atmos CONSULTING

Environmental Impact Assessment Report

Swarclett Wind Farm

Technical Appendix 6-1: Habitat Surveys

Swarclett Wind Energy Limited

wind2

June 2024

Contents

1 Introduction 1
1.1 Terms of Reference 1
1.2 Site Location and Description 1
1.3 Proposed Development 1
1.4 Objectives 1
2 Methodology 3
2.1 Desk Study 3
2.2 Extended Phase 1 Habitat Survey 3
2.3 NVC Survey 3
2.3.1 Groundwater Dependent Terrestrial Ecosystems 4
2.4 Limitations 4
3 Results 5
3.1 Desk Study 5
3.1.1 Designated Sites 5
3.1.2 Aerial Photography 6
3.2 Extended Phase 1 Habitat Survey 6
3.2.1 Overview 6
3.2.2 Habitat Descriptions 6
3.3 NVC Survey 7
3.3.1 Overview 7
3.3.2 Community Descriptions 8
4 Evaluation 12
5 References 13
Annex A: Botanical Species List 15

Contents

Tables

Table 6-1-1:	Designated Sites	5
Table 6-1-2:	Habitat Evaluation Including GWDTE dependency (according to SEPA, 2017)	12
Table 6-1-3:	Botanical Species List	15

Figures

Figure 6-1-1: Environmental Designations

Figure 6-1-2: Phase 1 Habitat Survey Results

Figure 6-1-3: NVC Survey Results

Document Prepared For

Hannah Brown
Wind 2 Limited

Document Prepared By

Connor McKinnie
Ecological Consultant
connor.mckinnie@atmosconsulting.com

James Wilson
Principal Ecologist
james.wilson@atmosconsulting.com

Document Approved By

Greg Fullarton
Regional Director
greg.fullarton@atmosconsulting.com

Version	Date	Reason
1.1	November 2023	Original Issue
1.2	December 2023	Client comments addressed by Atmos

1 Introduction

1.1 Terms of Reference

In September 2019, Atmos Consulting Ltd. (Atmos) was commissioned by Swarclett Wind Energy Limited to undertake habitat (Phase 1 habitat and National Vegetation Classification (NVC)) surveys in relation to a proposed wind farm development and battery storage on land approximately 10km southeast of Thurso, Highland (hereafter referred to as the "Site").

This report describes the method followed and habitats / NVC communities identified. The conservation status and potential groundwater dependency of the habitats present on Site are also provided.

1.2 Site Location and Description

The Proposed Development lies approximately 10km to the southeast of Thurso, Caithness, Highland, centred on National Grid Reference (NGR) ND 20915 62900 (Figure 1-1-1 (EIA Report Volume 4a)).

The site itself is a mix of semi-improved agricultural fields, felled / windblown forestry plantation, and an area of mire or fen in the valley bottom. Loch Scarmclate is situated 2.3km to the southwest.

1.3 Proposed Development

The Proposed Development will consist of two three-bladed horizontal axis wind turbines, each up to 149.9m above ground level (agl) maximum blade tip height and a rotor diameter of 133m. The final choice of turbine will be subject to a selection process which considers technical and commercial aspects of the turbines and would be based on the turbine models which are commercially available at the time of construction.

Associated infrastructure includes hard standing areas for erecting cranes at each turbine location, on-site access tracks and turning heads, an on-site substation compound with battery storage, and a temporary construction compound. The Proposed Development has been designed to have an operational life of 30 years.

1.4 Objectives

The objective of the study was to undertake a survey to document the Phase 1 habitat and NVC communities present within the Site and appropriate buffers in order to evaluate their potential nature conservation interest and to assess the potential for Groundwater Dependent Terrestrial Ecosystems (GWDTEs) to be present.

This report provides details of the following:

- field survey methods;
- field survey results;
- description of the plant communities present within the site boundaries;
- initial peatland habitat condition assessment; and

- discussion of potential Ground Water Dependent Terrestrial Ecosystems (GWDTEs).

2 Methodology

2.1 Desk Study

A desk study was undertaken in order to establish baseline information for the site. Various data sources were utilised including the website of the statutory agency, NatureScot via the 'Site Link Portal', and aerial photography for the site.

Through completion of a desk study identified statutory designations such as Special Areas of Conservation (SACs), Ramsar wetlands, Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs) within 10km of the site. In addition, Local Nature Reserves (LNRs) and relevant non-statutory designations within a 5km radius of the site were searched for.

2.2 Extended Phase 1 Habitat Survey

An extended Phase 1 habitat survey was undertaken on the 14th September 2020, and updated on the 25th July 2023 to account for a change to the design of the Proposed Development. Extended Phase 1 habitat survey is a standardised method of recording habitat types and characteristic vegetation, as set out in the *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit* (JNCC, 2010). The habitat survey area covered the site and a buffer zone of 250m to identify any potential GWDTEs in accordance with Scottish Environment Protection Agency (SEPA) guidance. Species nomenclature follows standard guidance (Stace, 2010; Atherton *et al.*, 2010).

Habitats were mapped and field notes describing the composition and structure of the sward taken in order to describe characteristic habitats, features of ecological interest, or any features which require ecologically sensitive design or mitigation.

The survey method was 'extended' through the additional recording of specific features indicating the presence, or likely presence, of protected species or other species of nature conservation significance and any habitats which would be suitable for them. Overall, the main deliverables of the survey include to:

- describe and map the habitats within the survey area;
- record evidence of protected species and other ecologically significant features; and
- assess the potential of the habitats as suitable for protected species.

Any incidental observations of bird species and any other notable species during completion of the surveys were also recorded for inclusion in Chapter 7: Ornithology .

2.3 NVC Survey

NVC field survey work was undertaken on the 15th, 16th and 18th September 2020, and on the 25th July 2023 to inform the Site design.

The vegetation was surveyed by suitably qualified and experienced botanical surveyors using the NVC (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.

Homogenous stands and mosaics of vegetation were identified and mapped by eye, drawn as polygons on field maps; these polygons were surveyed qualitatively to record dominant and constant species, sub-dominant species and other species present. In practice, the vegetation was mapped progressively across the site to ensure that no areas were missed and that mapping was accurate. An aerial photograph of the site was also used to aid accurate mapping of vegetation boundaries. 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 where possible.

2.3.1 Groundwater Dependent Terrestrial Ecosystems

As part of the NVC exercise, any wetland habitats identified with the survey buffers stated earlier were evaluated in terms of their potential to be GWDTE, making reference to SEPA guidance (SEPA, 2017), modified from the United Kingdom Technical Advisory Group (UKTAG) list of NVC communities and associated groundwater dependency scores.

GWDTE are defined by the UKTAG (2003) as:

> *"A terrestrial ecosystem of importance at Member State level that is directly dependent on the water level in or flow of water from a groundwater body (that is, in or from the saturated zone). Such an ecosystem may also be dependent on the concentrations of substances (and potential pollutants) within that groundwater body, but there must be a direct hydraulic connection with the groundwater body."*

A detailed study of vegetation communities allows the potential level of groundwater dependency to be determined.

Determination of complete groundwater dependency is complicated by the ability of many vegetation communities to use whatever source of water is available. In some topographical and hydrogeological conditions, a particular community can be groundwater-dependent whereas in others the same community is surface water-dependent. Seasonal patterns of water use provide an additional level of complexity, with groundwater reliance typically being greater in the summer when rainfall and surface water are less available.

2.4 Limitations

All surveys were undertaken in suitable weather conditions (i.e. good visibility and no snow cover). While surveys were undertaken relatively late in the season, boundaries between vegetation community types were clearly identifiable and no significant limitations in terms of survey timing or weather conditions were identified.

Although every effort was made to identify all plants, habitats, mammal signs and any ecologically sensitive features, the results of the surveys should not be considered exhaustive.

3 Results

3.1 Desk Study

3.1.1 Designated Sites

Statutory Designations

There are eleven sites designated for ecological interest within 10km of the Site as shown in Table 6-1-1 below and Figure 6-1-1.

Table 6-1-1: Designated Sites

Designated Site	Distance from Proposed Development Site Boundary	Designated Features
SACs		
Loch Watten	c. 4.12km south of the Proposed Development Site	Naturally nutrient-rich lakes or lochs which are often dominated by pondweed
Caithness and Sutherland Peatlands	c. 8.00km east of Proposed Development Site	Blanket bogs Depressions on peat substrates Otter *Lutra lutra* Acid peat-stained lakes and ponds Wet heathland with cross-leaved heath *Erica tetralix* Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels Marsh saxifrage *Saxifraga hirculus* Transition mires and quaking bogs
Ramsars		
Caithness and Sutherland Peatlands	c. 8.00km east of Proposed Development Site	Blanket bog (Ramsar criterion 1) Rare species of wetland plants and animals (Ramsar criterion 2) Breeding population of dunlin *Calidris alpina schinzii* (Ramsar criterion 6)
SSSIs		
Loch of Durran	c. 1.04km northwest of Proposed Development Site	Transition grassland Vascular plant assemblage
Loch Scarmclate	c. 2.50km southwest of Proposed Development Site	Base-rich loch Greylag goose *Anser anser*, non-breeding
Loch Watten	c. 4.12km south of Proposed Development Site	Base-rich loch Open water transition fen Greylag goose, non-breeding
Dunnet Links	c. 4.48km north of Proposed Development Site	Coastal geomorphology of Scotland Sand dune vegetation
Loch Heilen	c. 6.00km northeast of Proposed Development Site	Mesotrophic loch Greenland white-fronted goose *Anser albifrons flavirostris*, non-breeding Greylag goose, non-breeding Whooper swan *Cygnus cygnus*, non-

Designated Site	Distance from Proposed Development Site Boundary	Designated Features
		breedin
River Thurso	c. 7.90km northwest of Proposed Development Site	Flood-plain fen Vascular plant assemblage
Stroupster Peatlands	c. 8.00km east of Proposed Development Site	Blanket bog Oligotrophic loch
Shielton Peatlands	c. 9.3km southeast of Proposed Development Site	Blanket bog Breeding bird assemblage

3.1.2 Aerial Photography

Review of aerial photography shows that the majority of land within the survey area comprises agricultural fields and an area of clear fell forestry.

3.2 Extended Phase 1 Habitat Survey

The findings of the extended Phase 1 habitat survey are presented on Figure 6-1-2. A botanical species list is included in Table 6-1-3 listed within Annex A.

3.2.1 Overview

Most of the Site is dominated by grassland pastures including improved (B4), semi-improved neutral (B2.2) and marshy grasslands (B5). The west of the Site is predominantly made up of improved grassland on which cattle and sheep grazing takes place. Fields of arable cultivated land (J1.1) divide up these pastures towards the western and northern site survey area boundaries.

Immediately adjacent to the south of the Site lies an old clear fell and wind blown forestry block that has been succeeded by semi-improved neutral grassland. Within the old forestry lies some patches of mixed woodland.

In the east and northeast of the Site there are small areas of wet dwarf shrub heath (D2), transitioning into dry modified blanket bog (E1.8) immediately adjacent and beyond the Site boundary to the northeast.

3.2.2 Habitat Descriptions

Dense / Continuous Scrub (A2.1)

Field boundaries in the north of the survey area, immediately adjacent and beyond the Site boundary, support a narrow but dense strip of gorse *Ulex europaeus* scrub.

Improved Grassland (B4)

Improved grassland is widespread across the survey area. The western, central and northern areas all feature this grassland type where grazing by domestic livestock takes place. The habitat is species-poor pasture containing predominantly perennial rye grass *Lolium perenne* and white clover *Trifolium repens*.

Semi-Improved Neutral Grassland (B2.2)

Where grazing is less prevalent the grasslands have been able to flourish and consequently exhibit a greater species diversity. Small fields of these grasslands mostly occur in the south and east of the Site. Species include Yorkshire-fog *Holcus lanatus*, tufted hair grass *Deschampsia cespitosa* and crested dog's-tail *Cynosurus cristatus*.

Marshy Grassland (B5)

Marshy grassland is widespread in the southeast of the survey area, with small patches occurring in the north in mosaic with wet dwarf shrub heath. Many areas are dominated by rush species, particularly soft-rush *Juncus effusus* and compact rush *Juncus conglomeratus*, as well as other species including marsh thistle *Cirsium palustre*.

Wet Dwarf Shrub Heath (D2)

There is a small area of wet dwarf shrub heath in the east of the survey area, adjacent to the Site. Common heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix* and deergrass *Trichophorum germanicum* is common here and the ground layer consists of mosses including red-stemmed feather-moss *Pleurozium schreberi* and small quantities of *Sphagnum* species.

This habitat type is also present in mosaic with marshy grassland in the northeast of the Site.

Dry Modified Bog (E1.8)

The wet dwarf shrub heath grades into small areas of dry modified blanket bog to the far northeast of the survey area, and immediately adjacent and outwith the Site boundary. Common cottongrass *Eriophorum angustifolium* and deergrass are common and the ground layer consist of various *Sphagnum* species typical of a bog habitat including lustrous bog-moss *Sphagnum subnitens* and papillose bog-moss *Sphagnum papillosum*.

3.3 NVC Survey

The findings of the NVC survey are presented on Figure 6-1-3.

3.3.1 Overview

Vegetation within most of the survey area comprises various types of grasslands and crops which are utilised for agricultural use including domestic livestock grazing and production of barley *Hordeum vulgare*. MG7a *Lolium perenne – Trifolium repens* leys cover most of the survey area along with barley fields to the west and on slopes to the northeast of the survey area.

Other fields that are less intensively managed contain MG9 *Holcus lanatus - Deschampsia cespitosa* and MG6 *Lolium perenne - Cynosurus cristatus* grasslands. The MG9 communities found include the MG9a *Poa trivialis* sub-community located towards the southeast corner of the survey area. The MG6 community consists of the MG6a typical sub-community *Deschampsia cespitosa* variant, covering an area beyond the Site boundary to the east and a smaller area in the centre of the south of the survey area.

In the southeast of the survey area there is a small patch of M15d *Trichophorum germanicum – Erica tetralix* wet heath, *Vaccinium myrtillus* sub-community. This grades into an area of M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire in the northeast of the survey area.

In the north of the survey area, the proposed access track runs immediately adjacent to an area of M23 *Juncus effusus / acutiflorus – Galium palustre* rush-pasture. In the south of the Site, the access track passes through a field supporting a mosaic of the two sub-communities of M23.

3.3.2 Community Descriptions

M15 *Trichophorum germanicum – Erica tetralix* wet heath

Sub-community recorded: M15d

This wet heath community is associated with thinner or better drained areas of ombrogenous peat in the wetter western and northern parts of Britain. Land management practises have a significant effect on the structure and composition of this community. Although it is common in the west and southwest of Scotland, draining and peat-cutting have extended its coverage to formerly deeper and wetter peats (Elkington *et al.,* 2002). Species dominance and associated flora can vary widely however purple moor-grass *Molinia caerulea,* deergrass, cross-leaved heath and heather are all of high frequency and it is mixtures of these species that give the vegetation its general character (Elkington *et al.*, 2002).

M15 is restricted to a small pocket in the southeast of the survey area and occurs in the margins of M17, occurring in the form **M15d *Vaccinium myrtillus* sub-community** which tends to be distributed in drier regions of the country. Common heather cover is widespread with cross-leaved heath also present. *Sphagnum* species are almost totally absent and have been replaced by an extensive carpet of red-stemmed feather-moss *Pleurozium schreberi* which helps point towards a drier habitat.

Typical of this community type, deergrass and cross-leaved heath are present and uneven in distribution. There are infrequent tussocks of wavy hair-grass *Deschampsia flexuosa* and heath rush *Juncus squarrosus* along with scatterings of purple moor-grass and red fescue *Festuca rubra*. Bilberry *Vaccinium myrtillus* is absent and may have been replaced by the other ericoids present in the community.

M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire

This community is typically found on blanket bogs occurring extensively on permanently waterlogged, deep peat in the more oceanic parts of Britain where the climate is mild and wet. It is usually on acidic peat at lower altitudes, where in Scotland this includes the southwest, western highlands and Western Isles (Elkington *et al.*, 2002) and is typically found on level ground or gentle slopes (Averis *et al.*, 2004). Modification of the vegetation through land management practises such as peat-cutting, burning and drainage often results in surface drying of the peat (Elkington *et al.*, 2002).

These communities typically comprise a mixture of grasses including common cottongrass, hare's-tail cottongrass *Eriophorum vaginatum*, deergrass and purple moor-grass. Common heather and cross-leaved heath clumps are also present and tormentil *Potentilla erecta* is a constant which helps to distinguish this community from other *Sphagnetalia* mires (Elkington *et al.*, 2002). The ground layer is made up of various

Sphagnum species which form a rich carpet underneath the vascular plants (Averis *et al.*, 2004) of which red bog-moss *Sphagnum capillifolium* and papillose bog-moss are constants and may be accompanied by other *Sphagnum* species (Elkington *et al.*, 2002).

M17 is present alongside M15 in the northeast of the survey area. Common heather is the dominant ericoid followed by cross-leaved heath, and both are widespread within the community. Beneath the heath lies a bold orange grassland composed of deergrass and bog asphodel *Narthecium ossifragum*, with scatterings of red fescue and purple moor-grass. Lustrous bog-moss is the most frequent and widespread *Sphagnum* species and is found alongside the infrequent red bog-moss and occasional flat-topped bog-moss *Sphagnum fallax* and soft bog-moss *Sphagnum tenellum*. Tormentil and *Cladonia* species such as reindeer lichen *Cladonia portentosa* are present but infrequent. The community lies on relatively level ground with no hummock and hollow features present. The *Sphagnum* moss layer is noticeably wet and boggy but with no bog pools present.

M23 *Juncus effusus / acutiflorus – Galium palustre* rush-pasture

This rush-pasture occurs over a variety of moist, moderately acid to neutral, peaty and mineral soils in the cool and rainy lowlands of western Britain including Skye and Caithness. It is usually found on gently-sloping ground around the margins of soligenous flushes, as a zone around topogenous mires and wet heaths, and is especially widespread in ill-drained, comparatively unimproved or reverted pasture (Elkington *et al.*, 2002). Grazing helps to maintain this community and prevent it from succeeding to woodland.

The bounds of this community are considered difficult to define due to the diversity of associated species. It is characterised by the abundance of soft-rush or sharp-flowered rush *Juncus acutiflorus* or both. Rushes often have a high cover, with soft-rush and sharp-flowered rush having an easterly and westerly distribution respectively. Yorkshire-fog is the most frequent grass and the ground layer typically consists of mesophytic herbs common in moist agricultural grassland including common marsh-bedstraw *Galium palustre* and marsh thistle (Elkington *et al.*, 2002).

Areas of M23 were recorded on the southern edge of the survey area, running adjacent to the clear-fell woodland. Both soft-rush and sharp-flowered rush were present, with the former being the more abundant species. Compact rush was also present in significant quantity. Yorkshire-fog and perennial rye-grass are the most frequent grasses here but other species were present including red fescue and tufted hair-grass. Notable herbs present include marsh thistle and common marsh-bedstraw.

MG6 *Lolium perenne – Cynosurus cristatus* grassland

Sub-community recorded: MG6a

In lowland Britain, the *Lolium – Cynosurus* grassland is a major permanent pasture type on moist but freely draining or moderately impeded circumneutral, mesotrophic brown soils. Enclosed stands form the bulk of agricultural pasture in the country and it is also found widespread on roadside verges and lawns (Rodwell *et al.*, 1992; Cooper, 1997). This grassland community is usually characterised by a short, tight sward which is grass dominated by species including perennial rye-grass and varying levels of crested dog's-tail (Rodwell *et al.*, 1992; Cooper, 1997).

MG6 covers an area beyond the Site boundary to the east with a smaller area in the centre of the south of the survey area. Domestic livestock are present, resulting in a heavily grazed environment. The variable **MG6a typical sub-community** is closely aligned to the MG6 communities recorded within the survey area, and this is indicated by the presence of white clover and occasional meadow buttercup *Ranunculus acris*. The infrequent presence of tufted hair-grass suggests this community maybe of the *Deschampsia cespitosa* variant.

MG7 *Lolium perenne* leys and related grasslands

Sub-community recorded: MG7a

This is a species poor grassland community that is found throughout much of lowland Britain. These are grasslands that are usually sown specifically for agriculture or recreational use and are usually derived from *Lolium - Cynosurus* grassland (MG6) by improvement from frequent addition of fertiliser, heavy grazing, trampling or natural enrichment (Rodwell *et al.*, 1992; Cooper, 1997).

The stands of this community type present within the survey area most closely align with the **MG7a *Lolium perenne* – *Trifolium* repens leys sub-community** which indicate that these areas of pasture are very species poor and likely highly fertilised to maximise production of vegetation for hay and / or silage. This community type was the most common and widespread across the survey area and reflects the agricultural nature of the site in general.

MG9 *Holcus lanatus – Deschampsia cespitosa* grassland

Sub-community recorded: MG9a

The MG9 grassland community is highly characteristic of permanently moist, gleyed and periodically inundated circumneutral soils across large areas of the British lowlands. It often occurs in pastures and meadows which are level to moderately sloping in topography. It is also often associated with roadside verges, forest rides and clearings and fen / wetland margins. The community usually contains a coarse and tussocky sward dominated by Yorkshire-fog and tufted hair-grass (Rodwell *et al.*, 1992; Cooper, 1997).

MG9 was recorded towards the southeast corner of the survey area where the sward most closely aligns with the **MG9a *Poa trivialis* sub-community** which is defined as more of an ungrazed open sward on moister soils. Here, it is indicated by the presence of white clover and meadow buttercup, set amongst a grassy sward dominated by Yorkshire-fog and tufted hair-grass (Rodwell *et al.*, 1992; Cooper, 1997).

W23 *Ulex europaeus – Rubus fruticosus* scrub

The W23 scrub occurs on acid, freely draining soils on gentle to very steep, rocky slopes at low altitudes. Its highest localities are at about 300 – 350m on south-facing slopes as far apart as the eastern Highlands and southwest England. The vegetation is mainly secondary, developing after woodland clearance or on abandoned pasture. Progression to woodland may be held in check by reintroduction of stock or by burning. The natural habitats of W23 scrub are likely to be steep, rocky slopes on thin soils that cannot support a continuous canopy of tall trees, unstable habitats such as riverside shingle banks, and temporarily disturbed ground after fires in woodland and heath.

W23 was recorded immediately adjacent to the Site boundary to the north. Here, the community is dominated by gorse. The understorey layer is relatively sparse, with a species-poor flora of bramble *Rubus fruticosus*, Yorkshire-fog, false oat-grass *Arrhenatherum elatius*, tufted hair-grass, and soft-rush at the periphery.

4 Evaluation

Table 6-1-2 evaluates each of the NVC communities recorded in the survey area in terms of nature conservation interest and potential groundwater dependence with respect to SEPA (2017).

Table 6-1-2: Habitat Evaluation Including GWDTE dependency (according to SEPA, 2017)

NVC Community	Potential Groundwater Dependence	Nature Conservation Status
M15 *Trichophorum germanicum – Erica tetralix* wet heath	Moderate (depending on the hydrogeological setting)	Northern Atlantic wet heaths with *Erica tetralix* (Annex 1) Alpine and Boreal heaths (Annex 1) Blanket bogs (Annex 1) Blanket bog (SBL) Upland heathland (SBL) Upland flushes, fens and swamps (SBL)
M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire	None	Blanket bogs (Annex 1) Depressions on peat substrates of the *Rhynchosporion* (Annex 1) Blanket bog (SBL) Upland heathland (SBL)
M23 *Juncus effusus / acutiflorus – Galium palustre* rush-pasture	High	Lowland meadows (SBL) Purple moor-grass and rush-pastures (SBL)
MG6 *Lolium perenne – Cynosurus cristatus* grassland	None	Lowland meadows (SBL)
MG7 *Lolium perenne* leys and related grasslands	None	Lowland meadows (SBL)
MG9 *Holcus lanatus – Deschampsia cespitosa* grassland	Moderate (depending on the hydrogeological setting)	Lowland meadows (SBL)
W23 *Ulex europaeus – Rubus fruticosus* scrub	None	None
Semi-Natural Mixed Woodland (A1.3.1)	None	None
Barley	None	None

Definitions:

Annex 1 - Annex 1 of the European Union Habitats Directive (92/43/EEC)

SBL - Scottish Biodiversity List

5 References

Atherton, I., Bosanquet, S. & Lawley, M. (2010). *Mosses and Liverworts of Britain and Ireland: a field guide*. British Bryological Society.

Averis B (2013). *Plants and Habitats: An introduction to common plants and their habitats in Britain and Ireland*. Ben Averis.

JNCC (2005) Caithness and Sutherland Peatlands Ramsar Information Sheet https://rsis.ramsar.org/RISapp/files/RISrep/GB971RIS.pdf?language=en accessed August 2023.

JNCC (2010). *Handbook for Phase 1 habitat survey - a technique for environmental audit*, Revised reprint. Joint Nature Conservation Committee, Peterborough.

NatureScot (2022). Shielton Peatlands SSSI Citation and Site Management Statement https://sitelink.nature.scot/site/1426 accessed August 2023.

Rodwell JS (Ed.) (1991 *et seq.*). *British Plant Communities*. 5 volumes: Vol. 1 (1991) - *Woodlands and Scrub*; Vol. 2 (1991) - *Mires and Heaths*; Vol. 3 (1992) - *Grasslands and Montane Communities*; Vol. 4 (1995) - *Aquatic Communities, Swamps and Tall-herb Fens*; Vol. 5 (2000) – *Maritime Communities and Vegetation of Open Habitats*. Cambridge University Press, Cambridge.

Scottish Natural Heritage (2005a). Loch Watten SAC Qualifying Interests https://sitelink.nature.scot/site/8308 accessed August 2023.

Scottish Natural Heritage (2005b). Caithness and Sutherland Peatlands SAC Qualifying Interests https://sitelink.nature.scot/site/8218 accessed August 2023.

Scottish Natural Heritage (2009). Stroupster Peatlands SSSI Citation and Site Management Statement https://sitelink.nature.scot/site/1503 accessed August 2023.

Scottish Natural Heritage (2010a). Loch of Durran SSSI Citation and Site Management Statement https://sitelink.nature.scot/site/1029 accessed August 2023.

Scottish Natural Heritage (2010b). Loch Watten SSSI Citation and Site Management Statement https://sitelink.nature.scot/site/1068 accessed August 2023.

Scottish Natural Heritage (2010c). Loch Heilen SSSI Citation and Site Management Statement https://sitelink.nature.scot/site/989 accessed August 2023.

Scottish Natural Heritage (2010d). River Thurso SSSI Citation and Site Management Statement https://sitelink.nature.scot/site/1365 accessed August 2023.

Scottish Natural Heritage (2011a). Loch Scarmclate SSSI Citation and Site Management Statement https://sitelink.nature.scot/site/1049 accessed August 2023.

Scottish Natural Heritage (2011b). Dunnet Links SSSI Citation and Site Management Statement https://sitelink.nature.scot/site/572 accessed August 2023.

SEPA (2017). *Land Use Planning System SEPA Guidance Note 31: Version 3*. Available online at https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf (accessed September 2023).

SNIFFER (2009). *A Functional Wetland Typology for Scotland*.

Stace, C. (2010). *New Flora of the British Isles*, 3rd Edition. Cambridge University Press, Cambridge.

Annex A: Botanical Species List

Table 6-1-3: Botanical Species List

English Name	Latin Name
Trees	
Grey willow	*Salix cinerea*
Lodgepole pine	*Pinus contorta*
Shrubs	
Cross-leaved heath	*Erica tetralix*
Heather	*Calluna vulgaris*
Ferns	
Narrow buckler-fern	*Dryopteris carthusiana*
Horsetails	
Marsh horsetail	*Equisetum palustre*
Herbs	
Autumn hawkbit	*Leontodon autumnalis*
Bog asphodel	*Narthecium ossifragum*
Bogbean	*Menyanthes trifoliata*
Broad-leaved dock	*Rumex obtusifolius*
Bulbous buttercup	*Ranunculus bulbosus*
Common mouse-ear	*Cerastium fontanum*
Common nettle	*Urtica dioica*
Common rue	*Ruta graveolens*
Common sorrel	*Rumex acetosa*
Cow parsley	*Anthriscus sylvestris*
Creeping buttercup	*Ranunculus repens*
Creeping thistle	*Cirsium arvense*
Daisy	*Bellis perennis*
Dandelion	*Taraxacum officinale section Ruderalia*
Devil's-bit scabious	*Succisa pratensis*
Field-rose	*Rosa arvensis*
Greater plantain	*Plantago major*
Knotgrass	*Polygonum aviculare*
Marsh thistle	*Cirsium palustre*
Meadow buttercup	*Ranunculus acris*
Rosebay willowherb	*Chamaenerion angustifolium*
Sneezewort	*Achillea ptarmica*
Tormentil	*Potentilla erecta*
White clover	*Trifolium repens*
Wild angelica	*Angelica sylvestris*
Yellow iris	*Iris pseudacorus*
Graminoids	
Barley	*Hordeum vulgare*
Carnation sedge	*Carex panicea*

English Name	Latin Name
Common cotton-grass	*Eriophorum angustifolium*
Compact rush	*Juncus conglomeratus*
Crested dog's-tail	*Cynosurus cristatus*
Deergrass	*Trichophorum germanicum*
False oat-grass	*Arrhenatherum elatius*
Heath rush	*Juncus squarrosus*
Mat-grass	*Nardus stricta*
Perennial rye-grass	*Lolium perenne*
Purple moor-grass	*Molinia caerulea*
Red fescue	*Festuca rubra*
Sharp-flowered rush	*Juncus acutiflorus*
Soft-rush	*Juncus effusus*
Tufted hair-grass	*Deschampsia cespitosa*
Wavy hair-grass	*Deschampsia flexuosa*
Yorkshire-fog	*Holcus lanatus*
Bryophytes	
Common haircap	*Polytrichum commune*
Flat-topped bog-moss	*Sphagnum fallax*
Lustrous bog-moss	*Sphagnum subnitens*
Papillose bog-moss	*Sphagnum papillosum*
Red bog-moss	*Sphagnum capillifolium*
Red-stemmed feather-moss	*Pleurozium schreberi*
Soft bog-moss	*Sphagnum tenellum*
Waved silk-moss	*Plagiothecium undulatum*
Lichens	
Reindeer lichen	*Cladonia portentosa*