

Plantecol Limited

Ben Sca Redesign Wind Farm: Habitat and Vegetation Survey Report

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10/30/2023

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BEN SCA REDESIGN WIND FARM: HABITAT AND VEGETATION SURVEY

1. Background

Plantecol Limited was commissioned by SLR Consulting to carry out a vegetation survey of the Proposed Development site, on the Isle of Skye in the Inner Hebrides of Scotland. The survey area includes a buffer zone of 200 metres around all proposed infrastructure, including the access track, construction compound and substation (**Figure 5.1.1**). The aim of the survey was to provide an assessment of the habitats and vegetation types within the area shown.

2. Methods

2.1 Pre-survey preparation

Digital versions of the Ordnance Survey (OS) 1:25,000 map tiles were overlain with digital aerial imagery obtained from an official OS supplier and printed at 1:5,000 scale on to sheets of A3 paper. These maps, including the OS maps without the aerial imagery were used to draw boundaries to areas, termed polygons, of apparently uniform habitat and vegetation. Each polygon was assigned a unique identifying number (UID).

2.2 Field survey

The habitats and vegetation were surveyed within the assigned 255ha of ground by walking through each polygon to identify the habitats and vegetation types present. Field surveys were only carried out on days without mist, low cloud or heavy rain to minimise as far as possible mapping errors.

At the request of SLR Consulting, the habitats defined in the UKHabitat categories, devised by UKHab Ltd, were mapped with reference to the definitions given in the UK Habitat Classification (Version 2.0)¹. Most polygons had two or more habitats present within them and consequently the proportion of the polygon occupied by each had to be given. However, exact percentages were not given for the coverage of ground by a habitat as this gives a false impression of the level of precision that can be achieved in assessing the cover occupied by different habitats (Hurford 2007). Instead, each habitat was assigned to a class interval with intervals for percentage cover as given in Table 1. These class intervals are based on the Domin and Braun-Blanquet scales (Mueller-Dombois & Ellenberg, 1974) for assessing the cover of different species of plant. The use of an interval scale with broad intervals is important in minimizing, as far as possible, observer error in estimating the area covered by habitats and communities as well as species.

A Garmin GPS map 65s receiver was used to help identify locations of boundaries and to record the grid reference for any target notes on particularly small and unique habitats, e.g., flushes. Some of the polygon boundaries were altered, added or removed in the field by

¹ Available @:<https://ukhab.org>

marking in pencil on paper copies of the maps printed at a scale of 1:10,000, or changing the polygon boundaries of the maps within the Qfield GIS program.

The presence of blanket bog habitat was established by using the presence of peat depths of 50cm or more by testing the ground with a 1m threaded metal rod fitted with a wooden t-bar fitted at the end. This is because NatureScot recognise blanket bog habitat as being present where peat depths are at least 0.5m thick, that supports potentially peat forming communities of plants and that it is ombrotrophic (i.e., dependent on rainfall (and snow) for all its hydrological, and therefore, nutrient inputs)². The reliance on only vegetation types is unsafe as vegetation types typically found in bog habitats can be present on thin layers of peat in western Scotland, and the reverse can be true where wet heath and acid grassland vegetation types can be found on deep peat where the habitat has been significantly modified/damaged.

Apparently, uniform stands of vegetation were assigned to one or more of the communities and/or sub-communities described in the NVC (Rodwell 1991a, 1991b, 1992 and 1995). As with the habitats many of the polygons are composed of mosaics of at least two plant communities. The plant communities were decided by reference to the species that are constants for a community, and the preferential species that are indicative of the sub-communities that may be present for a particular plant community. Not all areas of vegetation could be assigned to a sub-community. This was usually due to the low number of species present or the small area of the stand of vegetation. Assignment of stands of vegetation to a single community or sub-community is also not possible where there are ecotones, i.e., gradients in the species composition from one habitat type to another.

The condition of the blanket bog habitat was assessed at each location where infrastructure would be constructed, i.e., each proposed turbine, substation and construction compound. Sample locations were assigned *a priori*, based on the locations given for the infrastructure and a set of points along the track network at approximately 150m intervals. These sample locations are shown on **Figure 5.1.2**. The assessment was based on the guidance for blanket bog habitat as set out in the Common Standards Monitoring (CSM) guidance for Upland (version 2009) habitats³ (JNCC 2009). The presence of natural surface patterning was recorded as well as the depth of peat at each sample location.

Data was entered in the field into an Excel spreadsheet using a tablet. All the field survey work was carried out by Dr A Headley, the director of Plantecol Limited, on the following dates: 28 September 2023; 08 and 18 October 2023. Data collected is presented in Section 5 of this report.

2.3 Data Analysis

The polygons mapped and altered in the field were digitised using the QGIS programme by Fraser Milne, a sub-contractor to Plantecol Limited. These were displayed using the ArcMap10 programme.

An estimate of the area for each habitat, plant community/sub-community was calculated by multiplying the mid-point of the class interval assigned to the habitat/plant community for a polygon by the area of that polygon. Lower and upper limits to the estimated area of each

² See NatureScot description @: <https://www.nature.scot/landscapes-and-habitats/habitat-types/mountains-heaths-and-bogs/blanket-bog>

³ Available @: <https://hub.jncc.gov.uk/assets/78aaef0b-00ef-461d-ba71-cf81a8c28fe3>

habitat and plant community assigned to a polygon were calculated in a similar manner using the lower and upper bounds of the class intervals given in Table 1.

3. Results

3.1 Habitats

The estimated area of each of the habitats is presented in Table 2 and shown on **Figures 5.1.3** and **5.1.4**. The coniferous plantation of Sitka spruce (*Picea sitchensis*) covers the greatest proportion (36%) of the survey area in the north and east of the site followed closely by unmodified blanket bog (27%) in the south and west of the site and degraded blanket bog (22%) in the south of the site. Much of the blanket bog on the open-hill ground immediately to the south and east of the conifer plantation is intact. The degraded blanket bog habitat includes drained bog within the conifer plantations, cut-over and heavily grazed bog north of the A850, areas with badly hagged ground east of the meteorological mast and around Ben Sca, and erosion gullies throughout parts of the open-hill ground. Some of the old erosion gullies are re-vegetating north of the fence that runs through the centre of the survey area on the open hill, whilst nearly all of the peat hagsgs to the south of this fence are actively eroding. The moorland to the south of the fence is grazed both by cattle and sheep, whilst evidence of red deer tracks was seen across all of the survey area, including the forest rides.

Blanket bog habitat was not present at turbine base locations BS01, BS02, BS03 and BS04, and at sample locations TR13, TR14 and TR15 along the track network between turbines BS01 and the substation and turbine BS02 (**Table 3, Figure 5.1.2**). Although the northern part of the survey area has extensive areas of deep peat, it has been planted up with conifers and is no longer effectively blanket bog habitat. The condition assessment of the blanket bog habitat at all sample locations where the infrastructure would be installed is presented in **Table 3**. This shows that the blanket bog habitat failed one or more of the CSM targets at all sample locations. Sample locations TR3 through to TR6 only failed on the cover of non-native species (aliens) being more than 1% cover, and this was due to the presence of the Sitka spruce plantation within the site of these sample locations. The blanket bog further to the south failed on the drainage of the bog being more than 10%, which was due to the presence of significant amounts of erosion gullies or haggging.

The upland acid grassland at the southern end of the survey area has areas of upland dry heathland habitat mixed in with the acid grassland. For the most part these look to be secondary habitats that have established on the ridge after the blanket bog peat has been eroded away, as there are hagsgs of blanket bog peat between about 0.5m and 1.5m high, especially on the west side of the ridge.

A line of flushes was found on the east side of the ridge just to the east of the location where turbine BS02 is proposed (**Figure 5.1.3**). Brief notes on the main species of plant found in these flushes are given in the target notes in **Table 5**. They have species indicative of neutral oligotrophic flushes which may be near neutral to slightly alkaline based on the species of plant present.

3.2 Plant Communities

Only ranges in the estimated area for each plant community identified in the field survey are given in **Table 4**. This is because there is strong evidence that there is a low level of reproducibility in different field ecologists being able to identify the same stand of vegetation to the same plant community described in the NVC (Hearn *et al.* 2011).

The main plant community that was present within the blanket bog habitat was the heather (*Calluna vulgaris*) – hare's-tail cotton-grass (*Eriophorum vaginatum*) or M19 (**Figure 5.1.4**). Much of this plant community can be assigned to the cross-leaved heath (*Erica tetralix*) sub-community (M19a).

In the small valley immediately to the southeast of Mullach Ben Sca there is a stand of the hare's-tail cotton-grass (*Eriophorum vaginatum*) blanket and raised mire community (M20) (**Figure 5.1.4**). There are stands of soft rush (*Juncus effusus*) along the watercourse in this valley and elsewhere within the blanket bog habitat. These stands of vegetation have been placed within the soft rush sub-community of the star sedge (*Carex echinata*) – bogmoss (*Sphagnum recurvum/auriculatum*) mire or M6c. They occur elsewhere within the survey area along watercourses draining the blanket bog habitat on the open hill and within the conifer plantation.

The few bog-pools with standing water in the area at target note TN02 have both the cow-horn bogmoss community (*Sphagnum denticulatum*) bog-pool community (M1) and the feathery bog-moss/flat-topped bog-moss (*Sphagnum cuspidatum/recurvum*) bog-pool community (M2).

The most widespread wet heath community was the typical sub-community of the common deergrass (*Trichophorum germanicum*) – cross-leaved heath wet heath plant community (M15b).

The upland acid grassland habitat around Ben Sca hill mostly has the mat-grass (*Nardus stricta*) – heath bedstraw (*Galium saxatile*) grassland community (U5). It is mixed in with the heather – bell heather (*Erica cinerea*) heath community (H10) and there are subtle gradients between these two communities. The H10 heath community is represented by the typical sub-community in this situation, but small areas of woolly hair-moss (*Racomitrium lanuginosum*) rich stands of the H10b community occur on rocks and on eroding banks of dried out blanket bog peat.

3.3 Signs of protected species of mammal

No signs of pine marten or otter were found during the walkover survey. However, not all watercourses or forest rides were thoroughly searched, and either of these species could be present. Otters could hunt for frogs in spring if they are mating in the pool at target note TN01.

There is no evidence of protected mammals on this site prior to these surveys.

4. References

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5. Tables

Table 1. The class intervals used for assessing the proportion of a polygon or quadrat occupied by the component plant communities or species of plant.

Cover range	Domin	Braun-Blanquet	Cover range	This study
91–100%	10	5	95 – 100%	8
76–90%	9		75 – 95%	7
51–75%	8	4	50 – 75%	6
34–50%	7	3	25 – 50%	5
26–33%	6		10 – 25%	4
11–25%	5	2	5 – 10%	3
4–10%	4		1 – 5%	2
<4% (many individuals)	3	1	<1%	1
<4% (several individuals)	2	+		
<4% (few individuals)	1	Rare		

Table 2. The estimated areas (in hectares) for each habitat within the survey area.

Habitat	Code	Median (ha)	Minimum (ha)	Maximum (ha)
other coniferous woodland	w2c	90.68	82.32	99.05
blanket bog	f1a5	69.70	58.48	80.93
degraded blanket bog	f1a6	54.96	41.06	68.86
upland acid grassland	g1b	18.31	15.64	20.98
wet heathland with cross-leaved heath; upland	h1b6	7.16	3.86	10.47
cutover peat	Secondary code 422	3.05	2.44	3.66
dry heathland; upland	h1b5	3.02	1.83	4.21
<i>Holcus-Juncus</i> grassland	g3c8	2.48	2.10	2.85
track	u1c	2.10	1.33	2.88
upland flushes, fens and swamps	f2c	0.83	0.26	1.41
inland rock outcrop	s1a	0.80	0.21	1.41
road	Secondary code 800	0.62	0.41	0.82
other neutral grassland	g3c	0.33	0.17	0.49
acid peat-stained lakes and ponds	r1c7	0.19	0.004	0.38
scattered scrub	Secondary code 10	0.13	0.05	0.22
surface flush or rill or soakway	Secondary code 419	0.10	0.002	0.21
All		254.46	210.12	298.82

Table 3. The results of an assessment of the condition of the blanket bog habitat present at locations where parts of the Ben Sca Wind Farm infrastructure will be located and carried out on the 18th October by A. Headley. Failed targets are highlighted in orange and those that pass the target are highlighted in green. Abbreviations: no* = conifer plantation within sight of the sample location; no† = drainage due to gullies and hagged peatlands.

Waypoint code		CC1	HS1	BSX-02	CC2	BSX-01	TR1	BP1	TR2	BS-07	TR3	TR4	TR5	TR6	TR7
infrastructure		construction compound	hard standing	turbine base	construction compound	turbine base	track	borrow-pit	track	turbine base	track	track	track	track	track
Easting		132392	132036	132046	132094	132262	132555	132566	132573	132453	132636	132769	132857	132848	132722
Northing		850738	849749	849718	849485	849473	849416	849349	849257	849123	849254	849179	849054	848963	848913
NVC (CP = conifer plantation)		M25a	M25a	CP	M25a	CP	M25a	M25a	M25a	CP	M19a	M19a	M17a/M1	M19a	M19a
Peat depth (m)		0.6	0.5	>1	>1	>1	0.5	0.4	>1	>1	>1	>1	0.7	>1	>1
Blanket bog habitat present		no	no	no	yes	no	yes	yes	yes	no	yes	yes	yes	yes	yes
≥6 indicator species?	4m ²	No (3)	No (3)	No (0)	No (3)	No (0)	No (5)	No (4)	No (5)	No (0)	Yes (6)	Yes (6)	Yes (8)	Yes (7)	Yes (7)
<i>S.fallax</i> only <i>Sphagnum</i> present	4m ²	yes	na	na	yes	na	yes	na	yes	na	yes	yes	yes	yes	yes
≥50% cover from ≥3 indicator species?	4m ²	yes	no	no	no	no	no	no	yes	no	yes	yes	yes	yes	yes
cover of any single taxon >75%?	4m ²	no	yes	yes	yes	yes	yes	yes	no	yes	no	no	no	no	no
cover of aliens <1%?	visible	no*	no*	no*	no*	no*	no*	no*	no*	no*	no*	no*	no*	no*	no*
cover of scattered native trees & scrub <10%?	visible	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
collective cover of common bent, Yorkshire fog, reed, bracken and creeping buttercup <1%?	4m ²	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<33% of long shoots dwarf-shrubs browsed?	4m ²	yes	yes	na	yes	na	yes	yes	yes	na	yes	yes	yes	yes	yes
no signs of burning into moss/lichen layer or bare peat surface?	visible	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
no burning or other disturbance inside sensitive areas?	visible	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
< 10% of area drained by ditches or trampling?	visible	yes	yes	no	no	no	no	no	no	no	yes	yes	yes	yes	no†
eroding peat/min soil < re-deposition/re-vegetation areas?	visible	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
< 10% of <i>Sphagnum</i> crushed, broken or pulled-up?	4m ²	yes	na	na	yes	na	yes	na	yes	na	yes	yes	yes	yes	yes
cover of disturbed bare ground <10%?	4m ²	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	visible	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
natural surface pattern present	visible	no	no	no	no	no	no	no	no	no	no	no	yes	yes	yes
notes									re-vegetated erosion gullies nearby						re-vegetated erosion gullies nearby

Table 3 continued.

Way-point code		TR8	BS-06	TR9	BS-05	TR10	BS-04	TR11	BS-03	TR12	BS-02	TR13	BS-01	TR14	TR15	SS1
structure		track	turbine base	track	turbine base	track	turbine base	track	turbine base	track	turbine base	track	turbine base	track	track	substation
Easting		132768	132591	132708	132723	132810	132964	133155	133215	133257	133368	133435	133475	133499	133492	133351
Northing		848862	848852	848713	848561	848459	848403	848409	848259	848122	848019	847905	847759	847620	847476	847486
NVC (CP = conifer plantation)		M19a	M19a	M19a	M17a	M19a	M15b	M19a	M15	M18	U5/H10	M15	H10b	U5	U5	M19
Peat depth (m)		>1	0.7	0.9	>1	0.6	0.1	>1	0.2	0.4	0.3	0.3	0	0.4	0.1	0.5
Blanket bog habitat present		yes	yes	yes	yes	yes	yes	yes	no	yes	no	no	no	no	no	yes
≥6 indicator species?	4m ²	Yes (6)	Yes (6)	Yes (7)	Yes (6)	Yes (6)	Yes (6)	No (4)	Yes (6)	No (4)	Yes (6)	Yes (6)	Yes (6)	No (3)	No (4)	Yes (6)
<i>S.fallax</i> only <i>Sphagnum</i> present	4m ²	yes	yes	yes	yes	yes	yes	yes	yes	na	yes	na	na	np	yes	yes
≥50% cover from ≥3 indicator species?	4m ²	yes	yes	yes	yes	yes	yes	no	yes	no	yes	yes	no	no	yes	yes
cover of any single taxon >75%?	4m ²	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
cover of aliens <1%?	visible	no*	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no*
cover of scattered native trees & scrub <10%?	visible	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
collective cover of common bent, Yorkshire fog, reed, bracken and creeping buttercup <1%?	4m ²	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<33% of long shoots dwarf-shrubs browsed?	4m ²	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	no	no	no	yes
no signs of burning into moss/lichen layer or bare peat surface?	visible	no	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
no burning or other disturbance inside sensitive areas?	visible	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
< 10% of area drained by ditches or trampling?	visible	no†	no†	no†	no†	no†	no†	no†	no†	no†	no†	no†	no†	no†	no†	no†
eroding peat/min soil < re-deposition/re-vegetation areas?	visible	yes	yes	yes	yes	no	yes	yes	yes	no†	na	no†	no†	no†	no†	no†
< 10% of <i>Sphagnum</i> crushed, broken or pulled-up?	4m ²	yes	yes	yes	yes	yes	yes	yes	yes	yes	na	no*	na	na	yes	na
cover of disturbed bare ground <10%?	4m ²	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	na	no	yes	yes	yes
	visible	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes
natural surface pattern present	visible	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
notes		re-vegetated erosion gullies nearby	old erosion and burning patterning	re-vegetated erosion gullies nearby	re-vegetated erosion gullies nearby	hagged	hagged	hagged	hagged	hagged		hagged	hagged		hagged	hagged

Table 4. The estimated areas (in hectares) for each community/sub-community within the survey area.

Plant community/sub-community name	Code	Minimum (ha)	Maximum (ha)
<i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> mire <i>Erica tetralix</i> sub-community	M19a	99.69	109.92
<i>Nardus stricta</i> – <i>Galium saxatile</i> grassland species-poor sub-community	U5	10.03	15.13
<i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> mire	M19	9.33	16.39
<i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath typical sub-community	M15b	5.86	13.07
<i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire <i>Erica tetralix</i> sub-community	M25a	2.58	6.22
<i>Holcus lanatus</i> - <i>Juncus effusus</i> rush-pasture typical sub-community	MG10a	2.05	3.03
<i>Calluna vulgaris</i> – <i>Erica cinerea</i> heath typical sub-community	H10a	2.02	5.09
<i>Trichophorum germanicum</i> – <i>Erica tetralix</i> wet heath <i>Vaccinium myrtillus</i> sub-community	M15d	1.99	4.97
<i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath	H12	1.19	2.59
<i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland	U4	0.09	0.55
<i>Carex echinata</i> – <i>Sphagnum recurvum/ denticulatum</i> mire <i>Juncus effusus</i> sub-community	M6c	0.06	1.08
<i>Eriophorum vaginatum</i> blanket and raised mire species-poor sub-community	M20a	0.05	0.54
<i>Sphagnum cuspidatum/recurvum</i> bog-pool community	M2	0.008	0.82
<i>Sphagnum denticulatum</i> bog-pool community	M1	0.005	0.52
<i>Eriophorum angustifolium</i> bog-pool community	M3	0.004	0.38
<i>Calluna vulgaris</i> – <i>Erica cinerea</i> heath <i>Racomitrium lanuginosum</i> sub-community	H10b	0.001	0.08
	All	134.96	180.39

Table 5. Target notes taken of small or notable features, species or habitats.

UID	Date	Easting	Northing	feature	Ukhab code	NVC	species	notes
TN01	28/09/2023	132236	849778	small pond	42		<i>Potamogeton polygonifolius</i> , <i>Carex echinata</i>	area = circa 30 - 40 m ²
TN02	28/09/2023	132716	848661	lochans	f1a6	M2/M3		network of pools in drained ridge top that was formerly more extensive
TN03	28/09/2023	133536	848036	flush	f2c	?	<i>Carex viridula</i> , <i>Eriophorum angustifolium</i> , <i>Juncus bufonius</i>	neutral flush
TN04	28/09/2023	133463	848101	flush	f2c/305	M?	<i>Ranunculus repens</i> , <i>Calliergonella cuspidata</i> , <i>Montia fontana</i> , <i>Cardamine pratensis</i>	
TN05	28/09/2023	133423	848143	spring	305		<i>Callitriche sp.</i>	stream flowing with abundant <i>Callitriche sp.</i>
TN06	28/09/2023	133416	848164	flush	f2c		<i>Carex panicea</i> , <i>C.echinata</i> , <i>Calliergonella cuspidata</i> , <i>Scorpidium cossonii</i>	neutral flush