

EARBA STORAGE

A GILKES ENERGY COMPANY

Earba Pumped Storage Hydro Scheme EIA Report

Appendix 12.4: Groundwater Dependent Terrestrial Ecosystems (GWDTE) Assessment

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Earba Pump Storage Scheme

Technical Appendix 12.4 Groundwater Dependent Terrestrial Ecosystems (GWDTE) Assessment

Earba Storage

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1.0 Introduction

This Technical Appendix presents an assessment of potential areas of Groundwater Dependent Terrestrial Ecosystems (GWDTE) for the Proposed Development.

A number of surveys, including a programme of peat depth probing, a Phase 1 habitat survey and a National Vegetation Classification (NVC) survey have been undertaken and have been used to inform this assessment.

The Phase 1 habitat and NVC surveys were undertaken by Tracks Ecology in July 2023 and included all of the infrastructure associated with the Proposed Development and a survey buffer of at least 250m to this. The survey area is dominated by a mix of upland habitats and has a significant altitudinal range from 250mAOD at the proposed entrance from the A86 public road to the upper slopes of the local peaks including Creag Pitridh and Binnein Shuas at 850mAOD. The total surveyed area is over 1,650ha.

This Appendix should be read in conjunction with the following Chapters of the Environmental Impact Assessment (EIA) Report:

- **Chapter 8: Terrestrial Ecology**, which contains a detailed description of the NVC survey undertaken and survey methodology;
- **Chapter 12: Geology, Soils and Water**, which contains a detailed description of the local hydrology and hydrogeology, water flow mechanisms and hydraulic properties of the soils and geology, the embedded mitigation incorporated in the development design, and an assessment of impacts on groundwater and surface water flows and quality; and
- **Technical Appendix 10.1: Peat Landslide Hazard Risk Assessment (PLHRA)**, which contains details of the peat survey and recorded depths as well as details of the substrate recorded beneath the soils / peat.

1.1 Survey Area Description

The lowland sections of the habitat survey area support areas of blanket bog, heath and grassland with scattered dwellings. Areas of semi-natural woodland are present along watercourses and sections of commercial and non-commercial planted conifer woodland cover small areas of land. The landscape rapidly develops into an upland environment to the south along the proposed access route with extensive open moorland including patches of blanket bog and significant sections of wet heath with smaller pockets of acid grassland.

The landscape adjacent to Lochan na h-Earba is steep and rugged with the valley sides rising quickly supporting wet heath and rocky outcrops. On the upper slopes the soils are thin and the vegetation is, in places, heavily influenced by the basic nature of the geology. In the northern end of Lochan na h-Earba the slopes are somewhat gentler and increased semi-natural woodland, in the form of birch and Scot's pine dominated woodland, is present. Out with the contiguous sections of woodland scattered trees remain, but many of these were in significant decline and regeneration was noted sparse in most areas.

The habitat survey area extended further southeast up to an altitude of approximately 750mAOD through Bealach Leamhain, before dropping down to Loch a' Bhealaich Leamhain which forms the upper loch of the pump storage project, located at around 640mAOD. The habitats located through the pass, and higher up on the adjacent peaks, supported montane heath habitats, with wet heath and blanket bog further southeast on the lower slopes.



1.2 Conceptual Hydrological Site Model

The following conceptual hydrological site model has been developed and is discussed in more detail in **Chapter 12: Geology, Soils and Water**:

- the Proposed Development is in an area that receives frequent rainfall and has a high annual rainfall total;
- where there are no drift deposits present, there is potential for some shallow groundwater to be present in the upper weathered surface of the bedrock. This is generally on elevated steeply sloping ground where rainfall would preferentially form surface runoff and thus limit the potential for infiltration to form groundwater;
- where shallow groundwater flow does occur in the weathered bedrock deposits it will follow topography; and
- the potential for rainwater recharge to groundwater within the bedrock is limited by (a) the presence regionally of peat and clays associated with the glacial till deposits, and (b) the low bulk permeability of the bedrock. Incident rainfall is likely to preferentially pond on the ground surface and where surface gradients allow form surface runoff or shallow interflow within the acrotelm (top) layer of the peat rather than infiltrate and form significant groundwater recharge.

The absence of significant quantities of groundwater in the superficial and bedrock deposits is confirmed by published mapping (see **Chapter 12, Figure 12.6**, and **Figure 12.7** of the EIA Report).



2.0 NVC Mapping and Occurrence of Potential GWDTE

2.1 NVC Mapping

The survey methodology and findings are discussed in detail in **Chapter 8: Terrestrial Ecology** of the EIA Report.

The NVC survey was undertaken in accordance with standard methodologies and guidelines, during which NVC communities were mapped in the field by applying polygons around visible boundaries of homogenous vegetation or mosaic and/or transitional communities. Where readily identifiable, stands were classified and mapped at sub-community level.

The NVC field surveyors report that the survey area was highly complex in terms of topography and habitats. As a result, complex associations of NVC communities were present with mosaics of different NVC communities recorded. Where mosaics were present these were recorded in order of dominance with respective percentage coverage provided.

Target notes were taken to record habitats and any specific features too small to map, along with a full species list available at the time of survey, and notes and identification of any GWDTE communities.

2.2 Occurrence of Potential GWDTE

The assessment of GWDTE began by identifying the NVC communities which are cited in SEPA guidance¹ as potential moderate or high groundwater dependent habitat.

Where potential moderate or high groundwater dependent communities, as specified in SEPA's guidance, are present in a mosaic, they have been considered in this assessment where they dominate the habitat within the mosaic (i.e. over 50% of the recorded habitat).

Using this approach, habitats determined to have a potentially moderate or high groundwater dependency are shown on **Figure 12.8a – 12.8e** of the EIA Report. Further site-specific scrutiny of these areas in terms of topography and hydrological context are discussed in the sections below.

In addition, a site-based assessment of potential habitat areas of moderate or high groundwater dependency, was completed by Tracks Ecology, and is presented as **Annex 01**. Their assessment presents both the potential groundwater dependency based on SEPA guidance but also an adjusted value, based on the site-specific setting of the community. As many of the communities are found in mosaic, the potential dependence of each individually mapped polygon may vary from that of the dominant community, based on the percentages of sensitive communities and the site-specific setting.

For example, where the dominant NVC community of a habitat is not groundwater dependent, but the wider mosaic supports a sub-dominant NVC community identified as being potentially dependent on groundwater, then this is classified as 'Low-Moderate' groundwater dependency. Similarly, where the dominant NVC community of a habitat is identified as being of moderate groundwater dependency but supports a sub-dominant NVC community identified as being potentially highly dependent on groundwater, then is classified as 'Moderate-High' groundwater dependency. See **Annex 01** and **Figure 5a – 5g, Appendix 8.3, Chapter 8: Terrestrial Ecology**.

¹ SEPA (2017) Land Use Planning System, SEPA Guidance Note 31, Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3.



Tracks Ecology report (**Annex 01**) that the vast majority of habitats are assessed as having relatively low dependency on groundwater. In some instances, habitats such as M15 *Trichophorum germanicum*-*Erica tetralix* wet heath which are identified as being of moderate dependency on groundwater within SEPA guidance have been assessed to be only of low dependency due to their landscape setting. In other cases, habitats which are identified as being of moderate dependency have been upgraded to high dependency due to significant influence on habitats from basic rock exposures or springs.

In summary, Tracks Ecology report areas of habitat with potential significant dependency on groundwater are generally located on the southern slopes of Binnein Shuas, on the upper slopes through the pass at Bealach Leamhain and to a lesser extent on the northern slopes of Loch a' Bhealaich Leamhain. These areas are discussed further below.

2.2.1 Habitats with Potential Moderate Groundwater Dependency

Table 2-1 discusses habitats of potential moderate groundwater dependency which dominate the polygon and are cited in SEPA guidance¹.

Table 2-1: Potential Moderate Groundwater Dependency Habitat

Habitat	Location	Discussion
M15 (including Target Notes 52 to 56)	Extensive areas across the Site.	The habitat is typically located on sloped ground across a range of elevations which is largely underlain by low permeability glacial till deposits. The habitat is not rare and is present across large areas of Scotland. During the NVC survey, M15 habitats were generally noted as low species rich with no species indicating influence of groundwater. Where base rich flushes were noted, they are shown to be underlain by low permeability glacial till. Given this distribution it is considered that this habitat is sustained by the high average annual rainfall, surface water runoff and surface water ponding above the low permeability glacial till rather than by emergent groundwater. Buffers specified in SEPA guidance to this habitat therefore need not apply, but safeguards will be required during construction and operation to maintain existing surface water flow paths to this habitat during construction.
M25 (including Target Notes 32 to 35)	Large areas on sloped ground particularly near Loch Earba.	The habitat is also typically located on sloped ground which is largely underlain by low permeability glacial till deposits. M25 dominated habitats were generally noted as part of the NVC survey as species poor or low species rich with no species indicating influence of groundwater. Given this distribution it is considered that this habitat too is sustained by the high average annual rainfall, surface water runoff and surface water ponding above the low permeability glacial till rather than by emergent groundwater. Buffers specified in SEPA guidance to this habitat therefore need not apply, but safeguards will be required during construction and operation to maintain existing surface water flow paths to this habitat during construction. There is one polygon of M25, which also contains four Target Notes of high potential GWDTEs (Target Notes 101 and 102 (M10), Target Note 122 (M11) and Target Note 99 (U15)) on the slopes of Binnein Shaus, to the north of Loch Earba, This polygon is situated on sloped ground which is underlain by Scottish Highland Ordovician Minor Intrusion Suite bedrock. Tracks Ecology report (Annex 01) this area is very species



Habitat	Location	Discussion
		rich including many indicators of base enrichment. Given the potential for groundwater to support these Target Notes they have been classified as high potential GWDTE. No development, except, a new footpath is proposed near these target notes – it is also recorded that these habitats are recorded at a higher elevation than the proposed footpath and thus the water catchment to them will not be intersected by the Proposed Development. The Proposed Development would not therefore affect the yield or quality of groundwater that sustains these habitats. Works near these Target Notes should be supervised by the project Ecological Clerk of Works (ECoW) to ensure this habitat and water flow paths are preserved.
MG9 (including Target Note 26)	Two polygons, noted outside of the Site Boundary along the banks of the Abhainn Ghuilbinn.	MG9 dominated habitats is localised and situated immediately adjacent to the Abhainn Ghuilbinn watercourse. The distribution is not typical of that attributable to a dominant groundwater discharge and it is considered that rainfall and surface water runoff sustains this habitat. The habitats are underlain by alluvium and river terrace deposits whereby any groundwater will be hydraulically connected to, and sustained by, the Abhainn Ghuilbinn. Buffers specified in SEPA's guidance to this habitat therefore need not apply, but safeguards will be required during construction to maintain existing surface water flow in the Abhainn Ghuilbinn .

Table 2-1 shows that, with one exception (polygon of M25 on the slopes of Binnein Shaus), habitats of potential moderate groundwater dependency cover large areas over a range of elevations and slopes or in areas adjacent to lochs and watercourse channels. This distribution is not typical of that which is sustained by emerging groundwater, such as springs or seepage lines.

In addition to the moderately dominant habitats described in **Table 2-1**, the NVC survey also noted areas of U6 (Target Notes 23, 24 and 90) which is considered a potential moderate groundwater dependent community. No U6 dominant polygons were recorded by the NVC survey. U6 does, though, form part of some sub communities of other polygons particularly near Loch Leamhain.

U6 habitat therefore represents a small area within larger community types which are not groundwater dependent. It is therefore considered, like the larger communities they are recorded within, the U6 habitat is predominately sustained by rainfall and surface water runoff and ponding. Works in or near these communities that contain U6 habitat, should be supervised by the project Ecological Clerk of Works (ECoW) to ensure existing surface water flow paths are maintained.

2.2.2 Habitats with Potential High Groundwater Dependency

Table 2-2 details areas of potential high groundwater dependency habitat which dominate the polygon, and which are cited in SEPA guidance¹.

Table 2-2: Potential High Groundwater Dependency Habitat

Habitat	Location	Discussion
CG10	Areas adjacent to watercourses within the Site.	CG10 dominated polygons are localised and situated immediately adjacent to watercourse channels across the Site. The distribution is not typical of that attributable to a



Habitat	Location	Discussion
(including Target Notes 28 and 29)		dominant groundwater discharge but rather rainfall and surface waterlogging of soils. Buffers specified in SEPA's guidance to this habitat therefore need not apply, but safeguards will be required during construction to maintain existing surface water flow paths.
M6 (including Target Notes 72, 73 and 100)	One polygon adjacent to Allt Loch a'Bhealaich Leamhain.	A M6 dominated polygon is noted adjacent to the Allt Loch a'Bhealaich Leamhain, which is underlain by glacial till. Other polygons which contain sub communities of M6 are also shown immediately adjacent to watercourse channels within the Site. The NVC survey also confirmed that M6 communities were noted as species poor and lacking base rich indicators. The distribution and habitat characteristics are not typical of those attributable to a dominant groundwater discharge and it is considered that rainfall and surface water sustains this habitat. Buffers specified in SEPA's guidance to this habitat therefore need not apply, but safeguards will be required during construction to maintain existing surface water flow paths.
M31 (including Target Notes 77 and 123)	One polygon and two target notes recorded on sloped ground near Loch Leamhain.	One M31 dominant polygon is recorded on sloped ground to the south of Loch Leamhain. Two target notes of M31 are recorded within the Site. M31 habitats are flush features that tend to be supported by a level of base rich water. The M31 habitats are recorded upstream / above the Proposed Development and therefore not considered to be at risk. The source of water which supports the habitat is located at an elevation higher than the Proposed Development and given the low permeability of the rocks recorded at site not at risk of dewatering or drying as a consequence of the development. As a precautionary approach, works near these communities should be supervised by the project ECoW and these habitats clearly marked to ensure they are not impaired.
W4 (including Target Notes 1 and 2)	Two polygons, noted outside of the Site Boundary near the banks of the Abhainn Ghuilbinn.	The W4 dominated habitat is localised and situated near the banks of the Abhainn Ghuilbinn. The distribution is not typical of that attributable to a dominant groundwater discharge but rather by rainfall and surface water and waterlogging of soils. The habitats are underlain by alluvium and river terrace deposits whereby any groundwater will also be hydraulically connected to and sustained by the Abhainn Ghuilbinn. Buffers specified in SEPA's guidance to this habitat therefore need not apply, but safeguards will be required during construction to maintain existing surface water flow paths.

With the exception of M31 habitat, **Table 2-2** confirms that areas of potential high groundwater dependency habitat coincide with watercourse channels or areas immediately adjacent to the watercourses, where waterlogging of soils from surface water will readily occur. These habitats are not considered to be sustained by groundwater, and buffers to these in SEPA guidance need not apply, but safeguards will be required to maintain existing surface water flow paths and water quality.

A number of target notes were also recorded as part of the NVC survey which recorded habitat that has a high potential to be sustained by groundwater (see **Figure 12.8a – 12.8e**); these included the following habitats:



- CG11 (Target Notes 30 and 31);
- M10 (Target Note 74 and 101 to 103);
- M11 (Target Notes 75, 76, 104 to 122);
- M32 (Target Notes 78 and 123 to 128);
- M37 (Target Notes 80, 129 to 131);
- U15 (Target Notes 62 and 99);
- U17 (Target Notes 40 and 91 to 96);
- W7 (Target Notes 3 and 4) and which is recorded by Tracks with low groundwater dependency; and
- W20 (Target Notes 17 and 84 to 89).

As a worst case, with the exception of W7 (Target Notes 3 and 4) it is assumed the habitat at these Target Notes are sustained by groundwater.

In addition to the potentially highly groundwater dominant habitats described in **Table 2-2**, the NVC survey identified two additional communities that were considered to have a high potential of groundwater dependence following the site-based assessment; a small sedge mire recorded as Target Note 36 and W9b habitat recorded at Target Note 5, neither of which are considered potential GWDTE in SEPA guidance.

The majority of the Target Notes listed above are located on the hill slopes near Loch Leamhain, on the northern slopes of the Sgurr an t-Siaghdeir and the southern slopes of Binnein Shaus, as shown on **Figure 12.8a – 12.8e**. It is evident that the majority of the Target Notes are located at a higher elevation than the proposed infrastructure and thus the water catchments to the Target Notes do not extend to or are not truncated by the Proposed Development². The habitats in these instances, therefore, will not be impaired or impacted as the water catchment area that sustains these habitats will be maintained. Safeguards will be needed and be deployed by the site ECoW prior to and during construction, to ensure there are no direct impacts on these habitats or their catchments, associated with earthworks or construction of the proposed infrastructure.

In the limited number of instances where the Target Notes are recorded within 100m – 250m and at a lower elevation than the proposed site infrastructure it is recognised that there is potential for the Proposed Development to impair the recorded habitat as a result of intercepting or diverting water which flows to and sustains the habitat / flush. At these locations, where technically feasible, excavation of soils should be avoided and drainage measures installed with agreement and under the supervision of the site ECoW to maintain existing surface and shallow soil drainage paths.

There are a number of instances where discrete areas (e.g. too small to be mapped) of potential GWDTE habitat at Target Notes will be lost e.g. at the powerhouse and within the upper reservoir inundation zone. This includes the following Target Notes: 17 (W20), 85 (W20), 87 (W20), 93 (U17), 94 (U17), 109 (M11), 110 (M11), 114 (M11), 115 (M11), 117 (M11) and 131 (M37). The impact of this habitat loss and proposed mitigation is discussed further in **Chapter 8: Terrestrial Ecology**.

² In upland setting or where soils are shallow / bedrock is near surface groundwater flow paths are typically similar to or the same as surface water catchments (e.g. topography is a good surrogate for contributing catchment area).



2.2.3 Summary

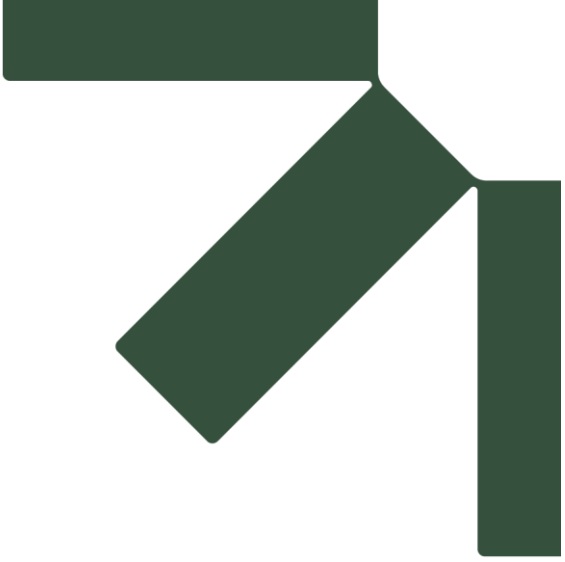
Review of **Figure 12.8a – 12.8e**, and **Table 2-1** and **Table 2-2** confirms that potential groundwater dependent habitats are typically located over large areas or in/adjacent to watercourse corridors. This distribution is not consistent with habitats sustained by groundwater but rather habitats predominantly sustained by a high average annual rainfall, surface water runoff and surface water ponding.

It is concluded therefore that buffers to potential high and moderate GWDTE specified in SEPA guidance need not apply in these instances, but safeguards will be required during construction to maintain existing surface water flow paths to these habitats. Micro-siting (for example of tracks) will also be required under direction of the project ECoW to safeguard valuable habitats, such as flushes, where possible, however it is noted that some of the habitats will be lost as a result of the Proposed Development, for example with in the inundation zone of the upper reservoir. Proposed compensation is discussed in **Chapter 8: Terrestrial Ecology**.

No permanent dewatering or groundwater management is required as part of the Proposed Development and therefore no permanent change to groundwater levels and flow direction will occur. Any existing groundwater contribution to habitats will therefore continue.

Examples of proposed safeguards which will be used to maintain existing surface water flow paths and maintain existing water quality are provided in **Chapter 12: Geology, Soils and Water** of the EIA Report. A commitment has been made to include these in the final CEMP. It also includes the provision of an ECoW to supervise construction works and whom would have the authority or approve drainage measures, and ensure their efficacy, deployed during the project.





Annex 01 Tracks Ecology - GWDTE Notes from NVC Survey

Earba GWDTE

Phase 1 habitat	NVC community	Notes	Groundwater dependency	
			Guidance	Site-specific
A1.1.1 Broadleaved woodland – semi-natural	W4b <i>Betula pubescens</i> - <i>Molinia caerulea</i> woodland, <i>Juncus effusus</i> sub-community	- Topographical setting on moderate slopes away from any obvious surface water features suggests possible groundwater influence, though slight easing of gradient may be resulting in ponding of surface water collected from further upslope. - Presence of small number of species of less acidic character than would normally be associated with this community may indicate some groundwater influence on the habitat.	High	Low to Moderate
	W4c <i>Betula pubescens</i> - <i>Molinia caerulea</i> woodland, <i>Sphagnum</i> sub-community	- Location on gentle slopes or level ground close to watercourses in valley bottoms indicates surface water influence. - Species-poor, with no species indicating influence of base-rich groundwater.	High	Low
	W7a <i>Alnus glutinosa</i> - <i>Fraxinus excelsior</i> - <i>Lysimachia nemorum</i> woodland, <i>Urtica dioica</i> sub-community	- Location on gentle slope adjacent to watercourse in valley bottom indicates surface water influence.	High	Low
	W7c <i>Alnus glutinosa</i> - <i>Fraxinus excelsior</i> - <i>Lysimachia nemorum</i> woodland, <i>Deschampsia cespitosa</i> sub-community	- Setting in slight depression on otherwise moderate slopes indicates possible ponding location for surface water collected from surrounding slopes.	High	Low
	W9b <i>Fraxinus excelsior</i> - <i>Sorbus aucuparia</i> - <i>Mercurialis perennis</i> woodland, <i>Crepis paludosa</i> sub-community	- Location on otherwise dry slopes away from any obvious surface water features suggests possible groundwater influence. - Moderately species-rich, with base-rich indicators. - NB: not regarded as a GWDTE community in the guidance, but W9b in particular can be associated with flushing, as here.	n.a.	High
A2.2 Scrub – scattered	W20 <i>Salix lapponum</i> - <i>Luzula sylvatica</i> scrub	- Strongly associated with wet crags and ledges where water appears despite no obvious surface flows. - Many stands are species-rich, with species of base-rich habitats.	High	High
B1.1 Acid grassland – unimproved	U6d <i>Juncus squarrosus</i> - <i>Festuca ovina</i> grassland, <i>Agrostis capillaris</i> - <i>Luzula multiflora</i> sub-community	- Species-poor, with no species indicating influence of base-rich groundwater. - Located in depressions adjacent to blanket bog at higher altitudes, indicating water received through mist, rain and surface run-off rather than groundwater.	Moderate	Low

	U6 base-rich <i>Juncus squarrosus</i> - <i>Festuca ovina</i> grassland	- Species-rich, including species indicative of base-enrichment. - Location on moderate slopes suggests diffuse flushing with base-rich water.	Moderate	High
B2.1 Neutral grassland – unimproved	MG9a <i>Holcus lanatus</i> - <i>Deschampsia cespitosa</i> grassland, <i>Poa trivialis</i> sub-community	- Moderately species-rich, but no floristic indicators of base-rich groundwater emergence. - Location adjacent to watercourse indicates surface water influence.	Moderate	Low
B3.1 Calcareous grassland – unimproved	CG10a <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Thymus drucei</i> grassland, <i>Trifolium repens</i> - <i>Luzula campestris</i> sub-community	- Located adjacent to surface water features where erosion by watercourses has exposed loose calcareous bedrock/till at or close to the surface. Indicates direct influence of geology rather than groundwater.	High	Low
	CG10b <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Thymus drucei</i> grassland, <i>Carex pulicaris</i> - <i>Carex panicea</i> sub-community	- Moderately basic species assemblage on damp ground in the absence of obvious surface water features or exposed calcareous bedrock, indicating flushing with moderately base-rich water.	High	High
	CG11a <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Alchemilla alpina</i> grass-heath, Typical sub-community	- Species-rich swards, including floristic indicators of base-enrichment in the absence of basic geology.	High	High
	CG11b <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Alchemilla alpina</i> grass-heath, <i>Carex pulicaris</i> - <i>Carex panicea</i> sub-community	- Damp ground on steep slopes with water movement in the absence of any obvious surface water sources, suggesting groundwater emergence directly above.		
B5 Marsh/marshy grassland	M25a <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire, <i>Erica tetralix</i> sub-community	- Species-poor or low species-richness, with no species indicating influence of base-rich groundwater. - Situations in mosaics with wet heath and blanket bog over extensive areas suggests rain and surface water fed, rather than groundwater.	Moderate	Low
	M25b <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire, <i>Anthoxanthum odoratum</i> sub-community			
	M25 species-poor <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire			
	M25c <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire, <i>Angelica sylvestris</i> sub-community	- Moderately species-rich, and with species indicative of base-richness - Damp ground on gentle slope, suggesting movement of base-enriched water through the substrate, probably mixed with rain and surface water run-off.	Moderate	Moderate
	M25a base-rich <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire	- Very species-rich, including many indicators of base-enrichment - Well-drained upper slopes, with no obvious sources of base-rich water except from groundwater.	Moderate	High
	Small sedge mire	- Not recognised in the NVC - Species-rich, and containing species indicating base-rich groundwater emergence.	n.a.	High

C2 Upland species-rich ledges	U17b <i>Luzula sylvatica</i> - <i>Geum rivale</i> tall-herb community, <i>Geranium sylvaticum</i> sub-community	- Very species-rich, including species indicative of base-enrichment. - Situated on damp ledges on wet rock, with no obvious source of surface water flows, suggesting emergence of base-rich groundwater.	High	High
D2 Wet dwarf shrub heath	M15a <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath, <i>Carex panicea</i> sub-community	- Located in wet situations with evidence of water movement through the vegetation. - Includes species of base-rich flushes, such as carnation sedge, flea sedge, common yellow-sedge and common butterwort.	Moderate	Moderate
	M15b <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath, Typical sub-community	- Low species-richness, with no species indicating influence of base-rich groundwater. - Situations in mosaics with marshy grassland and blanket bog over extensive areas, or in drier situations on steeper slopes, suggests rain and surface water fed, rather than groundwater.	Moderate	Low
	M15c <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath, <i>Cladonia</i> sub-community			
	M15d <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath, <i>Vaccinium myrtillus</i> sub-community			
	M15 montane <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath			
D4 Montane heath/dwarf herb	U15 <i>Saxifraga aizoides</i> - <i>Alchemilla glabra</i> banks	- Species-rich, including species indicating base-enrichment. - Situated on wet, dripping rock faces with no obvious source of surface water flows, suggesting emergence of base-rich groundwater.	High	High
E2.1 Flush and spring – acid/neutral flush	M6b <i>Carex echinata</i> - <i>Sphagnum fallax/denticulatum</i> mire, <i>Carex nigra</i> - <i>Nardus stricta</i> sub-community	- Species-poor and lacking base-rich indicators. - Located in depressions below blanket bog or along the edges of streams, indicating surface water rather than groundwater fed.	High	Low
	M6c <i>Carex echinata</i> - <i>Sphagnum fallax/denticulatum</i> mire, <i>Juncus effusus</i> sub-community	- Species-poor and lacking indicators of base-rich groundwater emergence. - Located adjacent to wet heath, suggesting surface water run-off responsible for wet conditions, rather than groundwater.	High	Low
E2.2 Flush and spring – basic flush	M10a <i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire, <i>Carex demissa</i> - <i>Juncus bulbosus/kochii</i> sub-community	- Moderately species-rich, and containing species indicating base-rich groundwater emergence. - Found in wet situations with no obvious source of water apart from groundwater.	High	High
	M11a <i>Carex demissa</i> - <i>Saxifraga aizoides</i> mire, <i>Thalictrum alpinum</i> - <i>Juncus triglumis</i> sub-community	- Moderately species-rich, and containing species indicating base-rich groundwater emergence.	High	High
	M11b <i>Carex demissa</i> - <i>Saxifraga aizoides</i> mire, <i>Palustriella commutata</i> - <i>Eleocharis quinqueflora</i> sub-community	- Found in wet situations with no obvious source of water apart from groundwater.		

E2.3 Flush and spring – bryophyte-dominated spring	M31 <i>Anthelia julacea</i> - <i>Sphagnum denticulatum</i> spring	- Small to larger diffuse areas of low species-richness, in situations of irrigation with groundwater and/or flushing with snow melt.	High	High
	M32a <i>Philonotis fontana</i> - <i>Micranthes stellaris</i> spring, <i>Sphagnum denticulatum</i> sub-community	- Small, species-poor features located in obvious points of groundwater emergence such as point sources with no other obvious source of water available.	High	High
	M32b <i>Philonotis fontana</i> - <i>Micranthes stellaris</i> spring, <i>Montia fontana</i> - <i>Chrysosplenium oppositifolium</i> sub-community			
	M37 <i>Palustriella commutata</i> - <i>Festuca rubra</i> spring	- Small, species-poor features located in obvious points of groundwater emergence such as point sources with no other obvious source of water available. - Includes species indicating base-enrichment.	High	High



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