



Cloud Hill Wind Farm

Technical Appendix 7.1 National Vegetation Classification and Habitats Survey

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Technical Appendix 7.1

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1 INTRODUCTION

MacArthur Green was commissioned by Cloud Hill Windfarm Limited (the Applicant) to carry out a National Vegetation Classification (NVC) and habitats survey at the proposed Cloud Hill Wind Farm, 5 km south-west of Sanquhar, Dumfries and Galloway (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 habitats¹; potential Groundwater Dependent Terrestrial Ecosystems (GWDTE); and Scottish Biodiversity List (SBL) priority habitats). This information is used to inform the wind farm design process and the ecological assessment for the Cloud Hill Wind Farm Environmental Impact Assessment Report (EIA Report).

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

2 THE SITE AND SURVEY/STUDY AREA

The Site is located in Dumfries and Galloway, with the entrance approximately 0.5 km south-west of Sanquhar, and the turbines and ancillary infrastructure around 4.5 km further to the south-west. The topography of the Site and immediate vicinity is complex, with elevation ranging from approximately 150 m Above Ordnance Datum (AOD) in the north-east part of the Site to approximately 470 m AOD in the south-east of the Site, at the summit of Corridow Hill. There are several other hills within the Site including Mid Rig (437 m AOD), Cloud Hill (451 m AOD) and Whing Head (456 m AOD).

In terms of habitats, marshy grassland dominates the Site, followed by unimproved acid grassland, wet modified bog, improved grassland, and conifer plantation woodland. Within and around these areas are patches and pockets of other habitat types such as bracken, semi-natural woodland, and blanket bog. The hills are dissected by several watercourses, including Whing Burn, Glenmaddie Burn, Glen Burn, and Glenlarie Burn. Watercourses within the Site flow into the Euchar Water and then the River Nith.

There are no designated sites within the Site although the Upper Nithsdale Woods Special Area of Conservation (SAC), the Back Wood SSSI (Site of Special Scientific Interest), the Mennoch Water SSSI, and North Lowther Uplands SSSI are designated sites within 5 km of the Site. 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 7: Ecology). The locations of the designated sites are presented in Figure 7.1.

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'.

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

Designated site	Distance from Site	Qualifying interests	Last assessed condition & date
Upper Nithsdale Woods SAC	2.6 km	Mixed woodland on base-rich soils associated with rocky slopes	Unfavourable Declining 09/11/2009
Back Wood SSSI	2.6 km	Upland oak woodland	Unfavourable Declining ² 08/10/2009
Mennoch Water SSSI	2.9 km	Fen meadow	Favourable Maintained 27/06/2016
		Upland oak woodland	Favourable Maintained 02/06/2014
North Lowther Uplands SSSI	3.6 km	Upland (habitat) assemblage	Unfavourable recovering 31/05/2015

There are multiple areas of ancient woodland (as present on the Ancient Woodland Inventory (AWI)) within 5 km of the Site, including some areas which border the Site; see Figure 7.1.

The Carbon and Peatland Map 2016³ 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 habitat⁴ as Class 1 and Class 2 peatlands. Figure 7.2 indicates that, according to this predictive tool and map, the Site contains a small amount of Class 1 peatland within the south-eastern area around Corridow Hill, with an area of Class 2 peatland around Whing Head and east and north of Corridow Hill. The majority of the Site includes Class 3⁵ and some Class 5⁶ soils.

This Technical Appendix reports on the habitats recorded within the survey area, i.e., the entire area covered by field surveys (see Figure 7.3). The survey area extends beyond the Site in certain

² Management measures are in place that should, in time, improve the feature to Favourable condition (Unfavourable Recovering Due to Management).

³ 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>

⁴ Priority peatland habitat is land covered by peat-forming vegetation or vegetation associated with peat formation.

⁵ Class 3 - Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Predominantly peaty soil with some peat soil.

⁶ Class 5 - Soil information takes precedence over vegetation data. No peatland habitat recorded.

areas, reflecting earlier areas of interest and to provide survey buffers to account for the presence of potential GWDTE (where land access permission allowed). The appropriate scale for the assessment of effects with regards habitat loss has been deemed to be the Study Area (which equates here to the Site area, as defined in Chapter 7: Ecology).

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 necessarily 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 on the following dates inclusive:

- 16th to 19th August 2021;
- 5th August 2022;
- 13th December 2022; and
- 6th to 8th February 2023.

Most of the Site and survey area was surveyed during the 2021 surveys. The 2022 surveys covered small additional areas for the proposed access route entering from Ulzieside to the north-east of the Site, and the 2023 surveys covered the remainder of the Site to the east. All areas of the Site were accessible.

The weather conditions were amenable to survey (dry, overcast, occasional light showers and low wind speeds) and were undertaken during the optimal season for vegetation surveys (except for the December and February surveys). However, in the December and February surveys the overall character and type of vegetation was still readily recognisable and could still be accurately attributed a NVC community due to the surveyor knowledge of the Site and survey area from earlier ecological surveys throughout the year and the persistent and still easily identifiable vegetation present in many areas such as various sub-shrubs, rushes, remnant dying/dead vegetation, bryophytes etc.

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.

5 RESULTS

5.1 Summary of Habitat Types & NVC Communities

24 NVC communities (and various associated sub-communities) and 13 non-NVC communities were recorded within the survey area, and these corresponded to 24 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
A1.1.1 Broadleaved Semi-Natural Woodland	W7 <i>Alnus glutinosa</i> – <i>Fraxinus excelsior</i> – <i>Lysimachia nemoreum</i> woodland W9 <i>Fraxinus excelsior</i> – <i>Sorbus aucuparia</i> – <i>Mercurialis perennis</i> woodland W11 <i>Quercus petraea</i> – <i>Betula pubescens</i> – <i>Oxalis acetosella</i> woodland
A1.1.2 Broadleaved Plantation Woodland	BP Broadleaved Plantation (non-NVC type) YBP Young Broadleaved Plantation (non-NVC type) W11(p ⁷) <i>Quercus petraea</i> – <i>Betula pubescens</i> – <i>Oxalis acetosella</i> woodland W17(p) ⁷ <i>Quercus petraea</i> – <i>Betula pubescens</i> – <i>Dicranum majus</i> woodland
A1.2.2 Coniferous Plantation Woodland	CP Coniferous Plantation (non-NVC type) YCP Young Coniferous Plantation (non-NVC type)
A1.3.2 Mixed Plantation Woodland	Mixture of CP and BP (non-NVC types)
A3.1 Scattered Broadleaved Trees	W7 <i>Alnus glutinosa</i> – <i>Fraxinus excelsior</i> – <i>Lysimachia nemoreum</i> woodland W11 <i>Quercus petraea</i> – <i>Betula pubescens</i> – <i>Oxalis acetosella</i> woodland
A4.2 Recently-Felled Coniferous Woodland	CF Clear-Felled Woodland (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 Cn <i>Carex nigra</i> dominant acid grassland (non-NVC type)
B1.2 Semi-Improved Acid Grassland	U4b <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland <i>Holcus lanatus</i> – <i>Trifolium repens</i> sub-community
B2.1 Unimproved Neutral Grassland	MG1 <i>Arrhenatherum elatius</i> grassland MG9 <i>Holcus lanatus</i> – <i>Deschampsia cespitosa</i> grassland
B4 Improved Grassland	MG6 <i>Lolium perenne</i> – <i>Cynosurus cristatus</i> grassland
B5 Marsh/Marshy Grassland	MG10 <i>Holcus lanatus</i> – <i>Juncus effusus</i> rush-pasture M23 <i>Juncus effusus/acutiflorus</i> – <i>Galium palustre</i> rush-pasture

⁷ The '(p)' denotes planted stands that are broadly referable to the corresponding NVC type, either in planted tree species composition or field layer, or both.

Phase 1 Habitats	NVC Communities & Other Non-NVC Habitats/Features Recorded
	M25 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire M25b <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire <i>Anthoxanthum odoratum</i> sub-community Je <i>Juncus effusus</i> acid grassland community (non-NVC type) Ja <i>Juncus acutiflorus</i> acid grassland community (non-NVC type)
C1.1/C1.2 Bracken – Continuous/Scattered	U20 <i>Pteridium aquilinum</i> – <i>Galium saxatile</i> community
C3.1 Tall Ruderal	OV25 <i>Urtica dioica</i> – <i>Cirsium arvense</i> community OV27 <i>Chamerion angustifolium</i> community
D1.1 Dry Dwarf Shrub Heath – Acid	H9 <i>Calluna vulgaris</i> – <i>Deschampsia flexuosa</i> heath
D2 Wet Dwarf Shrub Heath	M15 <i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath
E1.6.1 Blanket Bog	M3 <i>Eriophorum angustifolium</i> bog pool community M17 <i>Trichophorum germanicum</i> – <i>Eriophorum vaginatum</i> blanket mire
E1.7 Wet Modified Bog	M20 <i>Eriophorum vaginatum</i> blanket mire M25a <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire <i>Erica tetralix</i> sub-community
E2.1 Acid/Neutral Flush	M4 <i>Carex rostrata</i> - <i>Sphagnum fallax</i> mire M6 <i>Carex echinata</i> - <i>Sphagnum fallax/denticulatum</i> mire
E2.2 Basic Flush	M10 <i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire
E4 Bare Peat	ExP Exposed Peat (non-NVC type)
G2 Running Water	RW Running Water (non-NVC type)
J1.2 Amenity Grassland	PG Private Gardens & Lawns, Parks etc (non-NVC type)
J3.6 Buildings	BD Buildings (non-NVC type)
J4 Bare Ground	BG Bare Ground, Tracks, Hardstandings etc (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 7.3 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 7.3 and detailed within Annex A; target note photographs are included within Annex B. Further photographs of a number of the 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

The northern boundary of the survey area included areas of semi-natural broadleaved woodland stands and riparian areas, particularly within the area around Glenmaddie Wood and south of the

Euchan Water. The canopy structure varied with dense clusters around along the Euchan Water to a much more open canopy across the higher ground.

The stands were most closely referable to types of W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemoreum* woodland, W9 *Fraxinus excelsior* – *Sorbus aucuparia* – *Mercurialis perennis* woodland, and W11 *Quercus petraea* – *Betula pubescens* – *Oxalis acetosella* woodland, with W11 being the most extensive. All stands were recorded at community level only.

The W7 community is present both as homogenous stands and in mosaics with mire and grassland communities. The canopy includes a variety of species with the most common being *Alnus glutinosa*, *Sorbus aucuparia*, and *Betula* sp. with a field layer dominated by *Deschampsia cespitosa* and *Agrostis* sp., with *Juncus effusus* becoming more abundant within wetter areas.

The W9 community appears along the Euchan Water, north of Ulzieside, in several dense woodland stands, and forms the smallest component of the broadleaved semi-natural woodland habitat. The dense canopy was dominated with mature *Quercus petraea*, *Fraxinus excelsior*, *Acer pseudoplatanus*, *Sorbus aucuparia*, *Corylus avellana* and scattered *Betula pubescens* and occasional *B. pendula*. The field layer was often damp with neutral to basic soils hosting an abundance of *Urtica dioica*, *Luzula sylvatica*, *Galium aparine*, *Rumex acetosa*, *Viola riviniana*, *Dryopteris* sp., *Hedera helix*, *Rubus fruticosus*, and *Circaea lutetiana*. The moss cover was dominated by *Thuidium tamariscinum*, *Brachythecium rutabulum* and *Plagiothecium undulatum*.

The most dominant semi-natural broadleaved woodland within the survey area is the W11 community. This most often comprised a mature canopy of *Quercus* sp., *Betula pubescens*, *Fraxinus excelsior*, *Acer pseudoplatanus* with a field layer most closely associated with the U4 *Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland (see Section 5.3.1 below).

5.2.2 A1.1.2 Broadleaved Plantation Woodland

Broadleaved plantation woodland was recorded in only a few locations as small stands, mainly along the access track south-west of Ulzieside farm. In one of these areas the woodland did not align closely with an identifiable NVC community at the time of survey, comprising immature planted *Betula pendula*, *Fraxinus excelsior* and *Sorbus aucuparia* over the existing neutral grassland habitat.

A further planted stand was identified around Shieling Knowe as most closely referable to W11(p) *Quercus petraea* – *Betula pubescens* – *Oxalis acetosella* woodland and, in one location, W11(p) appears within a mosaic with W17(p) *Quercus petraea* – *Betula pubescens* – *Dicranum majus* woodland⁷. The main canopy species found within W11(p) were *Betula pendula*, *Acer pseudoplatanus* and *Sorbus aucuparia* with an acid grassland field layer most closely associated with the U4 *Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland (see Section 5.3.1 below). The W17(p) canopy species remained similar to that found within the W11(p) community except for the field layer to become dominated by *Calluna vulgaris* which gradually becomes co-dominant with *Molinia caerulea* as the field layer extends into the M25 *Molinia caerulea* – *Potentilla erecta* mire community beyond the canopy cover.

5.2.3 A1.2.2 Coniferous Plantation Woodland

The survey area includes several blocks of densely planted commercial coniferous plantation woodland (CP), the largest of which dominates the north-east of the survey area, known as the Ulzieside Plantation. A much smaller stand was recorded along the access track beside Ulzieside farm. There was also some young coniferous plantation woodland (YCP) recorded. These plantation woodlands are mostly dominated by *Picea sitchensis*. These types of plantation woodlands are of negligible botanical value due to over-shading and loss of the field flora.

5.2.1 A1.3.2 Mixed Plantation Woodland

A single area of mixed plantation woodland was found along the western edge of the Ulzieside Plantation mainly composed of *Picea sitchensis*, along with immature *Acer pseudoplatanus*, *Sorbus aucuparia* and *Betula* sp. This area formed a mosaic that included other mire and grassland communities which had become more established within areas where a more open canopy persisted.

5.2.2 A3.1 Scattered Broad-Leaved Trees

Scattered broadleaved trees were recorded within three areas to the north of the survey area. These individual or small groups of trees were not of a scale as to be mapped as woodland. Instead, all were incorporated into mosaics with other mire and grassland communities, with the scattered trees most closely related to the W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemoreum* woodland or W11 *Quercus petraea* – *Betula pubescens* – *Oxalis acetosella* woodland types. Scattered trees included species such as mature *Betula* sp., *Sorbus aucuparia*, and *Alnus glutinosa*.

5.2.3 A4.2 Recently Felled Coniferous Woodland

Along the northern edge of the Ulzieside Plantation there is an area of recently felled coniferous woodland. At the time of survey, the field layer had not re-established which meant much of the area was devoid of vegetation.

5.3 Grasslands & Marsh

5.3.1 B1.1/B1.2 Unimproved & Semi-Improved Acid Grassland

Unimproved acid grassland was found to be scattered widely throughout the survey area and could often be found closely associated with the marshy grassland habitat (see Section 5.3.4 below). To a much lesser extent, there were also small clusters of more semi-improved acid grassland more localised to the north of the survey area. 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. A few small patches of a non-NVC *Carex nigra* (Cn) dominated acid grassland community are also present within the grassland and mire mosaics of the survey area. These grassland communities were recorded as homogenous stands and also within mosaics with other grassland, mire and bog communities.

As well as community level U4, the following sub-communities were recorded; U4a Typical sub-community, U4b *Holcus lanatus*-*Trifolium repens* sub-community and to a much lesser extent the

U4d *Luzula multiflora* - *Rhytidiadelphus loreus* sub-community. Overall, the stands of U4 within the survey area were very widespread and common on well-drained slopes. The community often contained a variable mix of *Agrostis capillaris*, *A. vinealis*, *Festuca ovina* 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 *Nardus stricta*, *Avenella flexuosa*, *Juncus squarrosus*, *Achillea millefolium*, *Viola lutea*, *Luzula* sp., *Cirsium* sp., *Carex binervis*, and *C. nigra*. 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 *Deschampsia cespitosa*.

While the majority of the *Nardus stricta* dominated U5 was recorded at community level, in several locations the U5a Species-poor sub-community was found. 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.

The U6 community was recorded at community level and as the U6a *Sphagnum* sub-community, with the community as a whole being identified by the dominance of *Juncus squarrosus* in the sward. The community appears across the survey area and is most common on well-drained to quite wet, level to gently sloping ground; typically, as small areas scattered among bogs or U4 and U5 acid grasslands. 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. The community varied at times and only appears within mosaics with other mire and grassland communities, often forming a more minor component of these mosaics. The U6a sub-community was identified by the abundance of *Sphagnum fallax* and *S. capillifolium*.

Areas of semi-improved acid grassland (B1.2) are characterised by the U4b *Holcus lanatus*-*Trifolium repens* sub-community only and are generally located in the north above the Echan Water and Shielling Knowe within the survey area where there are fields in which there has been some form of historical improvement or a long history of intensive grazing and/or nutrient enrichment. The sward tends to be dominated by a semi-improved assemblage which includes typical species such as *Holcus lanatus*, *Agrostis* spp., *Cynosurus cristatus*, *Lolium perenne*, *Trifolium repens* and *Ranunculus repens*.

5.3.2 B2.1 Unimproved Neutral Grassland

Unimproved neutral grasslands are uncommon within the survey area, being found in three areas around Glenmaddie to the north and Ulzieside to the north-east. These stands most closely identified with MG1 *Arrhenatherum elatius* grassland and the MG9 *Holcus lanatus* – *Deschampsia cespitosa* grassland community. The MG1 community was recorded at community level and as the MG1a *Festuca rubra* sub-community. MG9 was recorded at community level only within two mosaics dominated by marshy grassland.

MG1 was often distinctive by its taller and coarse sward, the vegetation here contains a mix of *Arrhenatherum elatius*, *Dactylis glomerata*, *Holcus lanatus*, *Deschampsia cespitosa*, *Agrostis* spp., *Poa*

spp., *Rubus fruticosus*, *Plantago lanceolata*, *Lotus corniculatus*, *Trifolium repens*, *T. pratense*, *Urtica dioica*, *Chamaenerion angustifolium* and *Cirsium arvense*.

Within MG9, *Deschampsia cespitosa* dominates with other associates such as *Juncus effusus*, *Poa trivialis* and *Holcus lanatus*. This community was often found within mosaics with other marshy and wet grassland communities. Species diversity was predominantly limited to *Anthoxanthum odoratum*, *Rumex acetosa*, *Galium palustre*, *Ranunculus repens* and *Cirsium palustre*. Moss cover included *Calliergonella cuspidata* and *Rhytidiadelphus squarrosus*. These areas were found to be generally species poor.

5.3.3 B4 Improved Grassland

Improved grassland dominates many of the fields towards the north of the survey area, west of Glenmaddie, to the north of the Ulzieside Plantation and around Ulzieside farm. These areas are of the MG6 *Lolium perenne* – *Cynosurus cristatus* grassland community, where the fields and swards have been improved over time through fertiliser application, drainage and grazing/cropping. Species diversity is often limited with the main dominants and other characteristic species being *Lolium perenne*, *Cynosurus cristatus*, *Poa* spp., *Holcus lanatus*, *Trifolium repens*, *Ranunculus repens*, and *Cerastium fontanum*, with scattered tufts of *Juncus effusus*. The moss *Rhytidiadelphus squarrosus* can be abundant in small patches. On several occasions, within areas of wetter ground, this habitat often formed a mosaic with marsh/marshy grassland habitats (see Section 5.3.4 below).

5.3.4 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 is the most dominant and extensive habitat type within the survey area, and accounts for the majority of the Site west of Glen Burn (see Figure 7.3).

Within the survey area, the M23 (a & b), M25, M25b and MG10a 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.

Marsh/marshy grassland is extensively present along watercourse valleys and adjoining gentle slopes, and as noted above is predominately made up of MG10 *Holcus lanatus* – *Juncus effusus* rush-pasture, M23 *Juncus effusus/acutiflorus* – *Galium palustre* rush-pasture, and M25 *Molinia caerulea* – *Potentilla erecta* mire. Of these communities the most abundant and extensive is M23, in particular M23a. These communities also form mosaics and transitional areas with other grassland and mire communities.

In all cases the MG10 community was recorded as the MG10a Typical sub-community, and often found within mosaics with acid grassland and mire communities. This community has much in common with the MG9 community (referred to in Section 5.3.2 above) containing many of the same species but with *Juncus effusus* dominant, and the communities often differentiated by the respective proportions of *Holcus lanatus*, *Deschampsia cespitosa* and *Juncus effusus* in order to dictate the NVC classification.

The M23 NVC community is the most widespread and frequent across the survey area and is often species poor with *Juncus* spp. being the dominant species. Both M23 sub-communities are found within the survey area, however the M23a *Juncus acutiflorus* sub-community is much more extensive than the M23b *Juncus effusus* sub-community.

Generally, areas of M23 are dominated by mixtures of *Juncus effusus* and/or *Juncus acutiflorus* with patches of a low diversity of grasses such as *Deschampsia cespitosa*, *Holcus lanatus*, *Anthoxanthum odoratum*, *Molinia caerulea*, *Poa* sp., and *Agrostis* spp. Within the more herb rich areas, a variety of species were frequently to occasionally recorded such as *Galium palustre*, *G. uliginosum*, *Cardamine pratensis*, *Lotus pedunculatus*, *Trifolium repens*, *Epilobium palustre*, *Cirsium palustre*, *Rumex acetosa*, *Viola palustris*, *Potentilla erecta*, *Succisa pratensis*, *Carex nigra*, *C. echinata*, *C. panicea*, and *Ranunculus repens*; and more rarely *Achillea millefolium*, *Achillea ptarmica*, *Stellaria graminea* and *Caltha palustris*. Wefts of mosses are also common through 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 and the M25b *Anthoxanthum odoratum* sub-community. These were areas either wholly dominated by *Molinia caerulea* (M25) or where *Molinia caerulea* was accompanied by a mixture of grassland species (M25b). The M25b was dominated by *Molinia caerulea* in at times a tussocky sward and was found to form mosaics with the other marshy grassland and acid grassland communities. In some places 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' and 'Ja' non-NVC grassland communities are present here as patches of a *Juncus* spp. dominated calcifuge grassland, at times found as a small component of a wider mosaic with other grassland and mire communities. This is vegetation in which dominant and tall tussocks of *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*, *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 Tall Herb & Fern

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

Areas of bracken within the survey area are not frequent or extensive, the main patches are found within the central and northern parts of the survey area. A small number of these areas were recorded as scattered bracken forming part of a mosaic with other grassland and mire communities. The habitat was recorded as the U20 *Pteridium aquilinum* – *Galium saxatile* NVC

community and U20a *Anthoxanthum odoratum* 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 above).

5.4.2 C3.1 Tall Ruderal

This habitat type within the survey area is sparse and covers a small total area, being made up several small areas of the OV25 *Urtica dioica* – *Cirsium arvense* community and, to a much greater extent, OV27 *Chamerion angustifolium* community, found close to the west side of Ulzieside. Both stands were recorded to community level only. The OV25 community appears only once as a minor component of a mosaic dominated by the neutral grassland community MG1 (see Section 5.3.2 above). As is common with the OV27 community, *Chamerion angustifolium* dominates the sward, and is interspersed with some *Holcus lanatus*, *Holcus mollis*, *Anthoxanthum odoratum*, *Festuca rubra* and *Trifolium repens*.

5.5 Heathland

5.5.1 D1.1 Dry Dwarf Shrub Heath – Acid

Acid dry dwarf shrub heath was recorded as small patches in a few locations within the survey area. It appears in the form of the H9 *Calluna vulgaris* – *Deschampsia flexuosa* heath, each time as the H9c Species-poor sub-community. These swards are species poor being heavily dominated by *Calluna vulgaris* with occasional *Deschampsia flexuosa*, and the mosses *Hylocomium splendens* and *Plagiothecium undulatum*.

5.5.2 D2 Wet Dwarf Shrub Heath

Wet dwarf shrub heath is relatively uncommon within the survey area, and forms only a minor component of habitat coverage. It is entirely made up of the M15 *Trichophorum germanicum* – *Erica tetralix* wet heath NVC community, with both the M15b Typical sub-community and M15d *Vaccinium myrtillus* sub-community being recorded (M15b is the most common form present).

The dominants can be variable within the M15b and M15d sub-communities. The most obvious components present 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*. The drier and grassier assemblage of the M15d sub-community had a greater abundance of *T. germanicum* along with *Nardus stricta*. The moss layer contained mostly *Pleurozium schreberi*, *Rhytidiadelphus squarrosus*, *Hylocomium splendens*, and *Hypnum* sp. Within the wetter areas, *Sphagna* were present with *Sphagnum capillifolium* and *S. compactum* recorded.

5.6 Mire

5.6.1 E1.6.1 Blanket Bog

Blanket bog within the survey is sparse, scattered, and only forms small stands. The majority of blanket bog within the survey area appears within the central and south-eastern areas, being found more commonly within the elevated parts and watershed plateaus of the survey area. Signs of erosion were recorded with localised peat haggings and heavy grazing levels (see Annex A below).

Blanket bog here is mainly represented by the M17 *Trichophorum germanicum* – *Eriophorum vaginatum* blanket bog community. The M17 community often represents areas of relatively more intact, active and better-quality bog, with frequent to abundant *Sphagnum* in the basal layer. The M3 *Eriophorum angustifolium* bog pool community appears within a mosaic dominated by the M17 community.

The M3 community appears within the blanket bog area as very small bog pools. The bog pools contain *Eriophorum angustifolium* and occasional *E. vaginatum* over a carpet of *Sphagnum fallax*, *S. cuspidatum*, *S. capillifolium*, and occasionally *S. papillosum*.

M17, 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. The M17a sub-community that is semi-natural retains a high *Sphagnum* cover. 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 included *Erica tetralix*, *Eriophorum angustifolium*, *Vaccinium myrtillus*, *Molinia caerulea*, *Empetrum nigrum*, *Calluna vulgaris*, *Narthecium ossifragum*, *Avenella flexuosa* and *Galium saxatile*. The basal layer includes *Sphagnum papillosum*, *S. fallax*, *S. palustre*, *S. capillifolium*, *Aulacomnium palustre*, *Hylocomium splendens*, *Pleurozium schreberi*, *Pseudoscleropodium purum*, *Rhytidiadelphus loreus* and occasional *Polytrichum commune*.

5.6.2 E1.7 Wet Modified Bog

Wet modified bog in the survey area encompasses M20 *Eriophorum vaginatum* blanket mire and M25a *Molinia caerulea* – *Potentilla erecta* mire *Erica tetralix* sub-community (M25 and M25b have been classified as marshy grassland; see Section 5.3.4 above). Much of this habitat is scattered in small patches across the survey area with a greater concentration within the central and south-eastern areas.

Within the survey area, M20 wet modified bog is most abundant across level to gently sloping peat in the western part of the survey area. It was often found in mosaics with other bog and acid grassland communities. It appears to have been derived from blanket bog through grazing that has led to the scarcity or absence of *Calluna vulgaris* in the sward. M20 was recorded at community level and as the M20a Species-poor sub-community and the M20b *Calluna vulgaris* – *Cladonia* spp. sub-community. This is mire vegetation in which tussocks of *Eriophorum vaginatum* are abundant to dominant but with little or no *Calluna vulgaris*, the scarcity or absence of *Calluna vulgaris* precludes its classification as M19 – a community that in other respects much of the M20 here resembles. The M20a sub-community identifies the areas where the main vascular component of the sward is dominated by *E. vaginatum* and is otherwise species poor apart from a little *Avenella flexuosa*. Where there is a scattering of *Vaccinium myrtillus* and *Eriophorum angustifolium* along with some sparse *C. vulgaris* and patches of *Cladonia* spp., these areas were identified as representing the M20b sub-community. The mosses *Pleurozium schreberi*, *Hypnum jutlandicum* and *Sphagnum capillifolium* were found to be common throughout M20 and its sub-communities in variable amounts.

These communities have been classified as wet modified bog rather than blanket bog due to their lower relative quality as a result of likely historical habitat alteration or modification through a long history of grazing.

The M25 mire areas were identified due to *Molinia* overwhelmingly dominating the sward but with an associated flora containing mire species. This community was identified in the form of the M25a *Erica tetralix* sub-community when categorised as wet modified bog. The majority of the subordinate and mire associate species found within this M25a assemblage were short *Calluna vulgaris*, *Vaccinium myrtillus*, *Erica tetralix*, *Trichophorum germanicum*, *Juncus squarrosus*, *J. effusus*, *J. acutiflorus*, *Nardus stricta*, *Narthecium ossifragum*, *Anthoxanthum odoratum*, *Potentilla erecta*, *Agrostis capillaris*, *Avenella flexuosa*, *Carex nigra*, and *C. echinata*. Mosses such as *Hylocomium splendens*, *Pleurozium schreberi*, *Hypnum jutlandicum*, *Rhytidiadelphus squarrosus*, *Polytrichum commune* dominate the drier ground and to a lesser extent the wetter areas become dominated with *Sphagnum capillifolium*, *S. fallax* and *S. palustre*.

5.6.3 E2.1 Acid/Neutral Flush

Acid/neutral flushes appear in a small number of areas across the survey area, particularly to the south-east, often appearing within mosaics with other mire communities. The majority of this habitat is represented by M6 *Carex echinata* – *Sphagnum fallax/denticulatum* mire, and to a much lesser extent M4 *Carex rostrata* – *Sphagnum fallax* mire.

The majority of the M6 community was recorded as the M6d *Juncus acutiflorus* sub-community, and less so, the M6c *Juncus effusus* sub-community. These sub-communities are rush mires on wet and mostly flushed ground, often in this case found on steep slopes, 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*. 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 *Molinia caerulea*, *Rumex acetosa* and *Anthoxanthum odoratum*. Occasionally species such as *Ranunculus repens*, *Cirsium palustre*, *Carex* spp. and *Sphagnum capillifolium* were noted.

A single area of M4 was recorded within a mosaic dominated by the M17 bog community. This community was dominated by *Carex rostrata* with a basal layer composed of *Menyanthes trifoliata*, *Succisa pratensis*, *Potentilla palustris* with a thick carpet of *Sphagnum fallax*, *S. palustre* and *S. capillifolium*.

5.6.4 E2.2 Basic Flush

In several locations, west of Whing Head above the head waters of Glen Burn and close to the McTurk's Gutter burn, basic flushes were found within the survey area and recorded as target notes (see Annex A below). These are represented by the M10 *Carex dioica* – *Pinguicula vulgaris* mire community.

The M10 community comprises base-enriched flush mires whose short vegetation includes the sedges *Carex panicea*, *C. flacca*, *C. demissa*, *C. nigra* and *Eriophorum angustifolium*, and mosses such

as *Campylium stellatum*, *Palustriella commutata*, and *Scorpidium revolvens*. Other species noted here included *Succisa pratensis*, *Pinguicula vulgaris*, *Festuca vivipara*, *Juncus acutiflorus* and *Narthecium ossifragum*.

5.6.5 E4 Bare Peat

Several small areas were identified as the non-NVC community bare peat (ExP). These were found in areas where the ground has been disturbed along track verges and was devoid of vegetation.

5.7 Open Water

5.7.1 G2 Running Water

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

5.8 Miscellaneous

5.8.1 J1.2 Cultivated/Disturbed Land – Amenity Grassland

Amenity grassland is a non-NVC community used here for private gardens (PG) within the survey area. Most commonly these areas form lawns within the curtilage of private properties and in some instances may include scattered trees and hedges.

5.8.2 J3.6 Buildings

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

5.8.3 J4 Bare Ground

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

5.9 Invasive Non-Native Species

No Invasive Non-Native Species (INNS) were incidentally recorded during the habitat surveys; however, this does not preclude their presence from the survey area.

5.10 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). 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 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 11: Hydrology and Soils).

Using SEPA's guidance, Table 6-1 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 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
MG9	<i>Holcus lanatus</i> – <i>Deschampsia cespitosa</i> grassland
MG10	<i>Holcus lanatus</i> – <i>Juncus effusus</i> rush-pasture
U6	<i>Juncus squarrosus</i> – <i>Festuca ovina</i> grassland
Je ⁸	<i>Juncus effusus</i> acid grassland
Ja ⁸	<i>Juncus acutiflorus</i> acid grassland
W7	<i>Alnus glutinosa</i> – <i>Fraxinus excelsior</i> – <i>Lysimachia nemoreum</i> woodland
M6	<i>Carex echinata</i> – <i>Sphagnum fallax/denticulatum</i> mire
M10	<i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire
M23	<i>Juncus effusus/acutiflorus</i> – <i>Galium palustre</i> rush pasture

⁸ 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.

Within Figure 7.4 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 11: Hydrology and Soils).

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 Joint Nature Conservation Committee (JNCC) Annex I habitat listings and descriptions⁹, which have then been compared with survey results and field observations, the following NVC communities within the survey area which may constitute Annex I habitat are shown in Table 6-2.

Table 6-2 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 <i>Erica tetralix</i>	M15 <i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath
4030 European dry heaths	H9 <i>Calluna vulgaris</i> – <i>Deschampsia flexuosa</i> heath
7130 Blanket bog	M3 <i>Eriophorum angustifolium</i> bog pool community M17 <i>Trichophorum germanicum</i> – <i>Eriophorum vaginatum</i> blanket mire

⁹ <https://sac.jncc.gov.uk/habitat/>

Annex I Habitat	Corresponding NVC Communities & Other Non-NVC Habitats/Features Recorded
	M20 <i>Eriophorum vaginatum</i> blanket mire
7140 Transition mires and quaking bogs	M4 <i>Carex rostrata</i> - <i>Sphagnum fallax</i> mire
7230 Alkaline fens	M10 <i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire
91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	W11 <i>Quercus petraea</i> – <i>Betula pubescens</i> – <i>Oxalis acetosella</i> woodland
9180 <i>Tilio-Acerion</i> forests of slopes, screes and ravines	W9 <i>Fraxinus excelsior</i> – <i>Sorbus aucuparia</i> – <i>Mercurialis perennis</i> woodland

Further details on the inclusion or omission of certain NVC communities/sub-communities and/or Annex I habitats 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 several NVC communities within the survey area such as the M17 and M20 mire. However, 7130 Blanket bog can also include bog pool communities (M1-M3) where these occur within blanket mires such as M17-M20. As such M3 within the survey area is also assigned to the blanket bog Annex I type, as they are often associated with areas of M17 mire.

As noted above, 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 Sections 5.3.4 and 5.6.2 above, M25 within the survey area is for the most part species-poor and at the drier end of the scale, likely on shallower peat/peaty soils, as has been considered marshy grassland rather than bog in most areas. Many areas are a ubiquitous swathe of *Molinia* tussocks with few associate species and generally lack many of the main peat forming species such as *Sphagnum* mosses. Much of the M25 within the survey area is also grazed, in some areas quite intensively, and this has resulted in many areas of M25 appearing transitional to acid grassland communities (U4 – U6) and in intricate mosaics with these same communities. General field observations of M25 also indicate that this habitat is unlikely to be on deep peat within the

survey area. Given the character of the majority of M25 within the survey area it has not been considered to be of Annex I habitat quality in this case.

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. The example 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 community recorded – H9 – falls within this Annex I type. This NVC type can also be included within the Annex I type H4060 Alpine and Boreal heaths, but only where it is found at higher altitudes and includes arctic-alpine floristic elements. This community within the survey area is a lower altitudinal example so it falls under the 4030 European dry heaths Annex I type.

This dry heath within the survey area, as noted in the community description above, is species-poor, and a relatively botanically impoverished form of *Calluna* dominated heath.

6.3.7 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

This habitat type comprises a range of woodland types dominated by mixtures of *Quercus* spp. and *Betula* spp. It is characteristic of base-poor soils in areas of at least moderately high rainfall in northern and western parts of the UK. The habitat corresponds particularly to NVC types W10e, W11, W16b and W17.

Some of the stands of W11 within the survey area, particularly those mature stands of *Quercus* spp. woodland around the Echan Water, are likely to fall within this Annex I type.

6.3.8 9180 *Tilio-Acerion* forests

Tilio-Acerion ravine forests are woods of *Fraxinus excelsior*, *Ulmus glabra* and *Tilia* spp. and *Acer pseudoplatanus*. The habitat type often occurs on nutrient-rich soils that often accumulate in the

shady micro-climates towards the bases of slopes and ravines. It is found on calcareous substrates associated with coarse scree, cliffs, steep rocky slopes and ravines, where inaccessibility has reduced human impact. Variables such as slope, aspect and ground conditions can all influence the species diversity. As a result, the ground flora can be varied with a wide range of basiphilous herbs and grasses.

In the UK this Annex I habitat falls mainly within the W8 (sub-communities d-g) and the more upland W9 NVC types. North of the central belt in Scotland, and generally in the more upland areas, the base-rich conditions can become more acidic with the canopy incorporating a greater abundance of *Betula* spp. and *Quercus* spp.

Two homogenous stands of W9 woodland were recorded in a shallow ravine along the Euchar Water, south west of Euchar Bridge, within the survey area, and given the location of the woodland, its character and species present, it is considered to possibly belong to this Annex I habitat type.

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 website¹⁰), and associated NVC types recorded within the survey area are as follows:

- Wet woodland: W7;
- Upland mixed ashwoods: W9;
- Upland oakwoods: W11 (where oak forms >30% of canopy cover);
- Blanket bog: M17, M20 and M3 (where associated with M17-M20) and M25a where peat depth is greater than 0.5 m;
- Upland flushes, fens and swamps: M4, M6, M10, and M23a; and
- Upland heathland: H9 and M15.

These SBL priority habitats correspond with UK Biodiversity Action Plan (BAP) Priority Habitats¹¹.

¹⁰ <https://www.webarchive.org.uk/wayback/archive/20210408152132/https://www.nature.scot/landscapes-and-habitats/habitat-types/habitat-definitions>

¹¹ <http://jncc.defra.gov.uk/page-5718>

6.5 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			
M3	-	7130 Blanket bogs (examples associated with M17-M20)	Blanket bog
M4	-	7140 Transition mires and quaking bogs	Upland flushes, fens and swamps
M6c, M6d	High	-	Upland flushes, fens and swamps
M10	High	7230 Alkaline fens	Upland flushes, fens and swamps
M15b, M15d	Moderate	4010 Northern Atlantic wet heaths with Erica tetralix	Upland heathland
M17, M17a	-	7130 Blanket bogs	Blanket bog
M20, M20a, M20b	-	7130 Blanket bogs	Blanket bog
M23a, M23b	High	-	Upland flushes, fens and swamps (applies to M23a only)
M25, M25a, M25b	Moderate	-	Blanket bog (where peat depth >0.5m; applies to M25a only)
Dry Heaths			
H9c	-	4030 European dry heaths	Upland heathland
Calcifugous Grasslands			
U4, U4a, U4b, U4d	-	-	-
U5, U5a	-	-	-
U6	Moderate	-	-
U20, U20a	-	-	-
Mesotrophic Grasslands			
MG1, MG1a	-	-	-
MG6	-	-	-
MG9	Moderate	-	-
MG10a	Moderate	-	-
Woodland & Scrub			

NVC/Non-NVC Codes Recorded	Potential GWDTE Status	Annex I Habitat	SBL Priority Habitat Type
W7	High	-	Wet woodland
W9	-	9180 <i>Tilio-Acerion</i> forests	Upland mixed ashwoods
W11, W11(p)	-	91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles ¹²	Upland oakwoods ¹²
W17(p)	-	-	-
Vegetation of Open Habitats			
OV25	-	-	-
OV27	-	-	-
Non-NVC Types			
BD	-	-	-
BG	-	-	-
BP & YBP	-	-	-
CF	-	-	-
CP & YCP	-	-	-
Cn	-	-	-
Je	Moderate	-	-
Ja	Moderate	-	-
PG	-	-	-
RW	-	-	-

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 24 NVC communities were recorded within the respective survey area along with various associated sub-communities; a number of non-NVC habitat 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 marshy grassland, mainly represented by the M23 *Juncus effusus/acutiflorus* – *Galium palustre* rush-pasture and the M25 *Molinia caerulea* – *Potentilla erecta* mire NVC communities. Within and around these areas are patches and pockets of other habitat types such as unimproved acid grassland, wet modified bog, improved grassland, semi-natural woodland, conifer plantation, and blanket bog.

¹² Does not apply to W11(p).

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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APPENDIX A NVC TARGET NOTES

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 7.3 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	274448	605233	M10a	Dominated by <i>Succisa pratensis</i> , <i>Pinguicula vulgaris</i> , <i>Carex nigra</i> , <i>Festuca vivipara</i> , <i>Juncus acutiflorus</i> , <i>Narthecium ossifragum</i> , <i>Carex binervis</i> and a carpet of 'brown mosses'.	B-1
2	276196	605058	N/A	Peat haggling.	
3	276214	605449	N/A	Example of localised peat haggling. Area also heavily grazed.	B-2
4	275672	605612	M10a	Stony flush containing <i>Carex panicea</i> , <i>C. nigra</i> , <i>Narthecium ossifragum</i> , the moss <i>Scorpidium scorpioides</i> .	
5	275172	605141	N/A	Peat haggling along the boundary between the M15 and M17 NVC communities.	B-3

APPENDIX B TARGET NOTE PHOTOGRAPHS

ANNEX B. TARGET NOTE PHOTOGRAPHS

The following photographs correlate to the target notes described within Annex A, Table A.1.

Photo B-1: Target Note 1 - M10 flush



Photo B-2: Target Note 2 – Example of localised peat erosion



Photo B-3 Target Note 3 – Further example of localised peat erosion



APPENDIX C

GENERAL COMMUNITY PHOTOGRAPHS

ANNEX C. GENERAL COMMUNITY PHOTOGRAPHS

The following selected photographs are provided to give a visual representation of the survey area and several the community types present within the survey area.

Photo C-1 – General Site view, looking down the valley of Glen Burn (centre of Site) from Mid Rig



Photo C-2 - Typical survey area mosaic of habitats



Photo C-3 – M17 *Trichophorum germanicum* – *Eriophorum vaginatum* blanket mire



Photo C-4 – M20 *Eriophorum vaginatum* blanket mire on watershed plateau



Photo C-5 – M25 *Molinia caerulea* – *Potentilla erecta* mire in foreground giving way to extensive are of M23 *Juncus effusus/acutiflorus* – *Galium palustre* rush-pasture



Photo C-6 – M15 *Trichophorum germanicum* – *Erica tetralix* wet heath



Photo C-7 – Extensive M23 *Juncus effusus/acutiflorus* – *Galium palustre* rush-pasture typical of the survey area



Photo C-8 – W11 *Quercus petraea* – *Betula pubescens* – *Oxalis acetosella* woodland



Photo C-9 – W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemoreum* woodland



Photo C-20 – W9 *Fraxinus excelsior* – *Sorbus aucuparia* – *Mercurialis perennis* woodland around the Euchan Water



Photo C-31 – Scattered alder, willows and birch (W7) over rush-pasture (M23)



Photo C-42 – MG6 *Lolium perenne* – *Cynosurus cristatus* grassland



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