75
217	Grid/General Survey Area	0	0	0	0	0	50
218	Grid/General Survey Area	0	65	0	0	0	20
219	Grid/General Survey Area	0	60	0	0	0	20
220	Grid/General Survey Area	0	25	0	0	0	70
221	Grid/General Survey Area	0	60	0	0	0	25
222	Grid/General Survey Area	0	25	0	0	0	50
223	Grid/General Survey Area	1	0	2	0	0	50
224	Infrastructure	65	10	1	0	0	20
225	Infrastructure	0	75	1	0	0	20
226	Grid/General Survey Area	20	0	5	0	0	75
227	Grid/General Survey Area	0	0	0	0	2	65
228	Grid/General Survey Area	0	80	0	0	0	5
229	Grid/General Survey Area	0	0	0	0	10	60
230	Grid/General Survey Area	0	35	0	0	0	50
231	Grid/General Survey Area	20	0	20	0	0	60
232	Grid/General Survey Area	25	10	0	0	5	60
233	Grid/General Survey Area	0	0	0	2	0	75
234	Grid/General Survey Area	1	0	1	3	0	75
235	Infrastructure	70	0	0	0	0	15
236	Turbine	5	10	2	2	0	40
237	Track	0	75	0	0	0	10
238	Turbine	10	15	0	0	40	35
239	Grid/General Survey Area	2	70	0	0	0	10
240	Grid/General Survey Area	0	60	1	0	0	30
241	Grid/General Survey Area	0	0	0	0	0	80
242	Grid/General Survey Area	0	0	0	0	0	60
243	Grid/General Survey Area	0	70	0	0	0	25
244	Grid/General Survey Area	15	0	1	0	0	75
245	Grid/General Survey Area	0	60	0	0	0	40
246	Grid/General Survey Area	10	0	2	0	0	50
247	Grid/General Survey Area	5	65	0	0	5	25
248	Grid/General Survey Area	0	0	0	0	0	65
249	Grid/General Survey Area	0	5	1	2	0	60
250	Track	0	0	0	0	5	25
251	Turbine	0	75	0	0	0	10
252	Infrastructure	0	0	0	0	0	70
253	Track	10	0	15	0	0	40

Sample ID[21]	Sample Type[22]	Bare ground /peat	Sphagna	*Cladonia* spp. lichens	*Racomitrium lanuginosum*	*Polytrichum commune*	Other Non-Sphagnum mosses
254	Track	0	75	1	0	0	25
255	Track	0	0	0	0	0	50
256	Turbine	0	50	1	0	0	30
257	Grid/General Survey Area	60	0	0	0	0	10
258	Grid/General Survey Area	0	0	0	0	0	85
259	Grid/General Survey Area	0	0	0	0	35	30
260	Grid/General Survey Area	25	0	2	2	0	40
261	Grid/General Survey Area	15	40	15	0	5	20
262	Grid/General Survey Area	0	80	0	0	2	20
263	Grid/General Survey Area	0	85	0	0	0	5
264	Grid/General Survey Area	0	40	1	0	0	40
265	Grid/General Survey Area	95	0	0	0	2	0
266	Grid/General Survey Area	0	0	0	0	0	75
267	Turbine	5	0	1	0	0	20
268	Infrastructure	0	70	0	0	0	15
269	Grid/General Survey Area	0	0	0	0	0	40
270	Grid/General Survey Area	0	0	0	0	0	35
271	Grid/General Survey Area	0	10	1	0	5	65
272	Grid/General Survey Area	0	40	0	0	10	30
273	Grid/General Survey Area	20	60	1	0	0	20
274	Grid/General Survey Area	0	15	0	0	0	60
275	Turbine	0	0	0	0	2	65
276	Grid/General Survey Area	2	0	0	0	3	65
277	Grid/General Survey Area	0	0	0	0	2	70
278	Grid/General Survey Area	15	0	0	0	8	35
279	Grid/General Survey Area	1	2	0	0	0	5
280	Grid/General Survey Area	0	70	0	0	0	20
281	Grid/General Survey Area	0	10	0	0	0	75
282	Grid/General Survey Area	1	0	0	0	0	65
283	Grid/General Survey Area	0	0	0	0	5	50
284	Grid/General Survey Area	0	25	0	0	2	45
285	Grid/General Survey Area	0	80	0	0	15	5
286	Grid/General Survey Area	0	0	0	0	0	65
287	Grid/General Survey Area	0	0	0	0	10	50
288	Grid/General Survey Area	0	70	0	0	5	20
289	Grid/General Survey Area	0	60	2	1	0	25
290	Grid/General Survey Area	0	60	6	6	1	20
291	Grid/General Survey Area	0	0	0	0	0	60
292	Grid/General Survey Area	0	0	0	0	2	60

Sample ID[21]	Sample Type[22]	Bare ground /peat	Sphagna	*Cladonia* spp. lichens	*Racomitrium lanuginosum*	*Polytrichum commune*	Other Non-Sphagnum mosses
293	Grid/General Survey Area	65	0	0	1	0	10
294	Grid/General Survey Area	0	0	0	0	0	20
295	Grid/General Survey Area	0	5	0	0	10	15
296	Grid/General Survey Area	0	0	0	0	0	75
297	Grid/General Survey Area	0	1	0	0	0	70
298	Grid/General Survey Area	0	0	0	0	0	95
299	Grid/General Survey Area	0	20	0	0	10	50
300	Grid/General Survey Area	0	0	0	0	2	60
301	Grid/General Survey Area	0	5	0	0	15	90
302	Grid/General Survey Area	30	5	5	0	0	5
303	Grid/General Survey Area	0	0	0	0	0	75
304	Grid/General Survey Area	0	20	0	0	0	90
305	Grid/General Survey Area	0	0	0	0	0	30
306	Grid/General Survey Area	0	85	0	0	10	0
307	Grid/General Survey Area	0	90	0	0	5	10
308	Grid/General Survey Area	0	0	0	0	0	90
309	Grid/General Survey Area	0	80	0	0	0	30
310	Grid/General Survey Area	0	20	10	0	0	70
311	Grid/General Survey Area	0	5	0	0	5	80
312	Grid/General Survey Area	40	0	0	0	0	25
313	Grid/General Survey Area	0	75	0	0	15	10
314	Grid/General Survey Area	0	0	0	0	5	70
315	Grid/General Survey Area	0	70	0	0	15	5
316	Grid/General Survey Area	0	30	5	0	0	80
317	Grid/General Survey Area	0	85	0	0	5	10
318	Grid/General Survey Area	0	60	0	0	10	25
319	Grid/General Survey Area	0	0	0	0	15	65
320	Grid/General Survey Area	20	0	0	0	0	50
321	Grid/General Survey Area	0	65	0	0	10	15
322	Grid/General Survey Area	0	75	0	0	5	10
323	Grid/General Survey Area	0	0	0	0	0	75
324	Grid/General Survey Area	0	0	0	0	0	35
325	Grid/General Survey Area	0	10	1	0	0	70
326	Grid/General Survey Area	0	25	0	0	0	65
327	Grid/General Survey Area	0	0	0	0	15	80
328	Grid/General Survey Area	0	20	0	0	0	60
329	Grid/General Survey Area	0	0	0	0	0	85
330	Grid/General Survey Area	0	0	0	0	0	65

Table D-5 Sphagnum Species

Sphagnum species	No. Samples Present (out of 231)	Percentage Total (%)
Sphagnum capillifolium	144	62.3
Sphagnum fallax	127	55.0
Sphagnum palustre	5	2.2
Sphagnum papillosum	27	11.7
Sphagnum medium	2	0.9
Sphagnum tenellum	4	1.7
Sphagnum denticulatum	3	1.3
Sphagnum subnitens	3	1.3
Sphagnum cuspidatum	2	0.9
Sphagnum compactum	3	1.3