

Melgarve Cluster

National Vegetation Classification & Habitats Survey Report

Appendix 8.2

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1 INTRODUCTION

MacArthur Green was commissioned by SSEN Transmission (the Applicant) to carry out a National Vegetation Classification (NVC) and habitats survey for the Melgarve Cluster Project (hereafter the ‘Proposed Development’).

The aim of the NVC survey is to identify and map the vegetation communities present within the site and survey area in order to identify those areas of greatest ecological interest (i.e., Annex I habitats¹; potential Groundwater Dependent Terrestrial Ecosystems (GWDTE); and Scottish Biodiversity List (SBL) priority habitats). This information is used to inform the Proposed Development design process and the ecological assessment for the Melgarve Cluster Project Environmental Impact Assessment Report (EIAR).

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

2 THE SITE AND SURVEY AREA

2.1 Overview

The Proposed Development is driven by the requirement to connect the consented Cloiche Wind Farm² and the proposed Dell 2 Wind Farm³, located in the Monadhliath mountain range approximately 10km to the east of Fort Augustus, to the National Grid, at Melgarve substation.

The Proposed Development has been subject to a routeing process in which alternative routes and design solutions for the proposed connection were compared to find the best option based on the most appropriate balance between environmental, engineering and cost factors. A study of various alignment options within the chosen route was carried out, prior to selecting a proposed alignment and design solution to take forward for section 37 consent (that chosen alignment being the Proposed Development).

The NVC surveys covered several alignment options and associated buffers, collectively termed here as the ‘survey area’. This report details the results of NVC surveys within the entire survey area, which covered 2409.17 hectares (ha).

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 Received consent from the Scottish Government in November 2023.

³ It should be noted that in August 2019, an application to build and operate Dell Wind Farm was consented following an appeal to the Scottish Ministers. However, the wind farm has been re-designed at the same location to increase capacity and energy capture with fewer wind turbines. The application for Dell 2 Wind Farm was submitted to the Scottish Government Energy Consents Unit on behalf of the Scottish Ministers on 11th March 2024 and awaits decision. It is this proposed re-designed Dell 2 Wind Farm that this EIA Report refers to throughout, rather than the previously consented design.

2.2 Designated Sites

There are no ecological designated sites⁴ within the site or Limit of Deviation (LoD), although the Creag Meagaidh Special Area of Conservation (SAC), Creag Meagaidh Site of Special Scientific Interest (SSSI), Monadhliath SAC, and Monadhliath SSSI are designated sites within 5km of the LoD. These designated sites and the qualifying features relevant to this Technical Appendix are presented in **Table 2-1** below (the full list of all qualifying features can be found within **Chapter 8: Ecology**). The locations of the designated sites are presented in **Figure 8.1**.

Table 2-1 Designated sites with botanical qualifying features within 5km of the LoD

Designated Site	Distance from LoD (km)	Qualifying Feature	Last Assessed Condition & Date
Creag Meagaidh SAC	1.46	Acidic scree	Favourable, Recovered 29/09/2015
		Alpine and Subalpine heaths	Favourable, Recovered 02/10/2015
Creag Meagaidh SSSI	1.46	Rocky slopes (includes inland cliff, rocky outcrops, chasmophytic vegetation)	Favourable, Maintained 02/10/2015
Monadhliath SAC	2.32	Blanket bog	Unfavourable No change 18/10/2020
Monadhliath SSSI	2.23	Upland assemblage	Favourable, Maintained 11/2004
		Blanket bog	Unfavourable, No change 11/2004
		Vascular plant assemblage	Unfavourable, No change 07/2008

2.3 Ancient Woodland

There are no areas of ancient woodland (as present on the Ancient Woodland Inventory (AWI)) within the site or LoD; however, there are a few stands of ancient woodland within 5km of the LoD, the closest of which is 1.16km from the site; see **Figure 8.1**.

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

⁴ This does not include ornithological designated sites which can be seen on **Figure 9.2** of the EIA Report and are discussed in **Chapter 9 – Ornithology** of the EIA Report.

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.

2.4 Carbon and Peatland Map 2016

The Carbon and Peatland Map 2016⁵ was consulted to determine likely peatland classes present at 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 habitat⁶ as Class 1 and Class 2 peatlands.

Figure 8.2 indicates that, according to this predictive tool and map, the site and LoD contains a large amount of Class 1 peatland within the central and northern areas, with more fragmented Class 1 peatland and a smaller area of Class 2 peatland to the west of Sherramore Forest to the south of the site.

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 study 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

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.

(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) 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

Surveys were undertaken within the NVC survey area (see **Figure 8.3**) on the following dates inclusive:

- 17th to 21st October 2022;
- 31st October to 4th November 2022; and
- 29th November to 1st December 2022.

The weather conditions were generally amenable to survey (bright, with broken cloud and relatively light to moderate winds at times, and with some occasional periods with moderate to heavy rain showers).

While the surveys were undertaken outwith the optimal survey period for vegetation, due to the types of habitat present, the overall character and type of vegetation was still readily recognisable and could still be accurately attributed a NVC community due to surveyor knowledge of the site and survey area from other and previous ecological surveys and the persistent and still easily identifiable vegetation present in many areas such as various sub-shrubs, remnant vegetation, bryophytes etc. The survey timing is not considered to affect the validity of the survey results, or the robustness of any assessments made from these data, as detailed below. All areas of the survey area were accessible.

Following completion of surveys and upon finalisation of the Proposed Development design a minor survey gap for habitats was identified in the north of the site to the east of the proposed Dell 2 Wind Farm substation. The data gap here was resolved using a combination of surveyor knowledge of the location, desk-based extrapolation of contemporary NVC data for the Proposed Development using aerial imagery and adjoining habitat data as a proxy, and reviewing the previous NVC data collected for Dell 2 Wind Farm (which also entirely covered this gap).

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 1980s 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 support 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 are considered to be sufficient to undertake the assessment.

5 RESULTS

5.1 Summary of Habitat Types & NVC Communities

27 NVC communities, one intermediate NVC community and 13 non-NVC communities were recorded within the survey area, and these corresponded to 23 Phase 1 habitat types. These communities and habitat types, and their respective site-specific correlations are summarised below in **Table 5-1**.

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

Phase 1 Habitats	NVC Communities & Other Non-NVC Habitats/Features Recorded
A1.1.2 Broadleaved Plantation Woodland	YBP Young Broadleaved Plantation (non-NVC type)
A1.2.2 Coniferous Plantation Woodland	CP Coniferous Plantation (non-NVC type)
A4.2 Recently-Felled Coniferous Woodland	CF Clear-Felled Woodland (non-NVC type) CF>M25 Clear-fell in transition to M25 (non-NVC type)
B1.1 Unimproved Acid Grassland	U4 <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland U5 <i>Nardus stricta</i> – <i>Galium saxatile</i> grassland U6 <i>Juncus squarrosus</i> – <i>Festuca ovina</i> grassland
B5 Marsh/Marshy Grassland	M25 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire Je <i>Juncus effusus</i> acid grassland community (non-NVC type)
D1.1 Dry Dwarf Shrub Heath - Acid	H10 <i>Calluna vulgaris</i> – <i>Erica cinerea</i> heath H12 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath H21 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> – <i>Sphagnum capillifolium</i> heath H10-H12 Intermediate species-poor <i>Calluna vulgaris</i> heath (intermediate NVC type)
D2 Wet Dwarf Shrub Heath	M15 <i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath
D3 Lichen/Bryophyte Heath	H13 <i>Calluna vulgaris</i> – <i>Cladonia arbuscula</i> heath H14 <i>Calluna vulgaris</i> – <i>Racomitrium lanuginosum</i> heath H19 <i>Vaccinium myrtillus</i> – <i>Cladonia arbuscula</i> heath H20 <i>Vaccinium myrtillus</i> – <i>Racomitrium lanuginosum</i> heath U10 <i>Carex bigelowii</i> - <i>Racomitrium lanuginosum</i> moss-heath
D4 Montane Heath/Dwarf Herb	U7 <i>Nardus stricta</i> – <i>Carex bigelowii</i> grass-heath
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	M1 <i>Sphagnum denticulatum</i> bog pool community M2 <i>Sphagnum cuspidatum/fallax</i> bog pool community M3 <i>Eriophorum angustifolium</i> bog pool community M15 [^] <i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath ⁷ M17 <i>Trichophorum germanicum</i> – <i>Eriophorum vaginatum</i> blanket mire M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire
E1.7 Wet Modified Bog	M20 <i>Eriophorum vaginatum</i> blanket mire
E2.1 Acid/Neutral Flush/Spring	M4 <i>Carex rostrata</i> - <i>Sphagnum fallax</i> mire M6 <i>Carex echinata</i> - <i>Sphagnum fallax/denticulatum</i> mire M31 <i>Anthelia julacea</i> – <i>Sphagnum denticulatum</i> spring

⁷ The ‘^’ symbol indicates the vegetation is likely present on peat of 0.5m in depth or greater, and as such more appropriately classified as bog.

Phase 1 Habitats	NVC Communities & Other Non-NVC Habitats/Features Recorded
	M32 <i>Philonotis fontana</i> – <i>Saxifraga stellaris</i> spring
E2.2 Basic Flush/Spring	M10 <i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire M37 <i>Palustriella commutata</i> – <i>Festuca rubra</i> spring
E4 Bare Peat	ExP Exposed Peat (non-NVC type)
F1 Swamp	S9 <i>Carex rostrata</i> swamp
G1 Open Water	SW Standing Water (non-NVC type)
G2 Running Water	RW Running Water (non-NVC type)
J1.3 Cultivated/ Disturbed Land - Ephemeral/ Short Perennial	Jb <i>Juncus bulbosus</i> vegetation (non-NVC type)
J3.6 Buildings	BD Buildings (non-NVC type)
J4 Bare Ground	BG Bare Ground, Tracks, Hardstandings etc (non-NVC type)
J5 Other habitat	DG Disturbed Ground ⁸ (non-NVC type) 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 **Figure 8.3** which combines Phase 1 symbology with NVC data.

A number of target notes (TNs) were also made during surveys, often to pinpoint areas or species of special interest. These target notes are shown in **Figure 8.3** and detailed within **Annex A**; selected target note photographs are included within **Annex B**. Further photographs of several of the typical habitat types found within the survey area are provided within **Annex C**.

5.2 Woodland & Scrub

5.2.1 A1.1.2 Broadleaved Plantation Woodland

Young broadleaved plantation woodland (YBP) was recorded in and around Melgarve substation, within the south of the survey area. These areas of woodland, being only recently planted, did not align closely with an identifiable NVC community at the time of survey, comprising immature planted broadleaved species across disturbed and restored ground.

5.2.2 A1.2.2 Coniferous Plantation Woodland

The survey area includes a small number of blocks of densely planted commercial coniferous plantation woodland (CP), at Sherramore Forest to the south and east of Meall a' Ghiubhais, within the south of the survey area. These plantation woodlands are mostly dominated by *Picea sitchensis*, integrated with the occasional scattered trees of *Larix decidua*.

⁸ Including the codes DG>U4 and DG>U6.

These types of plantation woodlands are of negligible botanical value due to over-shading and loss of the field flora; patchy areas of moss, *Eriophorum vaginatum* and/or *Molinia caerulea* is therefore generally all that persists beneath the deep shade and the litter shed by the conifers.

5.2.3 A4.2 Recently Felled Coniferous Woodland

To the south of Meall a' Ghiubhais and immediately north of Melgarve substation there are areas of recently felled coniferous woodland. At the time of survey, the field layer had not re-established within one of the areas, which meant much of the area remained as brash and stumps with limited vegetation. However, the other area showed signs of being re-colonised with *Molinia caerulea* (CF>M25) and having a close affinity to the M25 community (see Section 5.3.2 below).

5.3 Grasslands & Marsh

5.3.1 B1.1 Unimproved Acid Grassland

Unimproved acid grassland was found to be scattered widely throughout the survey area, most often in small, isolated patches, with the largest extents of this habitat present on previously disturbed, reinstated and re-seeded ground associated with track verges and restored borrow pit areas associated with Stronelaig Wind Farm. The acid grassland within the survey area is of the U4 *Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland community, U5 *Nardus stricta* – *Galium saxatile* grassland community, and U6 *Juncus squarrosus* – *Festuca ovina* grassland community. U4 and U5 are the most commonplace and extensive of these communities within the survey area, with U6 comprising a much smaller proportion. U4 is the prevailing type with the restored and re-seeded areas noted above. These grassland communities were recorded as homogenous stands and also within mosaics with other grassland, heath and bog communities.

As well as community level U4, the following sub-communities were recorded; U4a Typical sub-community, U4d *Luzula multiflora* - *Rhytidiadelphus loreus* sub-community, and to a much lesser extent U4e *Vaccinium myrtillus*-*Deschampsia flexuosa* sub-community. Overall, the stands of U4 within the survey area were common on well-drained slopes in the vicinity of streams. The sub-community U4a often contained a variable mix of *Agrostis capillaris*, *Festuca vivipara*, *Nardus stricta* and *Anthoxanthum odoratum*. The herbs *Potentilla erecta* and *Galium saxatile* are very common and there can also be small quantities of other vascular species such as *Avenella flexuosa*, *Juncus squarrosus*, *Carex binervis* and *C. nigra*. In one location, the abundance of *C. nigra* was such that the community was recorded as 'U4aCn'. Mosses are common, especially *Hylocomium splendens*, *Pleurozium schreberi*, *Hypnum jutlandicum* and *Rhytidiadelphus squarrosus*.

The areas of the U4d sub-community are similar to U4a above, but the sward contains a noticeable frequency of *Carex bigelowii*, *Vaccinium myrtillus*, *V. vitis-idaea*, *Blechnum spicant* and the mosses *Rhytidiadelphus loreus* and *Polytrichum commune* giving it a more montane character compared to U4a. Several areas were also identified as U4e, while similar in species to U4a, this sub-community had an abundance of *Racomitrium lanuginosum* and/or *Cladonia* lichens, as well as a sparse growth of *Vaccinium myrtillus*, *V. vitis-idaea* and *Empetrum nigrum* and was usually present in mosaics with other types of montane heaths/grasslands.

While the majority of the *Nardus stricta* dominated U5 was recorded at community level, the following sub-communities were recorded; U5a Species-poor sub-community, U5b *Agrostis canina*-

Polytrichum commune sub-community, and U5e *Racomitrium lanuginosum* sub-community. Many of the grassland species found within the U5 community replicate many of the species found within U4 as described above, but with *Nardus stricta* obviously dominant. *Sphagnum* mosses become more of a feature through both U5b and U5e sub-communities where damper conditions prevail, namely *Sphagnum fallax*, *S. palustre*, *S. papillosum*, *S. capillifolium*, *S. compactum* and *S. tenellum*, as well as the presence of *Polytrichum commune*. The U5e sub-community is short and rather patchy grassland in which the low tussocks of *Nardus stricta* are scattered abundantly among the mosses *Racomitrium lanuginosum*, *Hylocomium splendens*, *Rhytidiadelphus loreus*, *Polytrichum commune*, *Sphagnum compactum*, *S. tenellum*, *S. papillosum* and *Campylopus introflexus*, and the lichens *Cladonia arbuscula*, *C. portentosa* and *C. uncialis*. Other vascular plants in U5e here include *Juncus squarrosus*, *Trichophorum germanicum*, *Calluna vulgaris*, *Vaccinium myrtillus*, *V. vitis-idaea*, *Huperzia selago*, *Agrostis canina* and *Pinguicula vulgaris*. U5e grassland occurs locally on stony/peaty soils among hagged bog, where previous deeper peat has been eroded almost or completely down to the mineral soil below.

The U6 community was recorded at community level, and as the U6a *Sphagnum* sub-community, U6c *Vaccinium myrtillus* sub-community, and as the U6d *Agrostis capillaris*-*Luzula multiflora* sub-community. The community appears scattered across the survey area and is most common on damp to quite wet, level to gently sloping ground; typically, as small areas scattered among bog, heath and grassland mosaics. The flora of most of the U6 here has much in common with that of the U4 and U5 acid grassland communities described above, but with *Juncus squarrosus* obviously dominant. Where wetter conditions are present, and in particular for U6a, *Sphagnum* moss becomes more common and includes *S. capillifolium*, *S. fallax* and *S. papillosum*. The usually small areas of U6a are scattered on wet, peaty ground among the M19 bogs in the survey area; mainly within parts of bog in which previous deep peat has been eroded down to a shallower layer. Areas of U6c also contained frequent to abundant *Vaccinium myrtillus*, *V. vitis-idaea* or *Empetrum nigrum*. Areas of U6d are generally quite similar to U4a but with abundant *J. squarrosus*.

On occasion, a heathier form of U6 was found (coded here as U6H) where *J. squarrosus* dominates along with a low but dense sward of *Calluna vulgaris*, along with other species such as *Nardus stricta*, *Vaccinium myrtillus*, *V. vitis-idaea*, *Empetrum nigrum*, *Hylocomium splendens* and *Sphagnum capillifolium*. It was found in a few places in the survey area, occupying damp, level to gently sloping ground among bogs and wet heaths.

5.3.2 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 in mesic conditions. Marshy grassland forms a very small component of the habitat types found within the survey area.

The areas of marshy grassland were composed of the M25a and M25b sub-communities of M25 mire, and the non-NVC community 'Je'. The M25 mire areas were identified due to *Molinia* dominating the sward. This community mostly appears as the M25a *Erica tetralix* sub-community. The majority of the species found within M25a along with *Molinia caerulea* were *Calluna vulgaris*, *Juncus squarrosus*, *Vaccinium myrtillus*, *Avenella flexuosa*, *Holcus lanatus*, and very occasional *Trichophorum germanicum*. Within the wetter areas of this community, the isolated patches of *Sphagnum* moss became more apparent, particularly *Sphagnum capillifolium* along with other

mosses such as *Polytrichum commune* and *Hylocomium splendens*. The M25b *Anthoxanthum odoratum* sub-community was classified as marshy grassland where the area was dominated by *Molinia caerulea* and accompanied by a mixture of typical upland grassland species. The M25b was dominated by *Molinia caerulea* as a tussocky sward and was found to form a mosaic with the U4 acid grassland community. Where the *Molinia* was not purely dominant, species included variable abundances of *Potentilla erecta*, *Galium saxatile*, *Anthoxanthum odoratum*, *Holcus lanatus*, *Avenella flexuosa*, *Rumex acetosa*, *Agrostis capillaris*, *Juncus effusus*, and the mosses *Polytrichum commune* and *Pleurozium schreberi*.

The 'Je' non-NVC grassland community is present as a patch of *Juncus* spp. dominated calcifuge grassland. This is vegetation in which dominant and tall tussocks of *Juncus effusus* 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*, *Deschampsia cespitosa*, *Molinia caerulea* and *Ranunculus repens*. Mosses typical of acid communities are also very abundant, and in some cases can be the only species present along with a uniform sward of *Juncus* spp., the most common mosses are *Hylocomium splendens*, *Pleurozium schreberi*, *Polytrichum commune*, *Pseudoscleropodium purum*, *Rhytidiadelphus squarrosus* and *Rhytidiadelphus loreus*. 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 Heathland

5.4.1 D1.1 Dry Dwarf Shrub Heath – Acid

Acid dry dwarf shrub heath is relatively scarce in the survey area and appears in limited areas, mostly across the southern half of the survey area on the slopes of Meall a' Ghiubhais. In many instances the dry heath forms mosaics with wet dwarf shrub heath and montane heaths.

Dry heath here appears in the form of H10 *Calluna vulgaris* – *Erica cinerea* heath, H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath, and H21 *Calluna vulgaris* – *Vaccinium myrtillus* – *Sphagnum capillifolium* heath and the intermediate NVC community H10-H12 Intermediate species-poor *Calluna vulgaris* heath. These heaths can appear as both homogenous stands or within mosaics with other heath, acid grassland and mire communities across the survey area. The vast majority of the dry heath within the survey area consists of H12.

The H10 heath community was recorded as pure stands of the H10a Typical sub-community. Much of this community is dominated by a dense canopy of *Calluna vulgaris* with abundant *Erica cinerea*. *Vaccinium myrtillus* can occur but only sparsely and in smaller quantity than *E. cinerea*. Other species include *Potentilla erecta*, *Galium saxatile*, *Agrostis capillaris*, *Deschampsia flexuosa*, and *Pteridium aquilinum* and the mosses *Hylocomium splendens*, *Pleurozium schreberi* and *Hypnum jutlandicum*. The accumulation of these species forming the H10a sub-community.

The H12 community forms a much greater proportion of this habitat type within the survey area. The community species assemblage is heavily dominated by *Calluna vulgaris* and contains a usually high density of *Vaccinium myrtillus*. Other species found in the sward included many of the species referred to above. This community was recorded as the H12a *Calluna vulgaris* sub-community, H12b

Vaccinium vitis-idaea – *Cladonia impexa* sub-community, and H12c *Galium saxatile* – *Festuca ovina* sub-community. The H12b sub-community was the most common out of the three sub-communities, with the addition of *Vaccinium vitis-idaea*, *Empetrum nigrum*, *Avenella flexuosa*, *Huperzia selago*, *Carex bigelowii*, the moss *Racomitrium lanuginosum* and the lichen *Cladonia arbuscula*. This sub-community formed a more montane form compared to the others with the appearance of *C. bigelowii*. The H12c sub-community appears once with a more grassland like assemblage, with an abundance of species such as *Agrostis capillaris*, *Festuca ovina*, *Anthoxanthum odoratum*, *Nardus stricta* and *Deschampsia flexuosa*.

Similar in species assemblage to that of the H12 community referred to above, the H21 community was recorded within a single mosaic with the H12 community. It differs from the H12 community in that the moss layer also includes extensive patches of *Sphagnum capillifolium* and some *Rhytidiadelphus loreus*.

The intermediate NVC type H10-H12 intermediate species-poor *Calluna vulgaris* heath appears within three areas within the survey area, often found within mosaics with the acid grassland communities. This H10-H12 intermediate heath does not fit readily within conventional NVC community codes or habitat descriptions. The H10-H12 intermediate classification arises from the similarity of the vegetation both H10 *Calluna vulgaris* – *Erica cinerea* heath and H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath but the vegetation does not allow the true classification of either. The assemblage contains components of both communities and therefore could not be differentiated.

5.4.2 D2 Wet Dwarf Shrub Heath

Wet dwarf shrub heath forms one of the more extensive habitats present, being widely found across the survey area, commonly being found in close association and mosaics with lichen/bryophyte heath, montane heath/dwarf herb mosaics, and blanket bog. It is entirely made up of the various forms of the M15 *Trichophorum germanicum* – *Erica tetralix* wet heath NVC community, with all the sub-communities being recorded; M15a *Carex panicea* sub-community, M15b Typical sub-community M15c *Cladonia* sub-community and M15d *Vaccinium myrtillus* sub-community.

The most obvious components present within this community included *Calluna vulgaris*, *Trichophorum germanicum* and *Vaccinium myrtillus*. Other species present in the sward are *Molinia caerulea*, *Juncus squarrosus*, *Avenella flexuosa*, *Carex echinata*, *Anthoxanthum odoratum*, *Potentilla erecta* and *Narthecium ossifragum*. In particular, the M15a sub-community contains varied amounts of *Carex panicea* and *Eriophorum angustifolium*, and the mosses *Sphagnum denticulatum*, *S. capillifolium*, *S. cuspidatum* and *S. papillosum*. It occurs mostly as small flushes on gently sloping ground that appears to be naturally flushed, or as narrow wet flushes running down gentle slopes, surrounded by other types of M15 wet heath. It also appears in places where previous deep peat has eroded down to a bare stony surface over which there is frequent water flow. The M15a flora here is mostly acidophilous, but locally there is evidence of at least mild base-enrichment, with species such as *Carex demissa* and *Selaginella selaginoides*.

The M15b sub-community contains similar species to that of M15a but is generally found on drier ground on damp peaty soils (of varying depth) on gentle slopes. It consists mainly of *Calluna vulgaris*, *Trichophorum germanicum* and *Sphagnum capillifolium*, mixed with generally smaller

amounts of *Juncus squarrosus*, *Empetrum nigrum*, *Potentilla erecta*, *Nardus stricta*, *Agrostis canina*, *Carex echinata*, *Narthecium ossifragum*, *Hylocomium splendens* and *Aulacomnium palustre*. Where this sub-community was found on deep peat it has been denoted as 'M15b^' and has been classified as blanket bog rather than wet heath (see Section 5.5.1).

The M15 community appears most often in the form of the M15c sub-community, containing many of the species common to the M15 community but with the notable addition of the moss *Racomitrium lanuginosum* and the lichens *Cladonia arbuscula* and *C. uncialis*. Where it appears on deeper peat it has been denoted as 'M15c^' and is likely to have derived from areas that might have been previously classified as M19 blanket bog (see Section 5.5.1 below).

The drier and grassier assemblage of the M15d sub-community has many similarities with the M15b sub-community with a greater abundance of *Juncus squarrosus*, *Nardus stricta* and *Empetrum nigrum*. It was often found within areas of shallow peat, however, in some cases where found on deep peat it has been denoted as 'M15d^'.

5.4.3 D3 Lichen/Bryophyte Heath

Lichen/Bryophyte heath appears in small areas within the central and northern areas of the survey area, the most extensive being to the south of Coire Odhar. This habitat is often found on exposed summits and ridges where the soils are well-drained, thin and stony or on top of small hummocks and knolls where the ground remains drier, and at times was found to form mosaics with the wet heath, montane heath, and blanket bog habitats. These areas are represented by H13 *Calluna vulgaris*-*Cladonia arbuscula* heath, H14 *Calluna vulgaris*-*Racomitrium lanuginosum* heath, H19 *Vaccinium myrtillus*-*Cladonia arbuscula* heath, H20 *Vaccinium myrtillus*-*Racomitrium lanuginosum* heath, and the U10 *Carex bigelowii*-*Racomitrium lanuginosum* moss-heath.

The H13 heath was recorded both at community level and as the H13a *Cladonia arbuscula*-*Cladonia rangiferina* sub-community. The sward height remains short, about 2-5cm tall, with *Calluna vulgaris* and the lichen *Cladonia arbuscula* appearing abundant. Other species include *Empetrum nigrum*, *Vaccinium vitis-idaea*, *Avenella flexuosa*, *Carex bigelowii*, *Nardus stricta*, *Juncus squarrosus*, *Festuca vivipara*, *Huperzia selago*, *Hylocomium splendens*, *Racomitrium lanuginosum*, *Cladonia uncialis*, *Cetraria islandica*, *Ochrolechia frigida* and, much more rarely, *Kalmia procumbens* and *Thamnolia vermicularis*. Similar in appearance and composition to the H13 community, the H14 heath is also recorded both at community level and as the H14b *Empetrum nigrum hermaphroditum* sub-community. The distinguishing features within this community are the greater abundance of *Racomitrium lanuginosum* and less cover of *Cladonia* lichens.

The H19 community has the smallest coverage within this habitat, being recorded at community level and as the H19c *Empetrum nigrum hermaphroditum*-*Cladonia* spp. sub-community. Most of the isolated patches of H19 were found on the upper parts of Sídhean Dubh na Cloiche Bàine. This heath is identified by the abundant *Empetrum nigrum*, *Vaccinium myrtillus*, *V. vitis-idaea* accompanied by the lichens *Cladonia arbuscula*, *C. rangiferina* and *C. uncialis*. Other species less dominant included *Carex bigelowii*, *Nardus stricta*, *Agrostis capillaris* and the mosses *Hylocomium splendens*, *Pleurozium schreberi* and *Rhytidiadelphus loreus*.

Within a small number of locations, the H20 *Vaccinium myrtillus*-*Racomitrium lanuginosum* montane heath was recorded, often being found within mosaics with the U7 *Nardus stricta*-*Carex bigelowii* grass-heath community (see Section 5.4.4 below). These areas have a short, cropped sward height in which *Vaccinium myrtillus*, *V. vitis-idaea* and *Empetrum nigrum* are abundant among an extensive mat of the moss *Racomitrium lanuginosum*. Other species within this assemblage were *Agrostis vinealis*, *Festuca vivipara*, *Hylocomium splendens*, *Pleurozium schreberi*, *Rhytidiadelphus loreus* and the lichens *Cladonia arbuscula* (abundant) and *C. rangiferina*.

The U10 heath appears mostly within mosaics in close association with the U7 grassland and H13 heath communities. Often found on wind-exposed summits and ridges, the U10 was recorded at both community level and as the U10a *Galium saxatile* sub-community. The community consists largely of mats of *Racomitrium lanuginosum*, with smaller amounts of *Carex bigelowii*, *Avenella flexuosa*, *Vaccinium myrtillus*, *V. vitis-idaea*, *Empetrum nigrum*, *Huperzia selago*, *Diphasiastrum alpinum*, *Alchemilla alpina*, *Nardus stricta*, *Agrostis capillaris*, *Festuca vivipara*, *Galium saxatile*, *Polytrichum alpinum*, *Cladonia arbuscula*, *C. uncialis*, *C. bellidiflora*, *Ochrolechia frigida* and *Cetraria islandica*.

5.4.4 D4 Montane Heath/Dwarf Herb

Montane heath/dwarf herb habitat appears predominantly within the central part of the survey area, the largest of which are focused to the north-west of Meall na h-Aisre and north-west of Sídhean Dubh na Cloiche Bàine. This habitat was found to be in close proximity to and sometimes in mosaics with the wet heath, lichen/bryophyte heath, and blanket bog habitats. These are short grassland areas represented by the U7 *Nardus stricta*-*Carex bigelowii* grass-heath community, including the U7b Typical sub-community.

Nardus stricta is often abundant or dominant, growing among an assemblage of other species including *Carex bigelowii*, *Juncus squarrosus*, *Empetrum nigrum*, *Vaccinium vitis-idaea*, *V. myrtillus*, *Diphasiastrum alpinum*, *Huperzia selago*, and *Galium saxatile*. The mosses include *Racomitrium lanuginosum*, *Hylocomium splendens*, *Pleurozium schreberi*, *Polytrichum alpinum* and *Plagiothecium undulatum*, the liverwort *Ptilidium ciliare* and the lichens *Cladonia arbuscula*, *C. uncialis* and *Cetraria islandica*. These areas are found mostly on higher ground in close association with the H13 and U10 heath communities (see Section 5.4.3 above).

5.4.5 D5 Dry Heath/Acid Grassland Mosaic

Dry heath/acid grassland mosaic appears to the north-east of Meall nan Ruadhag within the south of the survey area where there is a mixture of dry heath and acid grassland. These areas are dominated by the U5 *Nardus stricta* – *Galium saxatile* grassland community and H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath community.

The floristic assemblage of the U5 grassland community resembles that detailed in Section 5.3.1 above and the H12 heath communities closely resemble these communities referred to in Section 5.4.1 above.

5.4.6 D6 Wet Heath/Acid Grassland Mosaic

Wet heath/acid grassland mosaics appear across the northern half of the survey area where there is an intricate mixture of wet heath and acid grassland. These areas are dominated by M15

Trichophorum germanicum – *Erica tetralix* wet heath, U4 *Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland community, and the U5 *Nardus stricta* – *Galium saxatile* grassland community.

The floristic assemblage of the M15 wet heath community resembles that detailed in Section 5.4.2 above, and the U4 and U5 grassland communities resemble that detailed in Section 5.3.1 above.

5.5 Mire

5.5.1 E1.6.1 Blanket Bog

Blanket bog is the most common habitat found across the entire survey area and at times was found to form mosaics with a variety of other habitats such as acid grassland, wet heath, lichen/bryophyte heath, montane heath/dwarf herb, acid/neutral flushes and bare peat. This habitat is mainly represented by the M17 *Trichophorum germanicum* – *Eriophorum vaginatum* blanket mire community, M19 *Calluna vulgaris* – *Eriophorum vaginatum* blanket mire community, and M15[^] *Trichophorum germanicum* – *Erica tetralix* wet heath (where the M15 community appears to be present on peat over 0.5m in depth – the vegetation composition of M15[^] is as per Section 5.4.2). The M17 and M19 communities within the survey area are generally very degraded forms of blanket bog in poor condition with extensive peat haggging and peat erosion features present, with the peat often eroded to the underlying mineral substrates (see **Annex C**). The M1 *Sphagnum denticulatum* bog pool community, M2 *Sphagnum cuspidatum/fallax* bog pool community and the M3 *Eriophorum angustifolium* bog pool community were also recorded within these blanket bog areas (see **Annex A**).

The M1 community appears infrequently, often in close association within areas of M17 bog. The mosses *Sphagnum denticulatum*, *S. cuspidatum*, and a little *Eriophorum angustifolium* dominate these bog pools. There can also be a little *S. papillosum* and *Eriophorum vaginatum* around the pool margins.

The areas of M2 recorded were commonly found as minor components within the M15 and M17 communities and was the least common bog community within the survey area. This community is represented by the abundance of *S. fallax*.

M3 is common as small stands across the survey area. This is species-poor vegetation consisting mainly or often entirely of *Eriophorum angustifolium* and takes two forms in the survey area: i) growing as short to medium height open to rather dense swards in shallow water in bog pools or ii) on the level to very gently sloping surfaces of wet peat in eroded depressions between hagggs. M3 is widespread and common here, mainly within areas of M19 bog. Most patches of it are about 3-5m across, but locally it is more extensive. The abundance of M3 here appears to be a result of erosion of peat by deer trampling.

M17 is extensive and occurs both as large homogenous stands and within mosaics with other mire communities within the survey area. This community along with the M19 bog community form the largest proportion of this blanket bog resource within the survey area. It is often found on level to very gently sloping surfaces of deep, wet peat, being most extensive in wide basins and valley floors. While recorded at times at community level only, the majority of this type of blanket bog was recorded as the M17a *Drosera rotundifolia* – *Sphagnum* spp. sub-community and M17b *Cladonia* sub-community, with some instances of the M17c *Juncus squarrosus* – *Rhytidiadelphus loreus* sub-

community. The M17a sub-community represents a significant part of this community, being made up mainly of *Calluna vulgaris*, *Trichophorum germanicum*, *Eriophorum vaginatum* and *E. angustifolium*. Bryophyte cover varied with a layer of mosses including abundant *Sphagnum capillifolium* and *S. papillosum*. Other species include *Carex nigra*, *C. echinata*, *Narthecium ossifragum* and limited abundance of *Racomitrium lanuginosum*, *Cladonia arbuscula* and *C. uncialis*. The M17b sub-community contains similar species to that described for M17a above but with more *Racomitrium lanuginosum* and *Cladonia* lichens, and less *Sphagnum papillosum*. Similar in the species assemblage above for M17a, the M17c differs in that it has more *Juncus squarrosus*, *Nardus stricta* and *Empetrum nigrum*, and generally a little less *Sphagnum* cover.

The M19 community appears within this blanket bog habitat occurring on peat-covered level to gently sloping ground within the survey area. It is represented at community level, and in the form of the M19a *Erica tetralix* sub-community, M19b *Empetrum nigrum* sub-community, and the M19c *Vaccinium vitis-idaea*-*Hylocomium splendens* sub-community; M19c is the most extensive form present in the survey area. The community is generally distinctive with the bulk of the vegetation consisting of a mixture of *Calluna vulgaris* and *Eriophorum vaginatum*. The M19a contains *Erica tetralix*, *Vaccinium myrtillus* and/or *Avenella flexuosa*. The mosses *Hylocomium splendens*, *Polytrichum commune*, *Pleurozium schreberi*, *Hypnum jutlandicum* and *Sphagnum capillifolium* are collectively very abundant, forming deep and extensive carpets. M19b is broadly similar to the M19c sub-community below yet differs in being more species-poor with less *Hylocomium splendens* and *Cladonia* lichens. The M19c sub-community forms the largest component of this community with the familiar community characteristics of a dense growth of *Calluna vulgaris* and *Eriophorum vaginatum*. Other species in M19c include *Empetrum nigrum*, *Vaccinium vitis-idaea* and *V. myrtillus*, abundant mosses *Hylocomium splendens*, *Rhytidiadelphus loreus*, *Sphagnum capillifolium*, *S. fuscum* and *Racomitrium lanuginosum*, and abundant lichens including *Cladonia arbuscula*, *C. uncialis*, *C. portentosa* and *Cetraria islandica*. Areas of M19c above 600m in altitude generally and broadly correlates to montane bog. Much of this M19c contains large areas of peat haggging, most likely because of a long history of intensive grazing and trampling by deer. Despite the poor condition of the peatland there are also instances of some notable species, such as *Sphagnum fuscum* and *S. austini*, recorded as TNs (see **Annex A** and **Figure 8.3**).

Overall, the habitat surveys identified widespread degradation of peatland and bog habitats within the site and wider survey area, with extensive areas of active erosion through peat haggging and gullyng, and eroding bare peat, as shown in **Annex C**. Nearly all the peatland along the route of the Proposed Development is actively eroding through the presence of extensive and in places very high density eroding deep hagg and gully systems with bare peat cliffs and gully bottoms. Many of the gullies were eroded down to the underlying substrate/mineral soils, creating disconnected baulks of peat, and were acting as drains, with active waterflow draining the surrounding peatland.

5.5.2 E1.7 Wet Modified Bog

Wet modified bog is represented here by the M20 *Eriophorum vaginatum* blanket mire community, and this is very scarce within the survey area, found once within a mosaic with the M17 and M19 blanket bog communities. The species assemblage can be identified by the dominant tussocks of *Eriophorum vaginatum*, along with *Empetrum nigrum*, *Avenella flexuosa*, *Nardus stricta*, *Festuca*

vivipara, *Carex echinata*. Mosses included *Sphagnum papillosum*, *S. fallax*, *S. capillifolium* and *Polytrichum commune*. It is possible it has derived from M17 and/or M19 by grazing, leading to a reduction in dwarf shrub cover and a corresponding increase in *E. vaginatum*.

5.5.3 E2.1 Acid/Neutral Flush/Spring

Acid/neutral flushes and springs are scattered areas across the survey area in small stands, and their overall total extent is low. The majority of these features were of the M6 *Carex echinata* – *Sphagnum fallax/denticulatum* mire community, in particular the M6a *Carex echinata* sub-community. Otherwise, this habitat type consists of very small areas of M6b *Carex nigra*-*Nardus stricta* sub-community, M6c *Juncus effusus* sub-community, M4 *Carex rostrata* – *Sphagnum fallax* mire, M31 *Anthelia julacea* – *Sphagnum denticulatum* spring, or M32 *Philonotis fontana* – *Saxifraga stellaris* springs.

The few areas of M4 were recorded on wet peaty soils in mosaics with other mire, swamp and grassland communities. This community was dominated by *Carex rostrata* along with *C. echinata*, *Eriophorum angustifolium*, *Agrostis canina* and *Narthecium ossifragum*, and basal layer dominated by *Sphagnum papillosum*, *S. capillifolium* and *S. fallax*.

M6 was mainly represented in the survey area by the M6a *Carex echinata* sub-community, and to a much lesser extent, the M6b *Carex nigra* – *Nardus stricta* sub-community and M6c *Juncus effusus* sub-community. These are rush or sedge mires on wet and mostly flushed ground whose soils appear to be acidic, as judged by the abundance of *Sphagnum* mosses (especially *Sphagnum fallax* and *S. palustre*) and the moss *Polytrichum commune*. Individual areas of M6 are generally only small and occurring as flushes scattered among mires, heaths and grasslands.

The M6a sub-community is an acidic sedge mire that contains an abundance of *Carex echinata* together with varied amounts of *C. nigra*, *Eriophorum angustifolium*, *Agrostis canina*, *Avenella flexuosa*, *Anthoxanthum odoratum*, *Nardus stricta*, *Viola palustris*, *Potentilla erecta* and *Galium saxatile*. The moss layer includes *Sphagnum fallax*, *S. palustre*, *S. capillifolium* and *Polytrichum commune*. The M6b sub-community was found in one location within a mosaic with other mire communities being a sedge mire with its vascular sward including abundant to dominant *Carex nigra* mixed with some other species including *C. echinata*, *Eriophorum angustifolium* and *Agrostis canina*. The M6c sub-community is a rush mire dominated by tall swards of *Juncus effusus* with a carpet of *Sphagnum* moss spread within it, often dominated by *Sphagnum fallax* and *Polytrichum commune* and found within mosaics with other mire and grassland communities.

A number of small springs are dotted throughout the survey area (see also **Annex A**) often forming the minor component of mosaics with other mire communities and mainly appear as the M31 *Anthelia julacea* – *Sphagnum denticulatum* spring and M32 *Philonotis fontana* - *Saxifraga stellaris* spring community, represented at community level and by the M32a *Sphagnum denticulatum* sub-community.

The M31 community is dominated by the liverwort *Anthelia julacea*, interspersed with a variety of species including *Narthecium ossifragum*, *Trichophorum germanicum*, *Nardus stricta*, *Carex demissa*, *C. nigra*, *Huperzia selago*, *Eriophorum angustifolium*, the mosses *Sphagnum denticulatum*, *S. compactum* and *Warnstorfia sarmentosa*, and the liverwort *Marsupella emarginata*. Many of these

springs/flushes appear within areas that have had deep peat which has subsequently been subject to erosion over time. The M32 is composed of small springs whose vegetation includes extensive deep, spongy carpets of the mosses *Philonotis fontana*, *Sphagnum denticulatum*, *Aulacomnium palustre*, *Polytrichum commune* and the vascular plants *Agrostis canina*, *Juncus bulbosus* and *Carex echinata*.

5.5.4 E2.2 Basic Flush/Spring

In a few limited areas several basic flushes/springs were found, both as a standalone community and as part of mosaics with other mire and more flushed communities within the survey area. These areas are represented by the M10 *Carex dioica* – *Pinguicula vulgaris* mire community and the M37 *Palustriella commutata* – *Festuca rubra* spring community.

The M10 community comprises base-enriched flush mires whose short vegetation includes the sedges *Carex panicea*, *Eleocharis quinqueflora*, *C. demissa* and *Eriophorum angustifolium*, the rushes *Juncus articulatus* and *J. bulbosus*, the herbs *Pinguicula vulgaris*, *Narthecium ossifragum*, *Triglochin palustris*, *Euphrasia* sp. and *Huperzia selago*, and mosses such as *Campylium stellatum*, *Blindia acuta*, *Palustriella commutata*, *Scorpidium revolvens* and *S. scorpioides*. Other species found in some of these flushes include *Thalictrum alpinum*, *Juncus triglumis* and the mosses *Warnstorfia sarmentosa*, *W. exannulata* and *Pseudocalliergon trifarium*. These examples found show characteristics of the M10a *Carex demissa* – *Juncus bulbosus*/*Kochii* sub-community. Most of these flushed areas were found on wet stony ground amongst hagged bog and formed mosaics with other mire and heath communities, however some M10 was more locally present in wet heath on naturally shallow peaty soils.

A single M37 spring was recorded within a mosaic dominated by blanket bog, similar to that of the M32 springs (see Section 5.5.3 above) but differ in that the calcicole moss *Palustriella commutata* is abundant or dominant. Other mosses present included *Calliergonella cuspidata*, *Philonotis fontana*, *Warnstorfia exannulata* and the nationally scarce *Pseudobryum cinclidioides*, and the liverwort *Chiloscyphus polyanthos*. Vascular plants included *Cardamine pratensis*, *Montia fontana*, *Carex lepidocarpa*, *Nardus stricta*, *Selaginella selaginoides* and *Sagina procumbens*.

5.5.5 E4 Bare Peat

Bare peat (ExP) is a non-NVC community within the survey area, often found in areas of peat haggling, areas devoid of vegetation through erosion and restoration areas.

5.6 Swamp, Marginal & Inundation Habitats

5.6.1 F1 Swamp

A small number of areas of swamp were recorded within the survey area around pools and lochans, represented by the S9 *Carex rostrata* swamp community. It was recorded both at the community level and as the S9a *Carex rostrata* sub-community within mosaics, where in all cases the assemblage is dominated by *Carex rostrata*.

5.7 Open Water

5.7.1 G1 Standing Water

A number of small lochans within the survey area were recorded as standing water (SW).

5.7.2 G2 Running Water

A number of minor watercourses (RW) are present within the survey area.

5.8 Miscellaneous

5.8.1 J1.3 Cultivated/Disturbed Land – Ephemeral/Short Perennial

Juncus bulbosus vegetation (Jb) is a non-NVC community within the survey area found along the outer edge of the existing track in which previous bare soil is now revegetating with a sparse cover of *Juncus bulbosus*.

5.8.2 J3.6 Buildings

Buildings (BD) is a non-NVC community to identify buildings or built-up structures within the survey area, both inhabited and vacant, such as substations and outbuildings/sheds.

5.8.3 J4 Bare Ground

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

5.8.4 J5 Other Habitat

Other habitat is a non-NVC community used here where there is disturbed ground (DG) not classifiable as any other habitat type. However, some areas were found to be re-vegetating with secondary semi-natural vegetation over the disturbed ground. The re-vegetating disturbed ground areas are denoted by the '>' symbol followed by the NVC community that most closely fits with the emerging vegetation.

Muirburn (MB) is a non-NVC community within the survey area, also categorised here as 'Other Habitat' where the burning was very recent or of a degree that the parent or likely habitat type could not be easily determined.

5.9 Invasive Non-Native Species

No INNS were incidentally recorded during the habitat surveys; however, this does not preclude their presence from the survey area.

5.10 Notable Species

There were some notable species recorded within the survey area: the moss *Pseudobryum cinclidioides* (see Section 5.5.4 above); *Kalmia procumbens* (trailing azalea, see Section 5.4.3 above); the lichen *Thamnolia vermicularis* (see Section 5.4.3 above); and *Sphagnum fuscum* and *S. austini* (see Section 5.5.1 and **Annex A**).

6 EVALUATION OF BOTANICAL INTEREST

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.

6.1 Groundwater Dependent Terrestrial Ecosystems (GWDTE)

SEPA has classified a number of NVC communities as potentially dependent on groundwater (SEPA, 2017a & 2017b). Wetlands or habitats containing these particular NVC communities are to be considered GWDTE unless further information can be provided to demonstrate this is not the case. 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 habitat's 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 10: Geology, Hydrology and Hydrogeology**).

Using SEPA's guidance, **Table 6-1** shows which communities recorded within the survey area may be considered GWDTE. Those communities which may have limited (moderate) dependency on groundwater in certain settings are marked in yellow and NVC communities recorded that are likely to be considered high, or sensitive GWDTE in certain hydrogeological settings are highlighted in red.

Table 6-1 Communities within the survey area which may potentially be classified as GWDTE

NVC Code	NVC Community Name
M15	<i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath
M25	<i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire
U6	<i>Juncus squarrosus</i> – <i>Festuca ovina</i> grassland
Je ⁹	<i>Juncus effusus</i> acid grassland
M6	<i>Carex echinata</i> – <i>Sphagnum fallax/denticulatum</i> mire
M10	<i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire
M31	<i>Anthelia julacea</i> – <i>Sphagnum denticulatum</i> spring

⁹ In light of the SEPA classification on potential GWDTEs the non NVC type 'Je' 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).

NVC Code	NVC Community Name
M32	<i>Philonotis fontana</i> – <i>Saxifraga stellaris</i> spring
M37	<i>Palustriella commutata</i> – <i>Festuca rubra</i> spring

The location and extent of all identified potential GWDTE are provided on an appropriate NVC map; see **Figure 8.4**.

Within **Figure 8.4** 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.

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 be only partially groundwater fed or not dependant on groundwater. Determining the actual groundwater dependency of particular areas or habitat requires further assessment (see **Chapter 10: Geology, Hydrology and Hydrogeology**).

6.2 Annex I Habitats

6.2.1 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 Joint Nature Conservation Committee (JNCC) Annex I habitat listings and descriptions¹⁰, which have then been compared with survey results and field observations, the following NVC communities within the survey area which may constitute terrestrial Annex I habitat are shown in **Table 6-2**.

Table 6-2 Annex I Habitats and Corresponding NVC Communities

¹⁰ <https://sac.jncc.gov.uk/habitat/>

Annex I Habitat	Corresponding NVC Communities & Other Non-NVC Habitats/Features Recorded
4010 North Atlantic wet heaths with <i>Erica tetralix</i>	M15 <i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath
4030 European dry heaths	H10 <i>Calluna vulgaris</i> - <i>Erica cinerea</i> heath H12 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath H10-H12 Intermediate heath H21 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> – <i>Sphagnum capillifolium</i> heath
4060 Alpine and boreal heaths	H13 <i>Calluna vulgaris</i> – <i>Cladonia arbuscula</i> heath H14 <i>Calluna vulgaris</i> – <i>Racomitrium lanuginosum</i> heath H19 <i>Vaccinium myrtillus</i> – <i>Cladonia arbuscula</i> heath H20 <i>Vaccinium myrtillus</i> – <i>Racomitrium lanuginosum</i> heath
6150 Siliceous alpine and boreal grasslands	U7 <i>Nardus stricta</i> – <i>Carex bigelowii</i> grass-heath U10 <i>Carex bigelowii</i> - <i>Racomitrium lanuginosum</i> moss-heath
7130 Blanket bog	M1 <i>Sphagnum denticulatum</i> bog pool community M2 <i>Sphagnum cuspidatum/fallax</i> bog pool community M3 <i>Eriophorum angustifolium</i> bog pool community M15^ <i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath (on deep peat) M17 <i>Trichophorum germanicum</i> – <i>Eriophorum vaginatum</i> blanket mire M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire M20 <i>Eriophorum vaginatum</i> blanket mire
7140 Transition mires and quaking bogs	M4 <i>Carex rostrata</i> - <i>Sphagnum fallax</i> mire
7220 Petrifying springs with tufa formation (Cratoneuron)	M37 <i>Palustriella commutata</i> – <i>Festuca rubra</i> spring
7230 Alkaline fens	M10 <i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire

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

6.2.2 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, despite the degraded nature of the peatland within the survey area (see Section 5.5.1). However, 7130 Blanket bog can also include bog pool communities (M1-M3) where these occur within blanket mires such as M17-M20. As such M1, 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 and M19 mire.

As noted above, M15 wet heath and M25 mire can also fall within the blanket bog Annex I type, usually where the underlying peat depth is greater than 0.5m and the habitat is wet and contains peat forming species. As described in Section 5.3.2 above, there is limited M25 within the survey area and is for the most part species-poor and at the drier end of the scale. Many areas are a swathe of *Molinia* tussocks with few associate species and generally lack many of the main peat forming species such as *Sphagnum* mosses. Given the character of the majority of M25 within the survey area it has not been considered to be Annex I habitat in this case. With respect to M15, several areas of M15 on deep peat were recorded (denoted by the codes M15b[^], M15c[^], M15d[^]) and are likely to be considered blanket bog, albeit degraded.

6.2.3 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.

6.2.4 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. Examples of M10 mire in the survey area fall within this Annex I habitat type.

6.2.5 7220 Petrifying springs with tufa formation (*Cratoneuron*)

Tufa formation is associated with hard-water springs, where groundwater rich in calcium bicarbonate comes to the surface. These conditions occur most often in areas underlain by limestone or other calcareous rocks, and particularly in the uplands of northern England and the Scottish Highlands. All examples of the M37 *Palustriella commutata* – *Festuca rubra* spring in the survey area fall within this Annex I type.

6.2.6 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 on peat less than 0.5m in depth are included within the 4010 Northern Atlantic wet heaths category, M15 with peat depths of over 0.5m in depth (M15b[^], M15c[^], M15d[^]) are included in blanket bog above (Section 6.2.2).

6.2.7 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 – H10, H10-H12 Intermediate, H12, 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 tend to be lower altitudinal examples so they better fall under the 4030 European dry heaths Annex I type.

6.2.8 4060 Alpine and boreal heaths

Alpine heaths develop above the natural altitudinal treeline, and boreal heaths below the treeline 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 H13, H14, H19 and H20 heath within the survey area falls into the alpine and boreal heaths Annex I type.

6.2.9 6150 Siliceous alpine and boreal grasslands

Siliceous alpine and boreal grasslands are one of the few predominantly near-natural habitats remaining in the UK. The habitat is the most extensive type of vegetation in the high mountain zone, above an altitude of about 750m. It often forms large continuous tracts, covering summit plateaux and the tops of the higher summits and ridges. The habitat comprises a range of grassland types whose composition is influenced by contrasting extremes of exposure and snow-lie. Late-lie snow-bed communities dominated by bryophytes and dwarf-herbs are also included within the definition of the habitat. The habitat is vulnerable to nutrient inputs and physical damage such as occur due to dunging and urination by grazing animals, acid deposition, human and animal trampling, and use of all-terrain vehicles.

The stands of U7 and U10 within the survey area fall within this Annex I type. U10 moss-heath occurs on windswept ground blown clear of snow during winter and is the most extensive sub-type of the habitat across most of the UK. Where snow-lie builds up, such moss-heath gives way initially to U7 *Nardus* – *Carex* grass-heath.

6.3 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 website¹¹), and associated NVC types recorded within the survey area are as follows:

- Blanket bog: M17, M19, M20, and M1-M3 (M1-M3 where associated with M17-M20), and M15¹² where peat depth is greater than 0.5m;
- Mountain heaths and willow scrub: U4d/U4e, U5e, H13, H14, H19, H20, U7, and U10;
- Upland flushes, fens and swamps: M4, M6, M10, M31, M32, M37 and S9; and
- Upland heathland: M15, H10, H12, H10-H12 Intermediate, and H21.

These SBL priority habitats correspond with UK Biodiversity Action Plan (BAP) Priority Habitats¹³.

6.4 Sensitivity Summary

Table 6-3 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 6-3 Summary of survey area communities and sensitivities

NVC/Non-NVC Codes Recorded	Potential GWDTE Status	Annex I Habitat	SBL Priority Habitat Type
Mires & Wet Heath			
M1	-	7130 Blanket bogs (examples associated with M17-M20)	Blanket bog
M2	-	7130 Blanket bogs (examples associated with M17-M20)	Blanket bog
M3	-	7130 Blanket bogs (examples associated with M17-M20)	Blanket bog
M4	-	7140 Transition mires and quaking bogs	Upland flushes, fens and swamps
M6a, M6b, M6c	High	-	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 <i>Erica tetralix</i>	Upland heathland

¹¹ <https://www.nature.scot/scotlands-biodiversity/habitat-definitions>

¹² Excluding the M15a *Carex panicea* sub-community, due to its general flushed nature over shallower substances.

¹³ <http://jncc.defra.gov.uk/page-5718>

NVC/Non-NVC Codes Recorded	Potential GWDTE Status	Annex I Habitat	SBL Priority Habitat Type
M15b^, M15c^, M15d^	Moderate	7130 Blanket bogs	Blanket bog
M17, M17a, M17b, M17c	-	7130 Blanket bogs	Blanket bog
M19, M19a, M19b, M19c	-	7130 Blanket bogs	Blanket bog
M20	-	7130 Blanket bogs	Blanket bog
M25a, M25b	Moderate	-	-
M31	-	-	Upland flushes, fens and swamps
M32, M32a	High	-	Upland flushes, fens and swamps
M37	High	7220 Petrifying springs with tufa formation (Cratoneuron)	Upland flushes, fens and swamps
Dry Heaths			
H10a	-	4030 European dry heaths	Upland heathland
H10-H12 Intermediate	-	4030 European dry heaths	Upland heathland
H12a, H12b, H12c	-	4030 European dry heaths	Upland heathland
H21	-	4030 European dry heaths	Upland heathland
H13, H13a	-	4060 Alpine and Boreal heaths	Mountain heaths and willow scrub
H14, H14b	-	4060 Alpine and Boreal heaths	Mountain heaths and willow scrub
H19, H19c	-	4060 Alpine and Boreal heaths	Mountain heaths and willow scrub
H20	-	4060 Alpine and Boreal heaths	Mountain heaths and willow scrub
Calcifugous Grasslands & Montane Communities			
U4, U4a, U4aCn, U4d, U4e	-	-	U4d & U4e - Mountain heaths and willow scrub
U5, U5a, U5b, U5e	-	-	U5e - Mountain heaths and willow scrub
U6, U6a, U6c, U6d, U6H	Moderate	-	-
U7, U7b	-	6150 Siliceous alpine and boreal grasslands	Mountain heaths and willow scrub
U10, U10a	-	6150 Siliceous alpine and boreal grasslands	Mountain heaths and willow scrub
Swamps			
S9, S9a	-	-	Upland flushes, fens and swamps
Non-NVC Types			
BD	-	-	-
BG	-	-	-
CF	-	-	-
CF>M25	-	-	-
CP	-	-	-
DG	-	-	-

NVC/Non-NVC Codes Recorded	Potential GWDTE Status	Annex I Habitat	SBL Priority Habitat Type
ExP	-	-	-
Jb	-	-	-
Je	Moderate	-	-
MB	-	-	-
RW	-	-	-
SW	-	-	-
YBP	-	-	-

7 SUMMARY

MacArthur Green carried out NVC and habitat surveys within the survey area in order to identify those areas of vegetation communities with the greatest ecological or conservation interest.

In total 28 NVC and intermediate NVC communities were recorded within the respective survey area along with various associated sub-communities; a number of non-NVC habitat and feature types are also present. Only a small number of communities or habitat types account for the majority of the survey area.

The most common and widespread habitat making up the bulk of the landscape is degraded and eroding blanket bog, mainly represented by the M17 *Trichophorum germanicum* – *Eriophorum vaginatum* and M19 *Calluna vulgaris* – *Eriophorum vaginatum* blanket mire NVC communities. Within and around these areas are patches and pockets of other habitat types such as wet dwarf shrub heath, areas of bare peat, unimproved acid grassland, lichen/bryophyte heath, montane heath/dwarf herb heath, acid dry dwarf shrub heath, flushes and springs (**Figure 8.3**).

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 6-3**.

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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 **Figure 8.3** and detailed within **Table A.1** below. A 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	250169	804548	N/A	Example of natural erosion peat pipes running throughout the area.	B-1
2	250269	804091	M32	M32 spring.	
3	249877	804076	M32	M32 spring.	
4	249786	804046	M32	M32 spring.	B-2
5	248380	803595	M3	Example of bog pools scattered across the area.	B-3
6	250071	803494	M19c	<i>Sphagnum fuscum</i> in bog.	
7	250169	803473	M19c	<i>Sphagnum fuscum</i> in bog.	
8	247760	803398	M32	M32 spring. Species include <i>Philonotis fontana</i> (abundant) and <i>Straminergon stramineum</i> .	
9	250276	803324	M19c	<i>Sphagnum fuscum</i> in bog.	
10	248928	803190	M19c	<i>Sphagnum fuscum</i> in bog.	
11	250407	802957	M19c	<i>Sphagnum fuscum</i> in bog.	
12	250445	802949	M17b/M19c	<i>Sphagnum fuscum</i> (very good population) in bog.	
13	247606	802885	M15c	<i>Lycopodium annotinum</i> in small quantity in wet heath.	
14	250461	802805	M19c	<i>Sphagnum fuscum</i> in bog.	
15	248876	802711	M15b	<i>Sphagnum fuscum</i> locally frequent in wet heath.	
16	247641	802675	M32	M32 spring with species including <i>Philonotis fontana</i> (abundant) and <i>Warnstorfia sarmentosa</i> .	
17	250849	802660	M19c	<i>Sphagnum fuscum</i> in bog.	
18	247477	802638	M15c	<i>Umbilicaria</i> spp. on big boulder.	
19	250651	802590	M19c	<i>Sphagnum fuscum</i> in bog.	
20	247456	802578	M15c	<i>Cetraria islandica</i> in wet heath.	
21	250611	802562	M19c	<i>Sphagnum fuscum</i> in bog.	
22	247222	802498	M19c	<i>Sphagnum fuscum</i> in bog.	

Target Note ID	Easting	Northing	NVC Community	Description	Photo Reference
23	247226	802468	M15a	<i>Warnstorfia exannulata</i> in M15a heathy flush.	
24	249127	802456	M37	Base-rich spring with species including <i>Palustriella commutata</i> , <i>Warnstorfia exannulata</i> , <i>Calliergonella cuspidata</i> , <i>Chiloscyphus polyanthos</i> and the uncommon <i>Pseudobrym cinclidioides</i> .	
25	248326	802447	M19c	<i>Sphagnum fuscum</i> in bog.	
26	247509	802437	M19c	<i>Sphagnum fuscum</i> in bog.	
27	248357	802412	M19c	<i>Sphagnum fuscum</i> in bog.	
28	251435	802347	M19c	<i>Sphagnum fuscum</i> and <i>Rubus chamaemorus</i> in bog.	
29	247341	802277	M19c	<i>Sphagnum fuscum</i> in bog.	
30	247359	802251	M19c	<i>Sphagnum fuscum</i> in bog.	
31	249470	802191	M19c	<i>Sphagnum fuscum</i> in bog.	
32	247512	802098	M19c	<i>Sphagnum fuscum</i> in bog.	
33	247669	802061	M19c	<i>Sphagnum fuscum</i> in bog.	
34	247536	802027	M19c	<i>Sphagnum fuscum</i> in bog.	
35	251604	801985	M3/M19c	A few hummocks of <i>Sphagnum austinii</i> in partly eroded bog. A very little <i>Vaccinium uliginosum</i> in nearby U7.	
36	247646	801971	M19c	<i>Sphagnum fuscum</i> in bog.	
37	249182	801934	M32	<i>Warnstorfia exannulata</i> in M32 spring.	
38	247607	801733	M15c	<i>Gymnomitrium concinnatum</i> on rock.	
39	248504	801731	M19c	<i>Sphagnum fuscum</i> in bog.	
40	247606	801697	M15c	<i>Sorbus aucuparia</i> (browsed; 7cm tall), <i>Kalmia procumbens</i> , <i>Carex bigelowii</i> and <i>Cetraria islandica</i> in M15c/rock habitat.	
41	249214	801669	M19c	<i>Sphagnum fuscum</i> in bog.	
42	250232	801644	H13	<i>Thamnlia vermicularis</i> on stony ground in H13 heath on moraine.	
43	248420	801604	M17b	<i>Sphagnum austinii</i> and (at base of <i>S. austinii</i> hummock) <i>S. medium</i> , in bog.	
44	250455	801598	BG	<i>Gymnomitrium concinnatum</i> , <i>G. obtusum</i> and <i>Alchemilla alpina</i> on and among rocks.	
45	251641	801528	M15c	<i>Sphagnum fuscum</i> in wet heath.	
46	247818	801516	M19c	<i>Sphagnum fuscum</i> in bog.	
47	248446	801449	M19c	<i>Sphagnum fuscum</i> in bog.	

Target Note ID	Easting	Northing	NVC Community	Description	Photo Reference
48	247914	801406	M31	Good extent of M31 <i>Anthelia</i> spring/flush habitat.	
49	250995	801397	M19c	<i>Sphagnum fuscum</i> in bog.	
50	248924	801379	M19c	<i>Sphagnum fuscum</i> in bog.	
51	251355	801232	M32	<i>Saxifraga stellaris</i> in mossy spring.	
52	248471	801126	M19c	<i>Sphagnum fuscum</i> in bog.	
53	248173	801113	M10a/M31	Species in flush/spring habitat here include <i>Anthelia julacea</i> (in M31) and <i>Pseudocalliergon trifarium</i> , <i>Scorpidium scorpioides</i> , <i>Blindia acuta</i> and <i>Carex demissa</i> (in M10).	
54	249607	801104	M10/M31	Small M10 and M31 flushes.	
55	248066	800983	M19c	<i>Sphagnum fuscum</i> in bog.	
56	249573	800942	M31	Scattered M31 spring/flush habitat.	
57	251650	800615	M32a	Spring.	
58	248487	800605	M19c	<i>Sphagnum fuscum</i> in bog.	
59	251638	800525	M32/M10	M32 spring feeding M10 flush.	
60	251595	800500	M32	Number of large springs leading to flushes.	
61	251586	800480	M32	Number of springs.	
62	248620	800461	M19c	<i>Sphagnum fuscum</i> in bog.	
63	251576	800395	M32	Spring.	
64	251561	800325	M32	Number of bright green springs with <i>Philonotis fontana</i> .	
65	248668	800260	M10	Species in base-enriched flush include <i>Warnstorfia sarmentosa</i> , <i>Scorpidium revolvens</i> , <i>S. scorpioides</i> , <i>Blindia acuta</i> , <i>Carex demissa</i> and <i>Triglochin palustris</i> .	
66	248125	800258	M10a	<i>Pseudocalliergon trifarium</i> in base-enriched flush.	
67	248656	800232	M19c	<i>Sphagnum fuscum</i> in bog.	
68	251371	800197	M32	Number of springs and flushes.	
69	248253	800180	M19c	<i>Sphagnum fuscum</i> in bog.	
70	248648	800139	M19c	<i>Sphagnum fuscum</i> in bog.	
71	248616	800088	M19c	<i>Sphagnum fuscum</i> in bog.	
72	251191	799988	M32	Spring and rill.	
73	251047	799900	M32	Number of large springs and flushes.	
74	251051	799868	M32	Number of large springs and flushes.	

Target Note ID	Easting	Northing	NVC Community	Description	Photo Reference
75	249287	799667	H12b	<i>Carex bigelowii</i> in H12b heath (montane form of H12)	
76	248849	799603	M10a	Base-enriched M10 flushes with species including <i>Juncus triglumis</i> , <i>Thalictrum alpinum</i> , <i>Pseudocalliergon trifarium</i> , <i>Scorpidium scorpioides</i> , <i>Campylium stellatum</i> , <i>Carex lepidocarpa</i> and <i>Eleocharis quinqueflora</i> .	
77	248788	799566	M10a	<i>Pseudocalliergon trifarium</i> in stony base enriched M10 flush.	
78	249845	799269	M32a	Spring.	

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.

Photo B-1 Target Note 1 – Example of peat pipes found within the survey area



Photo B-2 Target Note 4 – M32 *Philonotis fontana* - *Saxifraga stellaris* spring



Photo B-3 Target Note 5 – Example of M3 *Eriophorum angustifolium* bog pools



ANNEX C. GENERAL COMMUNITY PHOTOGRAPHS

The following selected photographs are provided to give a visual representation to a number of the community types present within the survey area and the scale of peatland erosion/degradation.

Photo C-1: Formerly worked area undergoing grassland regeneration following seeding



Photo C-2: Example of an area of bog dominated by M17 *Trichophorum germanicum* – *Eriophorum vaginatum* blanket mire and M15 *Trichophorum germanicum* – *Erica tetralix* wet heath



Photo C-3: Intact M17 blanket bog



Photo C-4: M15 wet heath



Photo C-5: Example of peat gully erosion within the survey area



Photo C-6: Peat erosion and gullying, M17/M19 on tops, bare peat sides, some M3 recolonisation in gully base.



Photo C-7: Landscape extent of peat erosion within survey area



Photo C-8: Extensive eroding gully system actively draining the peatland



Photo C-9: Extensive bare peat micro-erosion and peat pan (with some recolonisation by *Eriophorum angustifolium*)



Photo C-10: Erosion down to underlying substrata



Photo C-11: Gullies and bare peat erosion/drainage



Photo C-12: Gullying down to substratum, severing and disrupting the hydrological unit



Photo C-13: Example of gully with bare peat sides acting as active drain



Photo C-14: H13 *Calluna vulgaris* – *Cladonia arbuscula* heath



Photo C-15: U7 *Nardus stricta* – *Carex bigelowii* grass-heath



Photo C-16: U10 *Carex bigelowii* - *Racomitrium lanuginosum* moss-heath



Photo C-17: Patches of M32 within heath and eroding peat

