

Torfichen Wind Farm National Vegetation Classification & Habitats Survey

Appendix 8.1

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1 INTRODUCTION

MacArthur Green was commissioned by Renewable Energy Systems Ltd. ('the Applicant') to carry out a National Vegetation Classification (NVC) and habitats survey at the proposed Torfichen Wind Farm, hereafter the Proposed Development.

The aim of the NVC survey was 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)²; and Scottish Biodiversity List (SBL) priority habitats³). This information is used to inform the wind farm design process and the ecological assessment for the Proposed Development's 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 AREA

2.1 Overview

The Proposed Development is located approximately 4 km south of Gorebridge and 9.5 km south-east of Penicuik, within the northern edge of the Moorfoot Hills in the Midlothian Council (MC) area.

The Proposed Development is set within a mixed landscape of undulating farmland, fragmented moorland and forestry which is populated sparsely with settlements. The elevation on site varies from 270 m Above Ordnance Datum (AOD) along the northern boundary of the site to 490 m AOD near the summit of Mauldslie Hill to the south. Elevation generally decreases towards the north-west. The site is primarily agricultural, predominately used for livestock farming. There are several minor first order watercourses on and around the site. The Proposed Development is fully described within **Chapter 3: Project Description** of the EIA Report.

This Appendix reports on the habitats recorded within the survey area, i.e., the entire area covered by NVC field surveys, covering a total of 1528.3 hectares (ha). The survey area in many areas extends well beyond the site boundary, which covers 852.3 ha; this reflects earlier and larger areas of interest which have been refined down during the iterative design process (see **Chapter 2: Site Selection & Design Evolution**), and also to provide sufficient survey buffers to account for the possible presence of potential GWDTE. The survey area and its juxtaposition with the site boundary is shown in **Figure 8.3**. The appropriate scale for the assessment of effects with regards habitat loss has been deemed to be the site boundary (as defined in **Chapter 8: Ecology**).

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

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

³ <https://www.nature.scot/scotlands-biodiversity/habitat-definitions>.

2.2 Designated Sites

There are six designated sites containing habitat related, or botanical, qualifying features within 5 km of the site. The details of, and relevant qualifying features for, each designation relevant to this Appendix are detailed in **Table 2-1**; see also **Figure 8.1**.

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

Designated Site	Distance from Site	Qualifying Feature	Last Assessed Condition & Date
Moorfoot Hills SAC	145 m	Blanket bog	Unfavourable Recovering 20 September 2009
		Dry heaths	Unfavourable No change 30 July 2013
Moorfoot Hills SSSI	145 m	Blanket bog	Unfavourable Recovering 20 September 2009
		Upland assemblage	Unfavourable Declining 30 July 2013
		Upland birch woodland	Unfavourable Declining 7 October 2014
Peeswit Moss SAC	2,711 m	Active raised bog	Unfavourable Recovering 2 June 2014
		Degraded raised bog	Unfavourable Recovering 11 September 2008
Peeswit Moss SSSI	2,711 m	Raised bog	Unfavourable Recovering 11 September 2008
Dundreich Plateau SSSI	4,041 m	Blanket bog	Unfavourable No change ⁴ 9 October 2005
		Subalpine flushes	Favourable Maintained 9 October 2005
Crichton Glen SSSI	4,215 m	Lowland neutral grassland	Unfavourable Declining ⁵ 7 July 2010
		Upland oak woodland	Favourable Maintained 7 July 2008
		Valley fen	Favourable Declining 27 July 2016

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

⁵ Management measures are in place that should, in time, improve the feature to Favourable condition (Unfavourable Recovering Due to Management).

2.3 Ancient Woodland

There are a large number of areas of ancient woodland (as present on the Ancient Woodland Inventory (AWI)) within 5 km of the site. There are a few areas of ancient woodland within or immediately adjacent to the site (**Figure 8.1**).

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

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

The ancient woodland within and immediately adjacent to the site is all conifer plantation in character and categorised as 2b LEPO.

2.4 Carbon and Peatland Map 2016

The Carbon and Peatland Map 2016⁶ was consulted to determine likely peatland classes present within the site. The map is a predictive tool that provides an indication of the likely presence of peat at a coarse scale. The Carbon and Peatland map has been developed as a high-level planning tool and identifies areas of nationally important carbon-rich soils, deep peat and priority peatland habitat⁷ as Class 1 and Class 2 peatlands.

Figure 8.2 indicates that, according to this predictive tool and map, there is an area of Class 1 peatland within the site in the area around Yorkston Moss, which extends to the north-east; there is no other Class 1 peatland within 2 km of the site. There is no Class 2 peatland within the site or within 2 km of the site. Much of the site and surrounding area is underlain by Class 0⁸ (mineral)

⁶ 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>.

⁷ Priority peatland habitat is land covered by peat-forming vegetation or vegetation associated with peat formation.

⁸ Class 0 - Mineral soil - Peatland habitats are not typically found on such soils. No peatland vegetation.

soils. The remainder of the site comprises scattered and fragmented patches of Class 3⁹, Class 4¹⁰ and Class 5¹¹ soils (see **Figure 8.2**).

3 METHODOLOGY

3.1 National Vegetation Classification (NVC)

The vegetation was surveyed by a suitably qualified and experienced surveyor 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 surveyor worked progressively across the survey area to ensure that no areas were missed, and that mapping was accurate. NVC communities were attributed to the mapped polygons using surveyor experience and matching field data against published floristic tables (Rodwell, 1991-2000). Stands were classified to sub-community level where possible, although in many cases the vegetation was mapped to community level only because the vegetation was too species-poor or patches were too small to allow meaningful sub-community determination; or because some areas exhibited features or fine-scale patterns of two or more sub-communities.

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

⁹ Class 3 - Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat. Indicative soil = Predominantly peaty soil with some peat soil. Indicative vegetation = Peatland with some heath.

¹⁰ Class 4 - Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soil. Indicative soil = Predominantly mineral soil with some peat soil. Indicative vegetation = Heath with some peatland.

¹¹ Class 5 - Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat. Indicative soil = Peat soil. Indicative vegetation = No peatland vegetation.

3.2 Phase 1 Habitat Characterisation

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

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

4 SURVEY DETAILS & LIMITATIONS

NVC and habitats surveys were undertaken for the Proposed Development within the NVC survey area in September 2022. Surveys were therefore undertaken during the optimal survey period, and all areas of the site were accessible. The weather conditions were amenable to survey on each survey day; bright, dry and relatively light wind.

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

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

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

5 RESULTS

5.1 Summary of Habitat Types & NVC Communities

Thirty NVC communities (and various associated sub-communities) and 21 non-NVC communities/feature types were recorded within the survey area, and these corresponded to 32

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	W6 <i>Alnus glutinosa</i> – <i>Urtica dioica</i> woodland W7 <i>Alnus glutinosa</i> – <i>Fraxinus excelsior</i> – <i>Lysimachia nemoreum</i> woodland W10 <i>Quercus robur</i> – <i>Pteridium aquilinum</i> - <i>Rubus fruticosus</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)
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	MP Mixed Plantation (non-NVC type)
A2.1 Scrub – Dense/Continuous	W21 <i>Crataegus monogyna</i> – <i>Hedera helix</i> scrub W23 <i>Ulex europaeus</i> – <i>Rubus fruticosus</i> scrub
A3.1 Scattered Broadleaved Trees	SBT (non-NVC type)
A3.2 Scattered Conifer Trees	SCT (non-NVC type)
A4.2 Recently-Felled Coniferous Woodland	CF Clear-Felled Woodland (non-NVC type)
B1.1 Unimproved Acid Grassland	U1 <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Rumex acetosella</i> grassland U2 <i>Avenella flexuosa</i> 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> 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 MG9x <i>Holcus lanatus</i> – <i>Deschampsia cespitosa</i> grassland – acidic variant (non-NVC type)
B2.2 Semi-Improved Neutral Grassland	MG10 <i>Holcus lanatus</i> – <i>Juncus effusus</i> rush-pasture HI <i>Holcus lanatus</i> dominated neutral grassland (non-NVC type)
B4 Improved Grassland	MG6 <i>Lolium perenne</i> – <i>Cynosurus cristatus</i> grassland MG7 <i>Lolium perenne</i> leys and related grasslands
B5 Marsh/Marshy Grassland	M23 <i>Juncus effusus/acuteiflorus</i> – <i>Galium palustre</i> rush-pasture M25 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire (excluding M25a) Je <i>Juncus effusus</i> acid grassland community (non-NVC type)

Phase 1 Habitats	NVC Communities & Other Non-NVC Habitats/Features Recorded
	Ja <i>Juncus acutiflorus</i> acid grassland community (non-NVC type) JaN <i>Juncus acutiflorus</i> neutral 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 Herb & Fern: Tall Ruderal	OV25 <i>Urtica dioica</i> – <i>Cirsium arvense</i> community OV27 <i>Chamerion angustifolium</i> community W24 <i>Rubus fruticosus</i> – <i>Holcus lanatus</i> underscrub
C3.2 Tall Herb & Fern: Non-Ruderal	Daff <i>Dryopteris affinis</i> dominant (non-NVC type)
D1.1 Dry Dwarf Shrub Heath - Acid	H12 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath H9-H12 Intermediate
D2 Wet Dwarf Shrub Heath	M15 <i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath
D5 Dry Heath/Acid Grassland Mosaic	Mosaics of D1 and B1 communities
D6 Wet Heath/Acid Grassland Mosaic	Mosaics of D2 and B1 communities
E1.6.1 Blanket Bog	M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire
E1.7 Wet Modified Bog	M25a <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire <i>Erica tetralix</i> sub-community
E1.8 Dry Modified Bog	M20 <i>Eriophorum vaginatum</i> blanket mire
E2.1 Acid/Neutral Flush/Spring	M4 <i>Carex rostrata</i> - <i>Sphagnum fallax</i> mire M6 <i>Carex echinata</i> - <i>Sphagnum fallax/denticulatum</i> mire
F1 Swamp	S9 <i>Carex rostrata</i> swamp
G1 Open Water	SW Standing Water (non-NVC type)
I2.1 Quarry	QY Quarry (non-NVC type)
J1.1 Arable	AR Arable (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 8.1** which combines Phase 1 symbology with NVC data.

A number of target notes (TNs) were also made during surveys, often to pinpoint areas or species of special interest. These target notes are shown in **Figure 8.1** 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 & A3.1 Scattered Broadleaved Trees

Semi-natural broadleaved woodland is rare within the site and of low total extent, being restricted to a few small areas generally around the edges of the site or outwith the site in the wider survey area. The only stand of notable size is the woodland present at Cockmoor Wood, this is also classed as ancient woodland. The remaining areas of woodland mainly comprise small, scattered groups of trees.

Most of woodland recorded in the survey area and within the site is W11 *Quercus petraea* – *Betula pubescens* – *Oxalis acetosella* woodland. However, some very small patches of W6 *Alnus glutinosa* – *Urtica dioica* woodland, W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemoreum* woodland, and W10 *Quercus robur* – *Pteridium aquilinum* - *Rubus fruticosus* woodland were recorded in the survey area.

The W11 at Cockmoor Wood is predominately *Betula* spp. with some *Quercus petraea* and occasional *Alnus glutinosa* and *Pinus sylvestris*; the ground flora contains a typical acid grassland flora reflecting U4a and U5a grassland compositions. Other small patches of W11 also had additional records of *Salix* spp. and *Crataegus monogyna*.

Of the other communities recorded, W10 is present to the east of the site access off the 7007 road, the mixed canopy here is underlain by a dry neutral grassland assemblage.

Areas of W7 were usually dominated by either *Betula* spp. or *Salix* spp. over a field layer with dominant - abundant *Juncus effusus*. One area was recorded as the W7c *Deschampsia cespitosa* sub-community where the field layer was dominated by *Deschampsia cespitosa*.

The area of W6 outwith the site comprised semi-mature *Alnus glutinosa* over a field layer dominated by *Urtica dioica*.

Occasional Scattered Broadleaved Trees (SBT) were found mainly along road or tracksides.

5.2.2 A1.1.2 Broadleaved Plantation Woodland

There are a number of patches of broadleaved plantation (BP) or young broadleaved plantation (YBP) in the survey area, with one area of YBP in the site. The character of these plantations ranges from older shelter belts dominated by *Fagus sylvatica* to more recent plantation of native species, including *Betula* spp., *Salix* spp., *Alnus glutinosa* and *Sorbus aucuparia*.

5.2.3 A1.2.2 Coniferous Plantation Woodland & A3.2 Scattered Conifer Trees

The survey area includes several blocks of densely planted commercial coniferous plantation woodland (CP) and young commercial coniferous plantation (YCP). These plantation woodlands are mostly dominated by *Picea sitchensis*. These types of plantation woodlands are generally of negligible botanical value due to over-shading and loss of the field flora.

Occasional scattered conifer trees (SCT) were recorded in the survey area, these were generally *Pinus sylvestris*.

5.2.4 A1.3.2 Mixed Plantation Woodland

A single small area of mixed plantation (MP) woodland was recorded in the survey area but outwith the site, at Allanshaw Wood.

5.2.5 A2.1 Dense/Continuous

Some small areas of W21 *Crataegus monogyna* – *Hedera helix* scrub and W23 *Ulex europaeus* – *Rubus fruticosus* scrub were recorded within the survey area, but outwith the site.

5.2.6 A4.2 Recently Felled Coniferous Woodland

A single area of recently felled conifer plantation was recorded in the survey area but outwith the site at Allanshaw Wood.

5.3 Grasslands & Marsh

5.3.1 B1.1 Unimproved Acid Grassland

Unimproved acid grassland is extensive within the site and is the most common habitat type present, covering approximately 293.8 ha (34.5%) of the site, it is also common in the wider survey area to the south-west. It is generally present on the thin mineral soils which predominate the site (c.f. Section 2.4), and is grazed by livestock (sheep, cattle and farmed deer).

The vast majority of unimproved acid grassland in the survey area is U4 *Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland and U5 *Nardus stricta* – *Galium saxatile* grassland, in particular the U4a Typical sub-community and the U5a Species-poor sub-community. There are much smaller scattered patches of U1 *Festuca ovina* – *Agrostis capillaris* – *Rumex acetosella* grassland, U2b *Avenella flexuosa* grassland *Vaccinium myrtillus* sub-community, U6 *Juncus squarrosus* – *Festuca ovina* grassland (including the U6c *Vaccinium myrtillus* sub-community), and a non-NVC *Carex nigra* abundant acid grassland (Cn).

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

Many of the grassland species found within the U5 and U6 communities replicate many of the species found within U4 as described above, but with *Nardus stricta* (U5) or *Juncus squarrosus* (U6) obviously the dominant species. The area of U6c also contained scattered *Vaccinium myrtillus*.

U1 was recorded once on sloping ground with bare patches due to rabbit warrens. Species recorded here included *Agrostis capillaris*, *Festuca* spp., *Cynosurus cristatus*, *Nardus stricta*, *Rumex acetosella*, *Campanula rotundifolia*, *Achillea millefolium*, *Lotus corniculatus*, *Galium verum* and *Plantago lanceolata*.

The U2b recorded was most likely derived from severely degraded M20 *Eriophorum vaginatum* blanket mire which has transitioned to a poor acid grassland. The U2b was dominated by *Avenella flexuosa* with a scattering of occasional *Nardus stricta*, *Agrostis* spp., *Juncus squarrosus*, *Galium*

saxatile, *Potentilla erecta*, *Vaccinium myrtillus*, *Calluna vulgaris* and *Eriophorum vaginatum*. Pleurocarpous mosses are common.

5.3.2 B1.2 Semi-Improved Acid Grassland

Areas of semi-improved acid grassland are characterised by the U4b *Holcus lanatus* - *Trifolium repens* sub-community only. Several fields in the east of the site are characterised by U4b where there has been more agricultural improvement over time. U4b is also present in patches in the wider survey area outwith the site.

The areas of U4b are generally intensively grazed with a very short sward and only occasional and more sparse acid indicator species. The sward is mainly comprised of *Holcus lanatus*, *Agrostis* spp., *Festuca* spp., *Cynosurus cristatus* and *Trifolium repens* with the more occasional to rare species including *Anthoxanthum odoratum*, *Juncus effusus*, *Nardus stricta*, *Molinia caerulea*, *Euphrasia officinalis*, *Plantago lanceolata*, *Cirsium* sp., *Campanula rotundifolia*, *Potentilla erecta* and *Galium saxatile*. The moss *Rhytidiadelphus squarrosus* is scattered in patches.

5.3.3 B2.1 Unimproved Neutral Grassland

Unimproved neutral grassland is rare within the site. Some patches were recorded outwith the site in the wider survey area, but all stands are small and widely scattered. These neutral grasslands are characterised by MG1 *Arrhenatherum elatius* grassland, MG9 *Holcus lanatus* – *Deschampsia cespitosa* grassland and a non-NVC more acidic variant of MG9 which has been classified here as MG9x.

MG9x is the only one of these communities within the site. The MG9x is visually similar to MG9 in that it is characteristically dominated by a taller and coarser sward with mixtures of *Holcus lanatus*, *Deschampsia cespitosa* and scattered *Juncus effusus*. The more acidic element of the vegetation is evident through the scattered but constant presence of *Potentilla erecta*, *Galium saxatile* and pleurocarpous mosses. MG9x was usually found in mosaics with other damp grassland communities (e.g., M25b, Ja, JaN, Je).

5.3.4 B2.2 Semi-Improved Neutral Grassland

Semi-improved neutral grassland is present in the form of grazed MG10 *Holcus lanatus* – *Juncus effusus* rush-pasture (all MG10a typical sub-community), and the presence of a non-NVC *Holcus lanatus* dominated neutral grassland (H1).

Much of the semi-improved neutral grassland within the site forms scattered patches in the east, and it appears to be more abundant outwith the site in the wider survey area to the north-west in the damper patches of the more improved fields.

The MG10a is generally characterised by a sward of *Juncus effusus* and *Holcus lanatus* with some scattered *Agrostis* spp., *Poa* sp., *Cirsium palustre*, *Rumex obtusifolius*, *Rumex acetosa*, *Prunella vulgaris* and *Ranunculus repens*. In the areas of H1, *Holcus lanatus* dominates with some *Cynosurus cristatus*, *Agrostis* spp., and *Dactylis glomerata* but in the absence of any acidic indicator that would allow the classification of U4b.

5.3.5 B4 Improved Grassland

Improved grasslands are found in the east of the site and are widespread in the wider area surrounding the site, particularly to the north and west, with many of the enclosed and improved fields used for silage as well as cattle and sheep grazing. These areas are characterised by MG6 *Lolium perenne* – *Cynosurus cristatus* grassland and MG7 *Lolium perenne* leys and related grasslands.

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

5.3.6 B5 Marsh/Marshy Grassland

Marshy grassland is habitat that includes several different sward types in which *Molinia caerulea*, *Juncus* spp. and/or *Carex* spp. can be prominent. This habitat type is common and in places extensive within the site and wider survey area. Marshy grassland is the second most dominant and extensive habitat type within the site and survey area, and accounts for approximately 179.1 ha (21.0%) of the site.

Within the survey area, the M23a, M23b, M25, M25b and M25c NVC communities are included within its limits along with the non-NVC communities Je, Ja and JaN. These communities also commonly form mosaics and transitional areas with each other, in particular the rushy areas, and also with adjoining grassland and mire communities. In the Phase 1 methodology MG10 can fall within either marshy grassland or neutral grassland classifications; here, due to the level of grazing, MG10 is better placed within neutral grassland, as per Section 5.3.4 above.

The rush dominated communities present are mostly the non-NVC types *Juncus effusus* acid grassland (Je), *Juncus acutiflorus* acid grassland (Ja), and *Juncus acutiflorus* neutral grassland (JaN). M23a *Juncus effusus/acutiflorus* – *Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community and M23b *Juncus effusus/acutiflorus* – *Galium palustre* rush-pasture, *Juncus effusus* sub-community make up a minor component of the rush pastures/marshy grasslands present.

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

The areas of M23 are often species poor with *Juncus* spp. being the dominant species, and its regularly grades in and out of JaN, Ja, and Je (see above). Generally, areas of M23 are dominated by mixtures of *Juncus acutiflorus* and/or *Juncus effusus* with patches of a low diversity of grasses such as *Holcus lanatus*, *Anthoxanthum odoratum*, *Poa* sp., and *Agrostis* spp. Within the sward, a variety of other graminoids and herbs are more occasional to rare and include *Juncus articulatus*, *Rumex obtusifolius*, *Molinia caerulea*, *Cirsium palustre*, *Rumex acetosa*, *Epilobium palustre*, *Galium palustre*, *Lotus corniculatus*, *Filipendula ulmaria* and *Angelica sylvestris*. Wefts of mosses are also common in M23 between these species, including *Calliergonella cuspidata*, *Kindbergia praelonga* and *Rhytidiadelphus squarrosus*.

The M25 NVC community was classified as marsh/marshy grassland where it was present at the community level and as the M25b *Anthoxanthum odoratum* sub-community and M25c *Angelica sylvestris* sub-community. These were areas either wholly dominated by *Molinia caerulea* (M25) or where *Molinia caerulea* was accompanied by a mixture of grasses (M25b) or wetland herbs (M25c). M25 and M25 are common within the site, with a small area of M25c only recorded in one area in the wider survey area and outwith the site. M25b was dominated by *Molinia caerulea* in a generally non-tussocky sward on shallow organo-mineral soils, the habitat was relatively dry and grazed. In some places where the *Molinia* was not purely dominant, species included variable abundances of *Potentilla erecta*, *Galium saxatile*, *Anthoxanthum odoratum*, *Avenella flexuosa*, *Festuca* spp. and *Agrostis capillaris*. Within the small area of M25c the *Molinia* was accompanied by scattered herbs including *Filipendula ulmaria* and *Angelica sylvestris*.

5.4 Tall Herb & Fern

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

Areas of bracken (*Pteridium aquilinum*) are present in the site and wider survey area, forming many scattered patches on sloping thin soils along the southern boundary of the site, with the most extensive stands present around Wull Muir and Wesley Cleugh.

The habitat was recorded as the U20 *Pteridium aquilinum* – *Galium saxatile* NVC community and where a sub-community was assigned this was generally the 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).

5.4.2 C3.1 Tall Ruderal

This habitat type within the survey area is very sparse and of low cover and is mostly present outwith the site. It is made up of communities dominated by the following species: *Rubus fruticosus* (W24), *Urtica dioica* and *Cirsium arvense* (OV25), and *Chamerion angustifolium* (OV27).

5.4.3 C3.2 Non-Ruderal

This habitat type is characterised by non-NVC stands of *Dryopteris* spp. (ferns). This vegetation was recorded once in the survey area but outwith the site, located in a gully near Mauldslie Hill.

5.5 Heathland

5.5.1 D1.1 Dry Dwarf Shrub Heath – Acid

Acid dry dwarf shrub heath is very sparse and of low total cover within the site and survey area. The largest, albeit fragmented, patches are outwith the site on the north-western slopes of Mauldslie Hill.

The majority of dry heath present is H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath, with the H12a *Calluna vulgaris* sub-community and grassier H12c *Galium saxatile* - *Festuca ovina* sub-community both present; H12c being more commonplace. In addition to H12, there is some heath classified as a H9-H12 intermediate heath.

H12 has the typical species assemblage of *Calluna vulgaris* with frequent *Vaccinium myrtillus*, with the sward also containing frequent to occasional *Potentilla erecta*, *Galium saxatile*, *Agrostis capillaris*, *Anthoxanthum odoratum*, *Nardus stricta*, *Festuca ovina*, *Avenella flexuosa*, *Blechnum spicant*, *Polystichum* sp., *Empetrum nigrum* and the mosses *Hylocomium splendens*, *Rhytidiadelphus loreus*, *Rhytidiadelphus squarrosus*, *Pleurozium schreberi* and *Hypnum jutlandicum*. The H12c areas tend to contain a higher cover of grasses and are grazed, often grading in and out of acid grasslands.

The H9-H12 intermediate classification was recorded on a couple of occasions, the categorisation arises from the similarity of the vegetation both H9 *Calluna vulgaris* – *Deschampsia flexuosa* heath and H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath but the vegetation does not allow the true classification of either. The canopy resembles that of H9 in being dominated by *C. vulgaris* with no accompanying dwarf shrub species, but the moss carpets are of the H12 type which is more developed and more diverse than in H9.

5.5.2 D2 Wet Dwarf Shrub Heath

Wet heath within the site and survey area is all the M15 *Trichophorum germanicum* – *Erica tetralix* wet heath community. Nearly all wet heath present is of the M15d *Vaccinium myrtillus* sub-community, with only a very small area of the M15b Typical sub-community recorded.

The wet heath in the site is predominantly concentrated in the area surrounding turbine 14. The wet heath present is generally at the drier end of the spectrum, has a very short sward created and maintained by intensive grazing, and is considered to be in a poor and degraded condition. The M15d assemblage here contains a low growing and clipped sward with *Calluna vulgaris*, *Erica tetralix*, *Trichophorum germanicum*, *Vaccinium myrtillus*, *Eriophorum angustifolium*, *Potentilla erecta*, *Galium saxatile*, *Agrostis capillaris*, *Nardus stricta*, *Anthoxanthum odoratum*, *Festuca ovina* and *Juncus squarrosus*. Mosses are predominantly pleurocarpous with *Pleurozium schreberi*, *Rhytidiadelphus* spp. and *Hylocomium splendens* common, *Sphagna* are only occasional in small patches and tend to be *Sphagnum capillifolium* and/or *S. fallax*. The areas of M15b were generally a ranker and co-dominant mixture of *Calluna vulgaris* and *Molinia caerulea* with occasional *Vaccinium myrtillus*.

5.5.3 D5 Dry Heath/Acid Grassland Mosaic

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

5.5.4 D6 Wet Heath/Acid Grassland Mosaic

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

5.6 Mire

5.6.1 E1.6.1 Blanket Bog

Blanket bog is scarce within the survey area and site, with just two main areas mapped during surveys, one outwith the site at Mauldslie Hill and the other within the site around Yorkston Moss (see also Annex A), which then grades into dry modified bog to the north-east (Section 5.6.3; **Figure 8.3**). The blanket bog here has been degraded over time by grazing, and blanket bog is likely to have been more extensive in the past, but a long history of anthropogenic effects has resulted in much of this transitioning to dry modified bog (Section 5.6.3).

The blanket bog present is all M19 *Calluna vulgaris* – *Eriophorum vaginatum* blanket mire which is a drier bog community (c.f. M17 and M18 mires). The M19 community is generally distinctive with the bulk of the vegetation consisting of a mixture of *Calluna vulgaris* and *Eriophorum vaginatum*. Throughout this *Calluna* – *Eriophorum* sward there is generally only an occasional scattering of other species including *Trichophorum germanicum*, *Erica tetralix*, *Vaccinium myrtillus*, *Empetrum nigrum* and more rarely present are *Avenella flexuosa* and *Drosera rotundifolia*. The basal layer contains *Polytrichum* spp., *Pleurozium schreberi*, *Hypnum jutlandicum*, *Cladonia* spp. (lichens) and patches of *Sphagnum capillifolium*. More rarely there are small patches with some *Sphagnum fallax*, *S. papillosum* and *S. medium*.

5.6.2 E1.7 Wet Modified Bog

Wet modified bog is of low total cover within the site and survey area and is represented by the M25a *Molinia caerulea* – *Potentilla erecta* mire *Erica tetralix* sub-community¹².

The M25a areas were identified due to *Molinia* overwhelmingly dominating the sward but with an associated flora containing some mire species. The majority of the subordinate and associate species found within this M25a assemblage were occasional *Calluna vulgaris*, *Vaccinium myrtillus*, *Erica tetralix*, *Trichophorum germanicum*, *Juncus squarrosus*, *Anthoxanthum odoratum*, *Potentilla erecta* and *Avenella flexuosa*. Mosses such as *Hylocomium splendens*, *Pleurozium schreberi*, *Hypnum jutlandicum*, *Rhytidiadelphus squarrosus*, *Polytrichum commune* are the most common but there are occasional patches of *Sphagnum capillifolium*, *S. fallax* and *S. palustre*.

5.6.3 E1.8 Dry Modified Bog

Dry modified bog in the site and survey area encompasses M20 *Eriophorum vaginatum* blanket mire. This habitat type is relatively abundant in certain parts of the site, accounting for approximately 106.6 ha (12.5%) of the site area. The dry modified bog is mainly concentrated on upper watershed plateaus, such as around Torfichen Hill and west of Hunt Law, or on lower flat ground such as around Yorkston Moss.

The M20 here appears to have been derived from historical blanket bog through a long history of grazing and anthropogenic effects that has led to the scarcity or absence of *Calluna vulgaris* and

¹² M25, M25b and M25c have been classified as marshy grassland; see Section 5.3.6.

other sub-shrubs in the sward. This degraded mire has also been affected by poaching from livestock in certain areas. Overall, the dry modified bog within the site is a drying out mire which is heavily grazed, with frequent poaching and patches of bare peat, and is considered to be in a degraded and poor condition. In some areas the M20 is present in mosaics with, and also appearing in transition to, acid grasslands such as U2 and U5.

M20 was recorded at community level and as 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. Other occasional species recorded amongst the dominant *Eriophorum vaginatum* were *Vaccinium myrtillus*, *Avenella flexuosa*, *Agrostis capillaris*, *Anthoxanthum odoratum*. The basal layer in these areas generally lacks any *Sphagna* and is dominated by pleurocarpous and hypnoid mosses.

5.6.4 E2.1 Acid/Neutral Flush/Spring

Acid/neutral flushes appear in a small number of areas across the site and survey area, with the main concentration of these features associated with the areas of mire in the vicinity of Yorkston Moss and along the course of the Latch Burn.

The majority of this habitat in the site is represented by M6c *Carex echinata* – *Sphagnum fallax/denticulatum* mire, *Juncus effusus* sub-community. However, there are also very small extents of the M6a *Carex echinata* sub-community, M6d *Juncus acutiflorus* sub-community and M4 *Carex rostrata* - *Sphagnum fallax* mire present in the survey area.

The M6c and M6d communities are rush mires on wet ground, often following the lines of watercourses, and 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* and *Rumex acetosa*. Occasionally species such as *Ranunculus repens*, *Cirsium palustre* and *Carex* spp. were noted. The small extent of M6a lacks the *Juncus* spp. of M6c and M6d, and instead contains abundant *Carex echinata* over a similar basal layer.

The small patches of M4 were dominated by *Carex rostrata* with a basal layer composed of *Sphagnum fallax*.

5.7 Swamp, Marginal & Inundation Habitats

5.7.1 F1 Swamp

A single very small patch of swamp vegetation was recorded in the survey area but outwith the site, this was a small extent of S9a *Carex rostrata* swamp, *Carex rostrata* sub-community. The sward consisted solely of *Carex rostrata* in very shallow water.

5.8 Open Water

5.8.1 G1 Standing Water & G2 Running Water

There are several very minor watercourses within the site, and Gladhouse Reservoir is located to the west of the site.

5.9 Rock Exposure & Waste

5.9.1 I2.1 Quarry

There is a quarry located just of the B7007 by Broad Law.

5.10 Miscellaneous

5.10.1 J1.1 Cultivated/Disturbed Land – Arable

A single small area of arable was recorded at the edge of the survey area, but distant to the site.

5.10.2 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 hedge. Whilst present within the survey area, none of this feature type is present within the site.

5.10.3 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.

5.10.4 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.

5.11 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.

5.12 Notable Species

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

6 EVALUATION OF BOTANICAL INTEREST

6.1 Overview

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

- SEPA guidance on Groundwater Dependent Terrestrial Ecosystems (GWDTes);
- Habitats Directive (92/43/EEC) Annex I habitats; and
- Scottish Biodiversity List (SBL) priority habitats.

6.2 Groundwater Dependent Terrestrial Ecosystems (GWDTes)

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 GWDTes 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 GWDTes only in certain hydrogeological settings.

Designation as a potential GWDTes does not therefore infer an intrinsic biodiversity value, and GWDTes 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 10: Geology, Hydrology & Hydrogeology** of the EIA Report).

Using SEPA's guidance, **Table 6-1** shows which communities recorded within the survey area may be considered GWDTes. 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 GWDTes in certain hydrogeological settings are highlighted in red.

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

NVC Code	NVC Community Name
W6	<i>Alnus glutinosa</i> – <i>Urtica dioica</i> woodland
M15	<i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath
M25	<i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire
MG9/MG9x	<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 ¹³	<i>Juncus effusus</i> acid grassland
Ja ¹³	<i>Juncus acutiflorus</i> acid grassland
JaN ¹³	<i>Juncus acutiflorus</i> neutral 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
M23	<i>Juncus effusus/acutiflorus</i> – <i>Galium palustre</i> rush pasture

¹³ In light of the SEPA classification on potential GWDTes the non NVC types; Je, Ja and JaN should also qualify for potential GWDTes 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 8.3**.

Within **Figure 8.3** 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; and
- ‘Moderately - sub-dominant’ where potential moderate GWDTE(s) make up a sub-dominant percentage cover of the polygon and no potential high GWDTEs are present.

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

GWDTE sensitivity has been assigned solely on the SEPA listings (SEPA, 2017a & 2017b). However, depending on a number of factors such as geology, superficial geology, presence of peat and topography, many of the potential GWDTE communities recorded may in fact be only partially groundwater fed or not dependant on groundwater. Determining the actual groundwater dependency of particular areas or habitat requires further assessment (see **Chapter 10: Geology, Hydrology & Hydrogeology**).

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 descriptions¹⁴, which have then been compared with survey results and field observations, the following NVC communities within the survey area which constitute Annex I habitat are shown in **Table 6-2**.

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	H12 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath

¹⁴ <https://sac.jncc.gov.uk/habitat/>.

Annex I Habitat	Corresponding NVC Communities & Other Non-NVC Habitats/Features Recorded
	H9-H12 intermediate heath
7130 Blanket bog	M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire
7140 Transition mires and quaking bogs	M4 <i>Carex rostrata</i> - <i>Sphagnum fallax</i> mire

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

6.3.2 7130 Blanket bog

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

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

Annex I type 7130 Blanket bog therefore correlates directly with a number of NVC communities within the study area, such as the M19 mire. However, as noted above, M20 and M25 mire can also fall within the blanket bog Annex I type, usually where the underlying peat depth is greater than 0.5 m and the habitat is wet and contains peat forming species. As described in Sections 5.6.2 and 5.6.3 above, M20 and M25 within the site are in poor condition, degraded, species-poor, at the drier end of the scale and lack abundant peat forming species such as *Sphagnum* mosses. The M20 and M25 within the site is also grazed, in some areas quite intensively, and this has resulted in many areas of M20/M25 appearing transitional to acid grassland communities (U2 – U6) and in intricate mosaics with these same communities. General field observations of M20 and M25 also indicate that this habitat is unlikely to be on deep peat within the site, and the peat depth surveys have shown that much of these mapped areas of wet and dry modified bogs are less than 0.5 m in depth (see **Chapter 10: Geology, Hydrology & Hydrogeology**). Given the character of the M20 and M25 within the site 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 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 of *Erica tetralix*, *Calluna vulgaris*, grasses, sedges and *Sphagnum* bog-mosses. The examples of M15 wet heath were included within the 4010 Northern Atlantic wet heaths category.

6.3.5 4030 European dry heaths

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

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

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

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 website¹⁵), and associated NVC types recorded within the survey area are as follows:

- Wet woodland: W6 and W7;
- Lowland mixed deciduous woodland: W10;
- Blanket bog: M19, M20 and M15¹⁶/M25 where peat depth is greater than 0.5 m;
- Upland flushes, fens and swamps: M4, M6 and M23a; and
- Upland heathland: M15, H12 and H9-H12.

These SBL priority habitats correspond with UK Biodiversity Action Plan (BAP) Priority Habitats¹⁷.

¹⁵ <https://www.nature.scot/scotlands-biodiversity/habitat-definitions>.

¹⁶ Excluding the M15a *Carex panicea* sub-community, due to its general flushed nature over shallower substances.

¹⁷ <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			
M4	-	7140 Transition mires and quaking bogs	Upland flushes, fens and swamps
M6a, M6c, M6d	High	-	Upland flushes, fens and swamps
M15b, M15d	Moderate	4010 Northern Atlantic wet heaths with <i>Erica tetralix</i>	Upland heathland
M19	-	7130 Blanket bogs	Blanket bog
M20, M20b	-	-	Blanket bog
M23a, M23b	High	-	Upland flushes, fens and swamps (applies to M23a only)
M25, M25a, M25b, M25c	Moderate	-	Blanket bogs (where peat depth >0.5 m)
Dry Heaths			
H12a, H12c	-	4030 European dry heaths	Upland heathland
H9-H12	-	4030 European dry heaths	Upland heathland
Calcifugous Grasslands			
U1	-	-	-
U2b	-	-	-
U4, U4a, U4b	-	-	-
U5, U5a	-	-	-
U6, U6c	Moderate	-	-
U20, U20a	-	-	-
Mesotrophic Grasslands			
MG1	-	-	-
MG6	-	-	-
MG7	-	-	-
MG9	Moderate	-	-
MG10a	Moderate	-	-
Woodland & Scrub			
W6	Moderate	-	Wet woodland

NVC/Non-NVC Codes Recorded	Potential GWDTE Status	Annex I Habitat	SBL Priority Habitat Type
W7, W7c	High	-	Wet woodland
W10	-	-	Lowland mixed deciduous woodland
W11	-	-	-
W21	-	-	-
W23	-	-	-
W24	-	-	-
Swamps & Tall-Herb Fens			
S9	-	-	Upland flushes, fens and swamps
Vegetation of Open Habitats			
OV25	-	-	-
OV27	-	-	-
Non-NVC Types			
AR	-	-	-
BD	-	-	-
BG	-	-	-
BP & YBP	-	-	-
CF	-	-	-
CP & YCP	-	-	-
Cn	-	-	-
Daff	-	-	-
HI	-	-	-
Je	Moderate	-	-
Ja	Moderate	-	-
JaN	Moderate	-	-
MG9x	Moderate	-	-
MP	-	-	-
PG	-	-	-
SBT	-	-	-
SCT	-	-	-
SW	-	-	-
QY	-	-	-

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 30 NVC communities were recorded within the respective survey area along with various associated sub-communities; a number of non-NVC habitat types and features are also present (**Table 5-1**). A relatively small number of communities or habitat types account for the majority of the survey area and the site (**Figure 8.3**).

The site area is mainly open habitats, the most common and widespread making up the bulk of the landscape are acid grasslands and marshy grassland. Interwoven throughout these are patches and pockets of several other habitat types.

Although some large relatively homogeneous stands of vegetation occur, many of the communities often form complex mosaics and transitional areas across the survey area.

The survey results have also been compared to a number of sensitivity classifications, indicating the presence of Annex I, SBL and potential GWDTE habitats, as summarised in **Table 6-3**.

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ANNEX A. NVC TARGET NOTES

Target notes were also made during surveys, often to pinpoint springs/flushes, or an area or species of interest, these target notes are shown on **Figure 8.3** and detailed within **Table A-1** below. Target note photographs are provided in **Annex B**.

Table A-1 Survey Area Target Notes

Target Note ID	Grid Ref	NVC Community	Description	Photo Ref
1	NT 32786 54386	M19	Yorkton Moss - moderate quality bog west of fence line (east of fence line is heavily grazed and poor quality). The peatland unit appears to be slightly raised and sits above surrounding area. <i>Calluna vulgaris</i> and <i>Eriophorum vaginatum</i> dominate the flora. Throughout the sward there are generally only occasional to rare scattering of <i>Trichophorum germanicum</i> , <i>Erica tetralix</i> , <i>Vaccinium myrtillus</i> , <i>Empetrum nigrum</i> , <i>Sphagnum capillifolium</i> , <i>Cladonia</i> spp., <i>Pleurozium schreberi</i> , <i>Hypnum</i> sp., and <i>Polytrichum strictum</i> . More rarely there are small patches with <i>Avenella flexuosa</i> , <i>Drosera rotundifolia</i> , <i>Sphagnum fallax</i> , <i>S. papillosum</i> and <i>S. medium</i> .	B-1

ANNEX B. TARGET NOTE PHOTOGRAPHS

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

Figure B-1 Target Note 1 – M19 mire at Yorkston Moss



ANNEX C. GENERAL COMMUNITY PHOTOGRAPHS

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

Photo C-1: Heavily grazed and poor condition M15d wet heath typical of the survey area



Photo C-2: Fenceline showing the effects of grazing on wet heath present



Photo C-3: Very heavily grazed and degraded, poor condition, M25 *Molinia* mire



Photo C-4: M25b



Photo C-5: Degraded and poor condition M20 mire (dry modified bog)



Photo C-6: Heavily grazed M20 mire



Photo C-7: U2 *Avenella flexuosa* grassland



Photo C-8: *Juncus effusus* acid grassland (Je)



Photo C-9: U20 bracken dominated slopes in foreground at Wull Muir



Photo C-10: U5 acid grassland

