

Hill of Fare Wind Farm

Technical Appendix 8.3

National Vegetation Classification Survey

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Date	16 August 2023
Ref	

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Hill of Fare Wind Farm

Technical Appendix 8.3: National Vegetation Classification Survey

Client:	RES
Project/Proposal No:	5223
Version:	1.0
Date:	2023-08-16





Document Information

Project Name:	Hill of Fare Wind Farm
Document Title:	Technical Appendix 8.3: National Vegetation Classification Survey
Client Name:	RES
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Document Status:	Final for Issue
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Approved:	Richard King
Date:	2023-08-16
Version:	1.0
Project/Proposal Number:	5223
ITPEnergised Office:	4th Floor, Centrum House, 108-114 Dundas Street, Edinburgh, EH3 5DQ

Revision History

Version	Date	Authored	Reviewed	Approved	Notes
1.0	2023-08-16	D Black	M Forup & R King	R King	Final issue for Client

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1. Introduction

1.1 Background and Objectives

ITP Energised was commissioned by RES Ltd to undertake a National Vegetation Classification (NVC) survey of all habitats within the development area of the proposed Hill of Fare Wind Farm (hereafter referred to as the 'Site') and a 250 m buffer (i.e. the 'Study Area'). The Site, which is shown on Figure 1, is located on the Hill of Fare, just off the B977, and to the north of Banchory, Aberdeenshire and has a central Ordnance Survey Grid Reference NJ 69535, 03040.

The aim of the NVC survey is to identify habitats that may be of conservation importance or indicate areas of potential groundwater dependence.

This report documents the findings of the NVC survey, which was undertaken in July 2022.

1.2 Site Description

The Site is located on Hill of Fare, to the north of Banchory, just off the B977 in Aberdeenshire. The Site is formed of a former grouse moorland, it is 1,384.27 hectares (ha) in size and occupies a rise in the local landscape. The Site is predominately comprised of dry heath, blanket mire, bracken and regenerating conifers. An access track, connecting to the B977, bisects the Site from west to east.

Both mature and regenerating conifers surround the Site, as well as improved grassland in the east and further moorland in the west.

2. Methods

2.1 National Vegetation Classification

The NVC survey was carried out on 26-28 July 2022 by Donna Black (ACIEEM), a surveyor with several years of experience of such surveys. The survey followed the methodology described in the National Vegetation Classification Users Handbook (Rodwell, 2006) and plant communities were identified from representative quadrat samples with reference to the standard community descriptions and constancy tables in Rodwell *et al.* (1991 - 2000). The survey excluded highly modified habitats, such as conifer plantations and agricultural areas, which is mapped using the Joint Nature Conservation Committee (JNCC) Phase 1 habitat survey method (JNCC, 2010).

The vegetation was mapped and classified using the standard methodology (Rodwell 1991 *et seq.*; Rodwell 2006). It involved mapping polygons of apparently homogenous vegetation by eye and then sampling the vegetation within polygons through representative quadrats.

Sampling involved recording the species present together with their abundances using the Domin scale and noting other relevant information, such as any evidence of management. Species occurring within the vegetation polygon but not in the quadrat itself were also noted and are listed in brackets in Tables 1-8.

A total of 14 representative quadrats were taken, of 2x2m in size. Within each quadrat the cover of individual plant and bryophyte species was recorded using the Domin scale, as follows:

1: <4% few individuals	6: 26 – 33% cover
2: <4% several individuals	7: 34 – 50% cover
3: <4% many individuals	8: 51 – 75% cover
4: 4 – 10% cover	9: 76 – 90% cover
5: 11 – 25% cover	10: 91 – 100% cover



The vegetation was assigned to vegetation communities in accordance with the British Plant Community Keys (Rodwell, 1991 *et seq.*).

Communities will be evaluated in terms of their nature conservation interest, e.g. through inclusion on the Scottish Biodiversity List (SBL) (Scottish Government, 2013) or local Biodiversity Action Plan (BAP), as well as in terms of potential groundwater dependence (SEPA, 2017).

2.2 Groundwater-dependent Terrestrial Ecosystems (GWDTE)

A GWDTE site assessment was undertaken in conjunction with the NVC survey. GWDTEs are protected under the Water Framework Directive (Directive 2000/60/EC), transposed into Scottish Law in 2003 through the Water Environment and Water Services (Scotland) Act (WEWS) 2003.

Detection of potential GWDTEs is based on the National Vegetation Classification as detailed in the Scottish Environment Protection Agency (SEPA) document Land Use Planning System Guidance Note 31 (SEPA, 2017). Guidance Note 31 lists NVC community types which, if present, indicate that a wetland is likely to be either highly groundwater dependent or moderately groundwater dependent (depending on the hydrological setting).

2.3 Limitations

The survey was carried out during the optimal period for NVC surveys, being in July, and there were no access restrictions to the Site.

3. Results

3.1 National Vegetation Classification

The communities and their associated sub-communities are shown on Figure 2, which also shows the locations of quadrats. Phase 1 habitats and target notes are shown in Figure 3. The following Table summarises the results:

Table 1 – Summary of Results

NVC Community	Phase 1 Habitat	Area within the Site (ha)	Area within Study Area (ha)
Mires and flushes			
M4 <i>Carex rostrata</i> – <i>Sphagnum recurvum</i> mire	E2.1 Acid/neutral flush	0.19	0.19
M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire	E.1.6.1 Blanket bog	114.58	116.20
M21 <i>Narthecium ossifragum</i> – <i>Sphagnum papillosum</i> valley mire	E2.1 Acid/neutral flush	1.91	1.91
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture, <i>Juncus acutiflorus</i> sub-community	B5 Marsh/marshy grassland	5.74	5.74
M23b <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture, <i>Juncus effusus</i> sub-community	B5 Marsh/marshy grassland	13.83	14.06
Dry heaths			
H9 <i>Calluna vulgaris</i> – <i>Deschampsia flexuosa</i> heath	D1.1 Dry dwarf shrub heath - acid	1.66	1.66



NVC Community	Phase 1 Habitat	Area within the Site (ha)	Area within Study Area (ha)
H9d <i>Calluna vulgaris</i> – <i>Deschampsia flexuosa</i> heath, <i>Galium saxatile</i> sub-community	D1.1 Dry dwarf shrub heath - acid	20.65	21.81
H10a <i>Calluna vulgaris</i> – <i>Erica cinerea</i> heath, Typical sub-community	D1.1 Dry dwarf shrub heath - acid	869.59	1008.52
H12a <i>Calluna vulgaris</i> - <i>Vaccinium myrtillus</i> heath, <i>Calluna vulgaris</i> sub-community	D1.1 Dry dwarf shrub heath - acid	8.66	8.66
Grasslands and bracken			
U20c <i>Pteridium aquilinum</i> – <i>Galium saxatile</i> community, Species poor sub-community	C1 Bracken	130.19	168.72
Non-NVC Communities			
N/A	A1.2.2 Conifer plantation	192.13	493.53
N/A	A4.2 Recently felled woodland	24.02	62.62
N/A	B4 Improved grassland	1.05	49.39
N/A	G1 Pond	0.07	0.07
Totals		1384.27	1953.10

The communities are described below. Quadrat data, including national grid locations, are provided within the tables.

3.1.1 Mires and Flushes

3.1.1.1 M4 *Carex rostrata* – *Sphagnum recurvum* mire

One small (0.19 ha) area of M4 was recorded at the western side of the Site adjacent to the footpath. The vegetation at Q5 (Table 1) was dominated by bottle sedge (*Carex rostrata*) with occasional common cottongrass (*Eriophorum angustifolium*). Below the vascular plant layer was a thick layer of *Sphagnum* mosses including *Sphagnum fallax* and *Sphagnum cuspidatum* as well as *Polytrichum commune*.

M4 is characteristic of pools and seepage areas on the raw peat soils of topogenous and soligenous mires where the waters are fairly acid and only slightly enriched (Rodwell, 1991). Bare peat was visible in areas indicating the mire was dried out and degraded in parts.

Table 1 – M4 mire

Species	Domin Scale and Quadrat Location				
	Cover score by quadrat				Frequency & cover range
	Q5 NJ6725501966				
<i>Carex curta</i>	2				-
<i>Carex nigra</i>	2				-
<i>Carex rostrata</i>	8				-



Species	Domin Scale and Quadrat Location				
	Cover score by quadrat				Frequency & cover range
	Q5 NJ6725501966				
<i>Eriophorum angustifolium</i>	2				-
<i>Galium palustre</i>	3				-
<i>Juncus effusus</i>	2				-
<i>Polytrichum commune</i>	4				-
<i>Potentilla erecta</i>	1				-
<i>Sphagnum cuspidatum</i>	4				-
<i>Sphagnum fallax</i>	6				-

3.1.1.2 M19 *Calluna vulgaris* – *Eriophorum vaginatum* blanket mire

Two areas of M19 were recorded within the western part of the Site. The largest (at Q13) was in the north and located west of the watercourse; it was dominated by heather (*Calluna vulgaris*), locally with very wet areas dominated by bog asphodel (*Narthecium ossifragum*), hare’s-tail cottongrass (*Eriophorum vaginatum*) or bog-mosses (*Sphagnum* spp.) (Table 2). The smaller area to the southwest (Q7) was similar, though with a slightly drier appearance with lower frequencies of bog asphodel and bog-mosses.

M19 is mainly a blanket mire community typical of watersheds and gentle slopes where a deep layer of peat has been able to accumulate and occurs on drier peats than some related mire communities. The peat is generally firm, moist and fibrous rather than wet and slimy (Averis *et al.*, 2004).

Table 2 – M19 blanket mire

Species	Domin Scale and Quadrat Location				
	Cover score by quadrat				Frequency & cover range
	Q7 NJ6732102003	Q13 NJ6866503207			
<i>Calluna vulgaris</i>	8	7			V (7-8)
<i>Cladonia impexa</i>	2	3			V (2-3)
<i>Erica tetralix</i>	2	2			V (2)
<i>Eriophorum angustifolium</i>	4	5			V (4-5)
<i>Eriophorum vaginatum</i>	7	8			V (7-8)
<i>Hypnum jutlandicum</i>	2				III (2)
<i>Juncus squarrosus</i>	3	3			V (3)
<i>Narthecium ossifragum</i>	2	4			V (2-4)
<i>Pleurozium schreberi</i>	3	4			V (3-4)
<i>Scirpus cespitosus</i>	3	1			V (1-3)
<i>Sphagnum capillifolium</i>	5	7			V (5-7)
<i>Vaccinium myrtillus</i>	6	3			V (3-6)
<i>Vaccinium oxycoccos</i>	1				III (1)



3.1.1.3 M21 *Narthecium ossifragum* – *Sphagnum papillosum* valley mire

Two small areas of M21 were recorded within the Site at the south-western corner, in close proximity to the public footpath at Quadrats 2 and 4. The vegetation is dominated by carpets of bog-mosses, with abundant bog asphodel and frequent common cottongrass. The larger area at Q2 was found in amongst heath and was considered to be in good condition due to the variety of species present. In comparison the area at Q4 appeared dried out and slightly degraded with fewer species.

M21 is a community of permanently waterlogged acid and oligotrophic peats. It is commonly characteristic of valley mires maintained by a locally high ground water-table. The wetness of the substrate gives the vegetation some protection against the burning and grazing that are (or have been) important features in the heathland that usually surrounds the community, though draining is very deleterious and has severely affected some stands (Rodwell, 1991).

Table 3 – M21 valley mire

Species	Domin Scale and Quadrat Location				Frequency & cover range
	Cover score by quadrat				
	Q2 NJ6828801844	Q4 NJ6717901832			
<i>Calluna vulgaris</i>	4	3			V (3-4)
<i>Carex echinata</i>	2	1			V (1-2)
<i>Carex rostrata</i>		2			III (2)
<i>Cladonia impexa</i>	2				III (2)
<i>Drosera rotundifolia</i>	3	2			V (2-3)
<i>Erica tetralix</i>	5	2			V (2-5)
<i>Eriophorum angustifolium</i>	6	5			V (5-6)
<i>Juncus effusus</i>	3				III (3)
<i>Juncus squarrosus</i>	3				III (3)
<i>Narthecium ossifragum</i>	7	6			V (6-7)
<i>Polytrichum commune</i>	3	3			V (3)
<i>Potentilla erecta</i>	2				III (2)
<i>Sphagnum auriculatum</i>	7				III (7)
<i>Sphagnum magellanicum</i>	6	5			V (5-6)
<i>Sphagnum papillosum</i>	8	8			V (8)
<i>Sphagnum tenellum</i>		6			III (6)

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

M23 was found throughout the Site with small pockets in the east surrounding the watercourse as well as areas in the west within a mosaic of mire and heath. Two sub-communities, the M23a *Juncus effusus/acutiflorus* – *Galium palustre* rush-pasture *Juncus acutiflorus* sub-community and the M23b *Juncus effusus/acutiflorus* – *Galium palustre* rush-pasture *Juncus effusus* sub-community were both recorded. Quadrat 11 was taken in the east of the Site where the M23a was recorded; the vegetation was dominated by sharp-flowered rush (*Juncus acutiflorus*) with abundant Yorkshire fog (*Holcus lanatus*) and frequent marsh bedstraw (*Galium palustre*). Quadrat 6 was taken in the northwest of the Site where the M23b was recorded; here the vegetation was dominated by soft-rush (*Juncus effusus*).



Juncus-Galium rush-pasture occurs over a variety of moist, moderately acid to neutral, peaty and mineral soils in cool and rainy climates (Rodwell, 1991). It is a community of gently sloping ground, found around the margins of soligenous flushes and water-tracks.

Table 4 – M23a rush-pasture

Species	Domin Scale and Quadrat Location				
	Cover score by quadrat				Frequency & cover range
	Q11 NJ7213803297				
<i>Achillea ptarmica</i>	1				-
<i>Carex panicea</i>	1				-
<i>Equisetum palustre</i>	2				-
<i>Galium palustre</i>	3				-
<i>Holcus lanatus</i>	5				-
<i>Juncus acutiflorus</i>	8				-
<i>Juncus bulbosus</i>	2				-
<i>Juncus effusus</i>	6				-
<i>Polytrichum commune</i>	2				-
<i>Potentilla erecta</i>	2				-
<i>Ranunculus acris</i>	1				-

Table 5 – M23b rush-pasture

Species	Domin Scale and Quadrat Location				
	Cover score by quadrat				Frequency & cover range
	Q6 NJ6802703265				
<i>Achillea ptarmica</i>	1				-
<i>Galium palustre</i>	2				-
<i>Holcus lanatus</i>	4				-
<i>Juncus acutiflorus</i>	5				-
<i>Juncus effusus</i>	9				-
<i>Polytrichum commune</i>	2				-
<i>Potentilla erecta</i>	1				-
<i>Ranunculus acris</i>	2				-

3.1.2 Dry Heaths

3.1.2.1 H9 *Calluna vulgaris-Deschampsia flexuosa* heath

Pockets of H9 heath were recorded in the western part of the Site. The vegetation was mostly dominated by wavy hair-grass (*Deschampsia flexuosa*) which formed fairly extensive patches of tussocky turf among the



heather. The understory was dominated by heather (*Calluna vulgaris*) and heath bedstraw (*Galium saxatile*) and as such the vegetation aligned with the H9d *Calluna vulgaris* – *Deschampsia flexuosa Galium saxatile* sub-community.

The H9 heath community is the characteristic sub-shrub vegetation of acid and impoverished soils at low to moderate altitudes (Rodwell, 1991). The relatively cool and wet climate of this part of Britain has some influence on the floristics of the community but much of its character derives from a combination of frequent burning and grazing (or flailing).

Table 6 – H9d heath

Species	Domin Scale and Quadrat Location				Frequency & cover range
	Cover score by quadrat				
	Q3 NJ6778701875	Q8 NJ6782102015	Q14 NJ6812902280		
<i>Agrostis capillaris</i>	3	4	3		V (3-4)
<i>Calluna vulgaris</i>	5	4	5		V (4-5)
<i>Campylopus paradoxus</i>	2	2	3		V (2-3)
<i>Deschampsia flexuosa</i>	6	7	7		V (6-7)
<i>Festuca rubra</i>	4	3	4		V (3-4)
<i>Galium saxatile</i>	5	4	4		V (4-5)
<i>Hypnum cupressiforme</i>		3	4		IV (3-4)
<i>Juncus squarrosus</i>		2			II (2)
<i>Pohlia nutans</i>		4			II (4)
<i>Potentilla erecta</i>	4	3	3		V (3-4)
<i>Rumex acetosella</i>		3			II (3)

3.1.2.2 H10 *Calluna vulgaris* – *Erica cinerea* heath

H10 heath covered most of the Site (70.8%). Large areas were dominated by heather with frequent bell heather (*Erica cinerea*) and occasional bilberry (*Vaccinium myrtillus*). Wavy hair grass was locally frequent in areas with occasional deer-grass (*Trichophorum cespitosum*) and heath rush (*Juncus squarrosus*). As such the vegetation aligned with the H10a *Calluna vulgaris* – *Erica cinerea* heath, Typical sub-community (Table 7). There are clear signs that this habitat is heavily managed through cutting and burning.

H10 heath is characteristic of acid to circumneutral and generally free-draining soils in the cool oceanic lowlands and upland fringes. Grazing and burning play a considerable part in controlling its composition and structure (Rodwell, 1991).

Table 7 – H10a heath

Species	Domin Scale and Quadrat Location				Frequency & cover range
	Cover score by quadrat				
	Q9 NJ6988403156	Q10 NJ7132503742	Q12 NJ6893403162		
<i>Agrostis capillaris</i>	2		2		IV (2)
<i>Calluna vulgaris</i>	9	9	8		V (8-9)
<i>Carex panicea</i>			1		II (1)



Species	Domin Scale and Quadrat Location				
	Cover score by quadrat				Frequency & cover range
	Q9 NJ6988403156	Q10 NJ7132503742	Q12 NJ6893403162		
<i>Deschampsia flexuosa</i>	1	3	3		V (1-3)
<i>Erica cinerea</i>	2	5	4		V (2-5)
<i>Erica tetralix</i>	2	2	1		V (1-2)
<i>Festuca ovina</i>	1		2		IV (1-2)
<i>Festuca rubra</i>		2			II (2)
<i>Galium saxatile</i>	1	3	2		V (1-3)
<i>Hylocomium splendens</i>	2	2			IV (2)
<i>Juncus squarrosus</i>	4	3	4		V (3-4)
<i>Nardus stricta</i>	1	1	3		V (1-3)
<i>Narthecium ossifragum</i>	2		2		IV (2)
<i>Potentilla erecta</i>		3			II (3)
<i>Rhynchospora alba</i>	1	2	2		V (1-2)
<i>Scirpus cespitosus</i>	3	4			IV (3-4)
<i>Sphagnum capillifolium</i>		3	4		IV (3-4)
<i>Vaccinium myrtillus</i>	2	2	3		V (2-3)

3.1.2.3 H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath

An area of H12 heath was recorded in the southern part of the Site surrounding the western access track (Q1). The vegetation was found on a slope with exposed rock surfaces dominated by heather and bilberry. Amongst the dense, tall, growth other sub-shrubs, such as bell heather, were fairly common. The vegetation therefore aligned with H12a *Calluna vulgaris* – *Vaccinium myrtillus* heath, the *Calluna vulgaris* sub-community (Table 8).

H12 heath is the typical sub-shrub community of acidic to circumneutral, free-draining mineral soils through the cold and wet sub-montane zone (Rodwell, 1991).

Table 8 – H12a heath

Species	Domin Scale				
	Cover score by quadrat				Frequency and cover range
	Q1 NJ6921001340				
<i>Agrostis capillaris</i>	2				-
<i>Calluna vulgaris</i>	8				-
<i>Cladonia impexa</i>	1				-
<i>Deschampsia flexuosa</i>	2				-
<i>Dicranum scoparium</i>	3				-
<i>Eriophorum vaginatum</i>	1				-



Species	Domin Scale				
	Cover score by quadrat				Frequency and cover range
	Q1 NJ6921001340				
<i>Festuca ovina</i>	2				-
<i>Galium saxatile</i>	2				-
<i>Hypnum jutlandicum</i>	4				-
<i>Juncus squarrosus</i>	2				-
<i>Nardus stricta</i>	1				-
<i>Pleurozium schreberi</i>	3				-
<i>Polytrichum commune</i>	3				-
<i>Potentilla erecta</i>	3				-
<i>Scirpus cespitosus</i>	2				-
<i>Vaccinium myrtillus</i>	4				-
<i>Vaccinium vitis-idaea</i>	1				-

3.1.3 Grasslands and bracken

3.1.3.1 U20 *Pteridium aquilinum* – *Galium saxatile* community

Large swathes of the U20 community were recorded around the edges of the heathland, bordering the conifer plantations. In addition, some small pockets were present in the east, in amongst the heath. The vegetation was dominated by bracken (*Pteridium aquilinum*) which formed a dense canopy in most cases. Due to the dense nature of the vegetation no quadrats were taken within this community and instead it was assessed by eye as aligning to U20c *Pteridium aquilinum* – *Galium saxatile* community, the Species poor sub-community.

This community is very widespread, occurring usually on deeper, well-aerated though often quite moist soils, base-poor to circumneutral, up to moderate altitudes in mountains (Rodwell, 1991).

3.1.4 Non-NVC communities

3.1.4.1 Coniferous woodland plantation

Large areas of mature coniferous woodland plantation surround the heathland to the north and south of the Site. While most of it was dominated by Sitka spruce (*Picea sitchensis*), some areas also consisted of Scots pine (*Pinus sylvestris*), European larch (*Larix decidua*) and the occasional rowan (*Sorbus aucuparia*). The understory consisted of bramble (*Rubus fruticosus*), wood fern (*Dryopteris* sp), wood sorrel (*Oxalis acetosella*), pleurocarpos mosses and Hair-cap moss (polytrichum commune). An area of felled coniferous woodland was noted at the centre of the Study Area adjacent to the eastern access track within the buffer area.

3.1.4.2 Improved grassland

A field of improved grassland was noted at the eastern boundary of the Study Area.

3.1.4.3 Watercourses and waterbodies

Five small watercourses run through the Site, including the Burn of Lythebauds and the Landerberry burn. A small pond was also recorded at TN6 and as such is described in Appendix A.



3.1.4.4 Buildings, tracks, paths and bare ground

One small building, possibly a gamekeeper's hut, and a hunting lodge were found within the Site. The access track ran through the Site running from the main road in the west up through the Site to the eastern corner with a leg in the middle running back down to the main road.

4. Evaluation

4.1 Nature Conservation Interest

NVC communities can be compared with a number of nature conservation priorities in order to help in the assessment of the sensitivity and conservation interest of certain areas. It is important to note that although an NVC community may align with a priority habitat type it does not necessarily mean that a specific area of an NVC community constitutes priority habitat. Various factors, including quality, area, geographical location and substrates, all need to be considered in this respect. The extents and, particularly due to historical management and deer pressures, often relatively low quality and degraded nature of potential priority habitats mean that, although they may be of relatively good quality, they are not necessarily classifiable as priority habitat.

Table 9 compares the survey results and the NVC communities identified against the following classifications:

- Scottish Biodiversity List (SBL) (Scottish Government, 2013); and
- North East Scotland Local BAP.

Table 9: Evaluation of Conservation Status

Feature	Evaluation Reasoning
H9d heath	Upland heathland is a priority habitat on the Scottish Biodiversity List and is an important habitat on the North East Scotland Local Biodiversity Action Plan.
H10a heath	Upland heathland is a priority habitat on the Scottish Biodiversity List and is an important habitat on the North East Scotland Local Biodiversity Action Plan.
H12a heath	Upland heathland is a priority habitat on the Scottish Biodiversity List and is an important habitat on the North East Scotland Local Biodiversity Action Plan.
M4 mire	Upland flushes are not priority habitats but are listed with a watching brief on the Scottish Biodiversity List.
M19 blanket mire	Blanket bog is a priority habitat on the Scottish Biodiversity List and forms part of the important habitat 'Upland heathland' on the North East Scotland Local Biodiversity Action Plan.
M21 Valley mire	Upland flushes are not priority habitats but are listed with a watching brief on the Scottish Biodiversity List.
M23a rush-pasture	Rush pasture is a priority habitat on the Scottish Biodiversity List.



M23b rush-pasture	Rush pasture is a priority habitat on the Scottish Biodiversity List.
U20c bracken	Not a conservation priority
A1.2.2 Coniferous plantation woodland	Coniferous plantation woodland forms part of the important habitat 'Woodlands' on the North East Scotland Local Biodiversity Action Plan.
A4.2 Recently felled woodland	Not a conservation priority
B4 Improved grassland	Not a conservation priority
G1 Pond	Ponds are a priority habitat on the Scottish Biodiversity List and form part of the important habitat 'wetlands' on the North East Scotland Local Biodiversity Action Plan.

4.2 Groundwater Dependency

The results of the NVC survey identified two communities with potential for moderate or high groundwater dependency in accordance with SEPA guidance. These are summarised in Table 8 below.

Table 8 – Habitats with Potential Groundwater Dependency

NVC Code	NVC Community Name	Potential Groundwater Dependency
M21	<i>Narthecium ossifragum</i> – <i>Sphagnum papillosum</i> valley mire	High*
M23	<i>Juncus effusus</i> / <i>acutiflorus</i> – <i>Galium palustre</i> rush-pasture	High*

*Dependent on hydrogeological setting

GWDTE sensitivity has been assigned solely on the SEPA listings (SEPA, 2017), but habitats containing these particular NVC communities are to be considered GWDTE unless a hydrological/hydrogeological assessment is undertaken that demonstrates otherwise. 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 at all.

These results are also provided visually in Figure 4. Where polygons comprised a mosaic of NVC communities which differ in their potential groundwater dependency, the dominant NVC community's groundwater dependency has been shown.

Further investigations of these GWDTEs are required in order to determine whether or not they are truly groundwater dependent. Should they be found to be truly groundwater dependent then SEPA (2017) guidance on GWDTE, buffer zones of 100 m and 250 m must be adhered to where all groundwater abstractions need to be identified:

- within 100 m radius: all excavations less than 1 m in depth
- within 250 m radius: all excavations deeper than 1 m.

If all development can be planned outside of these buffer zones then any significant impacts upon potential GWDTEs may be avoided. If these distances cannot be maintained from known true GWDTEs then mitigation will be required in order to maintain hydrological connectivity within the substrates of the wider area.



4.3 Summary Table

Table 10 overleaf provides a summary of all NVC communities found within the Study Area and their conservation status and potential for groundwater dependency.

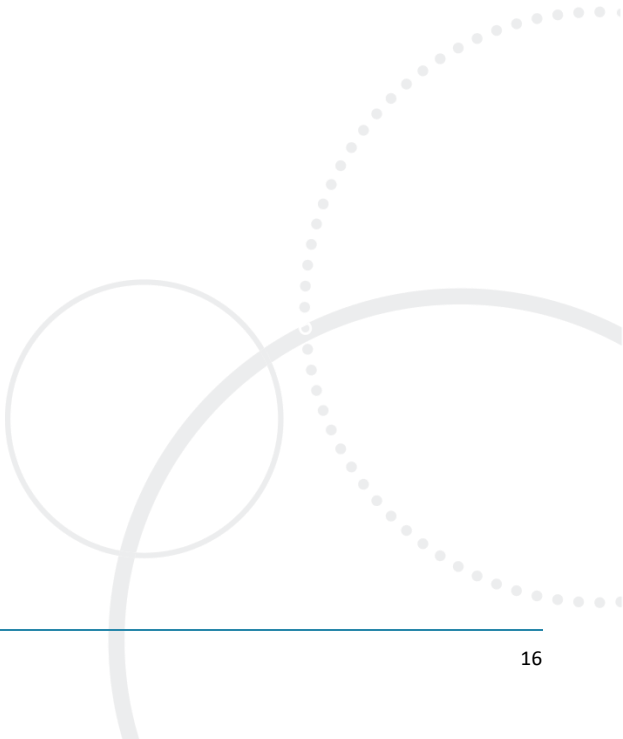




Table 10 - Summary of all NVC communities in the Study Area

NVC Community	Phase 1 Habitat	SBL	LBAP	Potential GWDTE?	Total Area (Ha)
M4 - <i>Carex rostrata</i> – <i>Sphagnum recurvum</i> mire	E2.1 Acid/neutral flush	Upland flushes, fens and swamps: Watching brief only	N/A	No	0.19
M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire	E.1.6.1 Blanket bog	Blanket bog	Upland heathland	No	116.20
M21 <i>Narthecium ossifragum</i> – <i>Sphagnum papillosum</i> valley mire	E2.1 Acid/neutral flush	Upland flushes, fens and swamps: Watching brief only	N/A	High	1.91
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture, <i>Juncus acutiflorus</i> sub-community	B5 Marsh/marshy grassland	Purple moor grass and rush pastures.	N/A	High	5.74
M23b <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture <i>Juncus effusus</i> sub-community	B5 Marsh/marshy grassland	Purple moor grass and rush pastures	N/A	High	14.06
H9 <i>Calluna vulgaris</i> – <i>Deschampsia flexuosa</i> heath	D1.1 Dry dwarf shrub heath - acid	Upland heathland	Upland heathland	No	1.66
H9d <i>Calluna vulgaris</i> – <i>Deschampsia flexuosa</i> heath <i>Galium saxatile</i> sub-community	D1.1 Dry dwarf shrub heath - acid	Upland heathland	Upland heathland	No	21.81
H10a <i>Calluna vulgaris</i> – <i>Erica cinerea</i> heath Typical sub-community	D1.1 Dry dwarf shrub heath - acid	Upland heathland	Upland heathland	No	1008.52
H12a <i>Calluna vulgaris-Vaccinium myrtillus</i> heath, <i>Calluna vulgaris</i> sub-community	D1.1 Dry dwarf shrub heath - acid	Upland heathland	Upland heathland	No	8.66
U20c <i>Pteridium aquilinum</i> – <i>Galium saxatile</i> community, Species poor sub-community	C1 Bracken	N/A	N/A	No	168.72
Non-NVC	A1.2.2 Conifer plantation	N/A	Woodland	No	493.53
Non-NVC	A4.2 Recently felled woodland	N/A	N/A	No	62.62
Non-NVC	B4 Improved grassland	N/A	N/A	No	49.39
Non-NVC	G1.1 Pond	Ponds	Wetland habitats	No	0.07
Non-NVC	Running water	Rivers	Wetland habitats	No	N/A



5. Summary

An NVC survey was carried out at the site of the proposed Hill of Fare wind farm in July 2022, during the optimum time for carrying out such surveys. In total 11 NVC communities and sub-communities were recorded within the Study Area; a number of non-NVC habitat types were also found to be present, in particular coniferous plantation woodland.

The most common and widespread habitat making up the majority of the landscape is dry dwarf shrub heath which reflects the former land use of grouse moor. To the west of the Study Area is a relatively large area (116.20 ha) of M19 blanket bog. On the steeper slopes mainly dry heath H10a and bracken dominated vegetation U20c occurs. Small instances of flush M4 and M21, and rush-pasture M23 are present, scattered throughout the Study Area.

The survey results have also been compared to a number of sensitivity classifications, indicating the presence of Scottish Biodiversity List habitats, LBAP and potential GWDTE habitats, as summarised in Table 10.



6. References

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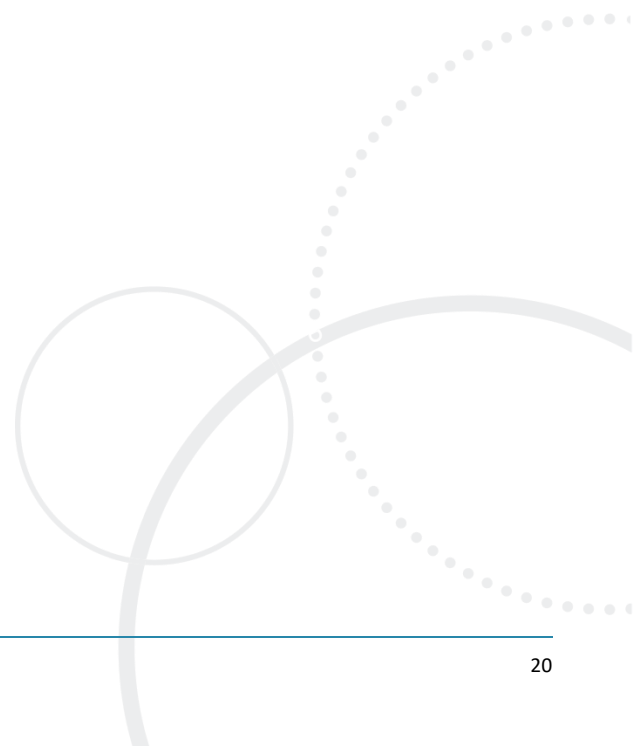
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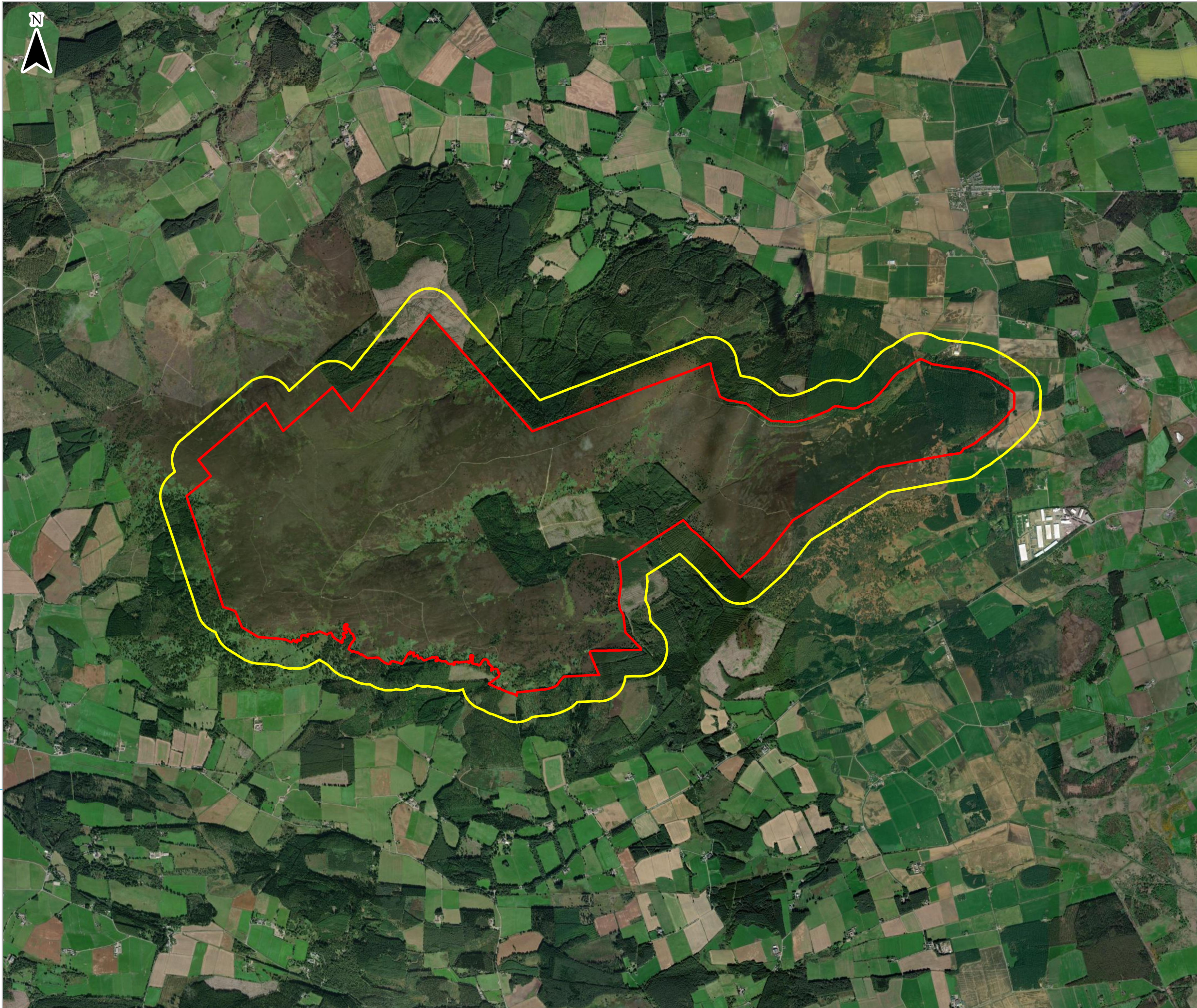
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Figure 1 – Site Location and Survey Boundary





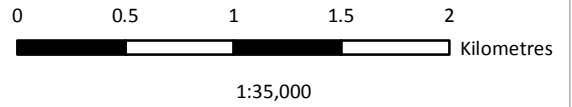
KEY

- 250 m survey buffer
- Site Boundary



Coordinate System: British National Grid
 Projection: Transverse Mercator

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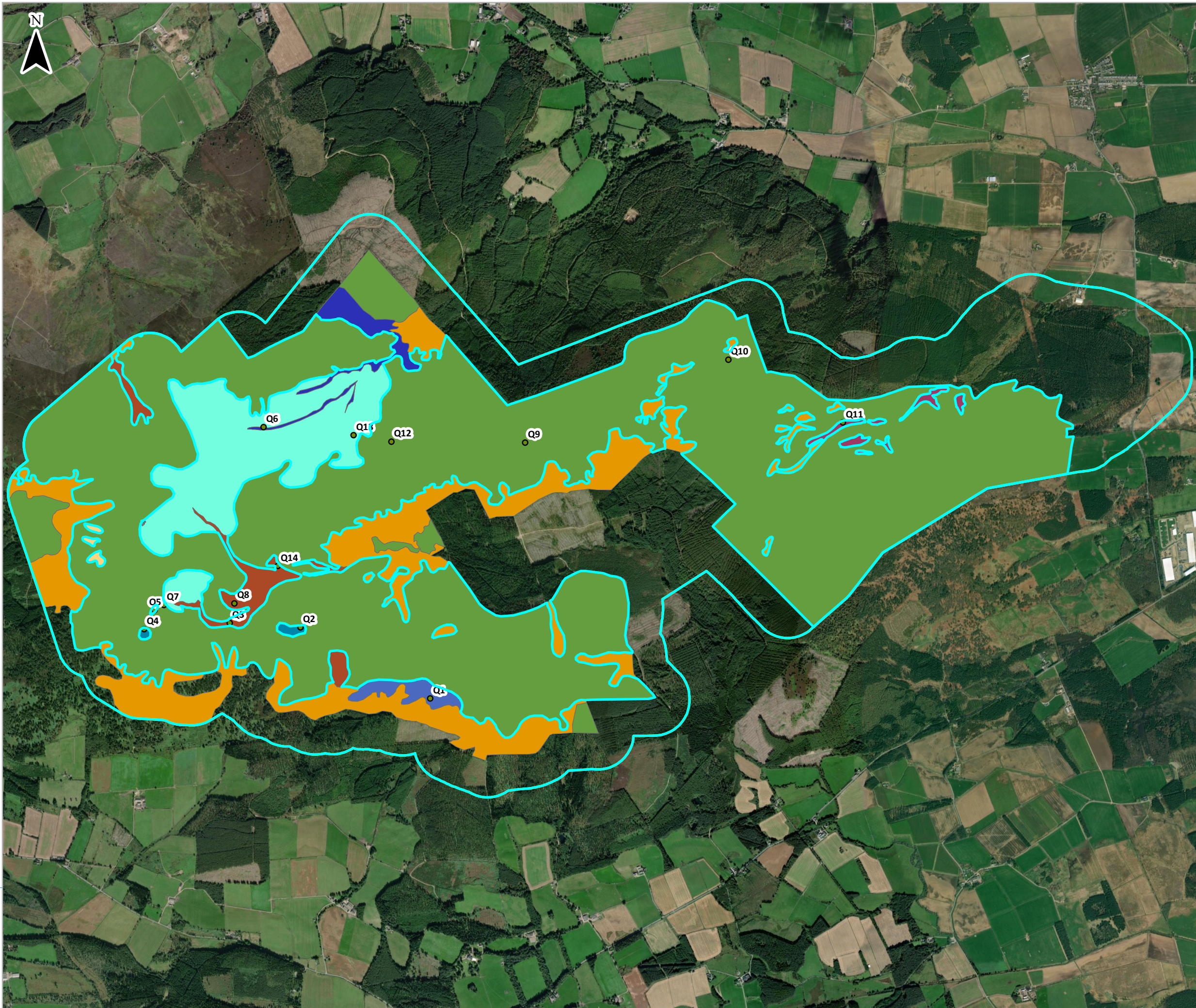
Figure 1
Site Location and Survey Boundary

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Figure 2 – National Vegetation Classification Survey Results

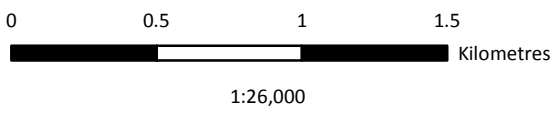


- Site Boundary
 - 250 m buffer
 - Quadrat locations
- NVC Communities**
- H10a *Calluna vulgaris* – *Erica cinerea* heath, Typical sub-community
 - H12a *Calluna vulgaris*-*Vaccinium myrtillus* heath, *C.vulgaris* sub-community
 - H9 *Calluna vulgaris* – *Deschampsia flexuosa* heath
 - H9d *Calluna vulgaris* – *Deschampsia flexuosa* heath, *Galium saxatile* sub-community
 - M19 *Calluna vulgaris* – *Eriophorum vaginatum* blanket mire
 - M21 *Narthecium ossifragum* – *Sphagnum papillosum* valley mire
 - M23a *Juncus effusus/acutiflorus*-*Galium palustre* rush-pasture, *Juncus acutiflorus* sub-
 - M23b *Juncus effusus/acutiflorus*-*Galium palustre* rush-pasture, *Juncus effusus* sub-community
 - M4 *Carex rostrata* – *Sphagnum recurvum* mire
 - U20c *Pteridium aquilinum*-*Galium saxatile* community, Species poor sub-community



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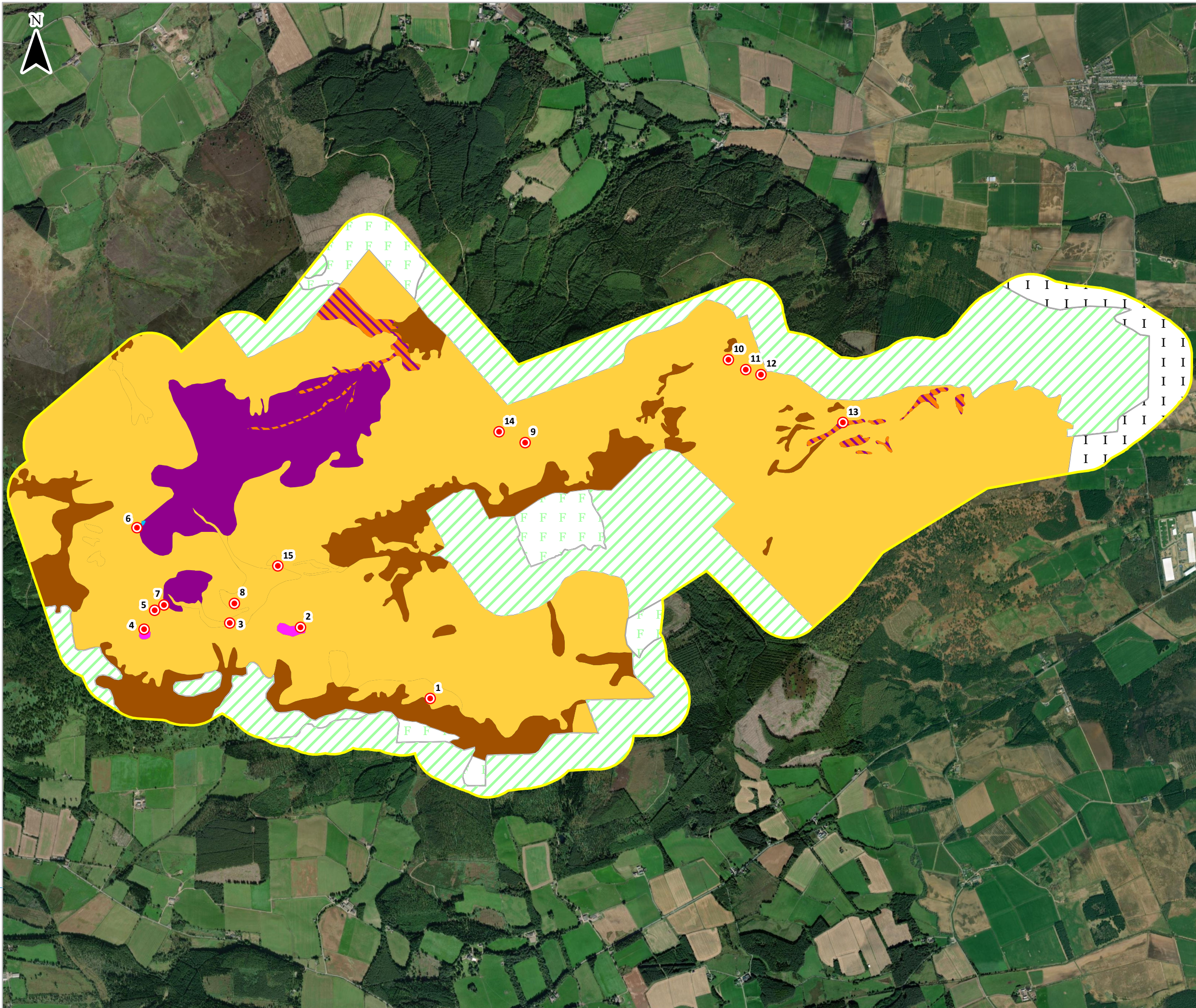
Figure 2
National Vegetation Classification Survey Results

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Figure 3 – Phase 1 Habitats and Target Notes



KEY

-  Site Boundary
-  250 m buffer
-  Target notes

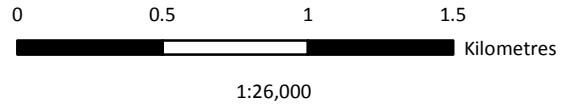
Phase 1 Habitats

-  A1.22 Conifer plantation
-  A4.2 Recently felled woodland
-  B4 Improved grassland
-  B5 Marsh/marshy grassland
-  C1 Bracken
-  D1.1 Dry dwarf shrub heath - acid
-  E.1.6.1 Blanket bog
-  E2.1 Acid/neutral flush
-  G1 Pond



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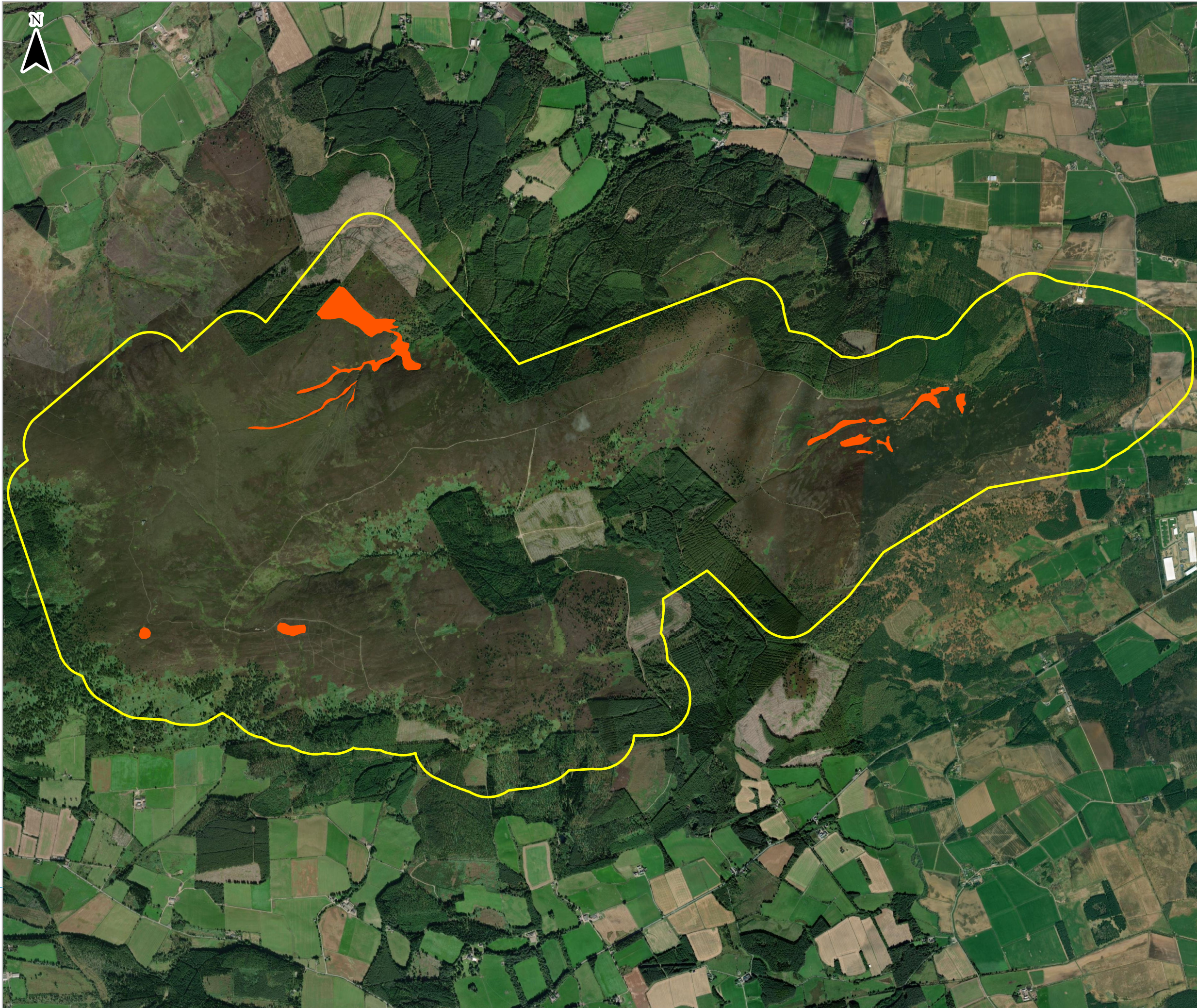
5223/ Hill of Fare
 Technical Appendix 8.3 -
 National Vegetation Classification Survey Report
Figure 3
Phase 1 Habitats and Target Notes

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Figure 4 – Potential GWDTes



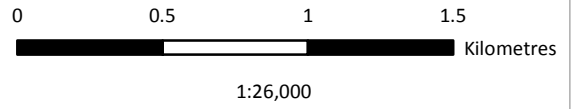
KEY

- Site Boundary
- 250 m buffer
- Groundwater Dependant Terrestrial Ecosystems**
- High Potential Groundwater Dependency



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 Technical Appendix 8.3 -
 National Vegetation Classification Survey Report
Figure 4
Potential GWDTEs

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Appendix A: Target Notes

Table A1: Plants and Habitats

Target Note (TN)	Grid Reference	Description and Photograph
TN1	NJ 69210, 01340	 <p data-bbox="587 1144 1369 1205">Area of H12 dry heath with heather being dominant and abundant bilberry, found to the south of the Site adjacent to the access track.</p>
TN2	NJ 68288, 01844	 <p data-bbox="587 1890 1369 1951">Area of blanket mire found within heathland dominated by bog-mosses, bog asphodel and cross-leaved heath.</p>



Target Note (TN)	Grid Reference	Description and Photograph
TN3	NJ 67787, 01875	 <p data-bbox="587 1025 1369 1088">Area of H9 heathland dominated by wavy hair-grass with abundant heather and frequent bilberry.</p>
TN4	NJ 67179, 01832	 <p data-bbox="587 1836 1369 1899">Area of dried out blanket bog dominated by bog-mosses with frequent common cottongrass with occasional heather and common sundew.</p>


Target Note (TN)	Grid Reference	Description and Photograph
TN5	NJ 67255, 01966	 <p data-bbox="587 1061 1382 1133">Area of M4 Mire, dominated by sedges including bottle sedge, with abundant <i>Sphagnum recurvum</i> and frequent <i>Polytrichum commune</i>.</p>
TN6	NJ 67159, 02572	 <p data-bbox="587 1908 1382 1977">Pond located adjacent to track surrounded by soft-rush, heather, sedges and wavy hair-grass.</p>




Target Note (TN)	Grid Reference	Description and Photograph
TN7	NJ 67321, 02003	 <p data-bbox="587 1084 1372 1182">Area of dry modified bog dominated by heather with abundant deer grass, frequent common cottongrass and bilberry, and occasional bog-mosses and cranberry.</p>
TN8	NJ 67821, 02015	<p data-bbox="587 1196 1372 1294">Area of H9 heath dominated by wavy hair grass, with frequent heather, compact rush, bilberry, occasional common cottongrass, heath bedstraw and foxglove.</p>




Target Note (TN)	Grid Reference	Description and Photograph
TN9	NJ 69884, 03156	 <p data-bbox="587 1055 1369 1182">Area of heath dominated by short heather with tussocks of deer grass, occasional heath rush, <i>Cladonia</i> lichens, and bell heather with scattered Sitka spruce and Scots pine trees saplings. The heather appears wind beaten in places.</p>
TN10	NJ 71325, 03742	

Target Note (TN)	Grid Reference	Description and Photograph
		H10 heathland dominated by short heather, with frequent <i>Cladonia</i> lichens, occasional cross-leaved heath, deer grass and heath rush. Again, heather appears wind beaten in areas.
TN11	NJ 71448, 03673	Small patch of vegetation dominated by pendulous sedge with frequent deer grass and cross-leaved heath.
TN12	NJ 71556, 03638	 <p data-bbox="587 1330 1372 1422">Vegetation at sides of watercourse dominated by compact rush with abundant soft-rush and bog-mosses and with occasional cross-leaved heath.</p>



Target Note (TN)	Grid Reference	Description and Photograph
TN13	NJ 72138, 03297	 <p data-bbox="587 1126 1382 1196">Area of M23a rush pasture dominated by jointed rush, with compact rush, Yorkshire fog and <i>Polytrichum commune</i> moss.</p>

Target Note (TN)	Grid Reference	Description and Photograph
TN14	NJ 68665, 03207	 <p data-bbox="587 1131 1382 1198">Large area of M19 blanket mire with abundant heather, frequent hare's-tail cottongrass and bog-mosses, with occasional <i>Cladonia</i> lichens.</p>



Target Note (TN)	Grid Reference	Description and Photograph
TN15	NJ 68129, 02280	 <p data-bbox="587 1126 1372 1218">Area dominated by wavy hair-grass, with frequent compact rush, sweet vernal grass and heather with occasional mat-grass, tufted hair-grass and rare pendulous sedge.</p>



Appendix B: Plant Species List

Common Name	Scientific Name
Herbaceous species	
Bell heather	<i>Erica cinerea</i>
Bent grass	<i>Agrostis</i> sp.
Bilberry	<i>Vaccinium myrtillus</i>
Bog asphodel	<i>Narthecium ossifragum</i>
Bottle sedge	<i>Carex rostrata</i>
Bracken	<i>Pteridium aquilinum</i>
Bulbous rush	<i>Juncus bulbosus</i>
Carnation sedge	<i>Carex panicea</i>
Common bent	<i>Agrostis capillaris</i>
Common cotton grass	<i>Eriophorum angustifolium</i>
Common sedge	<i>Carex nigra</i>
Cowberry	<i>Vaccinium vitis-idaea</i>
Cranberry	<i>Vaccinium oxycoccos</i>
Cross-leaved heath	<i>Erica tetralix</i>
Deergrass	<i>Scirpus cespitosus</i>
Hare's-tail cottongrass	<i>Eriophorum vaginatum</i>
Heath bedstraw	<i>Galium saxatile</i>
Heather	<i>Calluna vulgaris</i>
Heath rush	<i>Juncus squarrosus</i>
Mat grass	<i>Nardus stricta</i>
Marsh bedstraw	<i>Galium palustre</i>
Marsh horsetail	<i>Equisetum palustre</i>
Meadow buttercup	<i>Ranunculus acris</i>
Red fescue	<i>Festuca rubra</i>
Round-leaved sundew	<i>Drosera rotundifolia</i>
Sharp-flowered rush	<i>Juncus acutiflorus</i>
Sheep's fescue	<i>Festuca ovina</i>
Sheep's sorrel	<i>Rumex acetosella</i>
Sneezewort	<i>Achillea ptarmica</i>
Soft-rush	<i>Juncus effusus</i>
Star sedge	<i>Carex echinata</i>
Sweet vernal grass	<i>Anthoxanthum odoratum</i>
Tormentil	<i>Potentilla erecta</i>



Common Name	Scientific Name
Tufted hair-grass	<i>Deschampsia cespitosa</i>
Wavy hair-grass	<i>Deschampsia flexuosa</i>
White sedge	<i>Carex curta</i>
Yorkshire-fog	<i>Holcus lanatus</i>
Mosses\liverworts\Lichens	
Acute-leaved bog-moss	<i>Sphagnum capillifolium</i>
Common haircap	<i>Polytrichum commune</i>
Cow-horn bog-moss	<i>Sphagnum auriculatum</i>
Cypress-leaved plait-moss	<i>Hypnum cupressiforme</i>
Feathery bog-moss	<i>Sphagnum cuspidatum</i>
Flat-topped bog-moss	<i>Sphagnum fallax</i>
Glittering wood-moss	<i>Hylocomium splendens</i>
Heath plait-moss	<i>Hypnum jutlandicum</i>
Little shaggy-moss	<i>Rhytidiadelphus loreus</i>
Magellanic bog-moss	<i>Sphagnum magellanicum</i>
Nodding thread-moss	<i>Pohlia nutans</i>
Papillose bog-moss	<i>Sphagnum papillosum</i>
Red-stemmed feathermoss	<i>Pleurozium schreberi</i>
Reindeer lichen	<i>Cladonia impexa</i>
Soft bog-moss	<i>Sphagnum tenellum</i>
Trees and Shrubs	
Bramble	<i>Rubus fruticosus</i> agg.
European larch	<i>Larix decidua</i>
Gorse	<i>Ulex europaeus</i>
Hawthorn	<i>Crataegus monogyna</i>
Rowan	<i>Sorbus aucuparia</i>
Scots pine	<i>Pinus sylvestris</i>
Sitka spruce	<i>Picea sitchensis</i>



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