Technical Appendix 7.1: Habitats and Vegetation

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Contents

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Introduction

This Technical Appendix has been prepared to accompany **Chapter 7: Ecology** of the Appin Wind Farm (hereafter referred to as 'the Proposed Development') Environmental Impact Assessment (EIA) Report.

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

The objectives of the baseline studies were to:

- establish the spatial distribution of habitats and vegetation communities which may be impacted by the Proposed Development;
- identify the presence and distribution of any habitat types listed on Annex 1 of the Habitats Directive1, the Scottish Biodiversity List (SBL) and/or which represent potential Groundwater Dependent Terrestrial Ecosystems for (GWDTEs) for subsequent hydrological assessment; and,
- record the presence of any protected or non-native plant species listed on Schedule 8 and 9 of the Wildlife and Countryside Act 1981 (as amended) respectively.

It should be read with reference to the following Figures, which are included within **Volume 2** of the EIA Report:

- **Figure 7.1**: Ecological Statutory Designated Sites;
- **Figure 7.2a**: Habitat and Botanical Desk Study Records (Ancient Woodland Inventory 'AWI' area);
- **Figure 7.2b**: Habitat and Botanical Desk Study Records (Botanical Species);
- **Figures 7.3a**: Extended Phase 1 Habitat Survey Plan (the Site);
- **Figures 7.3b**: Extended Phase 1 Habitat Survey Plan (the Access Track); and
- **Figures 7.4:** National Vegetation Classification (NVC) Survey Plan.

Only common species names are referred to within the main text of this Technical Appendix. **Annex 1** provides the scientific names for all species referred to herein, within **Chapter 7: Ecology** and the Figures in **Volume 2**.

Site Overview

The Site (as shown in **Figures 7.1 to 7.4**) is located at Appin 6.2 km north of Moniaive, in Dumfries and Galloway. Several hills rise around to form the boundaries of the Site all between approximately 500 m and approximate 600 m, with Colt Hill in the far west being the highest point at 598 m. The tops of these rolling hills are open and mostly consist of acid grassland habitats with some areas of neutral grassland. The rest of the Site is dominated by commercial forestry, mostly Sitka spruce with some larch, all at various ages of growth from some large areas of clear-fell to fully grown trees ready for felling. Within this forestry are some small pockets of plantation broad-leaved trees, marshy grassland and areas of dense bracken, with more open habitats concentrated along the Appin Burn and tributaries.

The access track traverses through commercial forestry plantations, largely composed of Sitka spruce and mostly follows existing forestry roads. The access track passes along the contours of the south and east slopes of Benbrack Hill. Habitats are largely restricted to commercial plantations but gaps in clear-fell, rides burn gullies and tracksides include some other habitats, mostly a mix of acid grassland, marshy grassland and stands of bracken or dense scrub composed of young self-generating Sitka spruce.

Key Guidance

Habitat survey methodologies and subsequent interpretation of results has made reference to the following key industry standard guidance:

- Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D. and Yeo, M. (2014). An illustrated guide to British upland vegetation.
- Joint Nature Conservation Committee (JNCC) (2010). Handbook for Phase 1 Habitat Survey - a technique for environmental audit.
- Strachan, I.M. (2017). Manual of terrestrial EUNIS habitats in Scotland.
- Rodwell, J.S. (ed.) (2006). National Vegetation Community Users' Handbook.
- Rodwell, J.S. (ed.) (1991). British Plant Communities. Volume 1. Woodlands and Scrub.
- Rodwell, J.S. (ed.) (1992a). British Plant Communities. Volume 2. Mires and Heaths.

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

- Rodwell, J.S. (ed.) (1992b). Volume 3: Grassland and montane communities.
- Rodwell, J.S. (ed.) (1998). Volume 4. Aquatic communities, swamps and tall-herb fens.
- Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) (2009). WFD95: A functional wetland typology for Scotland.
- Clive, C.A. (1997). Field flora of the British Isles.
- Scottish Environment Protection Agency (SEPA) (2014). Guidance on assessing the impacts of development proposals on groundwater abstractions and groundwater dependent terrestrial ecosystems.

Methodology

Desk Study

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

Key desk study sources, search areas and information obtained is summarised in **Table 1**.

Table 1 – Desk Study Key Sources and Information Sought

Key Source	Information Sought	Search Area
NatureScot's Sitelink https://sitelink.nature.scot/home *March 2025*	Proximity to statutory designated sites, with habitats and/or botanical interests.	Within 10 km of the Site boundary (see **Figure 7.1**).
NatureScot's Open Data Geoportal https://opendata.nature.scot/datasets/biosphere-reserves/explore?location=57.631597%2C-4.815034%2C9.38 *February 2025*	Proximity to Biosphere Reserves, with botanical/ habitats interests.	Within 5 km of the Site.
South West Scotland Environmental Information Centre (SWSEIC) - *September 2021 and update in March 2025*	Non-statutory designated sites for nature conservation with qualifying habitats and/or botanical interests, and existing notable habitats and plant species records.	Within 2 km of the Site boundary, and within 1 km of the access track (see **Figure 7.2a-b**)[2].

Field Surveys

The following field surveys have been completed:

- Extended phase 1 habitat survey; and
- National Vegetation Classification (NVC) survey.

Extended Phase 1 Habitat Survey

An extended phase 1 habitat survey of the Site was undertaken on the 30th July and the 2nd and 3rd August 2021. The Study Area for the extended phase 1 habitat survey was the Site and out to 100 m (where accessible). An extended phase 1 habitat survey of the proposed access track was undertaken on 18th August 2022. The Study Area for the access track surveys was the access track route and out to 20 m either side. It should be noted that some areas of the access route (particularly the western extreme) were not surveyed due to a modest deviation between the access route surveyed and the final access route orientation. Habitats along and adjacent to the access route are principally existing forestry track and commercial forestry and considered of limited (if any) ecological value. Where any parts of the access route were not accessed, this is shown in **Figure 7.3b** as the asterisks* A1.2.2 and B5/B1 habitats, and were mapped following a review of aerial maps and from adjacent mapped habitats.

The surveys were undertaken in accordance with the UK industry standard Phase 1 Habitat Methodology (JNCC, 2010). The surveys were extended to include the recording of, or potential for, protected species, such as badgers, water vole otter.

A habitat 'validation' survey was undertaken on 8th October 2024 to check whether the habitats within the Site are comparable with those recorded during the initial survey in 2021. This aimed to record any notable changes in habitats in the interim period, including any recent clear-fell of forestry areas. NatureScot guidance (2024) states that ecology survey data is normally valid for two years, unless it is clearly evident that there no substantive change in number, distribution or activity of the ecological features. The habitat validation survey was thus undertaken to determine whether the habitats on-site have (or have not) substantively changed and thus confirm whether the survey data collected is considered appropriate for assessment. The habitat validation survey in 2024 revealed that the habitats within the Site were largely unchanged from those recorded from the habitat surveys in 2021 (as discussed within the Results section) and therefore data was considered appropriate for assessment.

[2] Note, the Search Area was based on a previous iteration of the access route which deviated slightly from the final access route, but given the extent of the Search Area records from an appropriate area most relevant to the access route would have been considered.

NVC survey

A NVC survey was undertaken of the Site on 2nd and 3rd August 2021. The NVC survey comprised all noteworthy habitats within the Site. The survey concentrated on those areas where plant communities were deemed likely to form Annex 1 habitats and / or represent Groundwater Dependent Terrestrial Ecosystems (GWDTEs).

During survey, square quadrats of relevant size were distributed throughout homogenous stands identified to provide a representative sample of the vegetation community present.

In each quadrat sample area, data was collected on the presence and abundance of vascular plant species using the Domin scale. This data was then analysed and classified to an NVC vegetation community, where possible, using the keys in Rodwell (various) British Plant Communities Volumes 1 to 4 (Rodwell, 1991, 1992a-b and 1998), aided by analysis using the Modular analysis of Vegetation Information System (MAVIS) created by the UK Centre for Ecology and Hydrology.

Personnel

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

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

Limitations

Forestry within the Study Areas was surveyed by traversing tracks and clearings rather than walking directly through dense plantation habitat, due to logistical and health and safety considerations. The Study Areas were appropriately covered from the accessible tracks and clearings, and this is not therefore considered a limitation to the results obtained.

It should be noted that the access route deviated modestly between the original access route which was surveyed and the final route proposed, but the habitats along the route not formally subject to an extended phase 1 habitat survey was predominantly commercial forestry and thus of limited ecological value. Where any parts of the access route were not accessed, this is shown in **Figure 7.3b** as the asterisks* A1.2.2 and B5/B1 habitats and were mapped following a review of aerial maps and from adjacent mapped habitats. Accordingly, all parts of the survey areas associated with the Site and the access route are considered to have been appropriately considered.

Results

Desk Study

Statutory Designated Sites for Nature Conservation

This section should be read with reference to **Figure 7.1**.

The Site does not form part of any statutory designated site for nature conservation with qualifying habitats or botanical interests.

Table 2 summarises statutory designated sites with habitat and/or botanical species features of interest located within 10 km of the Site.

Distances specified within **Table 2** are taken from the Site boundary to the designated site at its nearest point.

Table 2 – Designated Sites for Nature Conservation

Designated Site	Distance / Orientation	Ornithological Qualifying Interests
Upper Nithsdale Woods Special Area of Conservation (SAC)	5.3 km, south-east	Mixed woodland on base-rich soils associated with rocky slopes.
Tynron Juniper Wood SAC	5.3 km, south-east	Juniper on heaths or calcareous grasslands.
Stenhouse Wood Site of Special Scientific Interest (SSSI)	5.3 km, south-east	Upland mixed ash woodland.
Chanlockfoot SSSI	5.3 km, north-east	Upland mixed ash woodland.
Tynron Juniper Wood SSSI	8.6 km, south-east	Juniper scrub.

Non-statutory Designated Sites for Nature Conservation

Consultation with SWSEIC indicated the Site does not form part of any non-statutory designated site for nature conservation and no such sites are located within the Search Area.

A review of NatureScot's Open Data Geoportal identified that with the Site is within the Transitional Zone of the Galloway and Southern Ayrshire Biosphere Reserve, which is recognised as an internationally world class environment for people and nature. The Biosphere Reserve covers a large area (9,000 km^2) of south-west Scotland's land and sea.

Priority Habitats

Ten areas of woodland on the ancient woodland inventory were identified within the Search Area by SWSEIC, as shown on **Figure 7.2a**. Two of these are within the Site, however, from mapping, aerial photos and Site surveys, it appears these

woodlands have been, at least partially, converted to commercial forestry. They could still be classified as PAWS (Plantations on Ancient Woodland Sites) and as such, they are likely to retain a ground flora seedbank which could help in restoration to broad-leaved woodland.

Existing Protected, Notable and Non-Native Botanical Records

The consideration of existing records is also limited to those reported since (and including) 2010, to ensure that the most up to date (and thus relevant to the Proposed Development) records are considered.

Three 'notable' plant records were returned by the SWEIC. These comprised spotted cat's-ear (a nationally rare species but not listed on the IUCN red list of threatened species), field scabious (a species on the Dumfriesshire Rare Plant Register, DRPR) and juniper (a SBL and LBAP species, and on the DRPR). There was also one fungi record returned by the SWEIC: purple moor-grass rust, which is a SBL species.

No records of invasive non-native plant species were returned from the SWEIC.

Field Survey

This section presents the results of the field surveys, including an overview of broad phase 1 habitat types and, where relevant, detailed NVC communities present within the Study Area and their distribution. It should be read with reference to **Figures 7.3a-b** and **7.4**.

Phase 1 habitat survey Target Notes (TNs) are detailed in **Annex 2**, and detailed species lists, NVC tables are presented in **Annex 3**, with Site photographs presented in **Annex 4**.

Extended Phase 1 Habitat Survey Results – The Site

Habitats within the Site (and associated Study Area) are shown in **Figure 7.3a**.

A1.1.1 Broad-leaved Woodland – semi-natural: A small area of this habitat hugs the Appin Burn within the Study Area, mostly composed of ash trees and some willow, birch, rowan and sessile oak. This area was not inspected closely during the survey due to the presence of livestock. There are also isolated areas of this habitat along Shinnel Water along the northern and eastern boundaries of the Study Area.

A1.2.1 Broad-leaved Woodland Plantation: This habitat is, planted in small disjunct blocks throughout the commercial forestry. Some has been planted fairly recently and is only a few metres tall, while the more established areas are over 5 m in height. The trees include a typical range of mixed native broad-leaved trees including birch, rowan, alder, willows, cherry and beech. Some of the newer areas still have plastic tubing. Older areas are typically quite dense and with understorey limited to grasses or rushes (see **Annex 2** - TN3).

A1.2.2 Coniferous Plantation: This covers the majority of the Study Area and is almost exclusively composed of Sitka spruce, with occasional areas of larch. The commercial forestry is all at varying ages from 20 m pre-fell to 1 m tall re-stock, with the majority averaging around 5-6 m in height, forming dense thickets. The understorey is either needles or, in better lit areas, soft rush dominated 'B5 marshy grassland'.

A4 Clear-fell (recently felled woodland): There are several large areas of clear-fell within the forestry. These still contain brash and tree stumps and the vegetation within them is typically tufted hair grass dominated 'B2.1 neutral grassland' with stands of foxglove and rosebay willowherb. Some drier areas are dominated by wavy hair grass (see **Annex 2** - TN2).

B1.1 Acid Grassland – unimproved: This habitat covers a fairly large portion of the remaining Study Area, covering the majority of the Site's hilltops in the west and south. The grasslands are characterised by a variety of grasses and herbs including sweet vernal grass, sheep's fescue, common bent, wavy hair-grass, mat-grass, heath woodrush, bilberry, tormentil, frequent heath bedstraw, some heath rush and mosses, mainly springy turf moss. The soil here is both shallow, dry and well drained but where it becomes wetter, it transitions into tufted hair grass dominated neutral grassland. Locally there are small acid flushes where deergrass and bog asphodel can occur. There are also occasional large patches of great woodrush within this habitat (see **Annex 2** - TN7 and TN8).

B2.1 Neutral Grassland – unimproved: This is a fairly limited habitat and falls into two categories, there are areas of tufted hair-grass dominated grasslands, mostly found in wet flushes on hillsides in among the acid grasslands and along stream sides. Cock's foot and false oatgrass dominated grasslands are present in abandoned fields in the east of Study Area. The tufted hair grass dominated areas also contain frequent common sorrel, common mouse-ear, and marsh thistle, bugle and abundant Yorkshire fog. The abandoned field areas typically have a long sward of cock's foot and false oatgrass with meadow buttercup, creeping buttercup and white clover.

B2.2 Neutral Grassland – improved: This habitat is found within some enclosed fields within the buffer which are used intensively for sheep grazing. The grassland is cropped short and is on fairly dry and shallow soil, transitioning into surrounding rush dominated marshy grassland. The main grasses are perennial ryegrass, crested dog's-tail, red fescue, sweet vernal-grass and bents with herbs such as marsh thistle, creeping thistle, common nettle, white clover, common mouse-ear and creeping buttercup.

B5 Marshy Grassland: This habitat is dominated by rushes, principally soft rush, sharp-flowered rush and compact rush. It tends to be found in damp hollows, gullies along stream banks and within young plantations. Some of the richer areas have other species such as creeping soft-grass, common sorrel, bottle sedge, marsh bedstraw, marsh willowherb, marsh thistle and cuckoo flower present among the dense stands of rush (see **Annex 2** - TN9 and TN17). There are also a few areas of purple moor-grass dominated marshy grassland to be found on 'Peat Rig', adjacent to the small area of blanket bog. They are on shallow peat, on gently sloping ground and in forest rides. The habitat is characterised by purple moor-grass tussocks

and with other species including tormentil, bog asphodel, tufted hair-grass, wavy hair-grass, bog-mosses with occasional cross-leaved heath and common heather.

C1 Bracken: Typical bracken patches, mostly forming mosaics with other habitats (marshy grassland and/or neutral grassland) around the edge of the Study Area, below the canopy, and is not too extensive.

E1.6.1 Blanket Bog: This habitat is limited to a small area in between forestry near 'Peat Rig'. Here the peat is over 0.5 m deep and the community is dominated by hare's-tail cotton grass, with acute-leaved bog-moss, papillose bog-moss and a few other bog plants such as bog asphodel and deergrass. The area appears to be suffering from the drying out effects of the surrounding forestry (see **Annex 2** - TN7).

G1 Open Standing Water: Two ponds were noted in the Study Area, both with considerable emergent vegetation and invertebrate fauna (see **Annex 2** - TN20 and TN21).

G2.4 Dystrophic Running Water: Mostly typical hill streams of clear water running over boulders and pebbles, with the main watercourses, Appin Burn which flows through the centre of the Study Area and Shinnel Water which flows along the northern boundary of the Study Area (see **Annex 2** - TN1, TN11 and TN12).

J3.3 Domestic Buildings: There are two houses with gardens in the east of the Study Area which are occupied.

Other: There are existing forestry tracks which passes within the Study Area.

Note, the habitat validation survey in 2024 revealed that the habitats within the Site were largely unchanged from those recorded from the habitat surveys in 2021. The only change noted were two modest areas of commercial forestry within the interior of the Site, that had been clear-felled in the interim period between 2021 and 2024 (see **Figure 7.3a**).

Extended Phase 1 Habitat Survey Results – The Access Track

Habitats along the access track (and associated Study Area) are shown in **Figure 7.3b**.

A1.1.1 Broad-leaved Woodland, semi–natural: Some semi-natural woodland occurs along the access track. This woodland is very limited in its extent and composed mostly of sycamore trees, some of which are quite old and mature. There are also a few rowans and grey willows. The understorey is a mix of common grasses and ferns.

A1.1.2 Broad-leaved Woodland, Plantation: There are a few areas of planted broad-leaved trees, mostly in the west of the access track. Here the trees are establishing, only reaching a height of 2 to 3 m. They are mostly a mix of native species including alder, birch, hazel and rowan with an understory of soft rush and tufted hair-grass dominated grasslands (see **Annex 2** - TN24).

A1.2.1 Coniferous Woodland, semi–natural: There is a limited area of what could be semi-natural Scots pines within an old walled off area on the slopes of Cairn Hill. There are only around a dozen individual trees, but they appear quite old and include some standing dead wood. Canopy is around 15 m in height and the understory is composed of sheep's fescue dominated acid grassland.

A1.2.2 Coniferous Plantation: This planted forestry covers much of the habitat along the access track. The trees are composed mostly of Sitka spruce with occasional lodgepole pine, larch and Norway spruce. The trees include newly planted trees around 1 m tall, but the majority are more mature reaching 15 m and occasionally around 20 m in height. The understorey is largely devoid of other plants due to the dense canopy, consisting mostly of needles with occasional moss dominated areas (see **Annex 2** - TN26 and TN27).

A1.3.2 Mixed Plantation: Along the access track there is an area mixed planted woodland, composed mostly of sycamore and larch with some spruces, reaching around 20 m in height.

A2 Scrub: Sitka spruce regeneration is numerous and thick along many tracksides, creating a dense scrub of young trees varying from saplings to around 4 or 5 m in height. There are also a few areas of natural grey willow scrub within a few trackside clearings (see **Annex 2** - TN25 and TN35).

A4 Clear-fell (Recently felled woodland): There are several areas of clear-fell along the access track, containing large amounts of brash and dead stumps, with a mix of self-generating Sitka spruce scrub, rush dominated marshy grassland, rosebay willowherb stands, and often either acid grassland or tufted hair-grass neutral grassland starting to develop (see **Annex 2** - TN25).

B1.1 Acid Grassland – unimproved: This habitat occurs within older areas of clear-fell and in some rides on shallow well-drained soil. The vegetation is dominated by a mix of grasses including sheep's fescue, common bent, sweet vernal-grass, and Yorkshire fog and herbs, such as heath bedstraw and tormentil, with some hypnoid mosses (see **Annex 2** - TN25)

B2.1 Neutral Grassland – unimproved: This habitat occurs in similar areas as the acid grassland, in areas of clear-fell or newly planted areas, mostly in the west of the access track. It is dominated by dense tussocks of tufted hair-grass with some Yorkshire fog, common sorrel, common ragwort, and locally some meadowsweet. The habitat often forms a mosaic with adjacent marshy grassland.

B5 Marshy Grassland: This habitat is present along the access track, found in a variety of conditions, ranging from along burn lines, within rides, along trackside and ditches and within disturbed areas on clear-fell. The habitat is mostly dominated by tall dense tussocks of soft rush (locally sharp-flowered rush) with other species including marsh thistle, marsh bedstraw, Yorkshire fog and common sorrel. These areas are usually quite damp, but some areas are drier. There are also areas dominated by purple moor-grass, occurring on shallow peat mostly along the edge of forestry.

C1 Bracken: This habitat is quite widespread along the access track, often forming mosaics with neutral, acid and/or marshy grassland. It is dominated by tall stands of bracken with an understorey similar to the 'B1.1 Acid grassland – unimproved' described above.

C3.1 Tall Ruderal: This habitat is mostly composed of rosebay willowherb and some meadowsweet occurring in disturbed areas along the access track, and adjacent clear-fell areas, particularly in the western end of the Study Area.

D1 Dry Heath: There is one small area of dry heath along the banks of a narrow gully where the Ramscleugh Burn flows on the east face of Benbrack Hill. This habitat occurs on shallow, well-drained soil. The vegetation is dominated by thick stands of common heather and bilberry with some tufted hair grass, sheep's fescue, lady fern, hard fern, heath bedstraw and a variety of hypnoid mosses.

G1 Open Standing Water: One pond was noted along the access track, oligotrophic water indicated by the presence of feathery bog-moss (see **Annex 2** - TN38).

G2.4 Dystrophic Running Water: Mostly typical hill streams of clear water running over boulders and pebbles (see **Annex 2** - TN30-TN34 and TN39-TN43).

I2.1 Quarry: There is a small in-use quarry in the east of the access track.

J2.5 Wall: There are several old stone dykes along the access track.

NVC Survey Results – The Site

NVC habitats with the Site (and associated Study Area) are shown in **Figure 7.4**. Photographs showing the main NVC communities are provided in **Annex 4**.

Blanket bog

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

This community is only found in a ride between conifer plantation on 'Peat Rig' in the north of the Study Area. Peat here is only around 50 to 60 cm deep and is moist but considered to be suffering from drainage due to the presence of the nearby forestry. However, the bog community here remains fairly healthy with frequent bog mosses including acute-leaved bog-moss and papillose bog-moss being present and frequent bog asphodel. The community is largely dominated by hare's tail cottongrass tussocks abundant hypnoid mosses and wavy hair grass in drier parts. It transitions into nearby M25a community as the gradient of the hill slope increases and the peat becomes shallower. Grazing appears to be quite limited to deer.

The constant, dominant hare's-tail cotton grass, along with constant wavy hair grass and common cotton grass, and occasional sub-shrubs bilberry and common heather, all suggest an M20 community, although a sub-community cannot be assigned in this case. However, the vegetation does show elements of the M19 *Calluna vulgaris - Eriophorum* mire, with constant acute-leaved bog-moss and red-stemmed feather moss. This suggests it may represent an impoverished M19 bog community but there has been burning or severe grazing.

Occasional wetter areas, too small to be mapped, are characterised by dominant bog asphodel and papillose bog-moss, occasional purple moor-grass, and the absence of hare's-tail cottongrass.

Marshy Grassland

- M23a – *Juncus effusus/acutiflorus – Galium palustre* rush pasture, *Juncus acutiflorus* sub-community
- M25a *Molinia caerulea - Potentilla erecta* mire, *Erica tetralix* sub-community

The M23a community is present in fairly extensive areas within the Study Area. It is found on a variety of soil depths in poorly drained areas, with the soil being moist to wet. Grazing appears to be limited for the most part to deer except where it is found in sheep fields, but it does not appear to be heavily grazed even there. It transitions into adjacent U4a, MG6, U20 and MG9 communities. The vegetation is dominated by dense stands of sharp-flowered rush with herbs such as marsh bedstraw, marsh thistle, marsh willowherb, common sorrel, creeping buttercup, and marsh violet. Some areas are also characterised by frequent wild angelica, common valerian, yarrow and lesser stitchwort.

In very limited areas, the community more closely resembled M23b, with soft rush becoming more dominant. This was restricted to trackside ditches and occasional more open areas of restock forest plantation.

The M25a community is found on peaty soil around 30 cm deep on gently sloping ground within a forest ride on Peat Rig, in the north of the Study Area. The community is characterised by dominant purple moor-grass tussocks with abundant tormentil and occasional bog asphodel, wavy hair-grass, deergrass and bilberry.

The constant purple moor-grass at dominant levels of cover indicate this is an M25 community, however it does have several features in common with M15 *Trichophorum germanicum - Erica tetralix* wet heath. These include constant deergrass, and presence of common cottongrass, which are not particularly features of M25 communities. Aside from these species, however, most of the species present are representative of both communities. It is formed on shallow peat so does not represent degraded blanket bog.

The M25a also forms a mosaic with the M23a community in the south-east of the Study Area. Grazing is limited to deer.

Neutral Grasslands

- MG1 – *Arrhenatherum elatius – Dactylis glomerata* grassland: no sub-community assigned
- MG6b – *Lolium perenne – Cynosurus cristatus* grassland: *Anthoxanthum odoratum* sub-community
- MG9 – *Holcus lanatus – Deschampsia cespitosa* grassland: no sub-community assigned
- OV27 – *Chamaenerion angustifolium* community

The MG1 community is found in a small, enclosed field in the east of the Study Area and in a few trackside areas. There was no access for quadrats. The field appears to be well-drained and is not subject to grazing. Vegetation consists of tall, rank false oatgrass, cock's foot, sweet vernal-grass and few herbs, such as meadow buttercup.

The MG6b community is found in the east of the Study Area in a few enclosed fields used for sheep grazing. As such the area was heavily grazed and cropped short. The community persists on shallow soil on well drained slopes and transitions into adjacent M23a communities in damper less well drained hollows and low points. The community contained several grass species but is mostly dominated by crested dog's-tail, perennial ryegrass, sweet vernal-grass, red fescue and velvet bent. The constant sweet vernal-grass places it in the MG6b sub-community. There is a fairly limited range of common herbs, including creeping thistle, marsh thistle, common nettle, white clover, common sorrel and yarrow.

The MG9 is found on a variety of soil depths and slope aspects but is typically found on damp and moist areas, in low points in the topography, along stream floodplains and also within clear-fell areas. Grazing appears limited. The community is low in diversity, being dominated by tall stands of tufted hair-grass, with constant Yorkshire fog with low cover, and herbs including marsh bedstraw, common sorrel and marsh willowherb. It transitions into M23a, U4a and U20 communities.

The dominance of tufted hairgrass, along with constant Yorkshire fog, indicates clearly that this is MG9. However, the community is relatively species-poor and lacks the associates that would indicate either of the sub-communities.

The OV27 community occurs in an area of recent clear-felled forestry in the east of the Study Area. It consists of tall dense stands of rosebay willowherb within and adjacent to MG9 grassland.

Acid Grasslands

- U4a *Festuca ovina- Agrostis capillaris - Galium saxatile* grassland, typical sub-community
- U5a *Nardus stricta - Galium saxatile* grassland, species poor sub-community
- U16 *Luzula sylvatica-Vaccinium myrtillus* tall-herb community
- U20 *Pteridium aquilinum-Galium* saxatile community

The U4a grassland is only present in some fields in the north of the Study Area, mostly on the floodplain of the Shinnel Water, and is subject to grazing by sheep. It is present on shallow well-drained soil, where it transitions with adjacent MG9, M23a, U4 and U20 communities, and is cropped quite short. Typical species include sheep's fescue, common bent, sweet vernal-grass, heath bedstraw, tormentil and white clover. The community shows features corresponding to the typical sub-community, although constant white clover suggests some level of improvement, perhaps relating to the high levels of sheep grazing.

The U5a grassland dominates the hill tops in the west of the Study Area and is extensive. The soil here is quite shallow and fairly well drained but seems to have a small peat content and grazing appears to be limited to deer. Wavy hair-grass is constant and is abundant in places, giving the hillsides a pink tinge. Springy turf-moss and heath bedstraw are abundant throughout, other constants with lower cover include sweet vernal-grass, common bent, sheep's fescue, heath woodrush, mat-grass and tormentil.

The presence of wavy hairgrass visible across the hillside suggests a possible U2 community. However, in the quadrats the lower coverage of wavy hair-grass fits better with U5a. Sheep's fescue and common bent are common associates in U2 but never rival the dominance of wavy hair-grass as they do here. Furthermore, there is no common heather which is a constant in all U2 communities. The constant levels and abundance of springy turf-moss and heath bedstraw are also in keeping with the U5 classification. Rodwell (1992) suggests mixed swards which include mat-grass are best placed in U5.

The community is slightly more species-rich than many U5a grasslands, which are simply dominated by mat-grass, showing elements of the damper found community U5b, including heath woodrush, common haircap moss and heath rush. However, it lacks the bog-mosses and dominant velvet bent which are typical of U5b.

The U16 community is found in small areas on the hilltops around the periphery of the Study Area, within the U5a grasslands, and consists of dense stands of great woodrush.

The U20 is found across the Study Area, mostly on well-drained soil on steeper hillslopes and in forest rides. It consists of stands of tall and very dense bracken.

Woodlands

- W1 – *Salix cinerea-Galium palustre* scrub
- W9 – *Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis* woodland

The W1 scrub occupies a small area in the north of the Study Area, dominated by stands of grey willow and downy birch 5 m to 7 m tall and on flat, damp ground along the banks of the Shinnel Water.

The W9 woodland is found in the east of the Study Area, within a steep, narrow river gully. The trees are dominated by 25 m to 20 m tall ash and sessile oak, with a frequent mix of downy birch, rowan, grey willow and hazel.

Habitats Summary: Protected Habitats and Potential Groundwater Dependence

Vegetation communities present within the Site (and associated Study Area) and included in the NVC survey are summarised in **Table 3,** along with corresponding Habitats Directive (92/43/EEC) Annex 1 Habitat types, SBL priority habitat type and potential Groundwater Dependant Terrestrial Ecosystems (GWDTE) status in accordance with SEPA guidance (2014) and NatureScot NVC / EUNIS / Annex 1 correspondence tables (2017). **Table 3** should be viewed in conjunction with **Figure 7.4**.

The NVC survey has included all the main habitat areas which were identified as potentially corresponding to Annex 1 and SBL habitats, and potential GWDTEs, within the Site (and associated Study Area).

The only potential protected habitat identified along the access track is the small area of dry heath (D1), along the banks of a narrow gully where the Ramscleugh Burn flows on the east face of Benbrack Hill. This is both an Annex 1 and SBL protected habitat.

Small areas and mosaics of potentially groundwater dependent vegetation are often found along stream valleys, tracksides, rides and in areas of clear-fell access the access track. These mostly consist of marshy grassland (B5), dominated by rush species, tufted hairgrass or purple moorgrass, and could potentially have moderate or high groundwater dependence. Areas identified as unimproved neutral grassland (B2.1) that are characterised by rush or tufted hairgrass also have the potential to be moderately groundwater dependent.

There are also a number of watercourses and small ponds recorded, and it is considered that these represent SBL priority habitats. Ponds are described in Target Notes 20, 21 and 38 and watercourses in Target Notes 1, 11,12, 30-34, 37 and 39-43 (see **Annex 2** for details).

Table 3 – Summary of Vegetation Communities Recorded

Phase 1 habitat	**NVC community**	**Principal corresponding Habitats Directive Annex I type/s**	**Corresponding SBL Priority Habitat Type**	**Potential Dependence of community/ habitat on groundwater.* 1=High, 2=moderate, 3=low**
E1.6.1 Blanket bog	M20 – *Eriophorum vaginatum* blanket mire: no sub-community assigned	H7130 Blanket bog	Blanket Bog	3
B5 Marshy grassland	M23a – *Juncus effusus – Galium* palustre rush pasture, *Juncus acutiflorus* sub-community	-	Upland flushes, fens and swamps	1
B5 Marshy grassland	M25a *Molinia Caerulea - Potentilla erecta* mire, *Erica tetralix* sub-community	-	-	2
B2.1 Unimproved neutral grassland	MG1 - *Arrhenatherum elatius* grassland	-	-	3
B2.2 improved grassland	MG6 – *Lolium perenne – Cynosurus cristatus* grassland: *Anthoxanthum odoratum* sub-community	-	-	3
B2.1 Unimproved neutral grassland	MG9 – *Holcus lanatus – Deschampsia cespitosa* grassland: no sub-community assigned	-	-	2
B1.1 Unimproved acid grassland	U4a – *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland: typical sub-community	-	-	3
B1.1 Unimproved acid grassland	U5a *Nardus stricta - Galium saxatile* grassland, species poor sub-community	-	*Nardus stricta-Galium saxatile* grassland	3 (2 in very localised damper areas)
B1.1 Unimproved acid grassland	U16 *Luzula sylvatica-Vaccinium myrtillus* tall-herb community	-	-	3
C1 Bracken	U20 *Pteridium aquilinum – Galium saxatile* community.	-	-	3
C3.1 Tall ruderal	OV27 *Epilobium angustifolium* community	-	-	3

Phase 1 habitat	NVC community	Principal corresponding Habitats Directive Annex I type/s	Corresponding SBL Priority Habitat Type	Potential Dependence of community/ habitat on groundwater.* 1=High, 2=moderate, 3=low
A1.1.1 Broadleaved semi-natural woodland	W1 *Salix cinerea-Galium palustre* scrub	-	Wet woodland	2
A1.1.1 Broadleaved semi-natural woodland	W9 *Fraxinus excelsior – Sorbus aucuparia – Mercurialis perennis* woodland	-	Upland mixed ashwoods	3

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

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Annex 1 – Scientific Plant Names

Table A1-1 provides common and scientific names of plant species included in this Technical Appendix, and within **Chapter 7: Ecology**.

Table A1-1 – Plant Names

Common Name	Scientific Name
Acute-leaved bog-moss	*Sphagnum capillifolium*
Alder	*Alnus glutinosa*
Ash	*Fraxinus excelsior*
Beech	*Fagus sylvatica*
Bent grasses	*Agrostis* spp.
Bilberry	*Vaccininum myrtillus*
Birch	*Betula* spp.
Bog asphodel	*Narthecium ossifragum*
Bog-mosses	*Sphagnum* spp.
Bottle sedge	*Carex rostrata*
Bracken	*Pteridium aquilinum*
Bugle	*Ajuga reptans*
Bur-reed	*Sparganium* sp.
Cherry	*Prunus* sp.
Cock's foot	*Dactylis glomerata*
Common bent	*Agrostis capillaris*
Common cottongrass	*Eriophorum angustifolium*
Common gorse	*Ulex europaeus*
Common haircap moss	*Polytrichum commune*
Common heather	*Calluna vulgaris*
Common mouse-ear	*Cerastium fontanum*
Common nettle	*Urtica dioica*
Common ragwort	*Jacobaea vulgaris*
Common sorrel	*Rumex acetosa*
Common valerian	*Valerian officinalis*
Compact rush	*Juncus conglomeratus*
Creeping buttercup	*Ranunculus repens*
Creeping soft-grass	*Holcus mollis*
Creeping thistle	*Cirsium arvense*
Crested dog’s-tail	*Cynosurus cristatus*
Cross-leaved heath	*Erica tetralix*
Cuckoo flower	*Cardamine pratensis*
Deergrass	*Trichophorum germanicum*
Dog's mercury	*Mercurialis perennis*

Common Name	Scientific Name
Downy birch	*Betula pubescens*
False oatgrass	*Arrhenatherum elatius*
Feathery bog-moss	*Sphagnum cuspidatum*
Field scabious	*Knautia arvensis*
Foxglove	*Digitalis purpurea*
Great woodrush	*Luzula sylvatica*
Grey willow	*Salix cinerea*
Hazel	*Corylus avellana*
Hard fern	*Blechnum spicant*
Hare's-tail cottongrass	*Eriophorum vaginatum*
Heath bedstraw	*Galium saxatile*
Heath rush	*Juncus squarrosus*
Heath woodrush	*Luzula multiflora*
Juniper	*Juniperus communis*
Lady fern	*Athyrium filix-femina*
Larch	*Larix spp.*
Lesser spearwort	*Ranunculus flammula*
Lesser stitchwort	*Stellaria graminea*
Lodgepole pine	*Pinus contorta*
Marsh bedstraw	*Galium palustre*
Marsh marigold	*Caltha palustris*
Marsh thistle	*Cirsium palustre*
Marsh violet	*Viola palustre*
Marsh willowherb	*Epilobium palustre*
Mat-grass	*Nardus stricta*
Meadow buttercup	*Ranunculus acris*
Meadowsweet	*Filipendula ulmaria*
Norway spruce	*Picea abies*
Oak	*Quercus sp.*
Papillose bog-moss	*Sphagnum papillosum*
Perennial ryegrass	*Lolium perenne*
Pondweed	*Potamogeton* sp.
Purple moor-grass	*Molinia caerulea*
Purple moor-grass rust (fungus)	*Puccinia moliniae*
Raspberry	*Rubus idaeus*
Red fescue	*Festuca rubra*
Rosebay willowherb	*Chamaenerion angustifolium*
Rowan	*Sorbus aucuparia*

Common Name	**Scientific Name**
Scot's Pine	*Pinus sylvestris*
Sessile oak	*Quercus petraea*
Sharp-flowered rush	*Juncus acutiflorus*
Sheep's fescue	*Festuca ovina*
Sitka spruce	*Picea sitchensis*
Soft rush	*Juncus effusus*
Spotted cat's-ear	*Hypochaeris maculata*
Springy turf-moss	*Rhytidiadelphus squarrosus*
Sweet vernal-grass	*Anthoxanthum odoratum*
Sycamore	*Acer pseudoplatanus*
Tormentil	*Potentilla erecta*
Tufted hair-grass	*Deschampsia cespitosa*
Velvet bent	*Agrostis canina*
Wavy hair-grass	*Avenella flexuosa*
White clover	*Trifolium repens*
Wild angelica	*Angelica sylvestris*
Willow	*Salix* spp.
Yarrow	*Achillea millefolium*
Yorkshire fog	*Holcus lanatus*

Annex 2 – Extended Phase 1 Habitat Survey Target Notes

Table A2-1 provides the Target Notes, should be read with reference to **Figures 7.3a and 7.3b,** and photographic plates presented in **Annex 4**.

Table A2-1 – Target Note Details

Target Note	Grid Reference	Description	Photographic Plate (Annex 4)
TN1	NX75169 97617	River; 3 m wide and 0.25 m deep with clear water flowing strongly over a bed of small boulders and pebbles. Banks are thick ferns, grasses and mature larch trees.	1
TN2	NX75029 97659	Typical area of clear-fell within the Site, with dense brash, and foxgloves and rosebay willowherb in abundance. Here also with some purple moor-grass, bracken and lady fern.	2
TN3	NX74881 97771	Typical area of planted broad-leaved trees. This block around 5 m tall and largely dominated by cherry, ash and willows. Quite densely planted and understorey limited to common grasses.	3
TN4	NX74721 97873	Riverside pastures used for sheep grazing, containing a mosaic of acid grassland, neutral grassland, marshy grassland and patches of bracken.	4
TN5	NX74250 98254	Small area of mature cherry trees, around 12 m tall. Also larger area of willows behind.	5
TN6	NX72498 98430	Small area of peat bog that is located on Peat Rig in the north of the Study Area. Peat is around 60 cm deep. Vegetation dominated by hare's-tail cotton-grass tussocks, bog-mosses and some other bog plants.	6
TN7	NX71281 98782	Hilltop acid grassland, the largest continuous areas of grassland on the Site, with the biggest areas being around Colt Hill, Mullwhanny and Cormunnoch Hills. The community here is largely dominated by wavy hair-grass and contains high densities of heath bedstraw and dense with springy turf-moss.	7
TN8	NX71242 98783	These patches of great woodrush are scattered locally across the hilltop acid grasslands.	8
TN9	NX70870 98862	Patches of tufted hair-grass dominated neutral grassland occur within the acid grassland, mostly on these steep slopes where damp ground is found in small depressions. Common sorrel, marsh thistle, and bugle are common in these areas.	9
TN10	NX72855 97187	Small borrow pit with mossy flushes.	10
TN11	NX74430 97091	Large pool in stream. 3 m x 3 m in size and 1 m deep. Burn here is around 1m wide and 0.25m deep, steady flow over a bed of small boulders and pebbles.	11
TN12	NX74389 97189	Burn; around 1.5 m wide and 0.25 m deep, clear water with steady flow over a bed of small boulders, pebbles and gravel.	12

Target Note	Grid Reference	Description	Photographic Plate (Annex 4)
TN13	NX74389 97245	Typical area of more newly planted trees. These ones around 2.5 m tall, mostly consisting of ash, alder, cherry and oak. The understorey in most of the newly planted areas is a mix of tufted hair-grass and rosebay willowherb dominated communities.	13
TN14	NX74403 97263	Area of sheep pens made of stone dykes.	14
TN15	NX74279 97356	Small patch of 10 m tall beech and sycamore trees.	15
TN16	NX74669 97270	Cottage on the edge of the Site with tall ash tree in the garden and surrounding neutral and marshy grasslands.	16
TN17	NX74863 97331	Some of the sheep-grazed neutral and marshy grasslands found in the Study Area.	17
TN18	NX75122 97434	A small row of around seven 20 m tall southern beech trees. Most of which appear to be in poor health.	18
TN19	NX74337 98250	A few mature ash trees and some gorse scrub along the banks of a very dry river. The ash trees were around 20 m tall and contained a variety of holes and cavities indicating bat roost potential, though no signs of presence were noted.	19
TN20	NX71635 98137	Pond; 10 m x 5 m in size, possibly up to 1m deep. Full of emergent vegetation such as pondweed, bur-reed, sedges and rushes. Many invertebrate present including dragonflies.	20
TN21	NX74423 97078	Pond; 7 m x 7 m in size, depth unknown. Almost no open water, full of emergent plants, mainly sedges and rushes but also bur-reed and pondweed. Many invertebrates including dragonflies.	21
TN22	NX74650 97348	Young otter observed on a forest track within the Site.	22
TN23	NX64958 95628	Small quarry with large pile of gravel either side.	23
TN24	NX66023 96366	An example of some tube planted broad-leaved trees, mostly birch and hazel in an area of old clear-fell. The understorey is currently dense tussocks of tufted hair-grass neutral grassland.	24
TN25	NX65879 96305	Area of clear-fell with acid grassland coming through along the track-side. Here also some small amounts of Sitka spruce regeneration scrub and rosebay willowherb stands can also be seen.	25
TN26	NX65443 96112	An example of some of the densely planted commercial Sitka spruce plantation, this area around 10 m tall. Also some more tufted hair-grass dominated grassland along the trackside.	26
TN27	NX65100 95774	An example of some younger forestry, these trees only around 3 m tall. The trackside vegetation dominated by rosebay willowherb.	27
TN28	NX64905 95585	A communications mast appears to be fairly newly installed.	28

Target Note	Grid Reference	Description	Photographic Plate (Annex 4)
TN29	NX70251 97118	A group of old sycamore trees around 2 0m tall with some holes and crevices offering potential for bat roosts.	29
TN30	NX70183 97122	Small burn, only 0.5 m wide and around 20 cm deep. Water very clear, flowing quickly over small pebbles and gravel. Within semi natural woodland with banks of luxuriant mosses and overhanging raspberry and ferns.	30
TN31	NX69716 97328	Large burn; 2 m wide and 30 cm deep. Very clear water, flowing quicky and freely over a bed of boulders, pebbles and gravel. Within an area of mature mixed woodland composed of larch and sycamore. Banks mostly a mix of tall grasses and ferns.	31
TN32	NX69464 97414	Large Burn; 2 m wide and 30 cm deep. Very clear water, flowing steadily over a bed of boulders, pebbles and gravel. Banks are a mix of angelica, great woodrush, tall grasses and other herbs.	32
TN33	NX68728 97681	Ramscleugh Burn; around 1.5 m wide and 20 cm deep. Very clear water, flowing rapidly over a mix of bedrock, boulders and pebbles. Banks are a mix of common heather and bilberry dominated dry heath with some lady fern, sheep's fescue and rosebay willowherb.	33
TN34	NX68552 98010	Burn; around 1.5 m wide and 20 cm deep. Very clear water, flowing rapidly down a steep forestry ride over a mix of bedrock, boulders and pebbles. Banks are a mix of acid grassland and bracken. Some marsh marigold present in the burn.	34
TN35	NX68644 97982	An example of some of the dense Sitka spruce regeneration scrub that dominates much of the track sides within the forestry. The young trees here are reaching around 4 m in height.	35
TN36	NX69086 97966	Small area of possible semi-natural Scots Pine woodland growing within a small walled enclosure adjacent to the track. The trees are roughly 15 m tall and contain some standing deadwood, with holes and cavities that have some potential as bat roosts. Understorey is sheep's fescue dominated acid grassland with some bilberry.	36
TN37	NX70531 97723	Small Burn; around 0.5 m wide and 10 cm deep. Water very clear and flowing quickly and freely down hill over a bed of small boulders, pebbles and gravel. Banks are a mix of soft rush, ferns and tall grasses.	37
TN38	NX68705 97702	Small pond; roughly 1 m x 3 m in size and around 0.5 m deep. Water quality quite poor/murky. A few emergent rushes and some floating feathery bog moss. Banks are a mix of soft rush and herbs like lesser spearwort.	38
TN39	NX69429 97130	Burn and deep gully. Burn; around 1.5 m wide and 15 cm deep. Clear water, slightly peat stained flowing quickly downhill over a mix of bedrock, boulders and gravel. Banks are a very steep sided rock gully densely coated in lush mosses a mix of ferns, bilberry and other herbs including wild angelica. Scattered native trees present including silver birch and rowan.	39
TN40	NX68214 96150	Burn; around 1 m wide and 15 cm deep. Very clear water flowing quickly over a bed of small boulders, pebbles and gravel. Banks are a mix of acid grassland and bracken.	40
TN41	NX67655 96128	Burn; 0.5 m wide and 10 cm deep. Very clear water, flow slow but steady over a bed of pebbles and gravel. Banks with dense sharp-flowered rush.	41

Target Note	Grid Reference	Description	Photographic Plate (Annex 4)
TN42	NX67440 96140	Burn; 0.5 m wide and 10 cm deep. Very muddy water, flow very slow to stagnant over orange mud. Banks with dense sharp-flowered rush and Yorkshire fog.	42
TN43	NX67257 96068	Burn; 0.5 m wide and 15 cm deep. Water quite heavily peat stained and flowing very slowly or close to stagnant over a bed of boulders, pebbles and gravel. Banks are composed of acid grassland.	43

Annex 3 – NVC Survey Results

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

Table A3-1 – Dominance (DOMIN) Scale

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

Table A3-2 – NVC Tables

Phase 1 habitat type	**Blanket bog**					
NVC Community	**M20 – *Eriophorum vaginatum* blanket mire: no sub-community assigned**					
Quadrats	Q1	Q2	Q3	Q4	Q5	
OS grid co-ordinates	NX 72645 98408	NX 72639 98411	NX 72666 98416	NX 72580 98416	NX 72539 98420	
Peat Depth (cm)	50	55	60	60	50	
Vegetation height (cm)	25	35	30	35	30	
Species	**Cover**					**Constancy**
Eriophorum vaginatum	6	8	7	7	8	**5**
Molinia caerulea	3	3	3	3	3	**5**
Narthecium ossifragum	5	-	-	-	-	**1**
Deschampsia flexuosa	3	2	3	4	4	**5**
Potentilla erecta	3	3	3	3	3	**5**
Juncus squarrosus	3	3	1	-	3	**4**
Vaccinium myrtillus	3	1	-	3	2	**4**
Sphagnum capillifolium	5	5	5	4	5	**5**
Pleurozium schreberi	6	7	8	5	6	**5**
Festuca ovina	3	-	3	3	3	**4**
Calluna vulgaris	4	3	3	-	-	**3**
Rhytidiadelphus squarrosus	4	3	3	-	6	**4**
Trichophorum germanicum	3	-	-	-	-	**1**
Eriophorum angustifolium	3	3	2	3	3	**5**
Agrostis capillaris	-	3	-	-	-	**1**
Polytrichum commune	-	3	3	7	3	**4**
Sphagnum papillosum	-	-	3	-	-	**1**
Anthoxanthum odoratum	-	-	-	3	-	**1**

Phase 1 habitat type	**Blanket bog**					
NVC Community	**M20 – *Eriophorum vaginatum* blanket mire: no sub-community assigned**					
Carex nigra	-	-	-	-	2	**1**

Phase 1 habitat type	**Marshy Grassland**					
NVC Community	**M23a – *Juncus effusus* – *Galium palustre* rush pasture, *Juncus acutiflorus* sub-community**					
Quadrats	Q1	Q2	Q3	Q4	Q5	
OS grid co-ordinates	NX 74693 97901	NX 75085 97263	NX 70532 98615	NX 71603 98099	NX 73042 97724	
Soil depth (cm)	10	15	25	20	25	
Vegetation height (cm)	60	50	60	75	60	
Species	**Cover**					**Constancy**
Juncus acutiflorus	8	8	8	6	7	**5**
Anjelica sylvestris	4	-	-	4	-	**2**
Deschampsia cespitosa	3	-	-	-	-	**1**
Molinia caerulea	4	-	-	-	-	**1**
Ranunculus repens	3	5	4	-	3	**4**
Plantago lanceolata	2	-	-	-	-	**1**
Achillea Ptarmica	3	-	-	-	-	**1**
Galium palustre	3	-	5	3	3	**4**
Epilobium palustre	2	-	4	4	3	**4**
Potentilla erecta	3	-	-	-	-	**1**
Cirsium palustre	2	2	3	5	2	**5**
Cirsium arvense	3	-	-	-	-	**1**
Viola palustre	3	-	4	3	2	**4**

Phase 1 habitat type	**Marshy Grassland**					
NVC Community	**M23a – *Juncus effusus* – *Galium palustre* rush pasture, *Juncus acutiflorus* sub-community**					
Rumex acetosa	3	-	6	5	-	**3**
Rhytidiadelphus squarrosus	4	6	-	-	-	**2**
Hylocomium splendens	5	4	-	-	4	**3**
Holcus mollis	2	-	3	-	-	**2**
Anthoxanthum odoratum	3	3	-	-	-	**2**
Carex panicea	4	-	-	-	-	**1**
Luzula multiflora	1	-	-	-	-	**1**
Ranunculus acris	-	3	-	-	-	**1**
Holcus lanatus	-	3	-	-	3	**2**
Festuca rubra	-	2	-	-	-	**1**
Trifolium repens	-	3	-	-	-	**1**
Cerastium fontanum	-	1	-	-	-	**1**
Diplophylum albicans	-	-	5	4	-	**2**
Cardamine flexuosa	-	-	3	3	3	**3**
Carex nigra	-	-	-	5	-	**1**
Myosotis sp.	-	-	-	3	-	**1**
Valeriana officianalis	-	-	-	-	5	**1**
Juncus effusus	-	-	-	-	4	**1**
Stellaria gramminea	-	-	-	-	3	**1**
Equisetum pratense	-	-	-	-	3	**1**

Phase 1 habitat type	**Marshy Grassland**					
NVC Community	**M25a – *Molinia caerulea – Potentilla erecta* mire: *Erica tetralix* subcommunity**					
Quadrats	Q1	Q2	Q3	Q4	Q5	
OS grid co-ordinates	NX 72494 98424	NX 72372 98432	NX 72297 98437	NX 72198 98450	NX 72064 98458	
Peat depth (cm)	30	30	25	30	20	
Vegetation height (cm)	40	40	40	40	50	
Species	**Cover**					**Constancy**
Narthecium ossifragum	4	4	3	3	3	**5**
Deschampsia flexuosa	4	3	3	3	-	**4**
Trichophorum germanicum	7	8	8	8	8	**5**
Molinia caerulea	4	3	-	3	-	**3**
Calluna vulgaris	3	3	3	3	3	**5**
Agrostis capillaris	2	-	3	3	3	**4**
Luzula multiflora	3	3	-	3	-	**3**
Eriophorum vaginatum	3	-	-	-	-	**1**
Erica tetralix	3	4	3	4	5	**5**
Potentilla erecta	5	6	4	5	4	**5**
Pleurozium schreberi	-	6	3	-	-	**2**
Sphagnum capillifolium	-	4	4	4	3	**4**
Vaccinium myrtillus	-	4	-	-	4	**2**
Polytrichum commune	-	3	3	3	3	**4**
Anthoxanthum odoratum	-	-	3	-	-	**1**
Festuca ovina	-	-	3	3	4	**3**
Galium saxatile	-	-	5	4	5	**3**

Phase 1 habitat type	**Marshy Grassland**					
NVC Community	**M25a – *Molinia caerulea – Potentilla erecta* mire: *Erica tetralix* subcommunity**					
Hypnum jutlandicum	-	-	-	4	4	**2**
Rhytidiadelphus squarrosus	4	4	3	3	3	**5**

Phase 1 habitat type	**Neutral Grassland**					
NVC Community	**MG6 – *Lolium perenne – Cynosurus cristatus* grassland: *Anthoxanthum odoratum* sub-community**					
Quadrats	Q1	Q2	Q3	Q4	Q5	
OS grid co-ordinates	NX 75056 97230	NX 75014 97285	NX 74886 97310	NX 74839 97280	NX 75063 97161	
Soil depth (cm)	5	5	5	5	5	
Vegetation height (cm)	15	25	10	15	10	
Species	**Cover**					**Constancy**
Cirsium palustre	4	-	4	-	-	**2**
Cirsium arvense	4	4	-	3	-	**3**
Trifolium repens	6	6	7	6	6	**5**
Ranunculus repens	5	4	4	5	3	**5**
Cynosurus cristatus	3	4	4	4	4	**5**
Anthoxanthum odoratum	5	4	3	4	3	**5**
Festuca rubra	4	4	3	4	-	**4**
Lolium perenne	3	5	4	4	7	**5**
Cerastium fontanum	3	3	3	3	3	**5**
Rhytidiadelphus squarrosus	6	5	4	6	4	**5**
Rumex acetosa	3	3	3	3	3	**5**
Conopodium majus	2	2	-	1	-	**3**
Achillea millefolium	3	3	3	3	3	**5**

Phase 1 habitat type	**Neutral Grassland**					
NVC Community	**MG6 – *Lolium perenne – Cynosurus cristatus* grassland: *Anthoxanthum odoratum* sub-community**					
Quadrats	Q1	Q2	Q3	Q4	Q5	
OS grid co-ordinates	NX 75056 97230	NX 75014 97285	NX 74886 97310	NX 74839 97280	NX 75063 97161	
Soil depth (cm)	5	5	5	5	5	
Vegetation height (cm)	15	25	10	15	10	
Species	**Cover**					**Constancy**
Agrostis canina	3	2	3	3	2	**5**
Cirsium repens	-	-	3	4	4	**3**
Carex leporina	-	-	-	2	-	**1**
Urtica dioica	-	-	-	-	3	**1**
Rumex acetosella	-	-	-	-	3	**1**
Juncus conglomeratus	-	4	-	-	-	**1**

Phase 1 habitat type	**Neutral Grassland**					
NVC Community	**MG9 – *Holcus lanatus – Deschampsia cespitosa* grassland: no sub-community assigned**					
Quadrats	Q1	Q2	Q3	Q4	Q5	
OS grid co-ordinates	NX 74387 98155	NX 74352 98372	NX 73268 97624	NX 73185 97671	NX 73962 97310	
Soil depth (cm)	15	10	25	30	30	
Vegetation height (cm)	120	120	110	120	130	
Species	**Cover**					**Constancy**
Deschampsia cespitosa	8	7	7	8	8	5
Juncus acutiflorus	3	-	-	-	-	1
Molinia caerulea	5	-	-	3	-	2

Phase 1 habitat type	**Neutral Grassland**					
NVC Community	**MG9 – *Holcus lanatus – Deschampsia cespitosa* grassland: no sub-community assigned**					
Quadrats	Q1	Q2	Q3	Q4	Q5	
OS grid co-ordinates	NX 74387 98155	NX 74352 98372	NX 73268 97624	NX 73185 97671	NX 73962 97310	
Soil depth (cm)	15	10	25	30	30	
Vegetation height (cm)	120	120	110	120	130	
Species	**Cover**					**Constancy**
Ranunculus repens	3	2	-	-	4	3
Anthoxanthum odoratum	4	3	3	-	3	4
Holcus lanatus	3	2	4	3	3	5
Stellaria graminea	3	-	-	-	-	1
Rumex acetosa	3	3	3	3	3	5
Achillea Ptarmica	3	-	-	-	-	1
Potentilla erecta	3	-	-	-	-	1
Anjelica sylvestris	3	-	-	-	-	1
Holcus mollis	3	-	-	3	-	2
Galium palustre	3	3	4	3	-	4
Agrostis stolonifera	4	3	3	-	3	4
Carex panicea	3	-	-	2	-	2
Epilobium palustre	2	1	2	2	-	4
Cerastium fontanum	1	-	-	-		1
Cirsium palustre	-	3	2	-	5	3
Juncus effusus	-	5	-	-	-	1
Digitalis purpurea	-	3	-	-	-	1
Rhytidiadelphus squarrosus	-	5	5	4	-	3

Phase 1 habitat type	**Neutral Grassland**					
NVC Community	**MG9 – *Holcus lanatus – Deschampsia cespitosa* grassland: no sub-community assigned**					
Quadrats	Q1	Q2	Q3	Q4	Q5	
OS grid co-ordinates	NX 74387 98155	NX 74352 98372	NX 73268 97624	NX 73185 97671	NX 73962 97310	
Soil depth (cm)	15	10	25	30	30	
Vegetation height (cm)	120	120	110	120	130	
Species	**Cover**					**Constancy**
Plantago lanceolata	-	-	-	3	-	1
Pleurozium schreberi	-	-	-	5	5	2

Phase 1 habitat type	**Acid Grassland**					
NVC Community	**U4a – *Festuca ovina -Agrostis capillaris–Galium saxatile* grassland: typical sub-community**					
Quadrats	Q1	Q2	Q3	Q4	Q5	
OS grid co-ordinates	NX 74332 98335	NX 74298 98296	NX 74386 98267	NX 74448 98193	NX 74493 98107	
Soil depth (cm)	10	10	10	10	10	
Vegetation height (cm)	15	20	15	15	15	
Species	**Cover**					**Constancy**
Trifolium repens	6	5	5	6	5	**5**
Anthoxanthem odoratum	6	6	5	5	5	**5**
Ranunculus repens	4	4	3	4	3	**5**
Galium saxatile	5	5	4	4	4	**5**
Cerastium fontanum	3	3	4	2	-	**4**
Hylocomium splendens	4	4	4	5	-	**4**

Phase 1 habitat type	**Acid Grassland**					
NVC Community	**U4a – *Festuca ovina -Agrostis capillaris–Galium saxatile* grassland: typical sub-community**					
Agrostis capillaris	5	4	5	4	4	**5**
Festuca ovina	3	3	4	3	4	**5**
Potentilla erecta	3	3	3	3	-	**4**
Luzula multiflora	-	2	-	3	3	**3**
Achillea millefolium	-	3	-	3	2	**3**
Cirsium palustre	-	1	-	3	-	**2**
Rumex acetosa	-	-	3	3	3	**3**
Pleurozium schreberi	-	-	4	3	4	**3**

Phase 1 Habitat Type	**Acid Grassland**										
NVC Community	**U5a *Nardus stricta - Galium saxatile* grassland, species poor sub-community**										
Quadrat	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
OS grid coordinates	NX 71545 98662	NX 71063 98936	NX 70394 99005	NX 70003 98901	NX 70252 98445	NX 70501 98391	NX 71348 97649	NX 71659 97486	NX 72346 96949	NX 72718 96377	
Peat depth (cm)	10	10	10	10	10	10	10	10	10	10	
Veg height (cm)	25	30	30	30	30	30	30	30	30	30	
Species	**Cover**										**Const.**
Rhytidiadelphus squarrosus	8	9	8	6	8	6	5	6	6	8	**10**
Juncus squarrosus	7	4	-	2	-	-	-	4	-	3	**5**
Anthoxanthum odoratum	3	4	5	5	4	3	5	4	5	4	**10**
Deschampsia flexuosa	4	4	4	4	4	5	4	5	7	6	**10**
Festuca ovina	3	3	3	3	3	-	3	3	3	-	**8**
Galium saxatile	5	7	6	6	7	7	7	6	5	6	**10**
Agrostis capillaris	3	3	3	3	3	3	3	3	3	3	**10**
Potentilla erecta	3	3	3	2	3	1	1	2	3	3	**10**
Luzula multiflora	2	3	3	3	3	2	2	2	2	3	**10**
Nardus stricta	-	4	3	4	3	3	3	-	-	3	**7**
Hylocomium splendens	-	3	4	-	-	4	3	4	4	3	**7**
Pleurozium schreberi	-	-	-	6	5	5	6	4	-	3	**6**
Polytrichum commune	-	-	-	5	3	3	4	3	-	3	**6**
Vaccininum myrtillus	-	-	-	3	3	1	-	-	2	3	**5**
Carex nigra	-	-	-	-	-	4	-	-	-	-	**1**

Annex 4 – Photographs

Extended Phase 1 Habitat Survey Photographs

Photo 1 - Target Note 1

Photo 2 - Target Note 2

Photo 3 - Target Note 3

Photo 4 - Target Note 4

Photo 5 - Target Note 5

Photo 6 - Target Note 6

Photo 7 - Target Note 7

Photo 8 - Target Note 8

Photo 9 - Target Note 10

Photo 10 - Target Note 10

Photo 11 - Target Note 11

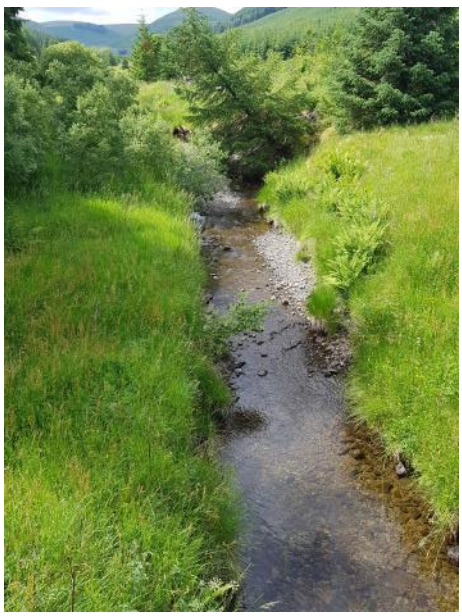

Photo 12 - Target Note 12

Photo 13 - Target Note 13

Photo 14 - Target Note 14

Photo 15 - Target Note 15

Photo 16 - Target Note 16

Photo 17 - Target Note 17

Photo 18 - Target Note 18

Photo 19 - Target Note 19

Photo 20 - Target Note 20

Photo 21 - Target Note 21

Photo 22 - Target Note 22

Photo 23 - Target Note 23

Photo 24 - Target Note 24

Photo 25 - Target Note 25

Photo 26 - Target Note 26

Photo 27 - Target Note 27

Photo 28 - Target Note 28

Photo 29 - Target Note 29

Photo 30 - Target Note 30

Photo 31 - Target Note 31

Photo 32 - Target Note 32

Photo 33 - Target Note 33

Photo 34 - Target Note 34

Photo 35 - Target Note 35

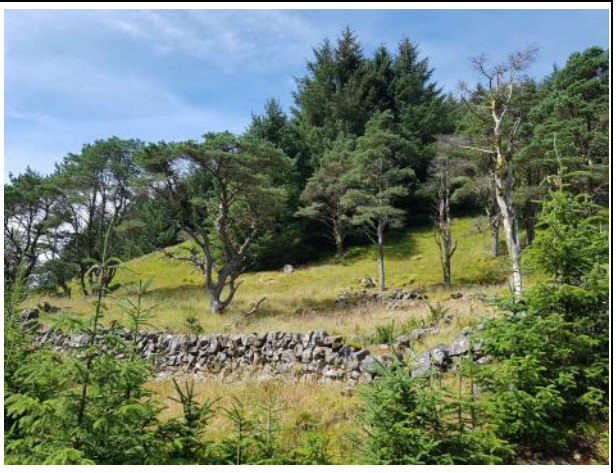

Photo 36 - Target Note 36

	
Photo 37 - Target Note 37	Photo 38 - Target Note 38
	
Photo 39 - Target Note 39	Photo 40 - Target Note 40
	
Photo 41 - Target Note 41	Photo 42 - Target Note 42

Photo 43 - Target Note 43

NVC Surveys Photographs

Photo 44 - M20 - *Eriophorum vaginatum* blanket mire

Photo 45 - M23a – *Juncus effusus* – *Galium* palustre rush pasture, *Juncus acutiflorus* sub-community

Photo 46 - M25a *Molinia Caerulea - Potentilla erecta* mire, *Erica tetralix* sub-community

Photo 47 - MG1 – *Arrhenatherum elatius* – *Dactylis glomerata* grassland

Photo 48 - MG6 – *Lolium perenne – Cynosurus cristatus* grassland: *Anthoxanthum odoratum* sub-community

Photo 49 - MG9 – *Holcus lanatus – Deschampsia cespitosa* grassland

Photo 50 - U4a *Festuca ovina- Agrostis capillaris - Galium saxatile* grassland, typical sub-community

Photo 51 - U5a *Nardus stricta - Galium saxatile* grassland, species poor sub-community

Photo 52 - U16 *Luzula sylvatica-Vaccinium myrtillus* tall-herb community