

Beinn Ghlas Wind Farm Access Track Habitat Survey Report



Alba Ecology Ltd.



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Dr Kate Massey, MCIEEM

Registered Office: Coilintra House, High Street, Grantown on Spey, Moray PH26 3EN Tel: 01479 870238,
enquires@albaecology.co.uk

Summary

A repowering project has been proposed at Beinn Ghlas Wind Farm by Ventient Energy Ltd. As part of the planning process, Alba Ecology Ltd. was commissioned to conduct a Phase 1 Habitat survey, a National Vegetation Classification (NVC) survey and an assessment of Groundwater Dependent Terrestrial Ecosystems (GWDTE) along the proposed access track plus a 100m buffer termed the Access Track Study Area.

The Access Track Study Area runs from the A85 at grid reference ca. NM 968 324 in the north, through Fearnoch Forest along current Forestry and Land Scotland (FLS) tracks, through Am Barr to Barguilean Farm where it follows the current Beinn Ghlas Wind Farm access track until it meets the Site Boundary. Much of the access track is within woodland habitat.

Field survey work was undertaken in February 2023 and included a Phase 1 Habitat Survey, an NVC survey and assessment of potential GWDTE.

The Access Track Study Area was characterised by habitats common to the west of Scotland including coniferous plantation, felled plantation and semi-natural broadleaved woodland (W4, W7, W11, W14). There were areas of acid grassland (U4 and U5), marshy grassland (MG10a), neutral grassland (MG9), dry heath (H10a) and bracken (U20). There were small amounts of other habitats within the Study Area including scrub (W1, W23), tall ruderal vegetation (OV27) and the introduced shrub, rhododendron.

Some of the vegetation communities within the Access Track Study Area were defined as wetlands and potential GWDTE. NVC communities W4 and W7 are considered to be potentially highly groundwater dependent, depending on the hydrological setting (SEPA, 2017a; SEPA, 2017b). NVC communities MG9, MG10 and W1 are considered to be potentially moderately groundwater dependent, depending on the hydrological setting (SEPA, 2017a; SEPA, 2017b).

When assessing the potential impact of the Proposed Development, the presence and importance of the habitats present should be considered.

Introduction

Beinn Ghlas Wind Farm is owned by Beaufort Wind Ltd 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 Ventient Energy Ltd. As part of the planning process, Alba Ecology Ltd. was commissioned to conduct a Phase 1 Habitat survey, a National Vegetation Classification (NVC) survey and an assessment of Groundwater Dependent Terrestrial Ecosystems (GWDTE) along the proposed access track plus a 100m buffer termed the Access Track Study Area.

This document reports the findings of the Phase 1 Habitat, NVC and potential GWDTE assessment undertaken by Alba Ecology Ltd. in February 2023.

Aims and Objectives

The objectives for this survey report are:

- To identify, map and describe Phase 1 Habitats and NVC communities in the Access Track Study Area; and
- To identify if the wetland habitats are potential GWDTE within the Access Track Study Area.

Study Area

What constitutes a study area is an important consideration for habitat and vegetation surveys. A 100m buffer is usually required around all proposed development infrastructure (with <1m evacuation) to comply with SEPA guidance (2017a). Therefore, for the purposes of this Phase 1 Habitat, NVC and GWDTE survey the Access Track Study Area included the route of the access track which was ca. 7.6km long plus a 100m buffer which is ca. 149ha in size (Figure 1).

The Access Track Study Area (hereafter 'Study Area') runs from the A85 at grid reference ca. NM 968 324 in the north, through Fearnoch Forest along current Forestry and Land Scotland (FLS) tracks, through Am Barr to Barguilean Farm where it follows the current Beinn Ghlas Wind Farm access track until it meets the Site Boundary. Much of the access track is within woodland habitat.

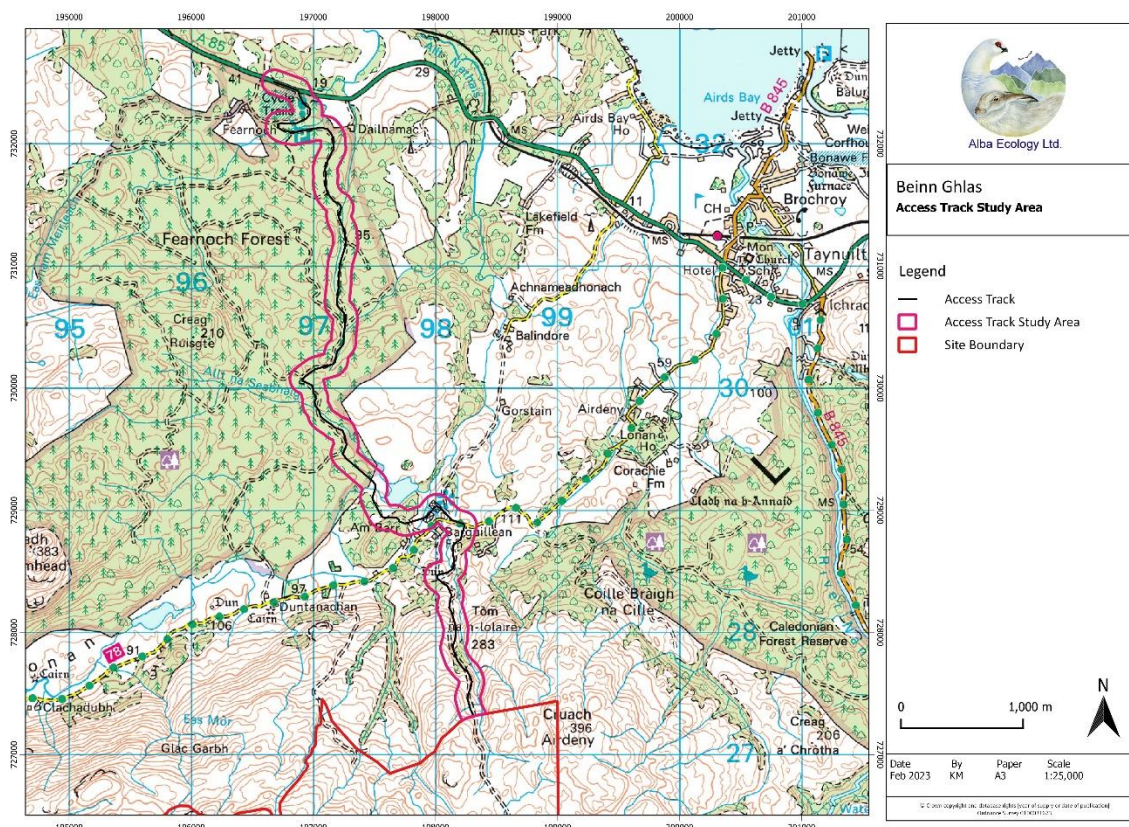


Figure 1: The Access Track Study Area.

Background Information

The Airds Park and Coille Nathais Site of Special Scientific Interest (SSSI), which is part of the Loch Etive Special Area of Conservation (SAC), is ca. 100m west of the Access Track Study Area. This site is designated for marsh fritillary butterfly and upland oak woodland (Figure 2).

The Ancient Woodland Inventory (AWI) identifies ancient woodland of semi-natural origin along and around the Study Area (Figure 2).

The predicted Carbon and Peatland Map (Scottish Soil, 2016) around the Study Area is shown in Figure 3. The majority of the Study Area is predicted to be Class 5 (defined as “*Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil or Class 0 (Defined as “Mineral soil - Peatland habitats are not typically found on such soils”)*”) with smaller areas predicted to be Class 2 (defined as “*Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential*”) (Figure 3).

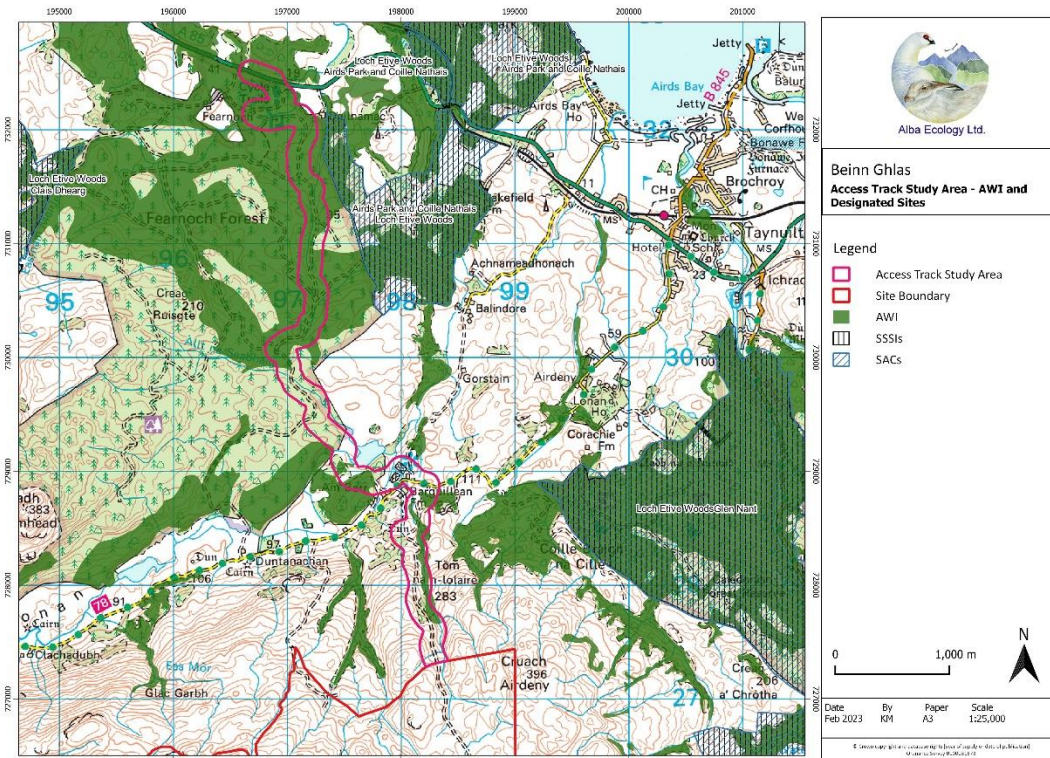


Figure 2: Designated sites and AWI along the Study Area.

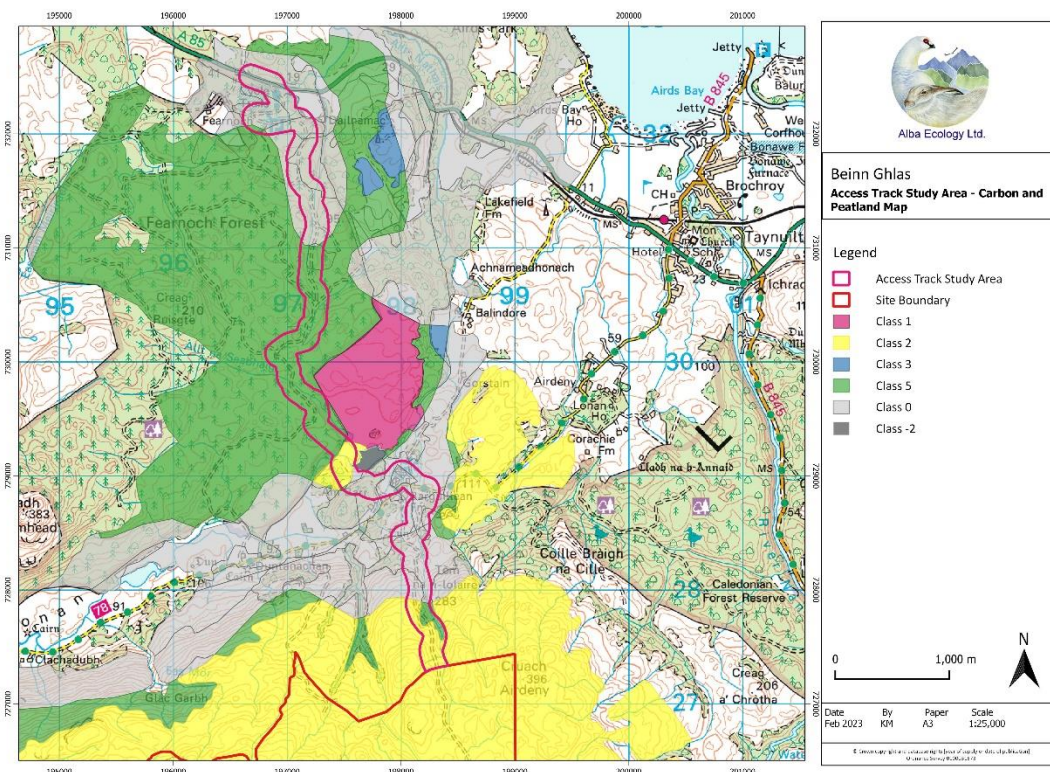


Figure 3: Extract of the predicted Carbon and Peatland Map for the Study Area (Scotland's Soil, 2016).

Methods

The habitat and vegetation surveys were undertaken by highly experienced habitats surveyor and ecologist Dr Kate Massey (MCIEEM) of Alba Ecology Ltd in February 2023.

The surveys were conducted using 1:50,000 Ordnance Survey maps and aerial photographs freely available from Google Satellite. The Phase 1 Habitat survey and the NVC survey were conducted at a scale of 1:5,000 using the Ordnance Survey maps and aerial photographs.

Phase 1 Habitat Survey

Phase 1 Habitat surveys are a standard national classification scheme of broad habitat types and are based on plant species presence and some abiotic indicators such as apparent peat depth. The vegetation was described and mapped following the methods described in the Joint Nature Conservation Committee (JNCC) Handbook for Phase 1 Habitat surveys ([JNCC, 2010](#)).

National Vegetation Classification (NVC) Survey

The NVC is a detailed survey of plant communities using plant species presence and abundance. The vegetation was classified and mapped following the methods described in the JNCC National Vegetation Classification User's Handbook ([JNCC, 2006](#)). Reference was made to NVC field guides (e.g. Hall *et al.*, 2004; Elkington *et al.*, 2001; Cooper, 1997) the published NVC communities and the floristic tables (e.g. Rodwell, 1991a; Rodwell, 1991b; Rodwell, 1992; Averis *et al.*, 2004).

The minimum size of vegetation mapped was approximately 20m x 20m. Smaller stands were described as target notes, located by GPS. Target notes were also made of any unusual features, rare species, management activities or other points of particular interest.

Groundwater Dependant Terrestrial Ecosystems (GWDTE)

Where wetlands were identified, following the Functional Wetland Typology (SNIFFER, 2009a and 2009b) and Botanæco GWDTE guides ([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. These micro-species are not important for defining NVC communities.

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 Study Area, it is unlikely that one survey can achieve full characterisation due to temporal variations. Limitations to Phase 1 Habitat, NVC and GWDTE surveys include:

- This survey was conducted outwith the usual survey period for vegetation surveys (which is broadly April to September). Therefore, some of the species were in a senescent or senescing state. However, habitats and associated species were well known to the (highly experienced) surveyor and so there was a high degree of confidence in plant identification. There was no snow on the ground obscuring vegetation.
- 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.
- Some Phase 1 Habitats and NVC communities are made up of similar assemblage of species, which can be at a transitional stage between two community types.
- The fit of NVC communities to the published communities is often imperfect and the closest approximation of the communities are described. Surveying in Scotland has the added limitation that many of the NVC community descriptions were derived in England and so the published descriptions may not match well with those found in Argyll.
- Phase 1 Habitat and NVC surveys are not floristic surveys intended to create full species inventories or count all individuals of any species but to map and describe the communities. Species were recorded when they were encountered, but it is likely that additional species, not listed, are present within the Study Areas, particularly as 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 (February 2023 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 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 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 Phase 1 Habitat and NVC 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 with vegetation communities, they have been noted and explained.

The limitations were minimised by conducting the field survey in good weather conditions by a highly experienced habitat surveyor who was familiar with both the area and habitats likely to be present.

It is important to note that measuring peat depth was outside the scope of these surveys. 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 hags and ditches. Peat depth data was provided for the Study Area by the Client and Fluid Environmental Consulting Ltd. prior to field surveys and was consulted.

Results

The Phase 1 Habitat survey map is shown in Figure 4a for the north of the Study Area and 4b for the south of the Study Area with the NVC communities labelled and target notes displayed. A list of habitat types within the Study Area are shown in Table 1. Potential GWDTE are shown in Figure 5a (north) and 5b (south). These figures are supported with a list of target notes (Appendix 1).

Overview

A total of ca. 36% of the Study Area was categorised as coniferous plantation which was usually dominated by sitka spruce. A further ca. 6% of the Study Area was categorised as recently felled coniferous plantation. These habitats were mostly located within the Fearnoch Forest. The community MG9 neutral grassland was often associated with felled plantation.

Semi-natural broadleaved woodland made up a further ca. 25% of the Study Area, and was located throughout the extent of Study Area, often associated with watercourses. There were four semi-natural broadleaved woodland NVC communities described including the oak-birch woodland W11, the birch and purple moor-grass wet woodland W4, the alder and ash wet woodland W7 and a small stand of beech trees, W14.

The south of the Study Area was generally recorded as acid grassland (U4 or U5), with marshy grassland (MG10a) and bracken (U20). W11 woodland was also common in this area.

Less common habitats and communities within the Study Area included willow scrub (W1), gorse scrub (W23), scattered trees, tall ruderal vegetation dominated by rosebay willowherb, (OV27). There was also rhododendron, an introduced shrub, as well as tracks, roads, buildings works areas and private land recorded in the Study Area.

Phase 1 Habitat (NVC community)	Area (ha)	% of Study Area
Semi-natural broadleaved woodland	37.5	25.1
W11	18.6	12.4
W11:W1	0.4	0.3
W11:W7:W4	5.5	3.7
W14	0.1	0.1
W4	1.2	0.8
W4:W7	2.0	1.3
W7:U20	0.2	0.1
W7:W11	9.6	6.4
Coniferous plantation	54.3	36.3
Felled plantation	8.9	6.0
Unimproved acid grassland	13.1	8.8
U5	0.3	0.2
U5:MG10a	6.8	4.6
U5:MG10a:MG9	0.8	0.5
U5:MG10a:U20	5.2	3.5
Semi-improved acid grassland	8.0	5.3
U4	4.9	3.3
U4:MG10a	1.5	1.0
U4:MG10a:U20:Track	1.7	1.1
Neutral grassland, MG9	2.8	1.9
Marshy grassland	8.1	5.4
MG10a	2.8	1.9
MG10a:MG9:U20	0.4	0.2
MG10a:U5:U20	2.6	1.7
MG10a:U5:u4:U20	2.4	1.6
Bracken	5.6	3.7
U20	2.1	1.4
U20:birch regen	0.2	0.2
U20:MG10a:U5	1.5	1.0
U20:U5	1.4	1.0
U20:W11	0.4	0.2
Dry heath	1.2	0.8
H10a	0.8	0.5
H10a: birch regen	0.4	0.3
Introduced scrub	0.1	0.1
Buildings, tracks etc	7.3	4.8
Building	0.5	0.3
Car park:W23:U5:U20:OV27:W11	0.8	0.6
Track	5.8	3.9
Works area	0.2	0.1
Private land	2.8	1.8
Total	149.7	100.0

Table 1: The total area and percentage of each Phase 1 Habitat found in the Study Area (**in bold**). Where relevant, the NVC community, and total area (in ha) which form part of the Phase 1 Habitats are also shown.

Habitat and Community Descriptions

The habitats and communities that were found in the Study Area are described within this report in the following manner: A Phase 1 Habitat description is followed by the corresponding NVC community(ies).

Semi-natural broadleaved woodland

Semi-natural broadleaved woodland was found throughout the extent of the Study Area. It was found on edges of the coniferous plantation, as a ca. 10-20m wide riparian corridor along watercourses and as stands of birch on the hill slopes in the south of the Study Area. Birch was regularly the most abundant species. A total of four NVC communities were described.

W4 *Betula pubescens* – *Molinia caerulea* woodland community

The birch and purple moor-grass W4 woodland was found as part of the riparian woodland corridor within the coniferous plantation in Fearnoch Forest. It was found on the flatter, waterlogged ground around the watercourses where birch dominated and purple moor-grass formed in the understorey with flat-leaved bog-mosses. There was often some soft rush and tufted hairgrass and occasionally species such as foxglove.



Photo 1: An example of W4 woodland within the Study Area.

W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemorum* woodland community

The alder and ash W7 woodland was found within the riparian corridor along the watercourses within Fearnoch Forest and around Barguillan Farm. Although ash or alder could be very conspicuous in some stands along with occasional oak, birch was often frequent to abundant, and this community was sometimes in an intermediate stage with either W4 in wetter areas, or W11 in drier areas. The ground layer included opposite leaved golden saxifrage in wetter areas and bramble, great woodrush and hard fern in drier areas. Sitka spruce was often invading the W7 woodland.

W11 *Quercus petraea* – *Betula pubescens* – *Oxalis acetosella* woodland community

Much of the semi-natural broadleaved woodland within the Study Area best fit the NVC community W11. In the north of the Study Area, in Fearnoch Forest, the W11 woodland was characterised by large and mature oaks with birch and occasional holly, rowan and eared willow. The ground flora usually had a continuous bryophyte layer including glittering wood-moss and shaggy-moss, with creeping bent, wavy hairgrass and hard fern. There were also areas with heather, bramble and great woodrush and honeysuckle.

As the Study Area gained altitude and was within the grazed hill slopes beyond Barguilean Farm, the W11 woodland lost the oak component and birch dominated the canopy layer. In these areas there was either bracken as a dense understorey or there was a more open understorey of shaggy-moss, glittering wood-moss, wavy hairgrass, common bent, creeping bent and sweet vernal grass.

There was occasional regeneration of woodland species in the W11 woodland including oak and birch but also occasionally sitka spruce.



Photo 2: An example of W11 within the Study Area.

W14 *Fagus sylvatica* – *Rubus fruticosus* woodland community

There was one small stand of beech dominated woodland in the north of the Study Area within Fearnoch Forest. This was formed of ca. 10m of beech trees (ca. 1-2 trees deep) in front of a stand of coniferous plantation. The ground layer was mostly made up of beech leaves with sitka regen. There was a little hard fern and bramble present.



Photo 3: An example of W14 within the Study Area.

Coniferous Plantation

A large part of the north of the Study Area was within Fearnoch Forest, which is an area of FLS commercial forestry and so was characterised by the habitat coniferous plantation. The coniferous plantation was usually made up of dense sitka spruce but sometimes larch dominated. There is no NVC community associated with this type of non-native coniferous plantation.

The dense canopy of sitka spruce or larch was over a sparse understorey, mostly of needles, but with occasional wavy hairgrass, creeping soft grass, hard fern, bugle, wood sorrel, bramble honeysuckle or heather. Small holly seedlings (<0.3m tall) were very occasional. A mix of mosses was common including ordinary moss, red-stemmed feather-moss, glittering wood-moss, flat-topped bog-moss, forked-moss and shaggy-moss.



Photo 4: An example of coniferous plantation within the Study Area.

There were two areas of wind throw within the coniferous plantation.

Recently felled plantation

Some of the coniferous plantation, to the south of Fearnoch Forest, was recently felled. There was sitka spruce regenerating in some areas which had been felled less recently, and in these areas species such as tufted hair-grass were also establishing.



Photo 5: An example of recently coniferous plantation within the Study Area.

Scattered trees

There were occasional scattered trees within the Study Area. These were mainly birch. They were generally quite small, approximately 5m in height.

Scrub

There were occasional patches of gorse and willow scrub across the Study Area. The willow scrub best fitted the **W1 *Salix cinerea* – *Galium palustre* scrub community**. It was found towards the south of the Study Area, near Barguilean Farm. The W1 vegetation was dense eared willow, 2m to 3m tall. It had a sparse understorey.



Photo 6: An example of W1 scrub within the Study Area.

The gorse was dense and ca. 2m high. It was located in the north of the Study Area around the Fearnoch Forestry car park. The NVC community for this gorse scrub was **W23 *Ulex europaeus* – *Rubus fruticosus* scrub community**.

Around the Fearnoch Forest car park, which was set in likely an old quarry in the north of the Study Area, there were occasional individual scrub/shrub species including broom, buddleia and hawthorn.

Dry dwarf-shrub heath

H10a *Calluna vulgaris* – *Erica cinerea* heath, typical sub-community

There were two small areas of H10a dry heath within the Study Area. One area of H10a dry heath was near the Fearnoch Forest car park to the north of the Study Area. It had a high proportion of birch regrowth and was over felled plantation. The second area was beyond the fence boundary at the southernmost point of the Study Area.

The H10a dry heath was characterised by heather, bell heather and occasionally blaeberry with purple moor-grass and a mix of mosses, particularly glittering wood-moss.

Acid grassland

U4 *Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland community

There were large areas of U4 acid grassland around Barguillan Farm. It was often located in sheep grazed fields. The U4 grassland was closely cropped and had a fairly rough, uneven sward of bent grasses, Yorkshire fog and sweet vernal grass with clover, tormentil, heath bedstraw and creeping buttercup. There was a ground flora of little shaggy-moss.

U5 *Nardus stricta* – *Galium Saxatile* grassland community

Much of the upper ground, in the south of the Study Area, was rough U5 acid grassland, often mixed with marshy grassland and bracken. The U5 grassland was generally short cropped, with a mix of mat grass, common bent, creeping bent, wavy hairgrass, Yorkshire fog and sheep's fescue. Other graminoids included occasional stiff sedge, heath rush, heath woodrush and occasional tufts of tufted hairgrass. Tormentil and heath bedstraw were constant and there was occasionally heath milkwort and hard fern. The moss layer was dominated by glittering wood-moss with little shaggy-moss.



Photo 7: An example of U5 acid grassland in the Study Area, with lines of MG10a marshy grassland and patches of U20 bracken.

Neutral grassland

MG9 *Holcus lanatus* – *Deschampsia cespitosa* grassland community

The neutral grassland within the Study Area was species poor and associated with felled plantation or in a mosaic with marshy grassland MG10a. The MG9 community was dominated by tufted hairgrass, with Yorkshire fog, purple moor-grass and soft rush also abundant in the sward. The tufted hairgrass was in large dense tussocks. Raspberry and bramble were common with species such as foxglove, hard fern, green ribbed sedge all occasional.



Photo 8: An example of MG9 in the Study Area.

Marshy grassland

MG10a *Holcus lanatus* – *Juncus effusus* rush-pasture, typical sub-community

There were several areas of MG10a marshy grassland within the Study Area, particularly around Barguilean Farm where cattle grazing was noticeable.

In the MG10a marshy grassland soft rush dominated. Yorkshire fog was abundant below the rushes. The MG10a community was generally species poor, with only occasional species such as sweet vernal grass, tormentil and common bent-grass. Tufted hairgrass and bracken were present in some stands. Mosses within this community included little shaggy moss and occasionally flat-topped bog-moss.

Tall Ruderal

There were occasional patches of rosebay willowherb in the north of the Study Area around the Fearnoch Forest car park. The rosebay willowherb was tall and dense but was in a state of senescence at the time of survey. Creeping bent dominated below the rosebay willowherb. The NVC community for this rosebay willow dominated community is **OV27 *Chamerion angustifolium* community**.

Bracken

U20 *Pteridium aquilinum* – *Galium saxatile* community



Photo 9: An example of U20 bracken within the Study Area.

Dense stands of bracken were very common across the Study Area, particularly mixed with acid grassland and marshy grassland on the upper slopes in the north of the Study Area. The dense bracken was typically over creeping bent, heath bedstraw, mat grass, glittering wood-moss, tormentil, sheep's fescue and wavy hairgrass. With some stands including bugle, white clove, Yorkshire fog and raspberry.

Introduced Shrub

There was some non-native rhododendron forming a hedge in one section of the Study Area near ornamental gardens. There is no NVC community for this type of non-native habitat. There were also very occasional small rhododendron shrubs along the track in Fearnoch Forest.

Running water

There were several watercourses within the Study Area, these included many unnamed watercourses and Allt na Seabhaig which runs through Fearnoch Forest from the unnamed lochan at Am Barr. These watercourses were generally small, 1-3m wide with boulder-cobble dominated substrate.



Photo 10: Allt na Seabhaig running through the Study Area.

Buildings, tracks and private land

There was a track or road running through the centre of most of the Study Area. This included the Fearnoch Forest track and the track through Barguilean Farm which leads to the operational Beinn Ghlas Wind Farm. The sides of the track were usually grassy with species such as creeping bent, creeping soft grass, ribwort plantain, selfheal, St John's wort, common cottongrass, bracken, common violet, foxglove, bramble, creeping buttercup, blaeberry, raspberry, hairy bitter-cress, New Zealand willowherb and rosebay willowherb.

There were several buildings and works areas within the Study Area including derelict glass houses, poly tunnels and areas with farm equipment.

There was some private land (that was not entered) including an ornamental garden.

GWDTE Evaluation

GWDTE are protected under the Water Framework Directive. BGS hydrogeological mapping identifies that the geology underlying the Study Area was considered to be a low productivity aquifer with groundwater only present in near surface weathered zone and secondary fractures (BGS, 2023). Therefore, there is limited potential for the presence of actual GWDTE within the Study Area.

SEPA's Guidance Note (2017a) recommends that the listed NVC communities should be treated as GWDTE unless information can be provided to demonstrate they are not dependent on groundwater. SEPA (2017a) does recognise that some of these communities are common

across Scotland and that these communities may be considered GWDTE only in certain hydrogeological settings, or may have limited dependency on groundwater in certain hydrogeological settings.

NVC communities recorded in the Study Area that are considered in the guidance (SEPA, 2017a; SEPA, 2017b) to be potentially groundwater dependent include:

- W1 *Salix cinerea* – *Galium palustre* scrub community;
- W4 *Betula pendula* – *Molinia caerulea* woodland;
- W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemorum* woodland;
- MG9 *Holcus lanatus* – *Deschampsia cespitosa* grassland; and
- MG10 *Holcus lanatus* – *Juncus effusus* rush-pasture.

Of these, W4 and W7 are considered to be potentially highly groundwater dependent, depending on the hydrological setting (SEPA, 2017a; SEPA, 2017b). All the other communities (W1, MG9 and MG10) are considered potentially moderately groundwater dependent, depending on the hydrological setting (SEPA, 2017a; SEPA, 2017b).

The W4 and W7 were generally located along watercourses, and whilst may have some groundwater influence, surface water influences may also sustain them.

At least some of the MG10a community, on the hill slopes to the south of the Study Area, was likely present due to wet conditions from water movement coming from the higher ground. The MG9 community was often located in areas of felled plantation and in these areas was likely to have developed as part of succession in the cleared areas rather than dependency on groundwater.

Table 2 displays the relationship between NVC communities, and the likelihood of groundwater dependency, with comments on the hydrological setting in the Study Area (Botanæco, 2019). Hydrological surveys/analysis by a qualified hydrologist will be required to confirm whether or not these potential GWDTE are actual GWDTE.

Habitat	NVC Community	FWT Category	Guidance potential GWDTE	Setting	Comment on Setting	Comment on GWDTE
Semi-natural broadleaved woodland	W11, W14	N/A	Not included	Hillslope and beside watercourses	N/A	Potentially low GWDTE, but likely no GWDTE influence.
Semi-natural broadleaved woodland	W4, W7	Wet woodland	Highly GWDTE	Beside watercourse	Formed along watercourse. Maybe some groundwater influence and surface water influence.	Potentially highly GWDTE.
Scrub	W1	Wet woodland	Moderately GWDTE	Hillslope	Formed on lower hill slopes. Maybe some groundwater influence.	Potentially moderately GWDTE.
Coniferous plantation	N/A	N/A	Not included	FLS land	N/A	Potentially low GWDTE, but likely no GWDTE influence.
Marshy grassland	MG10a	Marshy grassland	Moderately GWDTE	Hillslope and grassland around un-named lochan	The MG10 on the hillslopes was likely associated with rainwater flowing down the hillside and cattle grazing. The MG10a near the lochan may have had some groundwater association.	Potentially low GWDTE on hillslopes. Potentially moderate GWDTE in grassland around un-named lochan.
Neutral grassland	MG9	Marshy grassland	Moderately GWDTE	Felled plantation and grassland around un-named lochan	The MG9 in the felled plantation area was likely to be associated with succession after the removal of trees. The MG9 near the lochan may have had some groundwater association.	Potentially low GWDTE in felled plantation area. Potentially moderate GWDTE in grassland around un-named lochan.
Acid grassland	U4, U5	Montane grassland	Not included	Hillslope and pasture	N/A	Potentially low GWDTE, but likely no GWDTE influence.
Tall ruderal	OV27	N/A	Not included	Disturbed ground	N/A	Potentially low GWDTE, but likely no GWDTE influence.
Bracken	U20	N/A	Not included	Hill slopes and disturbed ground	N/A	Potentially low GWDTE, but likely no GWDTE influence.

Table 2: The relationship between Phase 1 Habitats, NVC communities, FWT categories and potential GWDTE.

Species of Note

The SBL is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. None of the plant species recorded in the Study Area are on the SBL.

Rhododendron is a non-native invasive species identified within the Study Area. It was located as a planted hedge near Am Barr and occasional small individuals were recorded along the Fearnoch Forest track. No other non-native invasive species were recorded in the Study Area. However, this does not preclude them from being present in the future or their presence in an un-vegetative/unidentifiable state during surveys.

Habitats of Note

Habitats within the Study Area that are considered to be consistent with, or similar to, SBL habitat descriptions and Annex 1 habitats listed in the EU Habitats Directive are shown in Table 3.

NVC community	Annex 1 Habitat (*priority)	SBL Habitat
H10	✓	✓
U5		✓
W1	✓	✓
W4	✓	✓
W7	✓	✓
W11	✓	✓
W14	✓	✓

Table 3: SBL and Annex 1 habitats recorded in the Study Area.

Discussion

The Study Area was mapped and described according to the Phase 1 Habitats descriptions and the NVC. The Study Area was characterised by habitats common to the west of Scotland. The majority of the Study Area was coniferous plantation and felled plantation. These were mainly set within Fearnorch Forest which is owned by FLS and is commercial forestry.

The semi-natural broadleaved woodland within the Study Area including NVC communities W4, W7, W11 and W14. These communities were often limited to the riparian corridors along the watercourse. Within Fearnoch Forest, these riparian corridors were only a few metres wide, often on steep slopes with non-native species such as sitka spruce invading. In addition, the W11 woodland extended up the slopes in the higher ground to the north although tended to lose the oak element of the woodland in these areas.

The nearby Airds Park and Coille Nathais SSSI which forms part of the Loch Etive SAC is designated for oak woodland and marsh fritillary butterfly. The Site Management Statement states “*Well-drained hillsides are dominated by oak and birch woodlands, while wetter ground supports alder and birch*” and describes NVC communities W4, W7 and W11 as part of the

upland woodlands included in the designation. These descriptions are similar to the semi-natural woodland within the Study Area. Whilst the designated site is nearby (ca. 100m) it is not fully connected as there appears to be a section of mostly coniferous woodland that separates the designated site from the Study Area.

There were also areas of acid grassland (U4 and U5), marshy grassland (MG10a), neutral grassland (MG9), dry heath (H10a) and bracken (U20) recorded in the Study Area along with small amounts of other habitats including scrub (W1, W23), tall ruderal vegetation OV27 and the introduced shrub, rhododendron.

Best practice guidance e.g. CIEEM (2018; 2019) identifies a hierarchy of mitigation for potential impacts that seeks to:

- avoid adverse ecological impacts, especially those that could be significant to important receptors;
- minimise adverse impacts that could not be avoided;
- compensate for any remaining significant residual impacts; and
- Provide ecological enhancement.

CIEEM (2018; 2019) states that “*Avoiding and/or minimising negative impacts is best achieved through consideration of potential impacts of a project from the earliest stages of scheme design and throughout its development*”. This approach, to avoiding potential adverse impacts within a design layout, is sometimes described as embedded mitigation or mitigation by design. “*Mitigation by design is particularly beneficial as there is greater certainty that it will be delivered*” (CIEEM, 2018; 2019).

Recently, the Scottish Government has published three important and relevant policy documents related to renewable energy, the climate crisis and biodiversity crisis in Scotland:

- National Planning Framework 4, Revised draft (NPF4, 2022);
- Scottish Biodiversity Strategy to 2045: Tackling the Nature Emergency in Scotland (Scottish Government, 2022 (published in draft) (SBS, 2022); and
- Onshore Wind Policy Statement (Scottish Government, 2022).

In these documents, the Scottish Government recognizes the need to jointly tackle the climate emergency and the nature crises throughout society. NPF4 emphasises the requirement to follow the mitigation hierarchy and particularly the requirement for ecological enhancement as part of the design process.

Avoidance of the habitats identified with high ecological value, including the semi-natural woodlands W4, W7 and W11 and the potentially highly GWDTE W4 and W7 is recommended wherever possible. Minimisation of impacts and compensation of any significant impacts on semi-natural habitat would be required where avoidance is not possible as per the mitigation hierarchy.

Opportunities for ecological enhancement could include:

- Removal of non-native coniferous species from semi-natural broadleaved woodland.
- Removal of non-native invasive species such as rhododendron.
- Planting riparian woodland.
- Managing grassland to provide food plants for the marsh fritillary butterfly (a designated feature of the nearby SSSI). The main food plant, for the caterpillar stage, is devil's bit scabious.

When assessing the potential impact of the Proposed Development, the presence and importance of key species and habitats should be considered. Furthermore, this should be informed by the likely design layout, as features of particular importance e.g. semi-natural broadleaved woodland habitats and potential highly GWDTE may be able to be completely avoided at the design stage.

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Figure 4a: NVC North

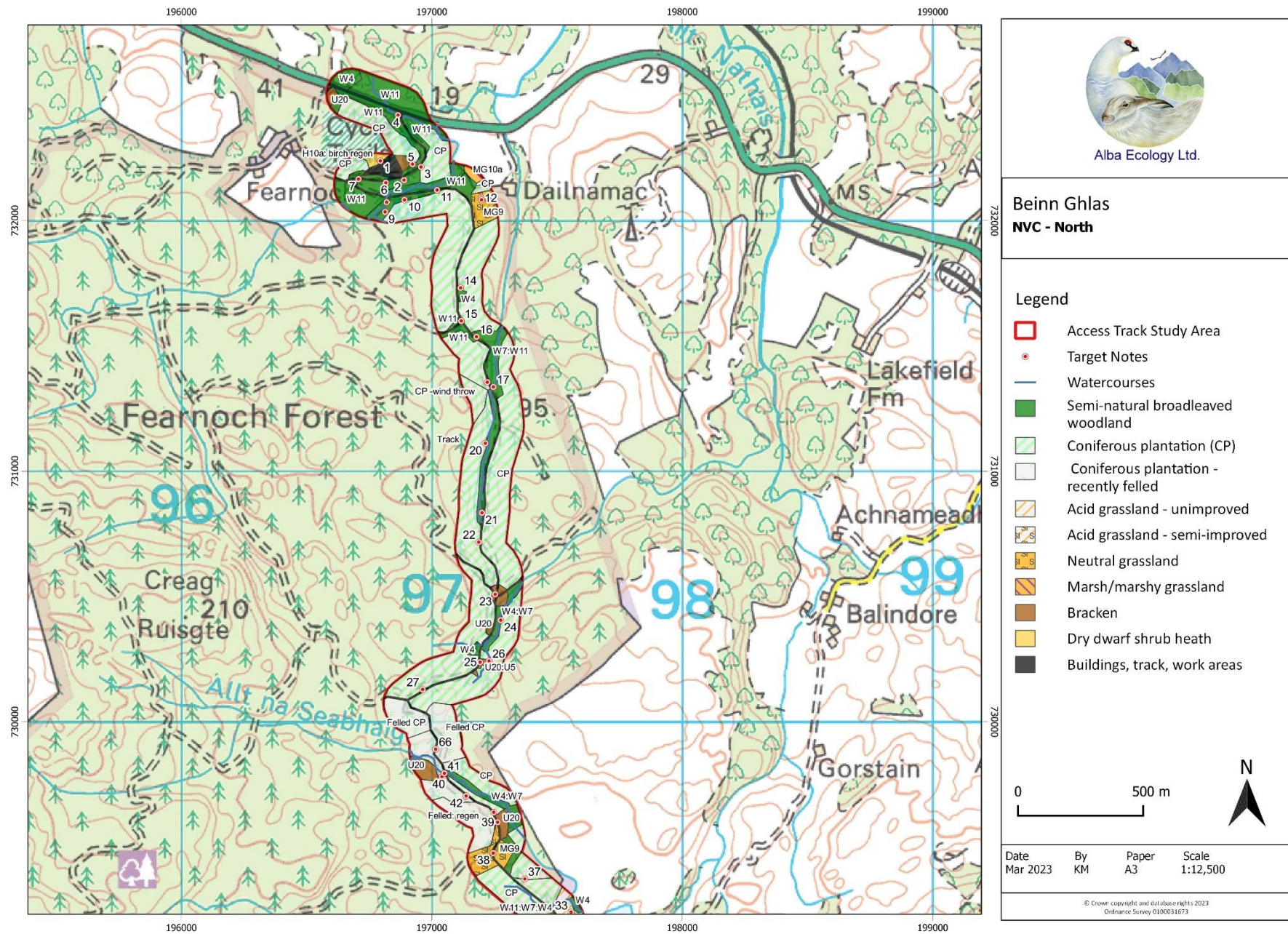


Figure 4b: NVC South

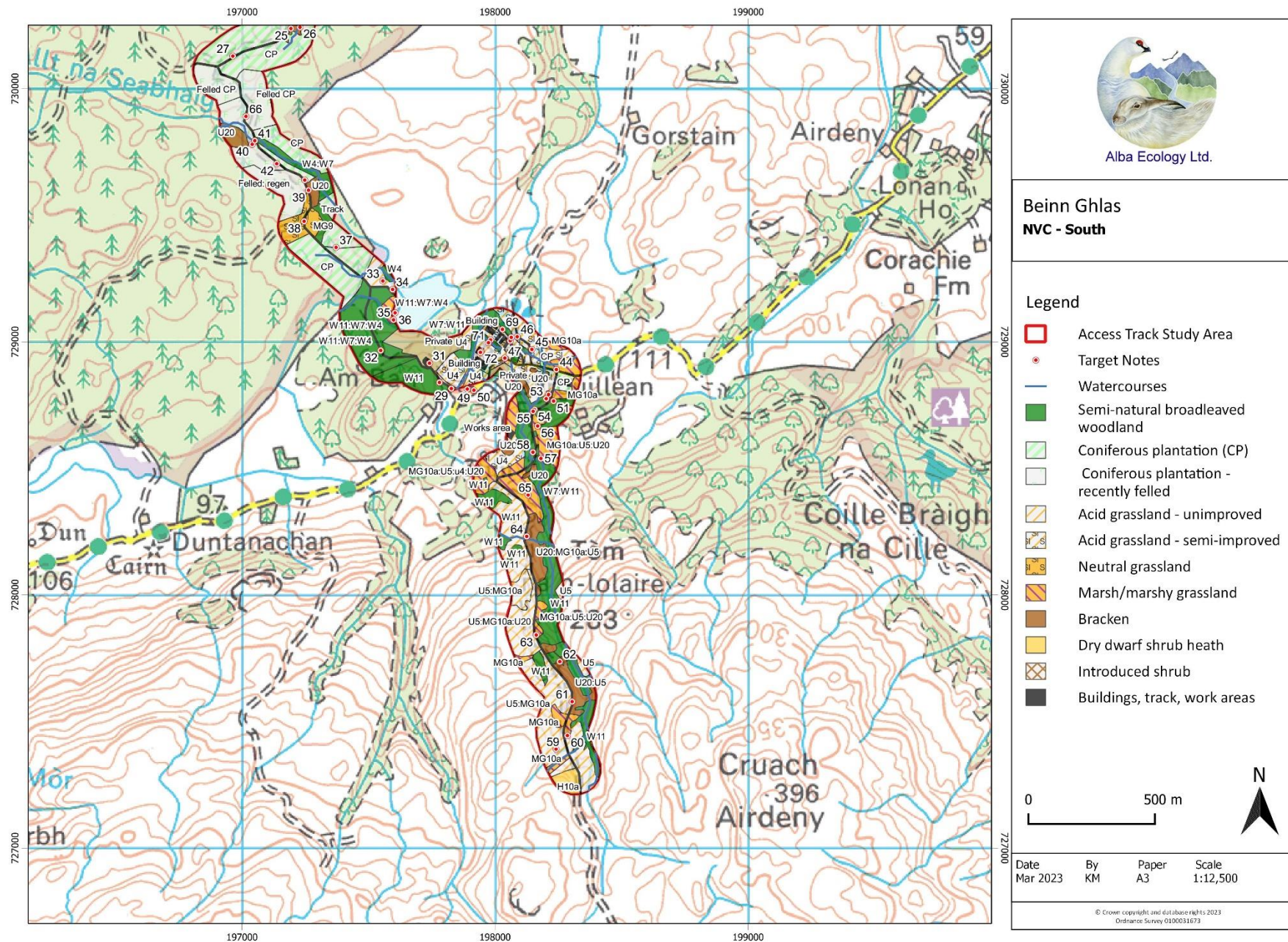


Figure 5a: Potential GWDTE North

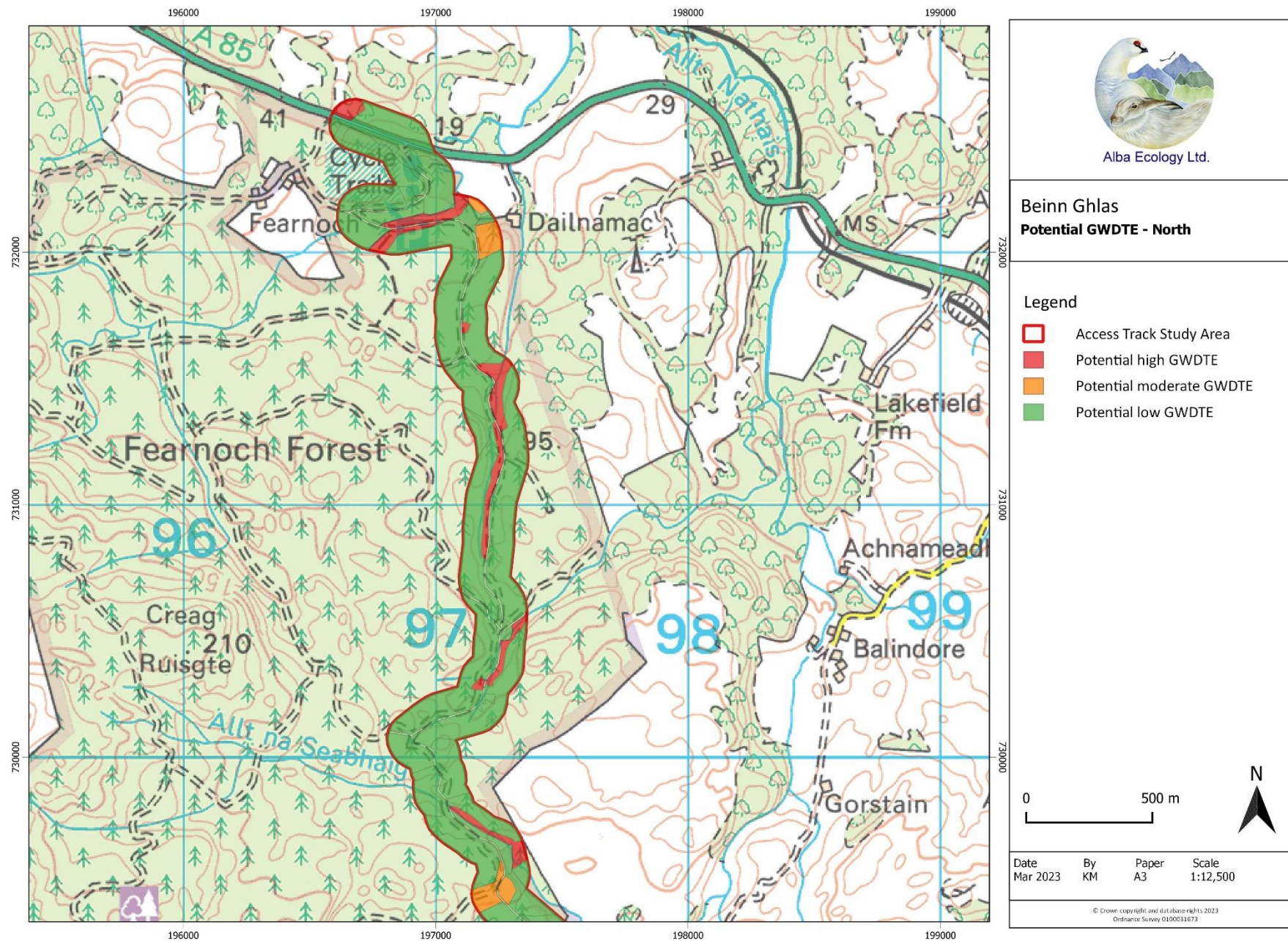
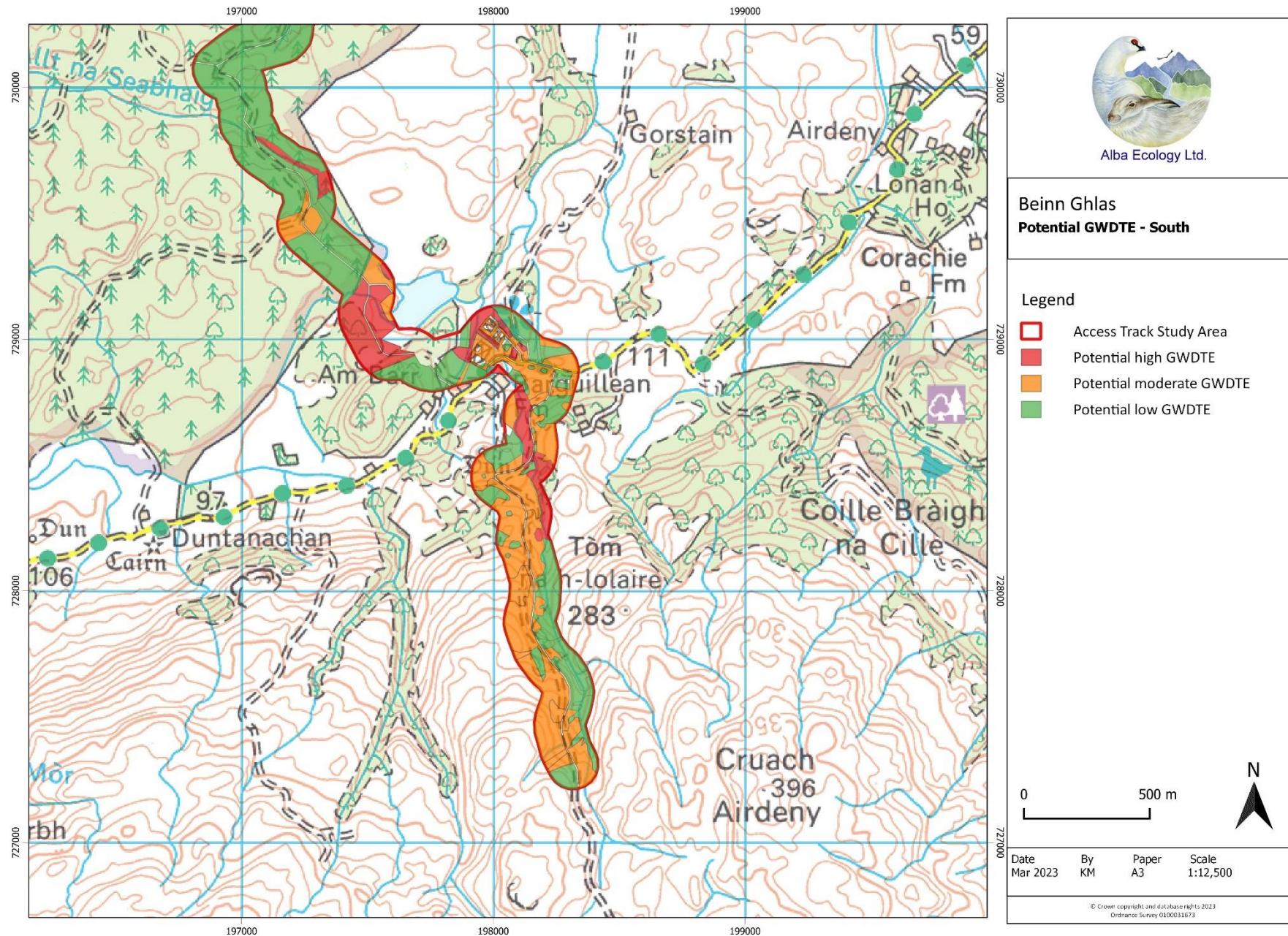

















Figure 5b: Potential GWDTE South












Appendix 2: Target Notes






TG	Grid ref	Comment	Photo
1	NM 96794 32238	Dry heath with birch scrub over felled plantation. Heather in tall tussocks, with purple moor-grass. Birch was ca. 3m tall around felled tree stumps. Occasional sitka spruce regen. Dry heath of heather, bell heather and blaeberry with a mix of feather mosses.	
2	NM 96889 32161	Natural regen, in W11 woodland.	
3	NM 96956 32214	Two red squirrels in the larch plantation beside road. On other side of road sitka spruce plantation with a ca. 10m corridor of W11 woodland with birch and oak beside road.	
4	NM 96864 32420	W11 and W4 by main road. Large oak at entrance to Fearnoch Forest. On the other side of the main road there were oaks forming a canopy over cattle grazed U4 grassland.	
5	NM 96922 32225	Wood ant nest ca. 0.5m tall. Bracken with birch regen.	






TG	Grid ref	Comment	Photo
			
6	NM 96816 32150	Young stands of W11 either side of track. Birch dominated with oak regen. Understorey similar to oak dominated W11 but slightly more open. Occasional sitka regen. Hard fern abundant. Bracken occasional to abundant. Bramble and wavy hairgrass frequent. Mosses highly abundant.	
7	NM 96707 32165	Beech dominated W14 woodland. One or two trees deep, before coniferous plantation. Ground layer mostly beech leaves with sitka regen mosses and hard fern frequent.	
8	NM 96819 32073	Alder and birch W7 woodland along watercourse. Bramble, great woodrush and hard fern dominant the ground layer. Opposite leaves golden saxifrage present in wet patches.	
9	NM 96813 32034	Wood ant nest ca. 1m high. At edge of sitka plantation.	






TG	Grid ref	Comment	Photo
			
10	NM 96890 32082	Mature oaks by watercourse with epiphytes. Alder and birch also along watercourse. Mix of W7 and W11. Coniferous plantation on other side of track. Coniferous plantation is extensive.	 
11	NM 97020 32121	W11 and W7 by the watercourse to west of track. Coniferous plantation beyond watercourse corridor. Coniferous plantation to edge of track on east side.	
12	NM 97196 32089	MG10a marshy grassland dominated by soft rush was present in a field beyond the coniferous plantation. The MG10a was surrounded by pasture (U4 grassland). There was a line of tall, mature sitka spruce mixed with oak and birch which widened to birch dominated W11.	




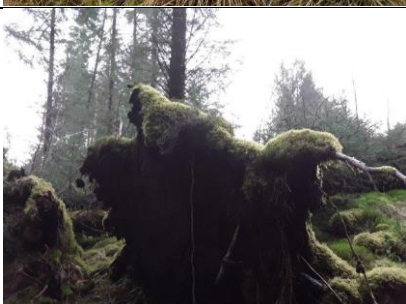

TG	Grid ref	Comment	Photo
13	NM 97198 32083	Bracken with neutral grassland MG9 with soft rush, tufted hairgrass, purple moor-grass and Yorkshire fog. Raspberry and bramble were common. Over felled plantation with brash. Shallow soils. Foxglove, hard fern, green ribbed sedge all occasional.	
14	NM 97115 31731	Small patch birch dominated W4. Purple moor-grass with flat-topped bog-moss and common bent. Pool with pondweed next to W4 woodland like associated with track drainage.	
15	NM 97117 31599	W11 birch dominated woodland by the side of the track. Large holly ca. 8m tall. Larch dominated plantation to east.	 
16	NM 97178 31536	Birch along watercourse. Understorey of hard fern, soft rush, flat-topped bog-moss, glittering wood-moss, wood sorrel, and bent grasses.	






TG	Grid ref	Comment	Photo
17	NM 97245 31336	Riparian woodland. Oak and birch along watercourse steep river valley in some locations. Sitka spruce occasional in semi-natural woodland. Could be removed to open up woodland for native species recovery. Riparian woodland surrounded by coniferous plantation.	
18	NM 97221 31355	Large open area with windthrow. Did not enter for health and safety reasons.	
19	NM 97221 31355	Watercourses with frequent birch and occasional sitka spruce in riparian woodland. Surrounded by coniferous plantation.	
20	NM 97213 31111	Watercourses on west side of track. Birch dominated W7. Occasional oak. Ground layer of common haircap and flat-topped bog-moss with glittering wood-moss, and shaggy-moss. There was a little tufted hairgrass, hard fern and creeping bent. Semi-natural woodland strip was ca. 10m wide.	






TG	Grid ref	Comment	Photo
21	NM 97199 30834	Rhododendron. Ca 0.5m tall and 1m wide, beside track. Non-native invasive species.	
22	NM 97187 30716	Occasional leylandii in the sitka spruce plantation.	
23	NM 97252 30508	Open area at crossroads of forestry tracks. Bracken (U20) and birch woodland (W11).	 
24	NM 97275 30405	W4 wet woodland with tufted hairgrass, purple moor-grass, soft rush and occasional foxglove under birch. Watercourse and riparian woodland on east side of track. Surrounded by coniferous plantation.	






TG	Grid ref	Comment	Photo
25	NM 97192 30237	Coniferous plantation opens to patch of bracken (U20) and acid grassland (U5). Bracken was over creeping bent, tormentil, bugle, white clove, Yorkshire fog and raspberry.	
26	NM 97228 30242	U5 grassland with creeping bent, tufted hairgrass, heath bedstraw, Yorkshire fog, and wavy hairgrass. There was occasional hard fern and heather. There was a layer of glittering wood-moss.	
27	NM 96963 30128	Felled plantation.	
28	NM 97889 28813	U4 field with bent grasses, creeping buttercup, Yorkshire fog and little shaggy-moss. Well cropped. Watercourse with soft rush (MG10a).	
29	NM 97826 28815	Line of rhododendron along the side of the track. W11 woodland on other side.	






TG	Grid ref	Comment	Photo
30	NM 97779 28839	Large mature oaks in W11 woodland. Occasional holly and willow. Frequent to abundant birch. Ground flora had a continuous bryophyte layer, glittering wood-moss, shaggy-moss, with creeping bent. Hard fern was common. Blaeberry was occasional.	
31	NM 97740 28915	Ornament gardens. Well established gardens with car park and ornamental species.	
32	NM 97547 28965	Ash and birch wet woodland (W4 and W7) in low ground along the watercourse. As ground rises oak dominated with birch (W11) but at the lower contour the wet woodland had abundant purple moor-grass and soft rush with hard fern, and ordinary moss.	
33	NM 97556 29240	Open area of grassland with a mix of U5, MG10a and MG9.	
34	NM 97594 29206	Mix of U20, MG10a and MG9. U20 was on drier ground. MG10a was on wet lower ground with extensive areas of MG9. Scattered birch.	






TG	Grid ref	Comment	Photo
			
35	NM 97598 29086	Loch with water horsetail, and bottle sedge transitions into wet woodland (W4 and W7).	
36	NM 97604 29114	MG9 with tussocky of tufted hairgrass and purple moor-grass.	
37	NM 97371 29372	Open area of wind-throw and sitka spruce regen.	
38	NM 97244 29475	Area of clear fell with MG9 grassland. Tufted hairgrass with Yorkshire fog, soft rush, raspberry, foxglove creeping bent, heath bedstraw over numerous tree stumps. Occasional sitka spruce regen.	

TG	Grid ref	Comment	Photo
39	NM 97262 29598	U20 and wet woodland dominated by birch along watercourse (mix of W4 and W7).	
40	NM 97039 29780	U20 on steep slope to watercourse. The west side of the track was cleared felled. Numerous sitka regen (or planted sapling) were ca. 2m tall.	
41	NM 97049 29794	Wet woodland along watercourse. There was a ca. 10m-20m corridor of wet woodland along the watercourses (mix of W4 and W7).	
42	NM 97136 29703	Area of clear fell with MG10a and sitka spruce regen. Numerous stumps and patches of brash.	
43	NM 97247 29638	Wet woodland corridor was thinner at this location, ca.<10m wide.	



TG	Grid ref	Comment	Photo
44	NM 98242 28890	Sheep grazed field of U4 with MG10a in wet areas. U4 grassland at track edge.	
45	NM 98145 28969	Sheep grazed U4 field. Bent grasses with clover, tormentil, heath bedstraw with little shaggy-moss.	
46	NM 98087 29020	Line of trees including sitka spruce, larch and poplar.	
47	NM 98038 28932	View of polytunnels.	
48	NM 98038 28935	U4 grassland beside public road. Going to private land.	


TG	Grid ref	Comment	Photo
49	NM 97914 28806	Mix of MG10a and U4 with birch woodland on dry slopes.	
50	NM 97916 28808	View of route through glasshouses.	
51	NM 98230 28765	W11 on slopes. At this location it was a birch canopy with no oak. Low layer of ground flora, with shaggy-moss, glittering wood-moss, wavy hairgrass, common bent, creeping bent and sweet vernal grass. Many signs of cattle grazing.	
52	NM 98211 28791	Cattle grazed MG10a. Ground was poached and heavily grazed. Eared willow scrub present in a couple of patches.	
53	NM 98201 28775	Willow scrub, W1 dominated by eared willow.	

TG	Grid ref	Comment	Photo
54	NM 98155 28731	Bare ground around cattle feeding location.	
55	NM 98150 28725	Steep river valley with large mature oaks with epiphytes on branches. Ash and alder present. Mix of W11 and W7.	 
56	NM 98167 28667	Open area of MG10a with U5 and U20 (ratio 60:35:5) which was and poached and heavily grazed. MG10a likely maintained by rain and disturbance. U5 mix of usual grasses with heath bedstraw, tormentil, heath wood rush and a mix of mosses.	
57	NM 98180 28538	Stream valley with ash, alder, birch and oak. Mix of W7 and W11. Ivy and bracken common.	

TG	Grid ref	Comment	Photo
58	NM 98149 28563	Ash, oak and birch along watercourse with hard fern, bracken, male fern and a mix of mosses.	
59	NM 98240 27390	U5 acid grassland with lines of marshy grassland MG10a following watercourse.	
60	NM 98285 27444	Swath of MG10a flattered by winter rains.	
61	NM 98304 27578	Bracken, U20. Large areas of bracken with acid grassland U5. W11 woodland was dominated by birch.	
62	NM 98255 27736	Woodland, W11. Mix of grasses and mosses below. Sheep grazed.	

TG	Grid ref	Comment	Photo
63	NM 98162 27841	Mix of MG10a, U5 and U20 on slopes below track (ratio 50:30:20). Upper slope were mostly U5 with less MG10a and U20 (ratio 80:10:10).	
64	NM 98124 28231	Mix of U5, U4, MG10a and U20 grassland at a ratio of 50:20:20:10. Sheep grazed and enriched.	
65	NM 98130 28394	MG10a, U5, U4 and U20 at a ratio of 50:20:20:10. U4 was highly sheep grazed.	
66	NM 97015 29890	Felled plantation.	
67	NM 98059 29004	U4 and MG10 at a ratio of 80:20.	

TG	Grid ref	Comment	Photo
68	NM 98063 29017	Line of birch, larch and poplar with bramble and bracken.	
69	NM 98028 29048	Polytunnels. Some used by community. Some appeared derelict.	 
70	NM 97981 29007	Riparian woodland and bracken.	
71	NM 97973 28996	U4 grassland with a little U20.	

TG	Grid ref	Comment	Photo
72	NM 97944 28960	Old, apparently derelict glasshouses.	
73	NM 97941 28958	Line of leylandii by ditch along fence line. Ditch had running water.	