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Technical Appendix 8.1: UKHab and NVC Habitat Report

Windburn Wind Farm

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Making Sustainability Happen

Revision Record

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Acronyms and Abbreviations

CIEEM	Chartered Institute of Ecology and Environmental Management
EIA	Environmental Impact Assessment
EUNIS	European Nature Information System
GWDTE	Groundwater Dependent Terrestrial Ecosystem
LBAP	Local Biodiversity Action Plan
MMU	Minimum Mapping Unit
NVC	National Vegetation Classification
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SEPA	Scottish Environmental Protection Agency
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research
UKHab	UK Habitat

1.0 Introduction

1.1 Background

SLR Consulting Limited (SLR) was commissioned by Windburn Wind Farm Ltd (The Applicant) in March 2023 to undertake habitat surveys for the proposed Windburn Wind Farm (the proposed development), centred on OS grid reference NN 87737 02889 (the site), to inform the Environmental Impact Assessment (EIA) for the proposed development. The original site layout initially proposed (and presented at Scoping stage) was for 15 turbines. This was then reduced to 13 turbines. This report provides the results of the baseline vegetation surveys for the site including part of Rhodders Farm Estate which covers the southern half of the site (and is in Clackmannanshire) and part of the Blackford Estate (which is in Perth and Kinross), including the access survey along the Sheriffmuir road to the north. The surveys included UK Habitat Classification (UKHab) and National Vegetation Classification (NVC) surveys, undertaken between July and September 2023.

It should be noted that the site was partially surveyed by SLR in August 2021. Although this data is superseded by the 2023 survey results, the data collected in 2021 has been reviewed and any relevant records included within this report where appropriate.

1.2 Site Description

The site is located in the Ochil Hills approximately 2.9km north of Alva and it is characterised by open habitats such as heathland, bog, and acid grassland, with some woodland within sheltered glens and small plantations. There are several watercourses within the site boundary including the Danny Burn, the River Devon and the Finglen Burn. The Upper and Lower Glendevon reservoirs are present outwith the site boundary to the east.

1.3 Scope of Study

The primary aim of the study was to record, map and describe baseline habitats present within the site and defined survey buffer, in accordance with UKHab and NVC survey protocols^{1,2}. Specific study objectives were to:

- 1) map baseline habitats present on site using UKHab and NVC survey protocols and record data in geospatial mapping software (ESRI ArcGIS); and
- 2) identify and quantify any habitats of nature conservation importance within the site (including Annex 1 habitats³, those listed within the Scottish Biodiversity List⁴, those

¹ UKHab Ltd (2023). UK Habitat Classification Version 2.0 (at https://www.ukhab.org)

² Rodwell, J.S, (2006), *NVC Users' Handbook*, 68 pages, ISBN 978 1 86107 574 1

³ Habitats listed on Annex 1 of the Council Directive EEC of 21 May 1992 on the Conservation of Natural Habitats and Wild Fauna and Flora (the Habitats Directive).

⁴ The Scottish Biodiversity List is a list of animals, plants and habitats that Scottish Ministers consider to be of principle importance for biodiversity conservation in Scotland. Available at https://www.nature.scot/doc/scottish-biodiversity-list.

listed within Local Biodiversity Action Plans^{5,6}, and those with potential to be ground water dependant).

The results of the study provide baseline information on the nature conservation value of habitats identified within the site and areas of potential ground water dependency. This data can in turn be used to inform the infrastructure design stage and the EIA process.

1.4 Survey and Reporting Personnel

Kirstie Hazelwood ACIEEM undertook the vegetation surveys. Kirstie Hazelwood is a Senior Ecologist with seven years' experience in ecology, and she has worked on over 30 upland wind farm sites in Scotland undertaking vegetation, ornithology and protected species surveys.

The report was drafted by Callum Taylor Qualifying member of CIEEM. Callum is a Senior Ecologist with five years' experience in ecology, including report writing, protected species surveys and vegetation surveys.

The report was reviewed by Sara Toule ACIEEM. Sara is a Principal Ecologist with 15 years experience in ecological consulting, she has produced numerous EIA Report chapters relating to terrestrial ecology for onshore wind developments.

⁵ Tayside Local Biodiversity Action Plan, 2nd Edition 2016-2026. Available online at <u>https://www.angus.gov.uk/sites/default/files/Tayside%20Local%20Biodiversity%20Action%20Plan%202016_2026</u> .pdf Accessed April 2024]

⁶ Clackmannanshire Biodiversity Action Plan 2012-2017 [available online at <u>https://www.clacks.gov.uk/document/meeting/227/475/3801.pdf</u>. Accessed April 2024

2.0 Methods

2.1 Field Survey

The field survey was carried out by Senior Ecologist Kirstie Hazelwood between 24 July 2023 and 5 September 2023. The weather during the surveys was mostly clear and dry with good visibility, with some short periods of rain. Methods associated with each aspect of the field survey are described below.

2.1.1 Study Area

The UKHab and NVC surveys were carried out on all land within 200m of the application boundary (the 'Survey Area') (**Figure 8.1.1a**).

2.1.2 UK Habitat Classification Survey

UK Habitat Classification (UKHab) is a comprehensive habitat classification system that is used for rapidly recording and classifying terrestrial, freshwater, and coastal habitats across the UK¹. The system enables habitats to be mapped using a hierarchical 'Primary Habitat' system (capturing ecosystems, broad habitats, priority habitats and Annex 1 habitats) and non-hierarchical Secondary Codes. The system has been designed to build on existing habitat mapping techniques and enable integration with European Union and other UK classification systems, including Phase 1 Habitat Survey, NVC, and European Union Nature Information Systems (EUNIS).

The UKHab survey was carried out in accordance with the method described in the UK Habitat Classification User Manual². During the survey, habitats within the site digitised in geospatial mapping software (ArcGIS). Target notes were recorded to describe any particularly notable features such as flushes, areas with habitat disturbance, or habitats that were too small to map. As required by the UKHab mapping system, the metadata table is provided in **Table 1**, **Annex A**.

2.1.3 National Vegetation Classification Survey

The NVC is a detailed classification system for mapping and recording vegetation communities using plant species presence and abundance. The NVC survey was carried out in accordance with standard methodology and guidelines^{2,7}. During the survey, NVC communities were mapped in the field by applying polygons around visible boundaries of homogenous vegetation. Where readily identifiable, stands were classified and mapped at sub-community level.

Due to variability in vegetation communities within the Survey Area, some polygons represent complex mosaics of two or more NVC communities. Where polygons have been mapped as mosaics, an approximate percentage coverage of each NVC community within the polygon has been provided so that the dominant community could still be ascertained and have been labelled with a '/'. Homogenous habitats that are considered to be in transition between two NVC communities are labelled with a '-'.

Vegetation communities were assessed using both quantitative (quadrats) and qualitative sampling. Where quadrat sampling was used, the following methodology was adopted:

⁷ Rodwell, J.S, (2006), NVC Users' Handbook, 68 pages, ISBN 978 1 86107 574 1

- a minimum one quadrat was taken per habitat across the site, this is lower than the recommended number of quadrats because of the size of the site and number of times habitats are repeated across the site;
- initial sampling of each vegetation type was carried out as recommended in the NVC users' handbook, by sampling stands of vegetation 'judged by eye to be floristically and structurally homogeneous'; and
- where it was difficult to establish the vegetation type, more than one sample was taken to achieve a larger data set.

The size of quadrat used was 2x2m. Within each quadrat, all vascular plants and bryophytes were identified and an estimate of cover value of each made. Results are presented using the DOMIN scale of cover, as shown **Table 2**, **Annex A**.

2.1.4 Ground Water Dependent Terrestrial Ecosystems

Ground Water Dependant Terrestrial Ecosystems (GWTDEs) are wetland habitats that derive their water supply primarily from groundwater as opposed to being rain or surface water fed, often supporting diverse, botanically rich ground-flora communities⁸. Habitat communities within 250m of all proposed infrastructure recorded during the survey were assessed against Scotland and Northern Ireland Forum for Environmental Research (SNIFFER)⁹ and Scottish Environmental Protection Agency (SEPA)¹⁰ guidelines for identifying potential GWDTEs.

2.1.5 Peat Condition Assessment

Peat condition is an indicator of past disturbance to peatlands and the current state of peatlands. A peat condition assessment was carried out on site using Peatland Action guidance¹¹, whereby peatland habitats are assessed as near natural, modified, drained or actively eroding.

2.2 Nomenclature

Botanical nomenclature in this report follows Stace $(2010)^{12}$ for vascular plants and Atherton *et al.* $(2010)^{13}$ for bryophytes. Due to the use of multiple English names for some plant species, only scientific names have been used within the main body of the report for clarity. English names are provided in, **Table 1**, **Annex B**, for reference.

2.3 Limitations

The UKHab Minimum Mapping Unit (MMU) for the field survey was 400m², which may result in small areas of notable habitat (e.g. Priority Habitat) being excluded from UKHab output maps. In order to ensure all areas of notable habitat were effectively captured, point features

⁸ CONFOR (2018). Practice guide for forest managers to assess and protect Groundwater Dependent Terrestrial Ecosystems when preparing woodland creation proposals

⁹ SNIFFER (2009) WFD95: A Functional Wetland Typology for Scotland

¹⁰ SEPA (2017). Land Use Planning System SEPA Guidance Note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems

¹¹ Peatland Action. *Peatland Condition Assessment* [Available Online at]: <u>https://www.nature.scot/doc/peatland-action-how-do-i-assess-condition-my-peatland</u> [Accessed March 2024]

¹² Stace C. (2010) Field Flora of the British Isles. Cambridge University Press

¹³ Atherton I. D. M., *et al.* (2010) *Mosses and Liverworts of Britain and Ireland: A Field Guide*. British Bryological Society

and target notes detailing the location of each habitat, key species, and general condition were recorded during the field survey.

Some of the conifer plantation areas to the north west of the Sherrifmuir road were bounded by fencing which could not be crossed. These habitats were therefore surveyed from the boundaries using binoculars and appropriate assumptions were made.

The above limitations discussed are not seen to have caused a significant impact and the results of this report are considered to be an accurate reflection of the site at the time of survey.

3.0 Results

The results of the UKHab and NVC survey are summarised in **Table 3-1**, and illustrated in **Figures 8.1.1** and **8.1.2** respectively. Target Notes are provided in **Table 2**, **Annex B**, which are designed to be reviewed in conjunction with Figures. NVC quadrat data is presented in **Table 3**, **Annex B**, however due to the large quantity of data recorded in quadrats, a sample of quadrats representing each of the habitats recorded on site has been provided in the report (43 quadrats out of 179 quadrats). Full quadrat data can be provided upon request.

A summary of each habitat recorded is provided below.

Table 3-1 Habitats Recorded at Windburn

Habitat	UKHab Category	Area (ha)	NVC Category	Protection Status	GWDTE Potential
Grassland	g1b6 Other Upland Acid Grassland		U4 <i>Festuca ovina-Agrostis capillaris-Galium</i> saxatile grassland	LBAP	
		640.15	U5 Nardus stricta-Galium saxatile grassland	LBAP	
			U6 Juncus squarrosus-Festuca ovina grassland	LBAP	Moderate
			M23 Juncus effusus/acutiflorus-Galium palustre rush- pasture	LBAP	High
			M25 Molinia caerulea-Potentilla erecta mire	LBAP	
	g1c Bracken	28.66	U20 Pteridium aquilinum-Galium saxatile community		
	g3c Other Neutral Grassland		MG2 Arrhenatherum elatius-Filipendula ulmaria tall-herb grassland	LBAP	
		101.14	OV24 Urtica dioica–Galium aparine community	LBAP	
			OV25 Urtica dioica-Cirsium arvense community	LBAP	
			OV27 Epilobium angustifolium community	LBAP	
	g3c5 Arrhenatherum neutral grassland	9.51	MG1 Arrhenatherum elatius grassland	LBAP	
	g3c6 Lolium-Cynosurus neutral grassland	7.59	MG6 Lolium perenne-Cynosurus cristatus grassland		
	g3c7 Deschampsia neutral grassland	3.76	MG9 Holcus lanatus-Deschampsia cespitosa grassland		Moderate
	g3c8 Holcus-Juncus neutral grassland	22.34	MG10 Holcus lanatus-Juncus effusus rush-pasture		Moderate
	g4 Modified Grassland	28.68	MG6 Lolium perenne-Cynosurus cristatus grassland		
Woodland and Forest	w1g Other Woodland; Broadleaved	1	W10 <i>Quercus robur-Pteridium aquilinum-Rubus fruticosus</i> woodland		
	w1g6 Line of Trees	0.25	NA	LBAP	
	w1h5 Other Woodland; Mixed	0.34	W10 Quercus robur-Pteridium aquilinum-Rubus fruticosus woodland		

Habitat	UKHab Category	Area (ha)	NVC Category	Protection Status	GWDTE Potential
	w2c Other Coniferous Woodland	70.05	NA		
Heathland and Shrub	h1b5 Dry heaths; upland (H4030)	19.76	H12 Calluna vulgaris-Vaccinium myrtillus heath	Annex 1, SBL, LBAP	
	h1b6 Wet heathland with cross-leaved heath; upland (H4010)	1.69	M15 Scirpus cespitosus-Erica tetralix wet heath	Annex 1, SBL, LBAP	Moderate
	h2a Hedgerow (priority habitat)	1.04	NA	SBL, LBAP	
	h3e Gorse Scrub	0.29	W23 Ulex europaeus-Rubus fruticosus scrub		
Wetland	f1a5 Blanket Bog (H7130)	446.65	M2 Sphagnum cuspidatum/recurvum bog pool community	Annex 1, SBL, LBAP	
			M17 <i>Scirpus cespitosus-Eriophorum vaginatum</i> blanket mire	Annex 1, SBL, LBAP	
			M18 <i>Erica tetralix-Sphagnum papillosum</i> raised and blanket mire	Annex 1, SBL, LBAP	
			M19 <i>Calluna vulgaris – Eriophorum vaginatum</i> Blanket Mire	Annex 1, SBL, LBAP	
	f1a6 Degraded Blanket Bog	284.81	M20 Eriophorum vaginatum blanket and raised mire	SBL, LBAP	
			M19 <i>Calluna vulgaris – Eriophorum vaginatum</i> Blanket Mire	SBL, LBAP	
	f2 Fen, marsh and swamp	2.72	M23 Juncus effusus/acutiflorus-Galium palustre rush- pasture	SBL	High

Habitat	UKHab Category	Area (ha)	NVC Category	Protection Status	GWDTE Potential
	f2c Upland Flushes, Fens and Swamps	5.06	M6 Carex echinata-Sphagnum recurvum/auriculatum mire	SBL	High
			M32 Philonotis fontana-Saxifraga stellaris spring	SBL	High
			Flush, not classified in NVC	SBL	High
	f2c8 Transition mires and quaking bogs, upland (H7140)	0.12	M4 Carex rostrata-Sphagnum recurvum mire	Annex 1, SBL	
			M9 Carex rostrata-Calliergon cuspidatum/giganteum mire	Annex 1, SBL	High
Sparsely Vegetated Land	s1a Inland rock outcrop and scree habitats	Too small to map	U16 <i>Luzula sylvatica-Vaccinium myrtillus</i> tall-herb community	LBAP	High
Cropland	c1c7 Other Cereal Crops	34.88	NA		
	c1d Non-Creal Crops	3.21	NA		
Rivers and	r1 Standing open water and canals	N/A	NA		
Lakes	r2a Rivers (priority habitat)	N/A	NA	LBAP	

3.1 Grassland

3.1.1 Other Upland Acid Grassland (UKHab g1b6)

Acid grassland communities were found across the site. These habitats are species-poor and mostly found in the upland parts of the site over areas with pressure from grazing which has displaced blanket bog or heath species.

Acid grassland communities were also frequently found in mosaics, with discrete patches of distinct swards. Acid grasslands were found in mosaic with other acid grassland communities and with damper M23, M25, MG9, and MG10 communities. Acid grassland was also found in mosaic or in transition with blanket bog (see Section 3.4.1).

U4 Festuca ovina-Agrostis capillaris-Galium saxatile grassland

This community was found to be the most common grassland on site. There is a mix of U4 sub-communities found across site, determined by the varying species assemblage but all are considered relevant to the UKHab classification g1b6.

U4a typical sub-community (**Photo 1**) comprised of species poor acid grassland with dominance of the moss *Polytrichum commune* and pleurocarpous mosses, often in hummocks with few graminoids, includnig *Anthoxanthum odoratum*, *Agrostis capillaris*, *Festuca rubra*, *Nardus stricta* and occasionally the sedge *Carex nigra* in damper areas.

The more nutrient rich U4b *Holcus lanatus-Trifolium repens* sub-community was commonly found in mosaic with damper rush communities in small areas across the northern part of the site. The habitat was mostly dominated by *Holcus lanatus* with a mix of acid and neutral grassland species such as *Potentilla erecta, Galium saxatile, Ranunculus repens* and *Cirsium* species. Additionally, the sub-community was found in small areas of grassland dominated by the woodland grass species *Holcus mollis* with species poor acid understory in small patches on the steeply sloping sides of gullies in the upland area, it is likely these areas are the remains of previously existing woodlands.

The U4c *Lathyrus montanus-Stachys betonica* sub-community was recorded in a ride in young conifer plantation in a small patch. The habitat represents an unusual mix of acid grassland species such as *Galium saxatile* with more calcareous herbs such as *Galium verum* and *Viola riviniana*.

Areas of U4d *Luzula multiflora-Rhytidiadelphus loreus* sub-community comprise *Carex nigra* dominated grasslands, with a mix of other acid and neutral herbs present and are more wet than other U4 sub-communities. These areas may be derived from wet heath or blanket bog but lack *Sphagnum* and other damp mosses and have frequent hummocks of drier hypnoid mosses.

The U4e Vaccinium myrtillus-Deschampsia flexuosa¹⁴ sub-community sub-communities (**Photo 2**) were species-poor acid grasslands, dominated by *Polytrichum commune* hummocks with *Avenella flexuosa* and scattered dwarf shrubs. The grassland is likely degraded from heath with heath species such as *Calluna vulgaris* and *Vaccinium myrtillus* still present.

¹⁴ Now called Avenella flexuosa



Photo 1: U4a upland acid grassland amongst peat haggs



Photo 2: U4e upland acid grassland with Vaccinium myrtillus

U5 Nardus stricta-Galium saxatile grassland

Species poor U5 grasslands were found dominated by *Nardus stricta*, often with much *Juncus squarrosus*, with numerous other acid grassland species in the sward, including *Agrostis capillaris, Avenella flexuosa, Festuca ovina* and *Galium saxatile* above pleurocarpous mosses. *Nardus stricta* dominated grasslands are often representative of a degraded dry heath where grazing has removed the more palatable dwarf shrub species and the less palatable *Nardus stricta* is left to dominate. The frequent *Vaccinium myrtillus* and *Calluna vulgaris*, and occasional *Carex binervis* and *Blechnum spicant* scattered through the sward indicate the heathland origins of the habitat. These habitats most closely represented the U5b *Agrostis canina-Polytrichum commune* sub community, however some areas had high cover of *Juncus squarrosus*, indicating that they are halfway between a the drier U5b and the damp U6d (**Photo 3**).



Photo 3: U5b upland acid grassland with much of both *Nardus stricta* and *Juncus squarrosus* indicating a community halfway between U5b and U6d

U6 Juncus squarrosus-Festuca ovina grassland

The damp U6 grassland dominated by *Juncus squarrosus* was found dominant in small areas in the grassy upland area in the south of the site. The habitat represents areas that have been grazed and are likely derived from wet heath or blanket bog communities originally. The habitat was found in mosaic with U5 acid grassland, where *Juncus squarrosus* often continued to play a dominant role in the sward alongside the U5 dominant *Nardus stricta*. The habitat was also found in mosaic with M20 blanket bog communities and in some cases part of a blanket bog transition community (see Section 3.4.1). Three subcommunities were recorded on site; the damp U6a *Sphagnum* spp. sub-community, the heathy U6c *Vaccinium myrtillus* sub-community and the grassier U6d *Agrostis capillaris-Luzula multiflora* sub-community.

M23 Juncus effusus/acutiflorus-Galium palustre rush-pasture

This community was found in damper patches throughout the site on peaty soils adjacent to watercourses or forming in flushes within the acid grassland and blanket bog communities (**Photo 4**). Communities on site were either the M23a *Juncus acutiflorus* sub-community or the M23b *Juncus effusus* sub-community, with acid species on the ground layer beneath the rushes such as *Galium saxatile, Agrostis capillaris* and pleurocarpous mosses. Excluding the areas from the more neutral MG10 communities but not quite meeting the herb rich requirements of M23, these areas have been assigned as M23 on this site. Signs of grazing were prevalent in these areas to the north of the site, with grasses present throughout the communities.

In some areas, particularly along the steep banks next to burns, M23 communities were in mosaic with acid grassland communities, with mixed patches of Juncus effusus and drier grass dominated patches. There were areas where the *Carex rostrata* dominated M4 or M9 present in patches throughout the M23 community.

Occasional small patches in the north of the site have been classified under UKHab category f2b purple moor-grass and rush pasture, where the herb community was richer with species such as *Viola palustre, Achillea ptarmica, Cirsium* and *Epilobium* species under the rush layer.

M25 Molinia caerulea-Potentilla erecta mire

The M25b Anthoxanthum odoratum sub-community (**Photo 5**) were found to be species poor, classified as acid grassland rather than the more species rich f2b UKHab community. The areas were dominated by *Molinia caerulea* with few other species, usually including frequent *Potentilla erecta, Avenella flexuosa* and hypnoid mosses. The community was found in some small patches on the lower ground to the north of the site and in larger patches in the north-eastern part of the upland area. It was found in dominant patches or in mosaic with acid grassland U4, U5 and M23 communities and with M20 degraded blanket bog, where *Molinia caerulea* had begun to encroach on the blanket bog.



Photo 4: Patch of M23b rush habitat running down damp line surrounded by blanket bog



Photo 5: M25b *Molinia caerulea* dominated habitat

3.1.2 Bracken (UKHab g1c)

U20 Pteridium aquilinum-Galium saxatile community

Areas of *Pteridium aquilinum* in the U20a *Anthoxanthum odoratum* sub-community dominated habitats were found frequently in the forest rides (**Photo 6**) and in dominant stands on the edge of fields and roadside verges towards the northern and eastern areas of the site. These communities were bracken dominated over a species-poor grassy ground layer, with species such as *Festuca rubra*, *Holcus lanatus* and *Agrostis capillaris*. The heathery U20b *Vaccinium myrtillus-Dicranum scoparium* sub-community was found in one of the steep gullies in the upland part of the site with heathy species such as *Vaccinium myrtillus* present throughout the understory.



Photo 6: U20 Bracken dominated habitat

3.1.3 Neutral Grassland (UKHab g3c, g3c5, g3c6, g3c7 and g3c8)

Neutral grassland was recorded primarily on the lower ground to the north of the site along the public road in fields designated for livestock grazing or hay, and where tall grass and herb communities dominate the roadside and along field margins. Damper neutral grassland communities (MG9 and MG10) were found in the upland areas. The upland community U4b was also recorded under UKHab category g3c.

Some neutral grassland was found in a felled forestry area, with a mix of *Arrhenatherum elatius*, *Juncus effusus and Ulex europaeus*. Throughout the sward there was also scattered *Rubus fruticosus*, *Cirsium arvense*, *Urtica dioica* and *Holcus mollis*. Due to the managed nature of the habitat no NVC community was deemed suitable.

MG1 Arrhenatherum elatius grassland

Communities of g3c5 grassland (MG1a *Festuca rubra* sub-community) were identified as *Arrhenatherum eliatus* dominated grasslands mostly located along road verges (**Photo 7**) and field margins with much *Rubus idaeus*, scattered fern species and *Ulex europaeus*. Some enclosed fields were classified as MG1 with small herbs such as *Veronica chamaedrys* and *Lotus corniculatus* and injurious weeds such as *Cirsium arvense* and *Rumex obtusifolius* frequent throughout in some areas.

MG2 Arrhenatherum elatius-Filipendula ulmaria tall-herb grassland

A small patch of MG2 was recorded on the north side of the A9 running between a hedge and a road. The area comprised co-dominance of *Arrhenatherum eliatus* and the damper *Filipendula ulmaria*.

MG6 Lolium perenne-Cynosurus cristatus grassland

Neutral g3c6 grasslands classified as MG6a typical sub-community and MG6b *Anthoxanthum odoratum* sub-community were recorded largely to the Northern area of site in enclosed fields used for livestock grazing. Most MG6 grasslands recorded were a poor fit for MG6 with dominant *Holcus lanatus* and frequent *Festuca rubra* and *Agrostis capillaris,* rather than the usual *Lolium perenne*, and may be considered to be somewhere between

U4b and MG6. Herbs such as *Veronica chamaedrys* and *Stellaria graminea* were frequent in the sward, leaning more towards a neutral grassland rather than the more acidic U4b.

This grassland can be found is mosaics of MG25b, U20a and OV25 communities.

The grassland MG6 community was also found to be in a transitional community with the more diverse MG5 community with many legume herbs such as *Vicea* species and *Lotus* species but lacking the diversity and species composition required for MG5. This area was likely to be managed with palatable grasses for grazing or for hay.

MG9 Holcus lanatus-Deschampsia cespitosa grassland

Areas were found dominated by *Deschampsia cespitosa* and *Holcus lanatus* with acid grassland species such as *Galium saxatile* mixed with neutral grassland species such as *Trifolium repens* and *Ranunculus repens* (**Photo 8**). These were often flushed areas on sloping ground, blending into the rushy MG10 or M23. Additionally, a single small area was found along a woodland ride, dominated by *Deschampsia cespitosa* with frequent *Cirsium arvense* and low growing herbs. The community is most representative of UKHab g3c7 and most areas fitted into the *Poa trivialis* sub-community MG9a, though a couple of areas in the lower areas to the north of the site fitted into the *Arrhenatherum elatius* sub-community MG9b.

MG10 Holcus lanatus-Juncus effusus rush-pasture

This community was found in damp grassy areas dominated by *Juncus effusus* and *Holcus lanatus*, sometimes with *Juncus acutiflorus or Deschampsia cespitosa* frequent in the sward. Damp herb species such as *Equisetum spp.*, *Ranunculus acris* and *Trifolium repens* were frequently recorded. These communities were recorded as g3c8 (UKHab) and MG10a NVC typical sub-community.



Photo 7: MG1a along roadside verge

Photo 8: MG9 area on sloping ground

OV24 Urtica dioica-Galium aparine community

Areas of tall roadside grassland were recorded which were dominated by tall herbs and with frequent *Ulex europeaus* scrub and broadleaved trees such as *Sorbus aucuparia, Sallix spp.* and *Fraxinus excelsior. Urtica dioica, Epilobium angustifolium, Achillea millefolium, Galium aparine, Filipendula ulmaria, Rubus idaeus, Angelica sylvestris, Cirsium arvense* and fern species were frequent in the sward. Both OV24a typical sub-community and OV24b *Arrhenatherum elatius-Rubus fruticosus* agg sub-community were found (**Photo 9**).

OV25 Urtica dioica-Cirsium arvense community

The OV25a *Holcus lanatus-Poa annua* sub-community was found in one area to the north of the site in mosaic with OV24 and MG6 communities. This area consisted of a mixed grassland with tall herbs around a small walled/fenced sheep fold.

OV27 Epilobium angustifolium community

A few small areas of OV27c *Rubus fruticosus agg. Dryopteris dilatata* sub-community were found in north of the site by the public road in strips along the verge dominated by *Epilobium angustifolium*¹⁵ with little else in the sward except occasional *Rubus fruticosus*.

3.1.4 Modified Grassland (UKHab g4)

MG6 Lolium perenne–Cynosurus cristatus grassland

Several areas of modified grassland (MG6a typical sub-community and MG6b *Anthoxanthum odoratum* sub-community) were recorded in the northern area of Site (**Photo 10**). This consisted of enclosed sheep grazed pasture dominated by *Lolium perenne* and *Trifolium repens* with scattered *Cirsium arvense* and *Cirsium vulgare*.



Photo 9: OV24b along roadside

Photo 10: MG6a grazed pasture

3.2 Woodland and Forest

3.2.1 Other woodland; broadleaved and other woodland; mixed (UKHab w1g and w1h)

W10 Quercus robur-Pteridium aquilinum-Rubus fruticosus woodland

Mixed woodlands were recorded alongside the northern roads. The patches to the south of the A9 were deciduous (UKHab w1g) with *Fagus sylvatica, Crataedgus monogyna* dominant and *Betula pendula, Acer pseudoplatanus* and *Salix spp.* also present (**Photo 11**). The patches to the north of the A9 also had coniferous tree mixed in (UKHab w1h5) in addition to the above species. The average canopy height extends to approximately 6m. The ground layer is sparse with *Holcus mollis* and scattered *Rubus idaeus* and *Rubus fruticosus*.

¹⁵ Previously called *Chamaenerion angustifolium*

3.2.2 Line of trees (UKHab w1g6)

Lines of trees were recorded in two strips to the north of site, alongside roadside verges of the A9. The trees were mature, up to 8m tall and comprised of mainly *Fagus sylvatica, Fraxinus excelsior* and *Acer pseudoplatanus*.

3.2.3 Other Coniferous Woodland (UKHab w2c)

There were three areas of coniferous plantation recorded on site. Two of which were young plantation with trees of up to 5m and 8m tall consisting primarily of *Pinus contorta* and *Picea sitchensis* (**Photo 12**). The third was a mature plantation up to 12m of mixed conifers.

All coniferous woodland on site was of non-native plantation origin and therefore not relevant to any NVC classifications.



Photo 11: Broadleaved woodland patch by public road

Photo 12: Young coniferous woodland plantation by public road

3.3 Heathland and Shrub

3.3.1 Dry heath, Upland (UKHab h1b5)

H12 Calluna vulgaris-Vaccinium myrtillus heath

Communities of H12a *Calluna vulgaris* sub-community were found by the public road (**Photo 13**) and in forest rides to the north and in one small stand in a steep gully in the upland part of the site. These areas comprise the dominant *Calluna vulgaris* with both *Vaccinium myrtillus* and *Erica cinerea* mixed in, with occasional graminoids. The grassier H12c *Galium saxatile-Festuca ovina* sub-community was more prevalent and was found in homogenous stands along roadsides in the north of the site. The community comprised the dominant *Calluna vulgaris* with graminoid dominant patches scattered throughout. Often this community was found in mosaic with U4 or U5 acid grassland communities, showing the gradation from dry heath to grassland. One area of H12c was planted with young *Sorbus aucuparia* and *Betula pendula*.



Photo 13: H12a Dwarf Shrub Heath by public road

3.3.2 Wet Heath, Upland (UKHab h1b6)

M15 Trichophorum cespitosum-Erica tetralix wet heath

Some areas of M15b typical sub-community wet heath were found to the north of the Sherrifmuir road, in open patches adjacent to the young forestry. The area was dominated by *Molinia caerulea* with *Erica tetralix* and *Vaccinium myrtillus* scattered throughout. Scattered bog species such as *Eriophorum vaginatum* and *Narthecium ossifragum* are present but the cover is not sufficient to classify as bog habitat.

3.3.3 Hedgerow (priority habitat) (UKHab h2a)

A single hedgerow was found to the north of Site, adjacent to the A9 road. *Crataegus monogyna* was present (up to 3m high, 3-4m wide) with occasional gaps along the base of the hedge (**Photo 14**). The hedgerow had no signs of recent management. The hedgerow divided the small public road from modified grassland grass.

3.3.4 Gorse Scrub (UKHab h3e)

A single stand of *Ulex europaeus* scrub was identified on site (W23a *Ulex europaeus-Rubus fruticosus* scrub, *Anthoxanthum odoratum* sub-community). The scrub canopy was dominated by *Ulex europaeus* and with occasional *Cytisus scoparius*, the ground layer comprised *Juncus effusus*, *Urtica dioica*, *Deschampsia cespitosa* and *Rubus fruticosus*.



Photo 14: Hawthorn Hedgerow

3.4 Wetland

3.4.1 Blanket Bog (UKHab f1a5 and f1a6)

Under this category blanket bogs are characterised by the presence of a peat deposit greater than 50cm deep, supporting *Sphagnum* and other peat forming species, with all but the steepest slopes are permanently waterlogged. Blanket bogs are rain fed – ombotrophic – and broadly convex, meaning that the surface flow lines diverge down slope from the crown of the bog unit. This describes most of the bog habitats within the site in general terms. The NVC categories detailed below describe the bog habitats in more detail.

The blanket bog areas fall under the UKHab f1a5 blanket bog (equivalent to Annex 1 Habitat H7130), where peat forming species are still dominant or abundant, notably *Sphagnum papillosium, Sphagnum capillifolium* and *Eriophorum vaginatum*. Bog that has degraded through erosion and grazing impacts falls under the UKHab f1a6 degraded blanket bog and are not considered Annex 1 habitats.

Blanket bog and degraded blanket bog was often found in mosaic with acid grassland communities, particularly in heavily hagged areas, where acid grassland species were found on the bottom of hagged areas, where the peat has eroded away in the lower parts of haggs. Areas where U4 communities are in mosaic with M20 communities represent areas that derived from blanket bog but have dried to grassland, with *Eriophorum vaginatum* still present and dominant in small patches, but acid grassland graminoids dominating most of the area and little or no *Sphagnum* remaining.

Transitional communities of M20a to U4 and U6 communities exist with leftover bog comprised of scattered *Eriophorum vaginatum* with little or no *Sphagnum* showing transition to acid grassland communities through the dominance of *Carex nigra* and scattered rushes and grasses. Peat depth can be over 50cm in places.

M2 Sphagnum cuspidatum/recurvum bog pool community

The *Sphagnum cuspidatum* dominated bog pools were located as small target notes in a few locations in the southern, upland part of the site. The areas comprised an open carpet of *Sphagnum cuspidatum* with scattered individual plants of *Eriophorum angustifolium* and sometime *E.vaginatum*.

M17 Trichophorum cespitosum – Eriophorum vaginatum Blanket Mire

A small extent of M17c Juncus squarrosus-Rhytidiadelphus loreus sub-community was present in the south of the site, dominated by *Trichophorum germanicum* with *Sphagnum capillifolium* and *Sphagnum papillosum*, *Calluna vulgaris*, *Eriophorum vaginatum* and *Narthecium ossifragum* are dotted throughout the community.

Some of the M17 is a mosaic of M17c and M20b sub-communities. These areas are heavily hagged peat where the water table sits at the lower part of the haggs sometimes with nothing but *Sphagnum* species and *Eriophorum angustifolium*, or with co-dominance of *Eriophorum vaginatum* and *Sphagnum* species. On the top of peat haggs above the water table are dominated by *Trichophorum germanicum* with very little Sphagnum but *Eriophorium vaginatum* scattered throughout the sward.

M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire and M19 *Calluna vulgaris* – *Eriophorum vaginatum* Blanket Mire

M19b *Empetrum nigrum* ssp. *nigrum* sub-community was the most common blanket bog habitat on site, found across the open upland area on site. The community was found with a co-dominance of *Calluna vulgaris and Eriophorum vaginatum* and *Sphagnum* frequent in the ground layer, primarily *Sphagnum capillifolium*, with species such as *Empetrum nigrum*, *Erica tetralix* and *Rubus chamaemorus*.

There were areas of transitional M18a (*Sphagnum magellanicum-Andromeda polifolia* subcommunity) to M19b, co-dominated by *Eriophorum vaginatum* and *Calluna vulgaris*, with a mixed *Sphagnum* carpet including *Sphagnum papillosum* and *Sphagnum magellanicum* indicative of M18, with species such as *Rubus chamaemorus* indicative of M19, with *Empetrum nigrum*, *Vaccinium myrtillus*, *Vaccinium vitis-idaea*, *Erica tetralix* and *Narthecium ossifragum* forming the diverse blanket bog community (**Photo 15**). These areas show transitional habitat between a Sphagnum rich M18 with *S.magellanicum* and a heathery M19 with *R.chamaemorus*.

Much of the M19b blanket bog, particularly in the southern half of the site on the Rhodders Farm Estate (in Clackmannanshire), showed signs of heavy erosion with deep haggs, with much bare peat exposed, though the vegetation communities were diverse with blanket bog plants throughout, and the bulky peat-forming *Sphagnums* such as *Sphagnum papillosum* and occasionally *Sphagnum magellanicum* mixed with the smaller *Sphagnum* species.

Usually the drier *Calluna vulgaris/Eriophorum vaginatum* dominated patches on top of the haggs above the water table and the lower parts of the haggs dominated by *Sphagnum* (usually *Sphagnum fallax*) with *Eriophorum* species or *Carex nigra* (M6 or M20) in the flatter parts of the site. In the drier parts of the site on the sloping ground, the lower parts of the haggs were grassier, where the M19 communities were recorded in mosaic with acid grassland communities (**Photo 16**). These areas had sparser *Sphagnum* cover and frequent hummocks of *Polytrichum commune* amongst the grassy patches, and were usually associated with f1a6 degraded blanket bog UKHab community. Occasionally rush-dominated patches (M23) ran through the lower parts of the haggs where small waterways of flushes areas appeared.

In the northern half of the site (within Perth and Kinross), hagging was older and much of the vertical hagg surfaces were revegetated, with the *Eriophorum vaginatum* dominated M20 communities in the lower parts of the haggs and M19b still dominating the higher areas. In some areas the M19 or M19 mosaic communities fall under the degraded blanket bog UKHab category (f1a6), where *Sphagnums* are scarce or absent and grasses are frequent in the sward, but peat depth remained deeper then 50cm.





Photo 15: M18a-M19b transition blanket bog with Sphagnum magellanicum and Rubus chamaemorus



M20 Eriophorum vaginatum Blanket and Raised Mire

The degraded blanket bog in the northern half of the site was on the higher ground, fitting into the M20a species poor sub-community or M20b *Calluna vulgaris-Cladonia spp.* sub-community. The areas are overwhelmingly dominated by *Eriophorum vaginatum* on peat deeper than 50cm, with *Sphagnum* either scarce or absent. The areas usually graded to, or were in mosaic with, drier grassland communities U4, U5 or U6, and sometimes with scattered rush-dominated patches (M23) often with hummocks of hypnoid mosses or *Polytrichum commune* scattered throughout showing continued drying effects. It is likely this degradation is caused by grazing in these areas.

In a few areas drainage is evident, with areas of M20b blanket mire dominated by *Eriophorium vaginatum* with frequent *Molinia caerulea* in sward, often in mosaic with the *Molinia caerulea* dominated M25 community. *Sphagnums* are frequent in ground layer but patchy, usually consisting of the smaller *Sphagnum capillifolium* and *Sphagnum fallax*. The drainage in these areas allow too much water flow for blanket bog species and allow *Molinia* caerulea to dominate.

3.4.2 Upland Flushes, Fens and Swamps (f2c)

M6 Carex echinata-Sphagnum recurvum/auriculatum mire

M6 communities were found across the site mostly in small patches along waterways, forming damp flushes or forming part of an eroded blanket bog community. The M6b *Carex nigra-Nardus stricta* sub-community was found across the site in small patches, with *Carex nigra* dominant alongside *Carex echinata* and *Carex panicea*, and grasses scattered frequently through sward amongst herb species including *Epilobium palustre*, *Galium palustre*, *Ranunculus acris*, *Cardamine pratensis* and *viola* species. The ground layer was usually dominated by *Sphagnum fallax*, though other *Sphagnums* were occasionally recorded.

The M6c *Juncus effusus* sub-community and M6d *Juncus acutiflorus* subcommunity were most commonly recorded, with *Juncus effusus* or *Juncus acutiflorus* dominant over a constant *Sphagnum fallax* ground layer. These areas were often found along watercourses, often in mosaic with the similar but non-*Sphagnum* based M23, or the *Carex* rostrata dominated M4.

There was a single patch dominated by *Juncus subnodulus*. These habitats were classified as M6a sub-community, but it should be noted that it is a poor fit for any NVC community.

M32 Philonotis fontana-Saxifraga stellaris spring

The M32b communities were frequent throughout the sloped acid grassland areas on site, these areas denote springs where water wells up from the ground (**Photo 17**). The M32 springs on site are variable in plant composition and most do not neatly fit into this NVC community, though they most resemble the *Montia fontana – Chrysoplenium oppositofolium* sub-community (M32b), with *Saxifraga stellaris* scarce or absent and *Montia fontana* often dominating alongside the bryophytes, and in some cases bryophytes have very low cover. Damp habitat loving herbs such as *Epilobium palustre* and *Ranunculus flammula*, with the rush *Juncus bulbosus* are frequently seen in these communities.

Flushes

Some areas in the site show clear flushing without a close fit to any NVC communities. These areas form patches within the taller acid grassland of low, damp, mesotrophic herbs such as *Stellaria alsine*, *Leontodon sp.* and *Cirsium sp.*, with grasses, *Juncus* and *Carex* species (**Photo 18**). While these patches do not fit into any NVC community, the distinctive change in vegetative community and the shape of the habitat indicating a water run-off indicates that there is the possibility of a ground water supply changing the PH of the soil, and water flowing out of the patches.





Photo 17: M32b spring dominated by *Monita fontana*

Photo 18: Flush with mesotrophic herbs

3.4.3 Transition mires and quaking bogs, upland (H7140) (UKHab f2c8)

M4 Carex rostrata-Sphagnum recurvum mire

Two small patched of M4 were recorded in the south east of the site, with *Carex rostrata* over a carpet of *Sphagnum fallax* and few other species. The areas were located in the damp ground along waterways maintained by slow moving water, mixed with the rushy M6c in one area. The areas do not represent potential GWDTE.

M9 Carex rostrata-Calliergon cuspidatum/giganteum mire

A few small, damp areas of M9 were recorded in the south-east part of the site, with the dominant *Carex rostrata* mixed with herbs such as *Rumex acetosa*, *Galium palustre*,

Cardamine pratensis and *Epilobium palustre*. These areas indicate a higher soil PH than their surrounding blanket bog and are considered potential GWDTE. On this site, the areas usually mark slow moving water at the head of small watercourses, often mixed in with M23b areas.

3.5 Sparsely Vegetated Land

3.5.1 Inland rock outcrop and scree habitats (UKHab s1a)

U16 Luzula sylvatica-Vaccinium myrtillus tall-herb community

Several small areas of the U16 tall herb community or similar were recorded as target notes on the steep rocky slopes in the gulleys in the upland part of the site. These areas are inaccessible to livestock and generally damp from the nearby waterway that formed the steep gully. These areas mostly comprised species *Luzula sylvatica, Avenella flexuosa* and *Vaccinium myrtillus*, however some were drier and grassier with less *Luzula sylvatica*.

3.6 Cropland

3.6.1 Other Cereal Crops (UKHab c1c7) and Non-cereal Crop (UKHab c1d)

Arable land was present to the north of the site adjacent to the public roads, mostly containing managed cereal crops, with one field of non-cereal vegetable crop to the north of the A9. These fields were separated by narrow hedges of fences with strips of long grassland vegetation.

3.7 Rivers and Lakes (UKHab r1 and r2a)

There are several small rivers transecting the site, the River Devon, a small burn with steep gullies and two tributaries, starts within the site boundary and runs south west to north east towards Glendevon reservoir. The reservoir lies to the east of the proposed site, outside the site boundary. Alva Burn and East Cameron Burn start within the site boundary and run east to west down the steep slopes in the west of the site. Danny Burn and Burn of Ogilvie start in the north west of the site and run to the north east, eventually joining the Allan Water to the north east of the Site. UKHab codes are not marked on the map but rivers are represented by marked waterways on the maps.

A ditch runs alongside the Sherrifmuir road in the north-east of the site, separating the small public road from a mortared wall and fence, surrounded by tall herb or scrub vegetation. The ditch was dry at the time of survey, with no indication that it regularly contains water.

3.8 Peat Condition Assessment

Under the peatland condition survey guidance published by Peatland Action, the majority of the blanket bog and degraded blanket bog on site was classified as 'modified' (**Figure 8.1.3**). Much of the southern half of the site (the area within Clackmannanshire) had good vegetation cover, with bulky peat-forming *Sphagnums* and a diversity of blanket bog species, however the area is deeply hagged throughout, with clear signs of erosion and damage from herbivores and exposed bare peat frequent on the hagg 'cliffs'. The area has been classified as modified rather than actively eroding due to the continuous presence of vegetation in the bottom of the haggs, though the continuous network of peat haggs indicate that active erosion is taking place.

Much of the northern half of the site (the area within Perth and Kinross) has also been classified as modified, though it is characteristically different to the blanket bog further south. The blanket bog and degraded blanket bog in the northern half of the site has less hagging

and exposed bare peat, and any existing haggs are mostly revegetated. The vegetation however is less diverse, and most areas have little or no *Sphagnum* and evidence of degradation through grazing and trampling.

A small area in the east of the site is classified as drained as it is cut through with artificial drains, transforming the habitat to a more *Molinia caerulea* dominated habitat with little or no *Sphagnum* species.

4.0 Evaluation of Botanical Interest

The habitats recorded during the field survey can be compared with several classification systems to assess their nature conservation interest and potential groundwater dependency. These classifications include:

- Annex I habitats listed under Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the Habitats Directive);
- priority habitats detailed within the Scottish Biodiversity List⁴ (SBL);
- priority habitats listed within the Tayside Local Biodiversity Action Plan⁵ and the Clackmannanshire Biodiversity Action Plan⁶; and
- Potentially groundwater dependant terrestrial ecosystems (GWDTEs) as defined by the Scottish Environmental Protection Agency¹⁰.

4.1 Annex I Habitats

Annex I habitats are natural habitat types whose conservation requires the designation of Special Areas of Conservation (SAC) and are generally regarded as being of European importance.

Several habitats identified during the survey were found to correspond to Annex 1 habitats. These are illustrated in **Figure 8.1.1**, and summarised below:

- European dry heaths (H4030);
- North Atlantic wet heaths with *Erica tetralix* (H4010);
- blanket bogs (H7130); and
- transition mires and quaking bogs (H7140).

4.2 Scottish Biodiversity List Habitats

The SBL is a list of animals, plants and habitats which the Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. The purpose of the list is to identify species and habitats which are the highest priority for conservation in Scotland, of which are termed 'priority habitats'.

Habitats identified that correspond with SBL priority habitats are presented in can be summarised as follows:

- hedgerows;
- upland heathland;
- blanket bog; and
- upland flushes, fens and swamps.

4.3 Local Biodiversity Action Plan Habitats

4.3.1 Tayside Local Biodiversity Action Plan

The Tayside Local Biodiversity Action Plan (LBAP)⁵, covering Perth and Kinross and therefore relevant to the northern half of the site, was established through drawing members from local government, statutory agencies, and non-governmental organisations to provide a

wide-ranging knowledge base and connected approach in tackling threats to, and promoting conservation of, local biodiversity.

Following a review of information available within the Tayside LBAP, habitat communities that correspond with local priority habitats include:

- species rich verges;
- hedgerows and treelines;
- upland heath;
- blanket bog; and
- rivers and burns.

4.3.2 Clackmannanshire Biodiversity Action Plan

The Clackmannanshire Local Biodiversity Action Plan (LBAP)⁶ was established through drawing members from local government, statutory agencies, and non-governmental organisations to provide a wide-ranging knowledge base and connected approach in tackling threats to, and promoting conservation of, local biodiversity.

Following a review of information available within the Clackmannanshire LBAP, habitat communities that correspond with local priority habitats include:

- upland grassland and heathland
- hedgerows;
- blanket bog;
- inland rock outcrop and scree habitat; and
- rivers and streams.

4.4 Groundwater Dependant Terrestrial Ecosystems

The potential groundwater dependency of each NVC community as recommended by SEPA guidance¹⁰ identified during the field survey is summarised below. Target notes in **Table 2**, **Annex B** details areas where potential GWDTE was noted, these are shown on **Figure 8.1.1** and **Figure 8.1.2**.

Moderate potential GDWTE:

- U6 acid grassland;
- M15 wet heath; and
- MG9 and MG10 neutral grassland communities.

High potential GWDTE:

- M6, M9 and M23 and M32 bog/flush and fen communities
- other flush communities not specified with NVC categories in target notes; and
- U16 tall herb community.

Where these habitats covered large areas and were assessed as having likely origins other than groundwater in the field, these habitats were not considered as potential GWDTE, for example moderate GWDTE potential habitats covering large areas within the landscape (see **Table 2**, **Annex B**).

It must be stressed that NVC survey is only able to identify communities that are potentially groundwater dependant and in practice some of the areas noted as 'potential GWDTE' within **Table 2**, **Annex B** may not represent GWDTEs. Current SEPA guidance recommends that NVC communities should however be treated as GWDTE unless information can be provided to demonstrate that they are not groundwater dependant. If it is not possible to avoid areas of potential GWDTE and the relevant buffer zones within infrastructure design, it is recommended that a hydrogeologist provides further advice on whether or not the relevant NVC communities are in fact groundwater dependent and conducts any further assessment that may be required.

GWDTE is considered further within **Chapter 10: Hydrology**, **Hydrogeology and Geology** of the EIA Report.

4.5 Notable Species

No notable plant species were identified during the field survey.

5.0 Summary

The site comprised largely upland blanket bog and acid grassland in the upland part of the site. Throughout this area numerous smaller pockets of neutral grassland, heath, flush and fen habitats listed as Annex 1, SBL and LBAP habitats are present, but with significantly lower cover. At the north of the site either side of the Sheriffmuir road, the habitat is a mix of neutral and modified grassland grazing pasture, croplands and commercial conifer plantation, with some patches of the protected upland heath and the more species rich neutral grassland and tall herb communities on roadside verges and along field margins. Waterways in good condition drain the site in multiple directions, offering habitat for protected species (see Technical Appendix 8.2: Protected Mammals Survey and Technical Appendix 8.3: Fish Habitat Survey).

Blanket bog is protected under Annex 1, SBL and Local Biodiversity Action Plans for Perthshire and Clackmannanshire. The habitat is formed from peat >50cm deep and is known to be an important carbon store and a habitat with unique biodiversity within the UK. Much of the blanket bog is degraded on site, through erosion caused by livestock grazing. The southern half of the site has potential for active restoration, where deep haggs with exposed bare peat are present. The northern half of the site has fewer opportunities for restoration, though it is likely that a reduction in grazing activities will allow the degraded blanket bog areas to recover. See **Technical Appendix 8.4: Outline HMP**.

The upland acid grassland that was recorded in the majority of the non-blanket bog areas in the upland part of the site have been created by long-term grazing of livestock. It is likely acid grassland habitats were once mixed with upland wet and dry heath habitats, as well as a greater extent of blanket bog that has now been lost. Removal or reduction in livestock may offer the opportunity for this habitat to recover to heathland, particularly where grassland habitats are found in mosaic with blanket bog or heath, where the *Calluna vulgaris* seed bank is present. Care should be taken with upland heath recovery to prevent bracken from invading and dominating, as bracken is present on some of the steeper slopes on site.

The waterways on site have been assessed in detail in **Technical Appendix 8.3: Fish Habitat Survey**. The riparian corridors currently offer little or no shade for aquatic species, and some areas are dominated by bracken or show remnants of woodland plant species from when these areas were previously wooded. The creation of riparian woodland along many of the waterways in the steep upland gullies will improve habitat for aquatic and terrestrial riparian species.

Upland flushes and fens and rush pastures are listed on SBL and LBAPs. These are generally small areas but can be species rich and can be potential GWDTEs. These areas should be avoided by infrastructure where possible and further protection and improvement can be provided for species rich flushes by excluding livestock grazing.

Hedgerows, treelines and species rich verges are listed on SBL and LBAPs, and represent species diversity, habitat and commuting corridors for wildlife in the lower part of the site to the north.



Figures

Technical Appendix 8.1: UKHab and NVC Habitat Report

Windburn Wind Farm

Windburn Wind Farm Limited

SLR Project No.: 428.V12959.00001

2 June 2025





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