Beinn Ghlas Repowering Peatland Condition Assessment Survey Report

Alba Ecology Ltd.

Dr Kate Massey, MCIEEM

November 2022

Registered Office: Coilintra House, High Street, Grantown on Spey, Moray, PH26 3EN
Tel: 01651 851712, kate@albaecology.co.uk

Table of Contents

Introduction

Beinn Ghlas Wind Farm is owned by Beaufort Wind Ltd (hereafter “the Applicant”) which is a wholly owned subsidiary of Ventient Energy Ltd. Beinn Ghlas Wind Farm is located south-west of Taynuilt in Argyll, Scotland. It comprises of 14 wind turbines and has been operational since May 1999. In July 2021, planning consent was secured (subject to the agreement of a revised S75 agreement) to operate the wind farm for an additional ten years to August 2033.

A repowering project has also been proposed at Beinn Ghlas by the Applicant. As part of the planning process, Alba Ecology Ltd. was commissioned to conduct a Peatland Condition Assessment (PCA) with the Study Area. In addition, any potential Groundwater Dependent Terrestrial Ecosystems (GWDTE), particularly flushes, were noted during the walkover survey as these are also an important planning consideration.

Study Area

The centre of the Study Area is situated at approximately Ordnance Survey (OS) grid reference NM 965 258 southwest of Taynuilt in Argyll and included the Application Boundary. **Figure 1** provides a map of the Study Area.

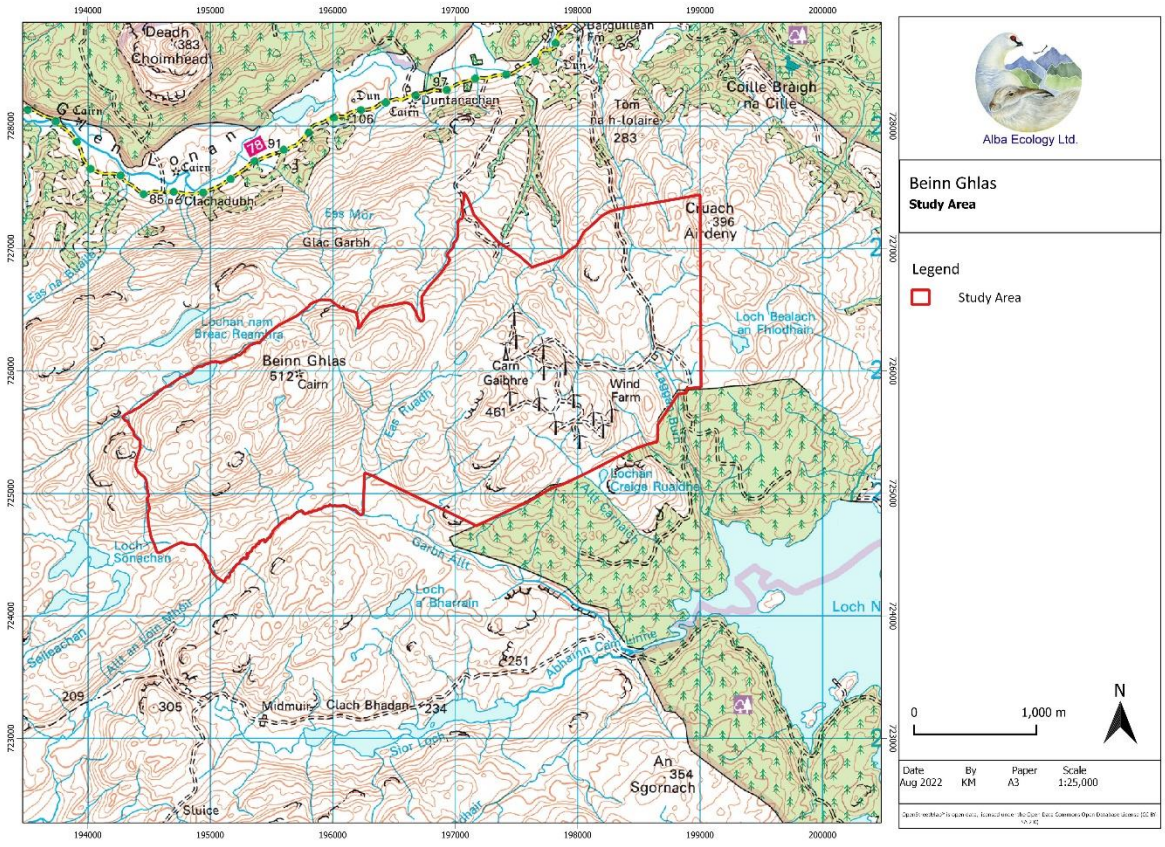


Figure 1: The Study Area.

The Study Area is characterised by open moorland, with a mixture of wet heath and blanket bog present. Details of the habitats within the Study Area can be found in the Beinn Ghlas Wind Farm Habitat Survey Report completed in 2022 by Avian Ecology. A desk study of biological records was conducted in 2021-2022 and is reported in the Natural Heritage Desk Study (Alba Ecology, 2022).

This document reports the findings of the PCA undertaken by Alba Ecology Ltd. in April 2022.

Aims and Objectives

The objectives for this survey report are:

- To consider, map and describe the condition of the peatland habitats within the Study Area; and
- To note any flushes or notable potential GWDTE within the Study Area.

Background

Peatland habitats comprise blanket bog, lowland raised bog, lowland fens, and part of the upland flushes, fens and swamps, as listed in the UK Biodiversity Action Plan (UK BAP)[1]. Blanket bog is the most widespread of these habitat types in Scotland, so it is blanket bog that is usually of relevance for proposed developments/wind farms and is the peatland habitat that is the main focus of this document, although it should be noted that there were upland flushes and fens also recorded within the Study Area.

Blanket bog

Blanket bog is the most widespread semi-natural habitat in Scotland with an estimated 1.8 million hectare (ha) or 23 % of the land cover (Bruneau and Johnson 2014, JNCC, 2020). The nature and quality of blanket bog is highly variable across Scotland due to a range of factors including climate, altitude, slope/gradient and also land-management practices such as drainage, grazing and muirburn.

Blanket bog is valued nationally and internationally as it is on the Scottish Biodiversity List (SBL) and Annex 1 habitat list in the European Union Habitats Directive[2]. When 'active' (areas where peat is currently forming and accumulating), blanket bog is an Annex 1 priority habitat.

In near-natural, fully functioning bogs, the vegetation is dominated by peat forming, wetland species such as *Sphagnum* bog-mosses and cottongrasses. As well as peat-forming species, the surface of a near-natural bog characteristically displays small-scale surface patterning termed 'micro-topography'. This patterning can be seen as a series of hummocks, lawns and hollows across the surface of the blanket bog, with different bog-moss species occupying different zones of the micro-topography in relation to the water table.

Beinn Ghlas is situated in the west of Scotland, experiencing high rainfall and a relatively warm climate. The west of Scotland is within the climatic region which would naturally result in the wettest form of bog habitat where hollows, lawns and pools are obvious characteristic features of flatter ground (Lindsay *et al.*, 2014b).

When blanket bog is in a near natural condition the associated ecology is likewise of a high quality and often contains a suite of specialist species. For example, greenshank and dunlin.

There are many factors which can change blanket bog from a near-natural state, resulting in a more degraded bog system. These include local, pastoral impacts (e.g. drainage, grazing

[1] UK Government (1994), UK Biodiversity Action Plan.

[2] European Union (1992), The Habitats Directive (Council Directive 92/43/EEC).

and burning) as well as global issues such as climate change and atmospheric nutrient deposition.

The degradation of blanket bogs often leads to drier conditions which favour non-wetland species such as heather. The lack of bog-mosses as a carpeting competitor often encourages growth form alterations in species such as cottongrasses, deergrass and purple moor-grass. These species typically change from open, single stem growth within a vigorous bog-moss carpet to dense tussocks growth forms in the absence of such a carpet (Lindsay *et al.*, 2014b). Put simply, degraded blanket bog vegetation changes structurally as well as compositionally. Blanket bog in a degraded state is not only evident in the structure and composition of the vegetation but also is evident in the wider ecology, with e.g. associated upland bird species missing.

Lindsay and co-workers (2014b) state that "*It is important to be aware that the majority of the UK peatbog habitat is currently in a state of degradation or recovery. Very little is in a state which can be regarded as 'near pristine'*".

Habitat Information

A Phase 1 Habitat and National Vegetation Classification (NVC) survey were conducted in October 2021 and is reported in Beinn Ghlas Wind Farm Habitat Survey Report (Avian Ecology, 2022). The Beinn Ghlas Wind Farm Habitat Survey Report states:

"A variety of habitats characteristic of upland sites were recorded across both the wind farm site and adjacent habitat management area. The terrain comprised a complex of steep-sided hills and valleys with a few flatter patches of bogs or marshy grassland, with several scattered small lochs and lochans. The vegetation comprised mostly of a mosaic of wet heath and bogs, interspersed with areas of acid and marshy grassland. The very steep and rocky slopes supported a mosaic of dry heath and acid grassland. Several watercourses were present across the site, a few of which were flanked by small remnants of deciduous woodland and willow scrub.

The vegetation communities present were characteristic of dry and wet upland habitats, including some that are likely to comprise groundwater dependent terrestrial ecosystems. Varying levels of grazing pressure by sheep and deer was evident throughout, which in some localities was likely to be resulting in the degradation of the vegetation communities present."

The NVC communities identified that are consistent with peatland vegetation were:

- M15 *Trichophorum germanicum – Erica tetralix* wet dwarf-shrub heath community;
- M17a *Trichophorum germanicum – Eriophorum vaginatum* blanket mire *Drosera rotundifolia – Sphagnum* species sub-community;
- M19b *Calluna vulgaris – Eriophorum vaginatum* blanket mire *Empetrum nigrum ssp nigrum* subcommunity; and
- M25a *Molina caerulea – Potentilla erecta mire, Erica tetralix* sub-community.

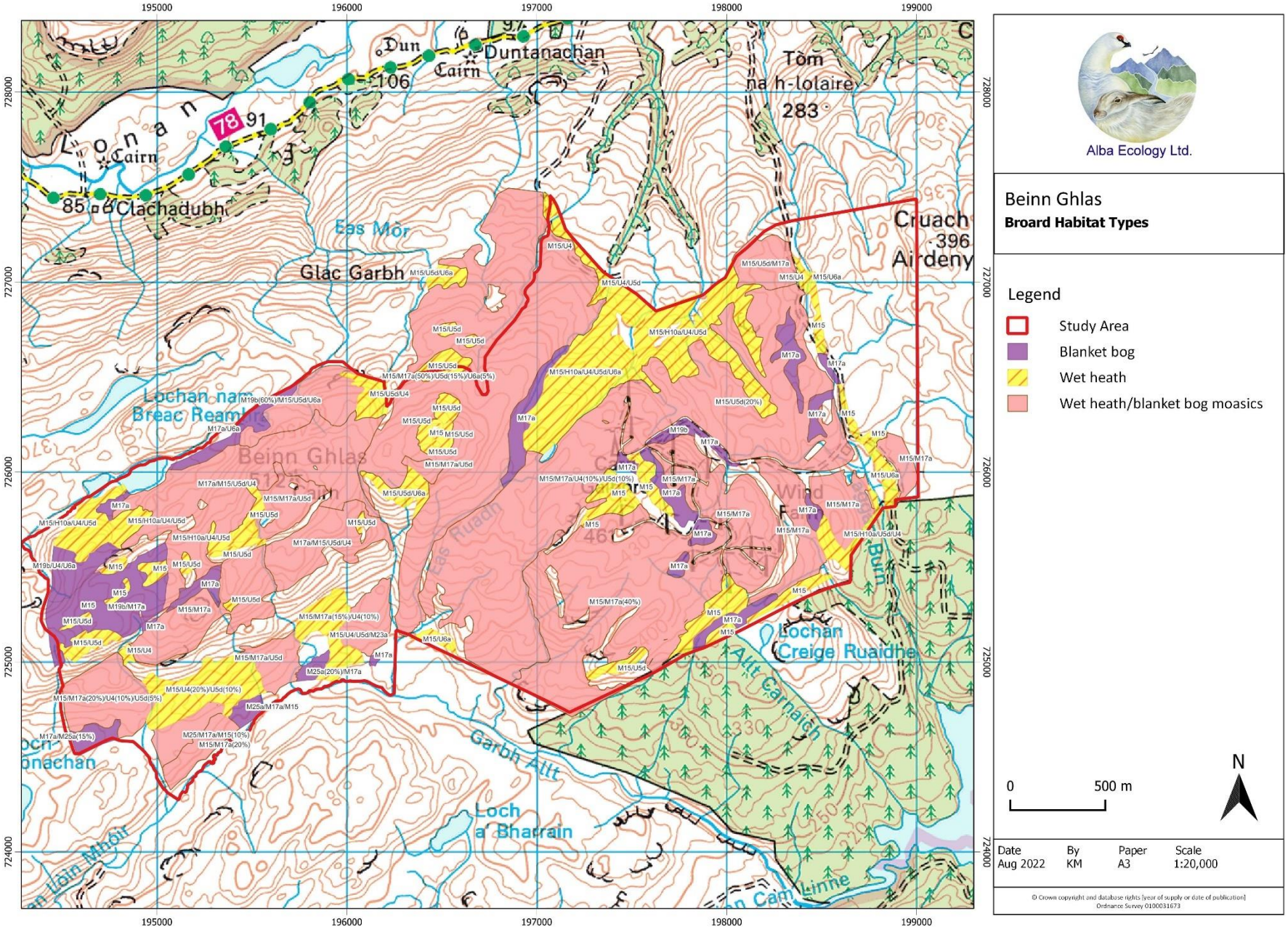
The NVC survey, undertaken by Avian Ecology, covered 782 ha of area, with a similar (but not quite the same due to changes in design layout) Study Area used in this PCA survey. In the NVC survey a total of 681.5 ha (87 %) was mapped as either a form of wet heath (137.5 ha, 18 %), blanket bog (59.6 ha, 8 %) with by far the majority of the area mapped as a form of wet heath and blanket bog mosaic (484.4 ha, 62 %). This demonstrates the widespread nature of peatland habitats across the Study Area and gives some indication as to both the complexity of the Study Area in terms of topology and the complexity of the condition of the peatlands so that wet heath and blanket bog could not easily be separated out as part of the NVC survey. **Figure 2** displays the area of wet heath, blanket bog and wet heath/blanket bog mosaic with **Table 1** displaying the areas and NVC communities as mapped by Avian Ecology (2022).

Broad Habitat Type	**NVC communities**	**Area (ha)**
Blanket bog		59.6
	M17a	25.9
	M17a/M25a(15%)	2.7
	M17a/U6a	4.1
	M19b	1.3
	M19b/M17a	16.6
	M19b/U4/U6a	5.6
	M25a(20%)/M17a	1.5
	M25a/M17a/M15	1.9
Wet heath		**137.5**
	M15	21.3
	M15/H10a/U4/U5d	31.9
	M15/H10a/U4/U5d/U6a	23.7
	M15/H10a/U5d/U4	3.3
	M15/U4	3.6
	M15/U4(20%)/U5d(10%)	13.7
	M15/U4/U5d	1.2
	M15/U4/U5d/M23a	7.5
	M15/U5d	16.9
	M15/U5d(20%)	1.1
	M15/U5d/U4	3.4
	M15/U5d/U6a	5.6
	M15/U6a	4.1
Wet heath/blanket bog mosaics		**484.4**
	M15/M17a	64.5
	M15/M17a(15%)/U4(10%)	7.1
	M15/M17a(20%)	5.5
	M15/M17a(20%)/U4(10%)/U5d(5%)	13.9
	M15/M17a(40%)	67.0
	M15/M17a(50%)/U5d(15%)/U6a(5%)	105.4
	M15/M17a/U4(10%)/U5d(10%)	120.0
	M15/M17a/U5d	14.7

Broad Habitat Type	NVC communities	Area (ha)
	M15/U5d/M17a	7.4
	M17a/M15/U5d/U4	61.8
	M19b(60%)/M15/U5d/U6a	12.0
	M25/M17a/M15(10%)	5.1
	Total	*681.5*

Table 1: The broad habitat categories (blanket bog, wet heath, wet heath/blanket bog), with their NVC communities and the area (in ha) of the Study Area (from Avian Ecology, 2022). Bold denotes the title and numeric of the broader habitat types

Figure 2: Broad Habitat Types and the NVC and Beinn Ghlas



Soil and Geology Information

Soil and geological information can provide insight into the vegetation expected in the Study Area and can inform decisions regarding GWDTEs. Therefore, the British Geological Society's (BGS) hydrogeological and geological mapping and the Scotland's Soils (2016) Carbon and Peatlands Map[3] have been consulted to inform this survey report and is presented in **Table 2**. The predicted Carbon and Peatland Map data for the Study Area has been displayed in **Figure 3**.

The majority of the Study Area is predicted to be Class 2 "*Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential*" with a small section predicted to be Class 5 "*Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat*."

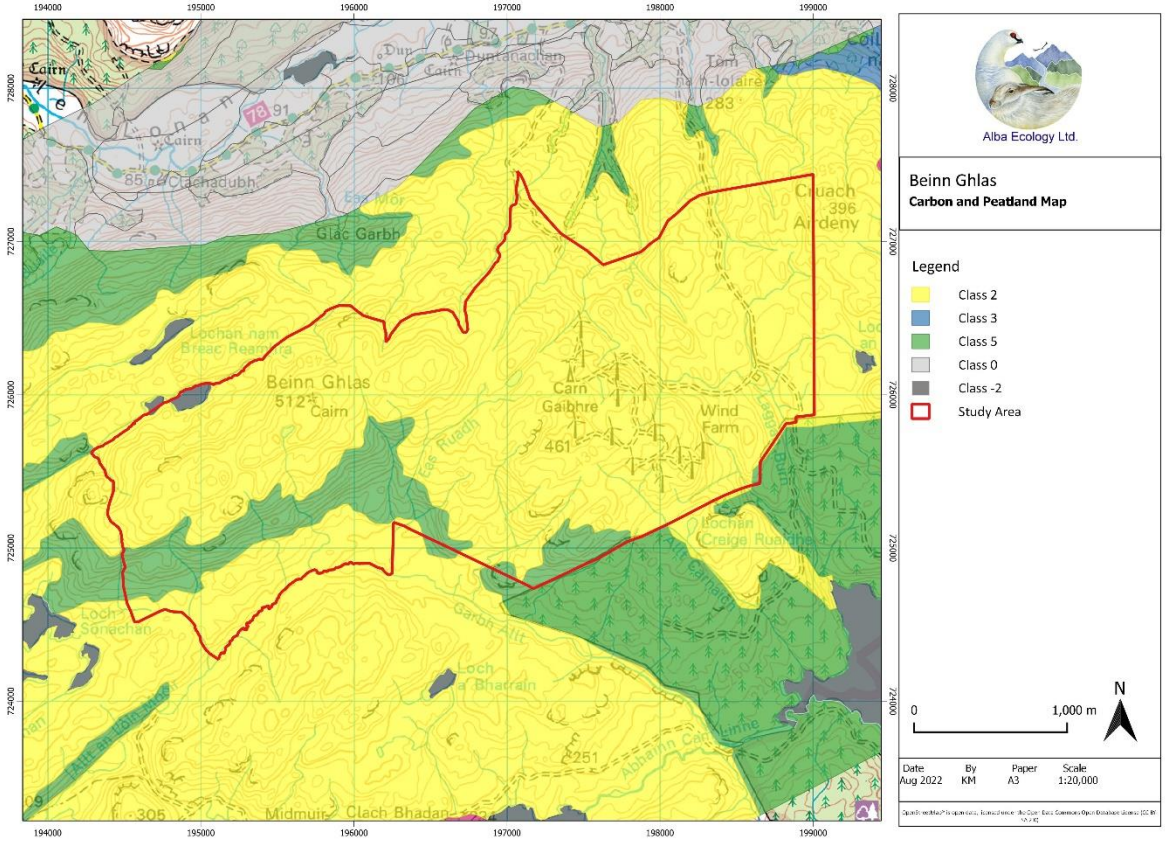


Figure 3: Extract of the predicted Carbon and Peatland Map for the Study Area (Scotland's Soil, 2016).

Table 2 provides an overview of the geological information recorded for the Study Area.

[3] *Scotland Soils (2016), Carbon and Peatland 2016 Map. Available at: https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map*

Source	Details
Carbon and Peatland map	Predicted mixture of: • Class 2 - Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential; • Class 5 - Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat. • Class -2 - Non-soil (e.g. loch, built up area, rock and scree) (Class -2).
BGS – superficial deposits	• No data available.
BGS – bedrock	Mixture of: • Lorn Plateau Volcanic Formation - andesite and basalt igneous bedrock formed approximately 393 to 424 million years ago in the Devonian and Silurian periods. Local environment previously dominated by eruptions of silica-poor magma; • Lorn Plateau Volcanic Formation - rhyolite and dacite igneous bedrock formed approximately 393 to 424 million years ago in the Devonian and Silurian periods. Local environment previously dominated by eruptions of silica-rich magma; • Lorn Plateau Volcanic Formation - Tuff and agglomerate igneous bedrock formed approximately 393 to 424 million years ago in the Devonian and Silurian Periods. Local environment previously dominated by explosive eruptions of magma; • North Britain Siluro-devonian Calc-alkaline Dyke Suite - microdiorite and appinitic dioritic igneous bedrock formed approximately 359 to 444 million years ago in the Devonian and Silurian Periods. Local environment previously dominated by intrusions of silica-poor magma.
BGS - hydrogeological maps	Low productivity aquifer with small amounts of groundwater in near surface weathered zone and secondary fractures.

Table 2: Summary descriptions of the soils, bedrock, and hydrogeology for the Site (BGS, 2022a; BGS, 2022b; Scotland's Soils, 2016).

Discussion with land managers

Discussions with the third-generation tenant farmer for the Study Area revealed that Beinn Ghlas has had a long history of interventionist management (*pers comm.*). The tenant farmer took over the tenancy of the land marked in yellow in **Figure 4** circa (ca.) 25 years ago. He does not have tenancy for the area to the west marked in blue which is currently the Habitat Management Plan (HMP) area for the operational Beinn Ghlas Wind Farm.

*Figure 4: Land ownership (provided by RSK) - **Redacted.***

The tenant farmer reported that 25 years ago there were approximately 800 ewes on the site. The stock was reduced to 575 ewes which has been maintained. There has also been an introduction of 20 breeding cattle in recent years. The tenant farmer has never been involved in deer culling, although it was acknowledged that deer were present, particularly in the HMP area. The whole of the tenancy area was at one time burnt regularly. However, it was noted that the site hasn't been deliberately burnt for ca. 10 years. In the 1970s some drains were ploughed. These have not been maintained and the tenant farmer stated that most have naturally filled back in. There has been heather beetle damage which has killed some heather. He does not have the tenancy for the HMP area. Although he had maintained a fence around the area since 1998.

Methods

The PCA survey and GWDTE walkover survey was led by highly experienced habitats surveyor Dr Kate Massey (MCIEEM) of Alba Ecology Ltd. in April 2022.

The surveys were conducted using 1:25,000 Ordnance Survey maps and aerial photographs with a resolution of 0.25 m at a scale of 1:5,000. The entire Study Area was walked, focussing on peatland habitats identified as part of the NVC survey and noting potential GWDTEs during the walkover.

Peatland Condition Assessment (PCA)

Consideration of the condition of the peatland habitat was based on the Peatland Action Guidance for PCA (Peatland Action, 2016).

PCA bases the condition of blanket bog on indicators such as bog-moss cover, extent of bare peat and evidence of grazing and burning (Peatland Action, 2016). The PCA recognises four broad categories of peatland condition:

1. Near-Natural - peat forming bog-mosses dominant, with no recent fires, little or no grazing pressure and little or no bare peat, heather is not dominant.
2. Modified – Bare peat is in small patches, fires may be recent, grazing impacts are evident, bog-mosses are absent or rate, extensive cover of heather or purple moor-grass.
3. Drained – within 30 m either side of an artificial drain or a revegetated hagg or gully system.
4. Actively Eroding – actively eroding hagg/gully system, extensive continuous bare peat surfaces.

At least one category from the PCA was assigned to each mapped peatland area. The category names are capitalised within the text.

PCA Support Tool

The PCA Support Tool is an online tool designed to assess the condition of peatlands. The tool was created by researchers of Scotland's Rural College (SRUC), The James Hutton Institute and the University of Leeds to support NatureScot's Peatland Action programme. It was developed using available scientific information and expert opinion and gives descriptions of peatlands as being 'good', 'intermediate' or 'bad' in terms of their condition (Glenk *et al*, 2017). The criteria for these descriptive terms are shown in **Table 3**.

The data collected from the PCA were considered in relation to the PCA Support Tool which describes if a bog is likely to be actively forming peat or not (Glenk *et al.* 2017). Peatland activity is the formation of peat when plant material does not decompose due to water-logged conditions. **Table 3** provides an outline of the criteria used in the PCA Support Tool to assess peatland activity. Consideration was also given to the IUCN descriptions of blanket bog activity (Lindsay, 2014a-c).

Signs	Good	Intermediate	Bad
Water	Plenty of water, visible on the surface.	Surface water is rarely visible.	Deep gullies have formed from wind and water erosion.
Vegetation	Small grasses, bog-mosses (*Sphagnum spp*.) common and very wet.	Taller plants, such as cottongrasses (*Eriophorum spp*.) and heather.	Rarely any plants grow on the areas that are exposed. Patches of grasses or heather are still found on 'islands' in between exposed bare peat.

Signs	Good	Intermediate	Bad
Bare peat	Little to no bare peat patches.	Bare peat patches are occasional, burning may occur.	Bare peat areas will continue to expand, leaving less plant cover as protection on the surface. Peat will continue to be lost until the solid rock is exposed.
Water quality	Water flowing from good quality peatland is clear.	Water flowing from peatland likely to be slightly brown, especially after heavy rainfall.	Bad water quality, it can be dark brown from the peat content.
Wildlife	Good for wildlife.	Wildlife less abundant than in good condition.	Home too little wildlife.
Resultant activity level	Active.	Stopped growing, inactive.	Inactive.

Table 3: Peatland Condition Assessment Support Tool categories of good, intermediate and bad peatland (Glenk et al*, 2017).*

Groundwater Dependant Terrestrial Ecosystems (GWDTE)

Where wetlands were identified, following the Functional Wetland Typology (SNIFFER, 2009a and 2009b) and Botanæco GWDTE guidance (Botanæco, 2021), an assessment was made as to whether they were likely to be potential GWDTE as defined in SEPA Guidance Notes (SEPA, 2017a; SEPA, 2017b).

Nomenclature

Common names only are given in this report. Nomenclature follows Streeter and co-workers (2016) for higher plant species, and Atherton *et al*., (2010) for bryophyte species. Plant groups comprising many micro-species (such as dandelions) are treated as aggregates.

Limitations

Standard sampling methods were followed, and any biases or limitations associated with these methods could potentially affect the results collected. Furthermore, while every effort was made to provide a full assessment and comprehensive description of the peatland habitat and potential GWDTEs within the Study Area, it is unlikely that one survey can achieve full characterisation due to temporal variations. Limitations to PCA surveys and GWDTE walkovers include:

- Maps are only indicative of the habitat, communities or condition boundaries as there was often no clear boundary between vegetation types, there being instead a gradual change set within a complex topography of hills, valleys and basins.

- Some habitats are made up of similar assemblage of species, which can be at a transitional stage/condition between two community types.

- PCA and walkover surveys are not floristic surveys intended to create full species inventories or count all individuals of any species but to map and describe the condition of the peatlands and note potential GWDTEs. Some species were recorded when they were encountered, but it is likely that additional species, not listed, were present within the Study Area, particular because species presence and visibility varies throughout the growing season.

- Plant species occurrence and visibility change both temporally and spatially. This is particularly true for colonising and invasive species. The data provided by habitat surveys is a snapshot in time (April 2022 for this survey) and cannot account for changes that occur outwith this time period. Non-native invasive species can be prolific colonisers. For example, Japanese knotweed spreads from rhizomes, rhizome fragments, as well as stem and crown fragments. Spread is usually a result of human intervention, such as spreading fragments in tyre treads (Fennell *et al.*, 2018). Additionally, at different times of year (e.g. winter) or life-stage (e.g. early colonisation) the identification of non-native invasive species can be challenging. Therefore, although non-native invasive species were considered during field surveys and field surveys were conducted at the optimal time of year, it is possible for non-native invasive species to be present (but unrecorded) within the Study Area.

- Habitat categories and the 'condition' of these categories are human (or artificial) constructs and, therefore, to a degree are subjective and a matter of professional judgement. Furthermore, different conditions can co-exist in an area of habitat (e.g. through drainage, preferential grazing, trampling etc.) and so it is not always appropriate to assume an entire area of habitat is in one condition or another. Under these circumstances, it is usually reported that the habitat is approaching a particular condition. This is fully recognised in ecological assessments and consequently it is not always possible to be unequivocal when making judgements such as whether a particular habitat is classified under one condition or another. Where discrepancies have occurred they have been noted and explained.

The limitations were minimised by conducting the field survey within the optimal survey period (between April and October).

It is important to note that measuring peat depth was outside the scope of this survey. Apparent peat depth as discussed in this report is estimated based on visual vegetation assessments and through estimating peat depth from available features such as haggs and ditches and through using a short probe to consider if the peat was more or less than 50cm deep. Peat depth surveys have been undertaken for the Study Area and are reported in the Environmental Iimpact Assessment (EIA) Report **Chapter 8 Hydrology, Geology and Hydrogeology**.

Results

The PCA is shown in **Figure 5** and potential GWDTE in **Figure 6**. These figures are supported with a list of target notes (**Appendix 1, Figure 7**).

The Study Area contained complex terrain with peatland habitats, namely blanket bog, in valley bases and on shallow slopes.

All the blanket bog within the Study Area had been subject to some degree of modification e.g. through climate change and nitrogen deposition, historic burning and drainage and extensive grazing pressure was noted across the Study Area, but particularly in the west of the site (the operational Beinn Ghlas Wind Farm HMP Area). The condition of the blanket bog habitat was variable across the Study Area and was on a continuum from very wet bog exhibiting characteristics of Near-Natural blanket bog to highly Modified and Actively Eroding areas.

The walkover GWDTE survey recorded very small springs and spring heads across the Study Area.

Peatland Condition Assessment

Table 4 gives the condition of the peatland within the Study Area according to the PCA categories with additional categories used to separate clear variation of the Modified category which was seen within the Study Area.

PCA Category	Area (Ha)	% of Study Area
Near-Natural	9.2	1.1
Lightly Modified	70.7	8.8
Modified	459.8	57.0
Actively Eroding	6.2	0.8
Recovering Erosion	1.5	0.2
Not blanket bog habitat	258.7	32.1
Total	*806.1*	*1.1*

Table 4: The total area and percentage of each PCA found in the Study Area.

The PCA is a standard, but broad-brush approach to considering peatland condition, with the Modified category in particular often having a number of clearly different types of modification present within one area. Therefore, the categories ‘Lightly Modified’ and ‘Recovering Erosion’ were used in the field as a way of separating clear differences that were present. It should be noted that both of these categories are considered to be Modified (as per the PCA) with the ‘Recovering Erosion’ category also having some characteristics of other categories such as Actively Eroding.

The PCA is shown in **Figure 5** with some examples of each category provided in **Table 5**. It should be noted there is a degree of subjectivity in the PCA, and so the map should be

considered indicative and the categories subjective and somewhat overlapping, particularly in and around complex habitat mosaics.

Near-Natural

The blanket bog which was considered to be in or approaching a 'Near-Natural' condition contained complexes of bog pools, bog-mosses hummocks and a relatively intact bog-moss layer which was generally thick and included several species (Photo 1). There were limited signs of grazing impacts or artificial drainage. The Near-Natural blanket bog was more frequently recorded in the western part of the Study Area.

Photo 1: Example of Near-Natural peatland with bog pools with open vegetation and hummocks of bog-mosses.

In the areas termed Near-Natural bog the pools could make up between ca. 10 % and 30 % of the bog surface area. The pools usually had feathery bog-moss within them and could be very deep. Around the edge there was usually a mixture of red bog-moss and papillose bog-moss with soft bog-moss, magnetillum bog-moss and lustrous bog-moss occasionally present. Vascular plant vegetation was often growing in an open form through the bog-moss carpet, including hare's-tail cottongrass, common cottongrass, heather and cross leaved heath. Bog asphodel and round-leaved sundew were frequently present. There were sometime hummocks of woolly fringe moss and red bog-moss. These areas were generally wet to very wet underfoot.

The Near-Natural bog was often located within a basin or valley, with likely deep or very deep peat. The Near-Natural nature had persisted as water-logging was retained due to the topography of the basins. This resulted in the area experiencing less impacts of grazing as the animals avoided these wetter areas in favour of drier slopes.

In some locations Near-Natural bog was located in a basin adjacent to some of the current wind farm infrastructure. These areas including the characteristic bog pools and bog-moss lawns commonly associated with near-natural bog systems with the vegetation surrounding the pools often very wet underfoot.

Lightly Modified

The areas termed ‘Lightly Modified’ denotes blanket bog habitat which was damp with bog-mosses frequent to abundant but had clearly experienced modifying influence (Photo 2). In these areas signs of grazing pressure were usually obvious. To distinguish these areas from the more Modified vegetation (described in the ‘Modified’ section) these areas were termed ‘Lightly Modified’. Most of the Lightly Modified bog was in the west of the Study Area.

Photo 2: An example of blanket bog vegetation classified as Lightly Modified bog.

The Lightly Modified bog was generally drier with a more impoverished bog-moss layer than in a Near-Natural setting. Bog-mosses were usually limited to red bog-moss and papillose bog-moss, although these could be thick and abundant in places. The vegetation included hare’s-tail cottongrass, and purple moor-grass which were often, but not always as tussocks, common cottongrass, cross-leaved heath and heather. There were occasional pools and hummocks of moss, but these were not characteristic of the Lightly Modified bog and not as extensive as found in the Near-Natural bog.

There were usually multiple of signs of grazing pressure including trails, hoof marks, dung piles, bite marks and artificial plastic feeding buckets. Vehicle tracks were also often seen. These areas were likely to have experienced burning and prolonged grazing, but due to the climate in the west of Scotland where rainfall is high and the topographic location which was usually within basins between small hills of wet or dry heath, the blanket bog retain bog-moss and some degree of dampness despite the modifying influences.

To be clear, these areas were considered Modified as per the PCA descriptions, but to a lesser degree than the blanket bog described in the ‘Modified’ section.

Modified

The areas termed ‘Modified’ denotes blanket bog habitat characterised by there being there were little to no bog pools present, a depleted/absent bog-mosses layer and and frequent evidence of grazing pressure.

Blanket bog in a Modified condition was present across the Study Area. Historic burning drainage and particularly grazing resulted in the Modified nature of the blanket bog. Grazing

pressure was notable with trees being restricted to steep stream sides and inaccessible locations. Grazing pressure was generally more prevalent in the west of the Study Area. Notably this was in the operational Beinn Ghlas Wind Farm HMP section of the Study Area.

There were several different types of bog which were considered to be in a (more) Modified condition:

- Wet heath vegetation (e.g. NVC community M15), potentially on deep peat in places (Photo 3a),
- Tussocky vegetation of hare's-tail cottongrass (e.g. NVC community M20) or purple moor-grass (e.g. NVC community M25) (Photo 3b), and
- Tussocky vegetation with heather (e.g. NVC community M19) (Photo 3c).

Photos 3a-c: Examples of blanket bog vegetation classified as Modified with wet heath vegetation (M15) over deep peat, tussocky hare's-tail cottongrass (M20) vegetation and tussocky heather and hare's-tail cottongrass vegetation (M19).

Blanket bog in a Modified condition characterised by wet heath (M15) vegetation was generally located on hill slopes. Heather was usually abundant to dominant and often tall and tussocky. There was usually a mix of common cottongrass and occasional hare's tail cottongrass with mosses such as glittering wood-moss and red-stemmed feathermoss. There was little bog-moss present which was generally restricted to red bog-moss. Much of this was not mapped separately as part of the PCA survey unless it was clearly on deep peat. The PCA mapping generally relied on the NVC mapping completed by Avian Ecology (e.g. where mapped as the M15/M17 mosaics or similar and is shown as a slightly lighter green colour in **Figure 5**). There is likely to be a frequent transition between shallow and deep peat and/or peat regularly being at the boundary of 'peaty soils (<0.5 m) and deep peat (>0.5 m) with wet heath vegetation.

The tussocky vegetation with either hare's-tail cottongrass (M20) or purple-moor grass (M25) dominant was likewise depleted in bog mosses. There were some hillsides and valleys to the west of the Study Area which were covered in these tussocky graminoids. Glittering wood-moss was common beneath. The presence of tussocks of hare's-tail cottongrasses and/or purple moor-grass provides evidence of sustained grazing pressure to the blanket bog resource. These tussocks can give a bumpy surface pattern to the bog making walking across it a chore and demonstrates a prolonged degradation of the habitat.

The Modified bog which was tussocky with heather present was M19 vegetation. There was generally a mix of heather, hare's tail-cottongrass, red bog-moss and glittering wood-moss.

Surface water was not a feature of this vegetation type and it was dry underfoot. There was abundant evidence of deer and sheep grazing with dung piles, animal trails and hoof marks.

Drained

There was ca. 720 m of historic drainage ditches mapped in the west of the Study Area. These were generally straight ditches, and between ca. 0.4 m-0.7 m wide and deep (Photo 4). These were often infilled with bog-mosses or other vegetation such as common cottongrass and there was limited evidence of vegetation change due to drainage either side of the ditches (e.g. heather wasn't lining the drains). Despite this, well vegetated drains can still drain water under certain flow conditions and drainage channels may still be functional below vegetation. Therefore, it would likely be beneficial to the blanket bog to block the drainage ditches. An estimated 30m 'Drained' buffer can be applied to drainage ditches.

Photo 4: Example of an historic drainage ditch in blanket bog vegetation.

Actively Eroding

The areas termed 'Actively Eroding' denotes blanket bog habitats that had extensive bare peat surfaces. There were many small and large areas of peatland habitat which was likely to be Actively Eroding. These areas were considered to be Modified, Drained and Actively Eroding (Photos 5a-b).

Photos 5a-b: Examples of blanket bog habitat classified as Actively Eroding.

These areas were generally characterised by bare peat, sometimes with blocks of peat recently broken. The vegetation at the top of the erosion features was characterised by heather and woolly fringe moss with common cottongrass and lichens. There was also cross-leaved heath present. Bog-mosses were depleted with only red bog-moss having any presence.

Some of the areas considered likely to be Actively Eroding had water present (e.g. M3 pools), but these were shallow and likely to dry out in warmer moths and be impacted by wind erosion.

The areas considered to be Actively Eroding had clear potential for peatland restoration.

Recovering Erosion

Photo 6: Example of blanket bog habitat classified as Recovering Erosion.

The areas termed ‘Recovering Erosion’ denotes blanket bog habitats that were characterised by old erosion features which had less exposed peat than those classed as Actively Eroding features with vegetated tops often folded over coving the once bare peat surface (Photo 6). In some places there was very wet habitat at the base of erosion features with pools and bog-mosses common. The pools may have been permanent or semi-permanent. It was considered likely that these areas were once bog pool rich which at some point dried out/de-watered form the original bog surface, leaving the original surface dry and with areas of active erosion. However, given the topography and the wet climate the lower surface is now characterised by bog pools and bog-mosses showing affinity to Near-Natural conditions.

The old erosion features were generally well vegetated, although within the complex there was often some active erosion occurring showing affinity to the Actively Eroding category. The old erosion features were likely having limited drainage impact on the surrounding vegetation other than some locally drying effect with woolly fringe moss generally predominant on edge of the features.

These areas were generally considered to have some restoration potential. Although these areas have restored naturally, some effort to revegetate remaining bare peat surface and wet the original bog surface would be beneficial.

PCA Category	Peatland Condition Category Descriptions	Comment	Example Photos		
Near-Natural	Peat forming bog-mosses dominant, with no recent fires, little or no grazing pressure and little or no bare peat, heather is not dominant.	Habitat approaching Near-Natural conditions within the Study Area had bog pool complexes, hummocks of bog-mosses and a good bog-moss layer. There were no clear signs of fires or drainage. Grazing pressure was present but not extensive. Heather was not dominant.	 Bog pool systems.	 Bog-mosses were abundant, sometimes forming hummocks and the vegetation was open.	 Bog pool system beside wind farm infrastructure.
Lightly Modified	Part of the Modified PCA description - Bare peat is in small patches, fires may be recent, grazing impacts are evident, bog-mosses are absent or rare, extensive cover of heather or purple moor-grass.	Fires were not a recent feature of the Study Area, but historic burning is known to have occurred. Small patches of bare peat were sometimes present. Bog-moss cover was depleted compared to areas classed as 'Near-Natural' but not usually absent and sometimes frequent to abundant. Heather wasn't dominant, but graminoids were. The tussocky structure of the vegetation demonstrated modification through grazing. Little to no surface water present. Sheep/deer grazing pressure was obvious.	 Frequent to abundant bog-moss and occasional pools, but tussocky vegetation and the moss layer was more depleted than the example of Near-Natural bog.	 Signs of sheep were common as tracks, hoof marks and dung piles.	 Sitka spruce seedling emerging in Lightly Modified blanket bog.
Modified	Bare peat is in small patches, fires may be recent, grazing impacts are evident, bog-mosses are absent or rare, extensive cover of heather or purple moor-grass.	Fires were not a recent feature of the Study Area, but historic burning (untill about 10 year ago) is known to have occurred. Bare peat patches were evident across some of the peatland habitat. Bog-moss cover was generally depleted, but not usually absent. The structure of the vegetation demonstrated modification through grazing. For example, there were extensive areas dominated by purple moor-grass and hare's-tail cottongrass.	 Deep peat with tussocky vegetation. Lots of signs of deer/sheep including dung, tracks and prints.	 Deep peat with tall tussocky heather common cottongrass and occasional hare's tail cottongrass. Lots of pleurocarps e.g. glittering wood-moss. Little bog-moss present.	 Deer and sheep hoof marks and dung in this Modified bog.

PCA Category	Peatland Condition Category Descriptions	Comment	Example Photos		
Actively Eroding	Actively eroding hagg/gully system, extensive continuous bare peat surfaces.	Bare peat surfaces present in gully/hagg systems with extensive bare peat surface. There was clear evidence of active erosion with blocks of peat broken off in places.	 Actively Eroding feature. It was ca. 1.5m high and ca. 70m long. Blocks of peat were recently broken off.	 Feature was ca. 1.5m high with 2m of bare peat at base.	 Clear evidence of active erosion. A peat block ca. 1m x 0.5m had broken off the side of an erosion feature.
Recovering Erosion	No specific PCA description, but part of the Modified bog with small areas Actively Eroding and some Near-Natural features present. Bare peat is in small patches, fires may be recent, grazing impacts are evident, bog-mosses are absent or rare, extensive cover of heather or purple moor-grass.	Bare peat was evident, sometimes with small areas clearly Actively Eroding. Fires were not recent but known to have occurred in the past. Bog mosses were only present on the lower (eroded) surface of bog, not on the original bog surface. Woolly fringe moss was a common feature, along with heather and purple moor-grass on the original bog surface.	 Recovering Erosion. Eroded, but recovering with woolly fringe moss folder over many old erosion features. Bog-mosses were well established between erosion features.	 Some little patches of active erosion present in the Recovering Erosion area. This small erosion feature was ca. 0.7m high.	 Some old erosion features. Little bare peat remaining. Some pools at base.

Table 5: Example evidence of the peatland condition within the Study Area, based on the PCA criteria.

Peatland Evaluation

The condition and likely activity of the blanket bog in the Study Area was assessed using the PCA support tool. The blanket bog in, or approaching, Near-Natural condition was considered to be in a 'good' condition and, given the evidence, was considered likely to be actively forming peat (**Table 6**).

The blanket bog in a Lightly Modified or Modified or Recovering Erosion condition was considered to be intermediate condition (**Table 6**) with areas of 'bad' condition where there was considered to be areas Actively Eroding.

Using the evidence provided here, and the PCA Support Tool, the blanket bog in a Lightly Modified, Modified, Recovering Erosion or Actively Eroding condition could be judged to have stopped being active and so may be a carbon source, rather than a carbon sink, in its current condition. However, this is a broad-brush, subjective tool, and does not take into account subtleties and variation within the blanket bog. The blanket bog, which was Modified to the point of being dominated by large tussocks of hare's-tail cottongrass or purple moor-grass or heather was considered unlikely to be actively forming peat. Likewise, the Actively Eroding areas were considered unlikely to be actively peat forming. But, given the wet, warm climate in the westerly location of the Study Area, and the reasonable quality of at least some of the blanket bog which was Lightly Modified and at the low surface in the Recovering Erosion category there is a degree of uncertainty to the peat forming activity level. These areas may have patches e.g. around pools or areas that retained some wetness with bog-mosses present that were partially active under some conditions (**Table 6**).

Signs	Condition Descriptions	Near-Natural	Lightly Modified	Modified	Actively Eroding	Recovering Erosion
Water	**Good =** Plenty of water, visible on the surface. **Intermediate =** Surface water is rarely visible. **Bad** = Deep gullies have formed from wind and water erosion.	 The blanket bog in Near-Natural condition had plenty of water on the surface of the bog = 'Good' condition.	 Bog pools and hollows were only occasional features in much of the blanket bog with little surface water visible = 'Intermediate' condition.	 Bog pools and hollows were not a feature of the Modified bog with little to no surface water visible = 'Intermediate' condition.	 The areas considered Actively Eroding had little to no water present except sometimes as shallow pools or as channels of water eroding the peat = 'Bad' condition.	 At base of well vegeted old erosion features bog pools could be prominent. These were only present on the lower eroded surface= 'Good-Intermeidate' condition.
Vegetation	**Good** = Small grasses, bog-mosses common and very wet. **Intermediate** = Taller plants, such as cottongrasses and heather. **Bad** = Rarely any plants grow on the areas that are exposed. Patches of grasses or heather are still found on 'islands' in between exposed bare peat.	 The blanket bog in Near-Natural condition had small open vegetation with bog-moss abundant = 'Good' condition.	 The blanket bog that was Lightly Modified generally had a tussocky form of hare's-tail cottongrass. Bog-mosses were generally present but not dominant = 'Intermediate' condition.	 The wet modified bog generally had tussocks of purple moor-grass or hare's-tail cottongrass or thick heather. Bog-mosses were less frequent. = 'Intermediate' condition.	 There was little vegetation in exposed peat areas. In vegetated areas they were generally included common cottongrass at the base and heather with woolly fringe moss and lichens at the top = 'Bad' condition.	 Vegetation at the orginal bog surface was generally dry with woolly fringe moss and heather. However, at the base bog-mosses were prominent. = 'Good-Intermeidate' condition.
Bare peat	**Good** = Little to no bare peat patches. Intermediate = Bare peat patches are occasional, burning may occur. Bad = Bare peat areas will continue to expand, leaving less plant cover as protection on the surface. Peat will continue to be lost until the solid rock is exposed.	 The blanket bog in Near-Natural condition had little to no bare peat patches, although some associated with some of the bog pools or edges of pools = 'Good' condition.	 Some bare peat patches were present and vehicle tracks were occasionally going through the vegetation. Sheep/deer tracks were common = 'Intermediate' condition.	 Patches of bare peat with hoof marks were common in the Modified bog = 'Intermediate' condition.	 Bare peat formed ca. 10-30% of the areas considered to be Actively Eroding = 'Bad' condition.	 Areas of bare peat that ws Actively Eroding was common = 'Bad' condition.

Signs	Condition Descriptions	Near-Natural	Lightly Modified	Modified	Actively Eroding	Recovering Erosion
Water quality	Good = Water flowing from good quality peatland is clear. Intermediate = Water flowing from peatland likely to be slightly brown, especially after heavy rainfall. Bad = Bad quality, it can be dark brown from the peat content.	  Water coming from the Study Area and in the Lochs and Lochans was clear to peat stained. 'good' to Intermediate' condition.				
Resultant 'activity' level		Likely active.	Likely inactive (but may have some limited activity where bog pools present).	Likely inactive.	Likely inactive.	Likely inactive (but may have some limited activity where bog pools present).

Table 6: Evaluation of the peatland quality within the Study Area, based on the PCA Support Tool criteria.

GWDTE

Beinn Ghlas Wind Farm Habitat Survey Report (Avian Ecology, 2022) identified a number of potential GWDTEs within the Study Area and reported on these. This is not repeated here (although some e.g. large fens are target noted). However, during the walkover survey a number of very small flushes were recorded and are noted upon. These are generally too small to map whilst conducting a landscape wide NVC survey, but suggest/indicate some groundwater connectivity.

The notable small GWDTE flushes recorded during the walkover survey are shown in **Figure 6** and included:

- M6 *Carex echinata – Sphagnum fallax* mire (Photo 7a); and
- M11 *Carex demissa – Saxifraga aizoides* mire (Photo 7b).

Some had a small M37 *Palustruella commutate-Festuca rubra* spring head associated with them (Photo 7c) There was also a small area of M15a *Trichophorum germainicum- Erica tetralix, Carex panicea* sub-community (Photo 7c).

Photos 7a-d: Examples acid/neutral flush (M6), a base-rich flush (M11) a spring head (M37) and a sedge rich area of wet heath (M15a).

Of these, M6, M11 and M37 are considered to be potentially highly groundwater dependent, depending on the hydrological setting (SEPA, 2017a; SEPA, 2017b).

M6 is an acid/neutral flush characterised by a thick layer of flat-topped bog-moss with sedges including star sedge and common sedge.

M11 is a base-rich stony flush found on hillsides. The M11 at Beinn Ghlas was characterised by common yellow sedge, carnation sedge, yellow saxifrage and black moss over rocks with

water trickling across it. There was a particularly high incident of M11 flushes along the south eastern boundary, near Allt Carnaaich around NM 980 252.

M37 is a spring head community where water issues from the ground and has associated mosses and sparse vascular plant present.

M15 is considered potentially moderately groundwater dependent, depending on the hydrological setting (SEPA, 2017a; SEPA, 2017b), but given the sub-community and the richness of sedges in the small patch it was considered likely to have association with groundwater.

Figure 5 PCA

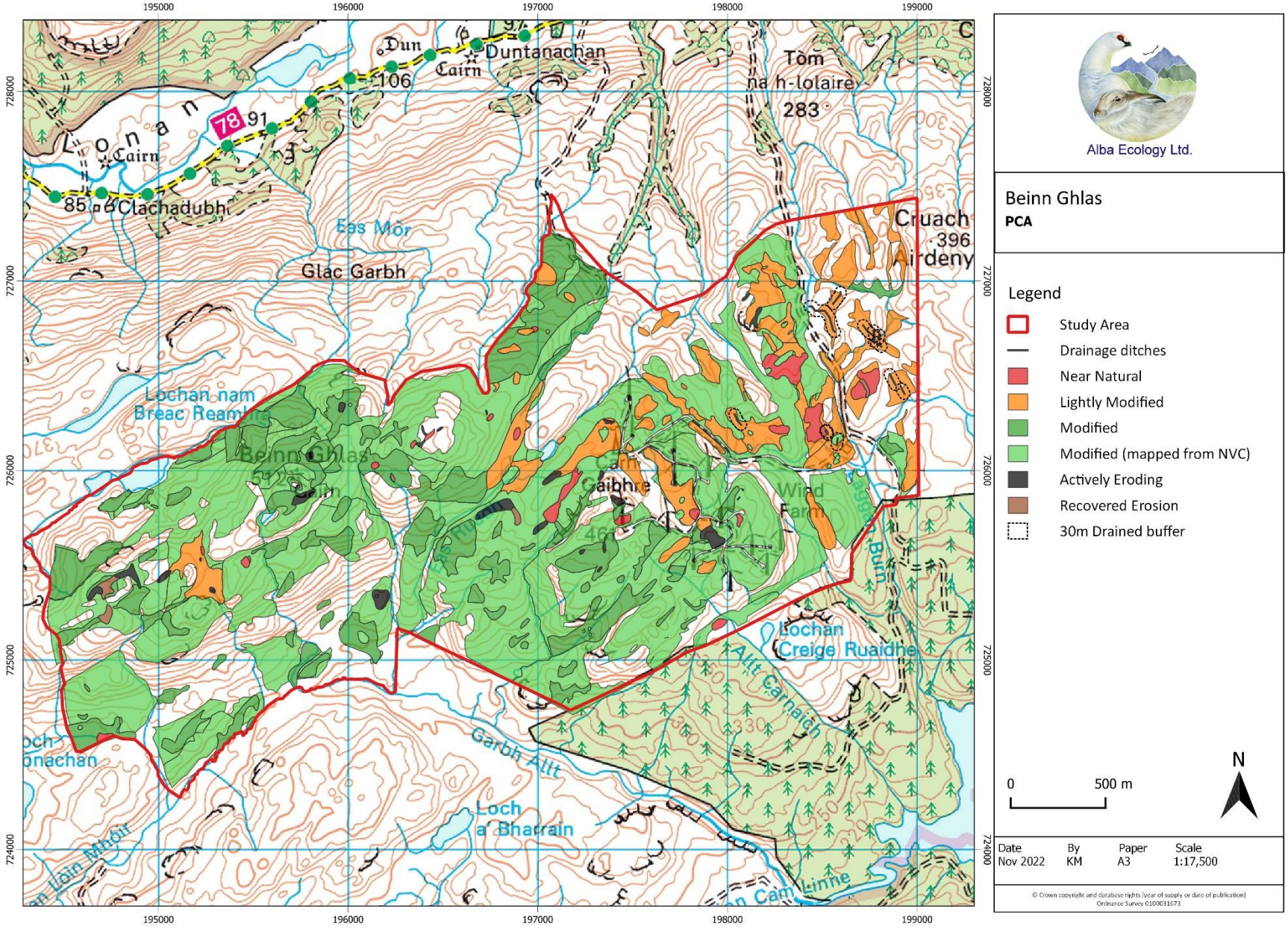
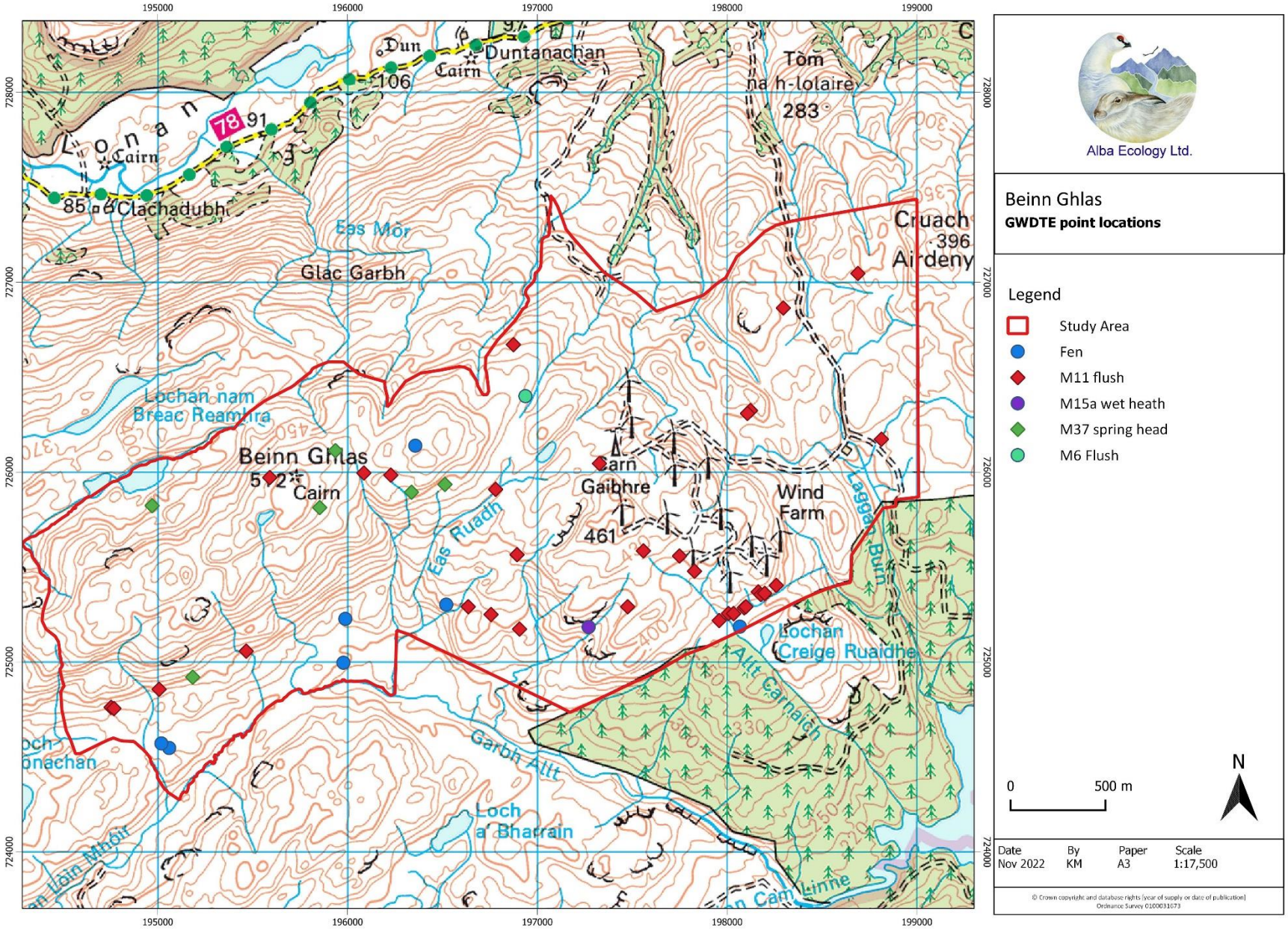

195000
196000
197000
198000
199000
728000
727000
726000
725000
724000
Dun Cairn
106
Duntanachan
Tòm na h-Iolaire
283
Lonan Cairn
78
91
85
Clachadubh
Eas Mòr
Glac Garbh
Cruach Airdeny
396
Lochan nam Breac Reamh
Beinn Ghlas
Cairn
Caibhre
Wind Farm
Burn
Lochan Creige Ruaidhe
Allt Carnaigh
Garbh Allt
Loch a' Bharrain
Alba Ecology Ltd.
Beinn Ghlas
PCA
Legend
Study Area
Drainage ditches
Near Natural
Lightly Modified
Modified
Modified (mapped from NVC)
Actively Eroding
Recovered Erosion
30m Drained buffer
0
500 m
N
Date
Nov 2022
By
KM
Paper
A3
Scale
1:17,500
© Crown copyright and database rights (year of supply or date of publication) Ordnance Survey 0100031673

Figure 6 GWDTE Point Location



Discussion

Blanket bog is the most widespread semi-natural habitat in Scotland. Beinn Ghlas is situated in the west of Scotland, experiencing high rainfall and a relatively warm climate resulting in blanket bog being present. The Phase 1 Habitat and NVC survey reported blanket bog and modified bog communities M15, M17a, M19 and M25a set within a complex topography (Avian Ecology, 2022).

This PCA survey considered the condition of these peatland habitat within the Study Area. All the blanket bog within the Study Area has been subject to some degree of modification e.g. through climate change and nitrogen deposition, historic burning and drainage and extensive grazing pressure. The condition of the blanket bog habitat was variable across the Study Area and was on a continuum from very wet bog exhibiting characteristics of Near-Natural blanket bog to highly Modified and Actively Eroding areas.

There are many factors which can change blanket bog condition from a near-natural state towards a more degraded bog system. These include local, pastoral impacts (e.g. drainage, grazing and burning) as well as global issues such as climate change and atmospheric nutrient deposition.

Lindsay and co-workers (2014b) note that "*degradation [of blanket bogs] often leads to drier conditions which favour non-wetland species such as heather. Lack of Sphagnum as a carpeting competitor often encourages growth form alterations in cottongrasses, deergrass and purple moor-grass. These species typically change from open, single stem growth within a vigorous Sphagnum carpet to dense tussocks growth forms in the absence of such a carpet*".

The blanket bog in the Study Area is known to have been historically widely burnt and drainage ditches ploughed. Additionally grazing impacts are known to have been occurring on the Study Area for generations. The impacts from these current and historic land-use practices were noted throughout the vegetation resulting in most of the blanket bog being considered as Modified with some areas having a greater degree of modification than other area.

Small and large erosion features were frequently recorded. These features were clearly Actively Eroding and likely to have formed from areas which were once (historically) filled with bog pools on deep peat, but have dried out/been dewatered resulting in the current exposure of bare peat surfaces and the creation of erosion features.

Given the lack of surface water-logging features, and the conditions described, overall, it is considered that the blanket bog at in a Modified or Actively Eroding Condition was likely to be largely inactive. However, this does not preclude that limited peat formation may occur at some locations under some circumstances.

Despite clear land management activities there was some blanket bog which was considered to be in, or approaching, Near-Natural conditions. This was due to a combination of a wet, warm climate in the west of Scotland and local topology resulting in basins which were more likely to

retain water. The blanket bog in a Near-Natural condition should be considered likely active and of high ecological value.

The operation Beinn Ghlas Wind Farm and the blanket bog in the Study Area

The operational Beinn Ghlas Wind Farm is a prominent feature of the Study Area and is an example of how wind farms and blanket bog can co-exist (Photos 8a-b). The complex topography was used to advantage in the design with turbines generally appearing to be located on rocky outcrops of wet or dry heath. The tracks likewise appeared to be generally located on rockier areas. There were three examples of the blanket bog mapped as being in or approaching Near-Natural condition being within a few metres from the infrastructure edge and many examples of the Lightly Modified bog being within metres of the infrastructure.

Photos 8a-b: Examples of the co-existence of wind farm infrastructure and blanket bog in a Near-Natural condition.

The Near-Natural bog near the turbines was located in basins. Bog pools were present with feathery bog-moss. There were hummocks and lawns of several bog-moss species including red bog-moss and papillose bog-moss. The vegetation surrounding the pools was very wet underfoot. This demonstrates the co-existence of good quality blanket bog and wind farms and the potential for the blanket bog in good condition to be retained beside wind farm infrastructure.

Recommendations

Scottish Planning Policy (SPP) requires "*further consideration*" of development proposals on blanket bog "*to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation*".

Therefore, it is recommended that the siting of the Proposed Development avoids and minimises impacts on all the blanket bog habitat as far as possible, paying particular attention to avoid the Near-Natural bog and limit impacts on the Lightly Modified bog. If impacts are likely to be considered significant under EcIA guidelines (CIEEM, 2018) then they should be compensated for through peatland restoration.

There is a growing body of policy and guidance that development plans should not just try to avoid causing likely significant effects. The Fourth National Planning Framework – Draft (NPF4)

(2021) has recently been drafted and is designed to support Scotland's commitment of reaching net zero emissions by 2045 and thereby tackling the climate change emergency. Best practice EcIA guidance also recommends seeking to provide net benefits for important biodiversity over and above design requirements for avoidance, minimisation or compensation (e.g. CIEEM, 2018; 2019).

Therefore, it is also recommended that large-scale habitat management measures for peatland habitats are provided as enhancement for the proposed Development.

References

Avian Ecology. 2022. *Beinn Ghlas Wind Farm Habitat Survey Report*. Commissioned Report.

BGS. 2022b. *GeoIndex Onshore*. GeoIndex - British Geological Survey (bgs.ac.uk). Accessed February 2022.

Botanæco. 2021. *GWDTE Go with the flow*. www.botanaeco.co.uk/blog.

British Geology Survey (BGS). 2022. Geology of Britain Viewer. Geology of Britain viewer - British Geological Survey (bgs.ac.uk). Site accessed February 2022.

Bruneau, P.M.C and Johnson, S.M. 2014. *Scotland's peatland - definitions and information resources*. Scottish Natural Heritage Commissioned Report No 701.

Chartered Institute of Ecology and Environmental Management (CIEEM). 2020. *UK Guidelines for Accessing and Using Biodiversity Data.* CIEEM.

CIEEM. 2018. *Guidelines for ecological impact Assessment in the United Kingdom and Ireland*. Version 1.1. Updated September 2019.

European Union (1992), The Habitats Directive (Council Directive 92/43/EEC)

Glenk, K., Martin-Ortega, J., Byg, A. 2017. Online Condition Assessment Support Tool. Peatland Action, Scottish Natural Heritage.

Joint Nature Conservation Committee (JNCC). 2020. UK Terrestrial & Freshwater Habitat Types: Uplands Habitat descriptions. Upland habitat descriptions: UK Terrestrial & Freshwater Habitat Types (jncc.gov.uk)

Lindsay, R. Birnie, R. and Clough, J. 2014a. IUCN UK Committee Peatland Programme Briefing Note No.1 Peat Bog Ecosystems: Key Definitions. IUCN UK Peatland Programme.

Lindsay, R. Birnie, R. and Clough, J. 2014b. IUCN UK Committee Peatland Programme Briefing Note No.2 Peat Bog Ecosystems: Structure, Form, State and Condition. IUCN UK Peatland Programme.

Lindsay, R. Birnie, R. and Clough, J. 2014c. IUCN UK Committee Peatland Programme Briefing Note No.7 Grazing and Trampling. IUCN UK Peatland Programme.

Scotland's Soils. 2016. Carbon and Peatland Maps. Carbon and peatland 2016 map | Scotland's soils (environment.gov.scot).

Scottish Environment Protection Agency (SEPA), 2017a. Land-Use Planning System SEPA Guidance Note 4: Planning Guidance on Wind Farm Developments. LUPG-GU4 Issue No' 9.

Scottish Government 2014. Scottish Planning Policy. Scottish Planning Policy - gov.scot (www.gov.scot).

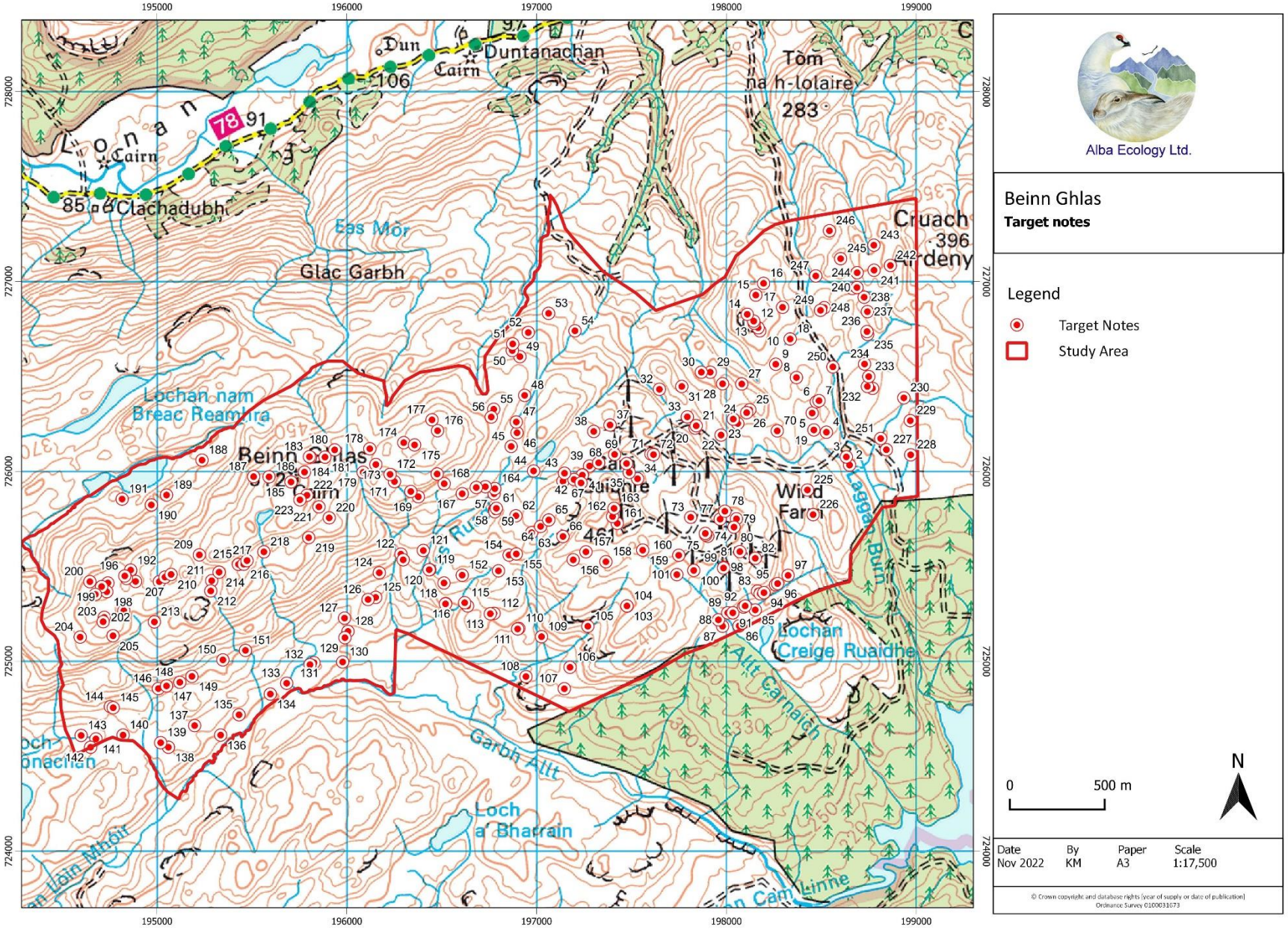
SEPA, 2017b. Land-use planning system SEPA guidance note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. LUPG-GU31 Version 3.

The Fourth National Planning Framework – Draft (NPF4). 2021. Draft National Planning Framework 4 - Scottish Government - Citizen Space (consult.gov.scot).

UK Government (1994), UK Biodiversity Action Plan.

Ventient Energy Ltd. 1997. Beinn Glhas Wind Farm Environmental Statement and Appendices.

Figure 7 target Notes



Target Notes

TG	Grid	Note	Photos
1	NM 97139 25948	Small patch (ca. 10 m x 10 m) of montane heath. Dominated by woolly fringe moss (90 %) with mat grass, heath rush and stiff sedge. Heather in small sprigs and rocks showing through.	
2	NM 98649 26033	Fence line marked to reduce bird strikes. Fence is protecting recently planted trees from grazing pressure.	
3	NM 98632 26076	Trees and thick heather restricted to steep inaccessible valleys and slopes due to grazing pressure.	
4	NM 98527 26206	Historic drainage ditch. It was ca. 50cm wide. Generally vegetated including some bog-mosses, but likely to have some limited drainage effect on surrounding bog.	

TG	Grid	Note	Photos
5	NM 98452 26307	Near-Natural blanket bog. Small pools were common (ca 10 %). Bog-mosses were abundant to dominant. Mixture of red bog-moss, papillose bog-moss with soft bog-moss occasional. Vascular vegetation was growing sparsely through the bog-moss carpet There were hummocks of woolly fringe moss. Located in a basin with deep peat. The retained wetness made the area resistant to impacts of grazing.	 
6	NM 98474 26366	Example of a small (ca. 50 cm tall) sitka spruce growing in blanket bog habitat.	
7	NM 98488 26372	Lightly Modified. It was much less bog-moss rich than the Near-Natural bog. Tussocks of hare's-tail cottongrass. Likely preferable to grazing animals as on slope and not as wet. Purple moor-grass common, common cottongrass absent but cross-leaved heath common. Red bog-moss, papillose bog-moss frequent.	

TG	Grid	Note	Photos
8	NM 98369 26494	Near-Natural blanket bog. High quality, wet bog set within a topographic basin. Bog-mosses dominant with pools, hummocks and hollows. Mixture of bog-moss species present including papillose, red, magellanicum, lustrous and soft. There were also hummocks of woolly fringe moss and some pleurocarp mosses.	 
9	NM 98260 26564	Near-Natural blanket bog developed between two hills of wet heath. Pools and bog-mosses very common.	
10	NM 98176 26740	Recovering Erosion. Some old erosion features. Little bare peat remaining. Some pools at base. Features likely having little impact, other than some drying effect locally with woolly fringe moss on edge of features. Features ca. 75cm high. No restoration required.	
11	NM 98167 26756	Signs of modification. Pulled bog-mosses. Lagomorph droppings. Deer and sheep droppings were frequent.	

TG	Grid	Note	Photos
			
12	NM 98146 26780	Actively Eroding feature ca. 1.2 m high. Bare peat face and base for ca. 0.5 m and ca. 15 m long. Heather overhanging.	
13	NM 98144 26791	Some Actively Eroding blanket bog in this area. but much is revegetated. Wet at base. Little restoration action needed.	
14	NM 98110 26827	Actively Eroding feature ca. 0.75 m high and 10 m long.	
15	NM 98155 26928	Multiple of signs of grazing on this tussocky Lightly Modified bog. Transition between acid grassland and blanket bog often goes through tussocky M19 for ca. 5 m.	

TG	Grid	Note	Photos
16	NM 98196 26990	Valleys of blanket bog vegetation between hills of wet heath and acid grassland. Can be quite wet underfoot, with occasional bog-moss hummocks, but generally no bog pools. Signs of grazing animals common. Lightly Modified.	
17	NM 98296 26864	M11 Potential GWDTE. Ca. 5 m x 5 m in size, followed by a small line of M11 ca. 20 m long. Common yellow sedge, brown mosses frequent over bare stones. Break in hill slope.	
18	NM 98336 26697	Hummocks of the compact form of red bog-moss were quite common in the wet heath vegetation. There was a small wet heath rise within a large area of M17a. Lightly Modified.	
19	NM 98461 26218	Example of sitka spruce growing within the blanket bog. It was ca. 15 cm tall.	

TG	Grid	Note	Photos
20	NM 97835 26228	Line of blanket bog vegetation beside track. Grazed by sheep. Occasional pools and hummocks present but Lightly Modified as much drier and more impoverished bog-moss layer than in a Near-Natural setting and signs of sheep common such as tracks and dung piles.	 
21	NM 97841 26240	Impact of wind farm track on the species composition was ca. 5-7 m wide. In this area acid grassland vegetation of mat grass, heather, soft rush, shaggy moss and common haircap were predominant as it transitioned to the M17a blanket bog habitat.	
22	NM 97972 26191	Lightly Modified area of blanket bog. Hare's-tail cottongrass was tussocky, but a thick near complete bog-moss layer between tussocks. No surface water and signs of grazing present.	
23	NM 98060 26252	Occasional small drainage features within the blanket bog habitat. They were thin and dark coloured. This example had a thin line of sedges and bog pondweed.	

TG	Grid	Note	Photos
24	NM 98036 26275	Sitka spruce seedling emerging in this generally Lightly Modified blanket bog. Slightly tussocky in nature with no bog pools.	 
25	NM 98123 26324	M11, likely a highly GWDTE. It was ca. 1 m x 2 m, going to a 20 cm wide watercourse.	
26	NM 98107 26309	M11, likely a highly GWDTE. Very small (ca. 50 cm x 50 cm) going to a 20 cm wide watercourse.	
27	NM 98081 26460	Sheep tracks and dung were evident in this Lightly Modified bog.	

TG	Grid	Note	Photos
28	NM 97980 26461	View of a blanket bog filled basin. There were vehicle tracks across it. The basin was set between steep slopes of heath and acid grassland. The blanket bog was on the lower shallow slopes and in the basin.	
29	NM 97915 26522	Sign of modification were evident. There were no bog pools but there was a watercourse with bottle sedge along it. There was a good carpet of papillose and red bog-moss. Vegetation was tussocky.	
30	NM 97868 26522	Small patch (ca. 10 m x 10 m) with abundant bottle sedge.	
31	NM 97765 26447	Very small patch (ca. 10 m x 30 m) of Lightly Modified blanket bog on a plateau on a steep hill slope.	
32	NM 97647 26432	Valley/basin without pools. Quite dry, bog-mosses present, but not forming a complete carpet. Modified to Lightly Modified. Tussocky. Heath rush was common in this area.	

TG	Grid	Note	Photos
33	NM 97794 26287	View of valley from the track. Blanket bog and deep peat between ridges of shallow soil with wet/dry heath and acid grassland. Bottle sedge occasionally present.	
34	NM 97532 25961	Evidence of an underground peat pipe collapse.	 
35	NM 97488 25994	Generally, bog-moss rich and damp underfoot. However, there were no bog pools, it was tussocky and there were signs of grazing pressure. Bottle sedge was common.	
36	NM 97474 26041	Bog pools system. Bare peat frequent. Bog-mosses common with occasional bottle sedge.	

TG	Grid	Note	Photos
37	NM 97387 26244	Actively Eroding. M3 pool and erosion features. The erosion features were ca. 75 cm tall with some bare peat exposed on the erosion face. The expanse of bare peat at the base had water sitting on it at the time of the survey, but it is likely that it dries out in the summer months and experiences erosion.	
38	NM 97301 26210	Lightly Modified. Deer/sheep tracks and tussocky nature despite a good bog-moss layer.	
39	NM 97279 26028	Deer/sheep hoof marks and dung in this Modified bog.	 

TG	Grid	Note	Photos
40	NM 97242 25982	Erosion feature ca. 1.2 m high and 50 m long. Actively eroding on face and along base in some places.	
41	NM 97241 25980	There appeared to be some areas of deep peat (ca. 80 cm). Corresponds to wet heath/blanket bog in NVC mapping. Little remaining evidence of bog habitat. Modified to the point that it is indistinguishable from wet heath habitat. There were occasional tussocks of hare's-tail cottongrass, common haircap, glittering wood-moss with patches of heather. There was little to no bog-moss present. Modified.	
42	NM 97197 25957	Near-Natural. Bog pool with extensive bog-moss layer. Hummocks and hollows evident.	 

TG	Grid	Note	Photos
43	NM 97147 25990	Actively Eroding. Erosion features set between much less modified blanket bog. Most erosion features were somewhat overgrown with gully infilled. But some erosion features had ca. 1m of exposed bare peat.	 
44	NM 96984 26002	Lightly Modified bog at edge of unnamed lochan.	
45	NM 96866 26131	Evidence of underground peat pipes. Water trickling overground then disappearing into what looked like a ‘plug hole’ or sump.	 

TG	Grid	Note	Photos
46	NM 96897 26203	Near-Natural. Bog pools persist in the centre of this wider area of blanket bog. Bog-mosses were extensive with some hummocks evident.	
47	NM 96893 26260	The blanket bog was generally tussocky with hare's-tail cottongrass. Bog-mosses abundant including papillose bog-moss. There was also some common haircap. Only a little deergrass or heather, blaeberry or cross-leaved heath.	
48	NM 96937 26400	M6 flush. Potential GWDTE. Flat-topped bog-moss dominated.	 
49	NM 96912 26604	Deep peat with heather common cottongrass and occasional hare's tail cottongrass. Abundant glittering wood-moss. Little bog-moss present. Modified. Heather tall and tussocky. M15.	

TG	Grid	Note	Photos
50	NM 96872 26636	Erosion feature ca. 1.2 m high and 10 m long. Actively Eroding.	
51	NM 96874 26671	M11. Potential GWDTE. Ca. 3 m x 5 m at head then line of M11 (ca. 0.2 m wide). Common yellow sedge and brown mosses.	
52	NM 96956 26731	Near-Natural. Small patch (e.g. 20 m x 50 m) with bog pools and bog-moss lawns.	
53	NM 97063 26832	Large area of possibly deep peat characterised by tussocky M15 with heather and little or no bog-moss. Modified.	
54	NM 97202 26740	Modified. Very tussocky hare's tail-cottongrass with little heather but cross-leaved heath present. Lots of glittering wood-moss. Patches of bog-moss. M20.	

TG	Grid	Note	Photos
55	NM 96774 26327	Flat-topped bog-moss dominated pool (2 m wide, 8 m long). Beside old, folded over erosion feature.	
56	NM 96761 26286	Near-Natural. Very small patch (ca. 20 m x 50 m). Bog pools present, bog-moss dominated. Old erosion features present but well vegetated not likely to be Actively Eroding.	
57	NM 96776 25882	Modified. Tussocks of hare's tail-cottongrass, patches of red bog-moss as part of tussocks. Dry underfoot.	
58	NM 96778 25796	Extensive area of Actively Eroding bog. Dry remains on top of peat islands. Wet bog at base. Often bare peat faces ca. 1 m high with ca. 1 m bare peat at base.	 

TG	Grid	Note	Photos
59	NM 96779 25791	There was deep peat with common cottongrass at the base of the erosion features. These areas were wet at the time of the survey but likely dry during summer.	 
60	NM 96780 25787	Example erosion feature. It was ca.1.5 m tall with ca. 1 m bare peat at base. Actively Eroding.	 

TG	Grid	Note	Photos
61	NM 96788 25805	Clear evidence of active erosion. A peat block ca. 1 m x 0.5 m had broken off the side of an erosion feature. The vegetation at the top of the feature was dominated by woolly fringe moss with common cottongrass and lichens. There was also cross-leaved heath present.	 
62	NM 96891 25766	Recovering Erosion. Area of old erosion features. They had less exposed peat with the tops often folded over. Very wet base of erosion features with pools common. The pools may have been permanent or semi-permanent. Likely these areas were once bog pool rich and have de-watered form the original bog surface but have remaining wet bog at the bases.	
63	NM 96974 25677	Actively Eroding. Another area where erosion features were ca. 1 m to 1.5 m tall with dry vegetation on tops. Some erosion islands present. Wet vegetation at base in some places.	
64	NM 97021 25710	At the base of the erosion gully is bare peat with scattered shoots of common cottongrass. It was wet at the time of survey but likely to dry out in summer months. Actively Eroding.	

TG	Grid	Note	Photos
65	NM 97064 25744	Near-Natural. Hummocks and hollows evident with bog pools and an abundance of bog-mosses.	
66	NM 97139 25657	Valley filled with deep peat and bog vegetation and a stream with soft rush. The blanket bog was Modified with large tussocks of hare's tail-cottongrass and abundant glittering wood-moss.	 
67	NM 97234 25939	Evidence of deer in this small patch of Lightly Modified bog.	
68	NM 97327 26045	M11. Potential GWDTE. It was ca. 2 m x 5 m in size with common yellow sedge, brown moss and rocks.	

TG	Grid	Note	Photos
69	NM 97411 26089	View demonstrating the co-existence of wet blanket bog in generally good condition with the wind farm infrastructure beside it.	
70	NM 98268 26213	Near-Natural. Wet underfoot, with an abundance of bog-moss. There were some bog pools and hummocks present. Woolly fringe moss present near small bare peat features.	 
71	NM 97603 26091	Lightly Modified. Some old erosion features present. Small natural drainage channel. But generally wet and bog-moss rich.	
72	NM 97616 26088	Turbines here were located on rocky outcrops not on blanket bog.	

TG	Grid	Note	Photos
73	NM 97812 25758	Near-Natural bog was located in a basin right next to some wind farm infrastructure. Bog pools were wet with feathery bog-moss. There were hummocks and lawns of several bog-moss species including red bog-moss and papillose bog-moss. The vegetation surrounding the pools was very wet underfoot. This demonstrates the co-existence of good quality blanket bog and wind farms with a careful design layout.	 
74	NM 97902 25658	The area around this turbine was a mixture of old erosion features and bog pools with lawns and hummocks of bog-mosses. There were some erosion features with bare peat present. Mapped as Actively Eroding, but there were areas of wet bog at the base and in hollows. Good restoration potential.	
75	NM 97891 25665	Example erosion feature. It was ca. 0.5 m high and 0.5 m wide. Sparse common cottongrass on the bare peat. The vegetation on top of the feature was dry heather and woolly fringe moss.	
76	NM 97889 25673	Sitka spruce ca. 70 cm tall.	

TG	Grid	Note	Photos
77	NM 97967 25748	Modified. Area of deep peat with wet heath vegetation (M15). It was tussocky heather with a depleted bog-moss layer.	
78	NM 97992 25790	Erosion feature. It was ca. 1.5 m high and 30 m long with ca. 0.5 m bare peat at base. Actively Eroding feature within a wider area of Modified blanket bog.	
79	NM 98053 25750	Bog pools within ca. 30 m of wind farm infrastructure, in a small basin. The peat depth was perhaps ca. 80 cm. There was a bog-moss carpets of red bog-moss and papillose bog-moss.	
80	NM 98040 25706	Erosion feature. It was ca. 1 m high and straight so possibly an old peat cutting. It was well vegetated at the base.	

TG	Grid	Note	Photos
81	NM 98071 25577	View. Looking west toward main site. Valley with tussocky hare's tail-cottongrass on slopes (Modified). Wetter area was Lightly Modified.	 
82	NM 98152 25542	Recovering Erosion. Group of old erosion features. Some erosion still evident, but largely revegetated edges with well-developed pools at base. Area recovering.	
83	NM 98164 25369	M11. Potential GWDTE.	

TG	Grid	Note	Photos
84	NM 98178 25355	M11. Potential GWDTE. Large (ca. 20 m x 20 m) area with common yellow sedge, carnation sedge, yellow saxifrage and brown mosses over rocks with water trickling through.	 
85	NM 98152 25270	Actively Eroding features. Some active erosion and some revegetation and generally wet at base. It was ca. 1.5 m high.	
86	NM 98067 25186	Fen. Potential GWDTE. There was a ca. 20 m x 20 m patch of bare peat with bog pondweed, common yellow sedge and bottle sedge. It was very wet. In the wider area there was soft rush and small streams with bog pondweed, set within M17a blanket bog.	
87	NM 97980 25184	Near-Natural bog.	

TG	Grid	Note	Photos
88	NM 97958 25218	M11. Potential GWDTE.	
89	NM 98007 25255	M11. Potential GWDTE.	
90	NM 98034 25254	M11. Potential GWDTE. All these small springs feed into the fen in the valley.	
91	NM 98034 25255	M11. Potential GWDTE.	
92	NM 98090 25285	M11. Potential GWDTE. This was feeding into the watercourse.	

TG	Grid	Note	Photos
93	NM 98099 25291	M11. Potential GWDTE.	
94	NM 98198 25361	M11. Potential GWDTE. This was feeding into a watercourse.	 
95	NM 98259 25403	M11. Potential GWDTE.	
96	NM 98270 25409	Several sheep on the slopes.	

TG	Grid	Note	Photos
97	NM 98325 25452	This hill slope was largely M15 wet heath, but deep peat was present between hillocks. It was Modified, dry and bog-moss depleted.	
98	NM 97987 25495	Recovering Erosion. Bog pools were common amongst old recovering erosion features. There was a good bog moss layer.	
99	NM 97985 25491	Bog-moss and bog pool within ca. 5m from track.	
100	NM 97828 25478	M11. Potential GWDTE.	
101	NM 97739 25456	Modified. Although bog-moss were frequent the vegetation was tussocky with hare's tail-cottongrass and purple moor-grass.	

TG	Grid	Note	Photos
102	NM 97477 25290	Modified. Valley with deep peat. The vegetation was tussocky with hare's tail-cottongrass and purple moor-grass. Bog-mosses included red bog-moss and papillose bog-moss. There was some soft rush, cross-leaved heath, and tormentil present.	
103	NM 97476 25291	M11. Potential GWDTE.	
104	NM 97476 25291	There were two red deer in the distance.	
105	NM 97270 25184	M15a. Potential GWDTE. Sedge dominated patch of wet heath with carnation sedge, common yellow sedge and common cottongrass.	
106	NM 97176 24968	Modified. Very tussocky. Purple moor-grass dominated (M25a) with hare's tail-cottongrass and good bog-moss layer. Appeared to be on deep peat.	

TG	Grid	Note	Photos
107	NM 97146 24855	Modified. Mix of M25a and M15. M25 appeared to be on deep peat.	
108	NM 96944 24919	Modified. Valley with deep peat. Tussocks of purple moor-grass, heather, hare's tail-cottongrass and cross-leaved heath (M25a).	
109	NM 97026 25129	Steep sided valley of wet and dry heath. Any pockets or slopes of deep peat modified likely to be wet heath vegetation.	
110	NM 96906 25173	M11. Potential GWDTE.	
111	NM 96900 25170	Papillose bog-moss and hummocks of red bog-moss were common in wet heath vegetation. Here the peat was only ca. 0.2 m deep.	

TG	Grid	Note	Photos
112	NM 96776 25252	Modified tussocky M15 on deep peat.	
113	NM 96756 25250	M11. Potential GWDTE.	
114	NM 96636 25291	M11. Potential GWDTE.	
115	NM 96621 25308	Modified. Tussocky hare's tail-cottongrass with blaeberry and mix of red bog-moss and glittering wood-moss with common haircap.	

TG	Grid	Note	Photos
116	NM 96521 25304	A 60 head herd of red deer running. Four were seen close by (first photo), 60 or more beyond in low ground (second photo).	 
117	NM 96520 25302	Fen in distant valley basin. Potential GWDTE.	
118	NM 96512 25412	The slopes were mainly shallow soil with wet heath vegetation. Occasional deep peat was located in small valleys. Modified. Tussocky hare's tail-cottongrass, purple moor-grass, cross-leaved heath blaeberry and glittering wood-moss.	
119	NM 96437 25482	Deep gully, with greater woodrush and primroses. Moss and lichen rich.	

TG	Grid	Note	Photos
120	NM 96434 25482	View of southern half of HMP area.	
121	NM 96403 25583	Modified. Deep peat with tussocky vegetation. Lots of signs of large ungulates including dung, tracks and prints.	 
122	NM 96285 25564	Another deeply incised valley with remnant woodland species including woodrush, primrose and ivy. Birch, alder and willow clinging on in some places.	 

TG	Grid	Note	Photos
123	NM 96297 25534	View of sheep on the hill slope.	
124	NM 96171 25466	Large hillslope of neutral grassland (MG10a). Shallow soils and steep slopes. Sheep were commonly seen over this area. Yorkshire fog, soft rush, creeping buttercup and little shaggy-moss.	 
125	NM 96152 25336	Actively Eroding. Bare peat with water on top. Lacking bog-mosses around the edge. Likely dries out in summer months. Surrounded by modified bog.	
126	NM 96112 25325	Sitka spruce. It was ca. 70 cm tall and had been browsed.	

TG	Grid	Note	Photos
127	NM 95988 25227	M23 fen. Potential GWDTE. Water feeding the vegetation likely derived, at least part, from groundwater.	
128	NM 96006 25157	Modified. Purple moor-grass dominated vegetation (M25a). Very tussocky. On deep peat. Many of signs of grazing. Occasional sitka spruce present.	
129	NM 95990 25124	Modified. There were occasional bog pools present, but they were species poor M3 pools with bare edges, and often animal dung present.	
130	NM 95978 24996	View of fen. Potential GWDTE.	
131	NM 95827 24992	Modified. Purple moor-grass dominated (M25a) vegetation in a topographic bowl with soft rush lining watercourse running through it.	

TG	Grid	Note	Photos
132	NM 95806 24982	Well defined animal trails.	
133	NM 95683 24884	Obvious fence line grazing effect. Grazing on HMP side of fence (right side in picture) results in very little heather. Outside HMP area (left in photo) heather was more abundant.	
134	NM 95597 24827	Soft rush dominated shallow soils. MG10. Yorkshire fog abundant. Quite dry. M23 was located by the stream.	 
135	NM 95432 24718	Modified. Deep peat areas in basins had purple moor-grass dominated vegetation (M25a). Slopes of M15 wet heath.	

TG	Grid	Note	Photos
136	NM 95335 24611	Several sitka spruce on hill slope. All were less than 1m tall.	
137	NM 95198 24661	Modified. Purple moor-grass dominated (M25a) area. Patches of bare peat with hoof marks. Some bog-mosses and quite wet.	 
138	NM 95060 24547	Seepage line potential associated with GWDTE.	
139	NM 95019 24571	Area likely associated with fen. Water was black with bog pondweed. It was sedge rich including abundant common yellow sedge. Potential GWDTE.	

TG	Grid	Note	Photos
140	NM 94821 24611	Area of wet bog, but largely depleted of bog-mosses and some active erosion evident. Bog asphodel and woolly fringe moss were abundant. Modified to Actively Eroding.	 
141	NM 94678 24591	Near-Natural. Hummocks and hollow present. Abundant woolly fringe moss with feathery bog-moss. There were lawns and hummock of red bog-moss and papillose bog-moss. This Near-Natural bog was localised.	 
142	NM 94650 24547	Erosion feature between fence lines. It was ca. 1 m deep. There was dry M17b vegetation surrounding it.	

TG	Grid	Note	Photos
143	NM 94600 24609	Modified. M25 on deep peat in basin.	
144	NM 94754 24761	M11. Potential GWDTE.	
145	NM 94769 24755	M11. Potential GWDTE.	
146	NM 95007 24856	M11. Potential GWDTE.	

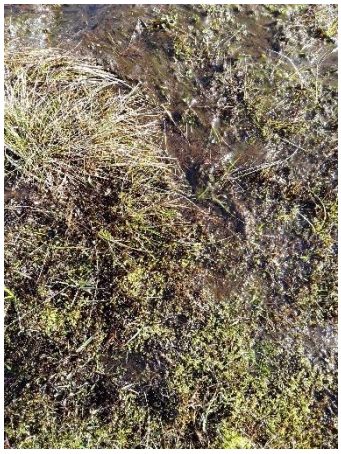
TG	Grid	Note	Photos
147	NM 95050 24870	View of basin with tussocky Modified bog.	
148	NM 95120 24889	Small pockets of deep peat on slopes. These areas of deep peat were localised and Modified. This one was ca. 20 m x 30 m in size. Tussocky M25a.	
149	NM 95184 24920	Small spring (M37), with algae growth evident going to a line of M11. Potential GWDTE.	 

TG	Grid	Note	Photos
150	NM 95347 25007	Small pool in Modified bog. Within small valley. Hoof marks were in bare peat at edge of pool. There was tussocky vegetation.	
151	NM 95466 25057	M11. Potential GWDTE.	
152	NM 96608 25453	Modified. Basins of deep peat with tussocky modified bog. M15 with purple moor-grass and cross-leaved heath abundant.	
153	NM 96799 25476	Clear deer/sheep trail with some prints evident.	
154	NM 96855 25559	Modified. Tussocky purple moor-grass dominated bog (M25a) in a basin. Depleted bog-moss layer.	

TG	Grid	Note	Photos
155	NM 96893 25565	M11. Potential GWDTE.	
156	NM 97193 25534	Feeding/water buckets were fairly common across site showing modification of bog through management of livestock. This was in a basin of Modified bog.	
157	NM 97260 25576	Actively Eroding. Some active erosion features ca. 1m high, with ca. 0.5 m bare peat at base. It was ca. 20 m long with several smaller features also present.	
158	NM 97365 25524	Actively Eroding feature. Very long erosion feature (ca. 70 m long). It was ca. 1.5 m high. Blocks of peat were broken off.	
159	NM 97559 25585	M11. Potential GWDTE. Head of burn.	

TG	Grid	Note	Photos
160	NM 97749 25558	M11. Potential GWDTE.	
161	NM 97425 25726	Near-Natural. Several small pools and bog-moss abundant.	
162	NM 97400 25762	Two small erosion features. They were ca. 1 m high, 3 m long and 2 m wide at base.	
163	NM 97408 25805	Actively Eroding area. Pools at bases of features but all faces were actively eroding. They were ca. 1 m to 1.5 m high and 20 m long.	
164	NM 96780 25909	M11. Potential GWDTE.	

TG	Grid	Note	Photos
165	NM 96730 25919	View of actively eroding area and wind farm.	 
166	NM 96682 25915	Modified. Tussocky hare's tail-cottongrass, blaeberry glittering wood-moss and red bog-moss.	
167	NM 96608 25882	View hillslopes with tussocky hare's tail-cottongrass.	

TG	Grid	Note	Photos
168	NM 96513 25935	Spring head (M37). Potential GWDTE. Brown mosses with bulbous rush and common yellow sedge.	 
169	NM 96377 25866	Modified. Hill slopes of peat perhaps ca. 70 cm deep. Tussocks of hare's tail-cottongrass dominated. Occasional cowberry, heath rush, common haircap, glittering wood-moss and flat-topped bog-moss with red bog-moss.	 

TG	Grid	Note	Photos
170	NM 96337 25894	Spring head (M37). Potential GWDTE.	
171	NM 96251 25946	Erosion features associated with watercourse. It was ca. 1.5 m high but largely vegetated.	
172	NM 96228 25984	M11. Potential GWDTE.	
173	NM 96153 26036	Near-Natural bog. There was some undulate dung and a track (so some sign of modification), but wet and bog-moss rich. High altitude bog. Hummocks largely woolly fringe moss.	
174	NM 96300 26151	Small 10 m wide line of deep peat with M15 going though rocky hills. Modified.	

TG	Grid	Note	Photos
175	NM 96357 26139	Pools. Potentially GWDTE. Common yellow sedge around edge of pools with bog pondweed. 1m high erosion features around pool with bare peat exposed.	 
176	NM 96478 26214	Actively Eroding feature next to lochan. It was ca. 1.5 m high and 40 m long. Broken blocks of peat had recently fallen.	
177	NM 96449 26271	Steep slopes. Any pockets of deep peat were Modified to appear as wet heath. Tussocky heather.	
178	NM 96121 26119	Erosion features and gully along this fence line. It was ca. 1 m tall.	

TG	Grid	Note	Photos
179	NM 96086 25995	M11. Potential GWDTE. Near gate.	
180	NM 95936 26113	Spring head (M37). Potential GWDTE. Surrounding area had bog within a basin between hillocks. Modified.	 

TG	Grid	Note	Photos
181	NM 95885 26075	Modified. M19 on slopes. Mix of heather, hare's tail-cottongrass, red bog-moss and glittering wood-moss. Tussocky with lots of evidence of deer. No surface water, dry underfoot.	 
182	NM 95809 26074	Actively Eroding. Features were ca. 3 m high with an expanse of bare peat. The pool was simply water on bare peat.	 
183	NM 95803 26077	This pool was simply water on bare peat. Likely dries out in the summer months. Actively Eroding.	

TG	Grid	Note	Photos
184	NM 95777 25996	View of complex of hill tops and erosion features.	
185	NM 95706 25944	Modified. Tussocky heather with hare's tail-cottongrass (M19).	
186	NM 95590 25971	M11. Potential GWDTE.	
187	NM 95509 25972	The south side of the hillslope (left in photo) was much more sheltered and had an abundance of heather compared to the north side, which was very windy and exposed, with little to no heather (right of photo).	

TG	Grid	Note	Photos
188	NM 95237 26059	Modified. Valley with M17a blanket bog. Tussocky. Single pool with bog-mosses around, but area was mostly dry and tussocky. Heather was present but as silvery dead stems. Frost damage.	 
189	NM 95050 25875	Modified. Bowl of tussocky M19. There was no surface water. It was dominated by common cottongrass and hare's tail-cottongrass tussocky with pleurocarp mosses. Surrounded by steep slopes of dry heath (H21).	
190	NM 94970 25823	Spring head (M37). Potential GWDTE.	
191	NM 94816 25854	Modified. Tussocky hare's tail-cottongrass with common haircap and glittering wood-moss.	

TG	Grid	Note	Photos
192	NM 94861 25476	Bog pool, surrounded by dry Modified bog with Actively Eroding features. Water flowed underground into a peat pipe, the re-emerged 10 m away and became a clear watercourse which went steeply downhill on far side of photo.	 
193	NM 94861 25480	Actively Eroding. Bare exposed peat with many hoof marks and dung. Erosion feature was ca. 1 m high.	 

TG	Grid	Note	Photos
194	NM 94887 25420	Actively Eroding. Evidence of underground peat pipes.	 
195	NM 94839 25436	Vegetation on top of 1m high erosion gully was very dry with tussocks of hare's tail-cottongrass.	
196	NM 94830 25449	Between the erosion gullies deep peat remained with hare's tail-cottongrass and bog-mosses. This section was ca. 20 m wide.	 

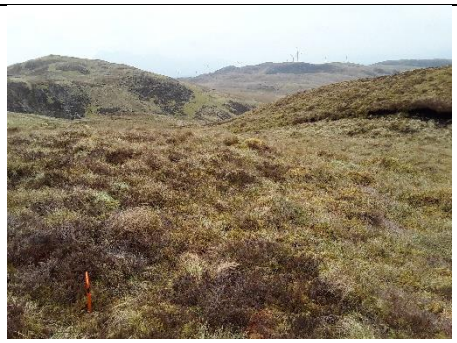
TG	Grid	Note	Photos
197	NM 94741 25412	Recovering Erosion. Eroded, but mostly recovered with woolly fringe moss folder over many old erosion features. Bog-mosses were well established between erosion features.	 
198	NM 94735 25366	Woolly fringe moss hummocks in Recovering Erosion area.	
199	NM 94708 25393	Some little patches of Actively Eroding peat present in the Recovering Erosion area. This small erosion feature was ca. 70 cm high.	 

TG	Grid	Note	Photos
200	NM 94646 25419	Steep hill slope, with largely wet heath. Any pockets of deep peat would be Modified.	
201	NM 94675 25352	Actively Eroding. Feature was ca. 1.2 m high. Peat blocks were recently broken off.	
202	NM 94722 25231	Recovering Erosion. Again, small areas of Actively Eroding features coupled with recovering erosion features and large bog pools with bog-moss carpets at the base.	
203	NM 94716 25208	Actively Eroding. Feature was ca. 1.5 m high with 2 m of bare peat at base.	
204	NM 94595 25127	View into basin which was tussocky and Modified.	

TG	Grid	Note	Photos
205	NM 94768 25134	Large areas of steep hill slopes with apparently shallow soils.	
206	NM 94825 25266	Modified. Tussocky hare's tail-cottongrass with blaeberry and cowberry. Damp in places and bog-mosses locally plentiful, but lots of signs of grazing impacts.	
207	NM 95012 25419	Actively Eroding feature. 3 m high erosion feature with ca. 5 m of bare peat at base. Deer hoof marks on bare peat. Very dry vegetation on top.	
208	NM 95042 25443	On OS map (1:25,000) this area is marked as a lochan. It has been lost. Remains are bare peat pan with occasional hare's tail-cottongrass tussocks and common cottongrass patches. There was ca. 5 m high erosion beside the lost lochan.	
209	NM 95223 25560	Near-Natural bog. Collection of bog pools (M2) with bog-moss lawns around them.	

TG	Grid	Note	Photos
210	NM 95074 25457	Small erosion feature in Lightly Modified bog.	 
211	NM 95288 25424	Lightly Modified. Wet underfoot with bog-mosses abundant, but tussocky and clear evidence of deer/sheep.	
212	NM 95283 25370	Active erosion at start of watercourse. Bare peat with line of bog pondweed.	
213	NM 94986 25207	Modified. Tussocky hare's tail-cottongrass and purple moor-grass.	

TG	Grid	Note	Photos
214	NM 95327 25469	Some bottle sedge within this basin. Likely remnant of a fen from previous wetter climatic times.	
215	NM 95429 25510	Near-Natural bog. View. Surface water evident with bog-mosses abundant. Some old erosion features around outside of this area.	
216	NM 95457 25511	Near-Natural bog. Hummocks and hollows with surface water present. Feathery bog-moss was common in the pool. There was a mix of bog-moss species.	 
217	NM 95474 25530	Recovering Erosion. Some well vegetated, old erosion features. The vegetation on top of the features was drier than at the base, which was bog-moss rich. Little to no bare peat remaining.	

TG	Grid	Note	Photos
218	NM 95563 25576	Modified dry bog vegetation with occasional erosion features.	
219	NM 95799 25651	Hillslopes with peat depth perhaps ca. 70 cm with tussocky hare's tail-cottongrass vegetation. Modified.	
220	NM 95907 25755	Modified. Dry bog vegetation on deep peat. There was an erosion feature to side of hill summit.	
221	NM 95853 25813	Spring head (M37). Potential GWDTE.	
222	NM 95790 25874	Recovering Erosion features with tussocky modified bog below and dry veg on top. Modified.	

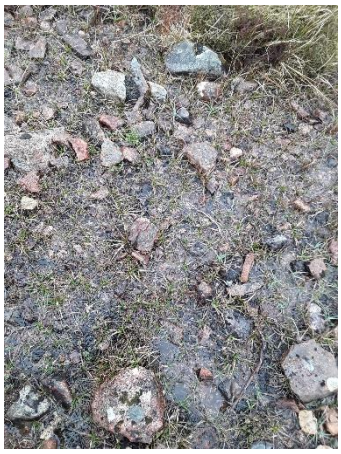
TG	Grid	Note	Photos
223	NM 95753 25850	Actively Eroding. This small area of bare peat may have a lochan. The erosion features were ca. 2 m high with 2-3 m wide bare peat at base.	
224	NM 96476 25986	View of wind farm.	
225	NM 98427 25902	Did not enter fenced area. Recent plantation with trees about 1 m high.	
226	NM 98457 25772	Lightly Modified. Bog-moss rich, wet underfoot not tussocky but signs of deer and little to no surface water.	
227	NM 98843 26114	Modified. Tussocky with many recent signs of deer and sheep. Small patches of bare peat were common.	

TG	Grid	Note	Photos
228	NM 98971 26087	Lightly Modified. Some shallow pools and bog-mosses with woolly fringe moss hummocks. But clear evidence of modification as bog-mosses were somewhat depleted, bare peat patches present and vehicle tracks were going through the vegetation. Sheep/deer signs were common.	
229	NM 98969 26267	View across site. Acid grassland in borrow pit. Deep peat set between hillocks of mainly wet heath.	 
230	NM 98935 26387	Lightly Modified. Very wet, but heavy rain all night, and few actual pools. Deer/sheep signs evident.	
231	NM 98770 26437	Near-Natural. Bog-moss rich and wet. Microtopography present, but not many hummocks of bog-moss.	

TG	Grid	Note	Photos
232	NM 98743 26447	Recovering Erosion. Old, mostly recovered erosion features with many pools and lawns of bog-moss at the base.	 
233	NM 98750 26499	Example of Near-Natural bog.	
234	NM 98728 26565	View of bog going through wet heath hill slopes. Dry heath on very steep slopes.	 

TG	Grid	Note	Photos
235	NM 98744 26721	Lightly Modified. Wet, with frequent to abundant bog-moss and occasional pools, but fairly tussocky vegetation and the mosses layer was more depleted than the example of Near-Natural bog.	
236	NM 98741 26736	Old drainage ditch, very straight. It was ca. 0.7 m wide and 0.7 m deep. Limited drainage.	
237	NM 98743 26841	Sitka spruce ca. 40 cm tall.	
238	NM 98726 26917	Steep section here tussocky and Modified.	
239	NM 98664 26963	Modified basin. Tussocky.	

TG	Grid	Note	Photos
240	NM 98688 26968	Historic drainage feature that was very straight.	
241	NM 98778 27059	Stone wall. Historic land use.	
242	NM 98864 27084	Lightly Modified. Bog-moss was frequent to abundant. Wet underfoot. Many signs of sheep/deer including a feeding bucket.	
243	NM 98777 27191	Lightly Modified. Damp, some hummocks and tussocks. Signs of deer/sheep.	

TG	Grid	Note	Photos
244	NM 98689 27046	M11. Potential GWDTE. Including yellow saxifrage.	 
245	NM 98602 27120	Lightly Modified.	
246	NM 98543 27267	Lightly Modified. There was a ca. 20 m x 20 m patch dominated by rushes (MG10).	 

TG	Grid	Note	Photos
247	NM 98471 27029	Fairly clear water coming off this area but some sign of peat staining.	 
248	NM 98516 26862	Lightly Modified. Very wet, but no pools or surface water. Bog-mosses were abundant. Sheep signs common.	
249	NM 98496 26848	Old drainage ditch. It was straight and ca. 0.2 m wide and 0.5 m deep. Some limited drainage still likely.	

TG	Grid	Note	Photos
250	NM 98561 26550	Lightly Modified. Some soft rush, bog myrtle and bottle sedge (M23) along watercourse.	
251	NM 98813 26173	M11. Potential GWDTE. Drainage into small burn. Common yellow sedge was abundant.