
Mynydd Fforch Dwm Wind Farm
Naturalis Energy Developments Ltd
Appendix 9.1: Habitats and Vegetation



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1 INTRODUCTION

- 1.1.1 This Technical Appendix has been prepared to accompany **Chapter 9: 'Ecology'** of the Environmental Statement ('ES') for the proposed Mynydd Fforch Dwm Wind Farm (hereafter 'Proposed Development').
- 1.1.2 It presents detailed methodologies, desk study and field surveys completed to establish baseline habitat conditions and should be read with reference to the following figures (presented in Volume 2 of the ES):
- **Figure 9.1a:** Ecological Statutory Designated Sites.
 - **Figure 9.1b:** Ecological Non-Statutory Designated Sites.
 - **Figure 9.2a:** Existing Ecological Records (Plants).
 - **Figure 9.2b:** Existing Ecological Records (Reptile).
 - **Figure 9.2c:** Existing Ecological Records (Other Protected Species).
 - **Figure 9.2d:** Existing Ecological Records (Invasive/Non-Native Species).
 - **Figure 9.3:** Phase 1 Habitat Survey Plan.
 - **Figure 9.4:** NVC Survey Plan.
 - **Figure 9.7:** Outline Habitat Management Plan Areas.
- 1.1.3 Other than where they form part of a plant community name or for some moss species where the scientific name is most regularly used, only common species names are used throughout this Technical Appendix. Scientific names for species referenced are supplied in **Annex 1**.
- 1.1.4 The 'Site' comprises the 'MFD' area (land area to the east) and the 'MB' area (land area to the west), with the Site shown in **Figure 9.3**.

2 METHODOLOGY

2.1 Objectives

- 2.1.1 The objectives of the baseline studies were to:
- Establish the spatial distribution of habitats and vegetation communities which may be impacted by the Proposed Development; and
 - Identify the presence and distribution of potential Groundwater Dependent Terrestrial Ecosystems for (GWDTEs) for subsequent hydrological assessment.

2.2 Desk Study

- 2.2.1 The desk study has included a review of the following key sources summarised in **Table 2.1**.
- 2.2.2 Additional peer reviewed literature and industry guidance has also been reviewed and is referred to where relevant.

Table 2.1: Desk study key sources and information sought.

Key Source	Date of Consultation	Information Sought	Study Area
Natural Resources Wales (NRW) website https://naturalresources.wales/?lang=en	October 2022	Proximity to statutory designated sites.	Within 10km of the Site (see Figure 9.1).
'MAGIC' website https://magic.defra.gov.uk/magicmap.aspx	October 2022	Proximity to statutory designated sites.	Within 10km of the Site (see Figure 9.1).
South East Wales Biodiversity Records Centre (SEWBRC)	October 2022	Existing botanical records ¹ . Proximity to non-statutory designated sites.	Within 1km of the Site (see Figures 9.2a and 9.2d).

2.3 Field Surveys

2.3.1 The following surveys have been completed:

- Extended Phase 1 habitat survey of the MFD area in 2015 (with habitat validation surveys in 2019 and 2021);
- Extended Phase 1 habitat survey of the MB area in 2021;
- National Vegetation Classification (NVC) survey of the MFD area in 2015 (with habitat validation surveys in 2019 and 2021); and
- NVC survey of the MB area in 2021.

Extended Phase 1 Habitat Survey

2.3.2 An extended Phase 1 habitat survey was undertaken 22nd June 2015.

2.3.3 The survey was undertaken in accordance with the UK industry standard Phase 1 habitat methodology (JNCC, 2010).

2.3.4 During the 2015 survey all habitats within the MFD area (and adjoining habitats where accessible) were mapped according to industry standards, with the use of descriptive target notes ('TN'; if required).

2.3.5 On 1st August 2019 and 26th July 2021 validation habitat surveys were undertaken to determine whether habitats within the MFD area (and adjoining habitat) were consistent with the results of the 2015 survey, or whether changes to the habitat baseline were required.

¹ This included those botanical species which have European and UK legal protection, are Section 7 priority species of the Environment (Wales) Act 2016, are on the Global Red List, are in the British Red Data Book, are on the Welsh Vascular Plant Red Data List, are considered Locally Important Species (as specified by local experts) and invasive/non-native species.

- 2.3.6 During the 2021 survey all habitats within the MB area (and adjoining habitats where accessible) were mapped according to industry standards, with the use of descriptive target notes ('TN'; if required).
- 2.3.7 For the purposes of this Technical Appendix, the Site and adjoining habitats where accessible is termed the 'survey area'. The survey area typically covered the Proposed Development and out to 200m.

National Vegetation Classification (NVC) Survey

- 2.3.8 A NVC survey was undertaken of the MFD area on 26th June 2015 following the guiding principles detailed within the 'National Vegetation Classification: User's Handbook' (Rodwell, 2006).
- 2.3.9 The NVC survey area comprised all noteworthy habitats identified from the Phase 1 habitat survey.
- 2.3.10 Areas were selected for NVC survey based on the presence of homogenous stands of vegetation and focusing on potential priority habitats on Section 7 of the Environment (Wales) Act 2016 of potential nature conservation value, as identified during the initial Phase 1 habitat survey.
- 2.3.11 The following habitat types as identified during the Phase 1 habitat survey, to be included for NVC survey were:
- Marshy grassland (B5);
 - Semi-improved neutral grassland (B2.2);
 - Semi-improved acid grassland (B1.2);
 - Wet modified bog (E1.7); and
 - Acid/neutral flush (E2.1).
- 2.3.12 The following habitats excluded from NVC survey because they were considered unlikely to form noteworthy habitats included:
- Poor semi-improved grassland (B6);
 - Broad-leaved semi-natural woodland (A1.1.1);
 - Coniferous semi-natural woodland (A1.2.1);
 - Coniferous plantation woodland (A1.2.2);
 - Mixed plantation woodland (A1.3.2);
 - Recently felled woodland/coniferous plantation (A4.2);
 - Tall ruderals (C3.1); and
 - Bracken (C1).
- 2.3.13 NVC square quadrats of size 2m² were distributed throughout homogenous stands identified in order to provide a representative sample of the vegetation community present. In each quadrat sample area, data was collected on the presence and abundance of vascular plant species using the Domin scale. These data were then analysed and classified to an NVC vegetation community, where possible, using the keys in Rodwell British Plant Communities Volumes 1 to 5 (Rodwell 1991, 1992, 1993, 1995, 2000).

- 2.3.14 On 1st August 2019 and 26th July 2021 validation walkover surveys were undertaken to determine whether habitats within the MFD area and adjoining habitats were consistent with the results of the 2015 survey, and thus whether the same habitats were subjected to a NVC survey.
- 2.3.15 On 26th July 2021 a NVC survey was undertaken of the MB area following the methodology detailed above, and marshy grassland was the only habitat considered for the NVC survey.

Personnel

- 2.3.16 The Phase 1 habitat survey and NVC survey of the MFD area in 2015 (and habitat validation survey in 2021) and Phase 1 habitat survey and NVC survey of the MB area in 2021 were carried out by Mr C. Davies MSc; who is a competent botanist with experience of undertaking habitat surveys, including NVC surveys, in such habitats.
- 2.3.17 The validation habitat survey of the MFD area in 2019 was conducted by A. Hulme BSc (Hons.) who is a competent botanist with experience of undertaking habitat surveys in such habitats.

Limitations

- 2.3.18 Some of the desk study records are at a 1km grid square resolution and thus the location of desk study records stated should be treated as indicative rather than definitive.

3 RESULTS

3.1 Desk Study

Statutory Designated Sites for Nature Conservation

- 3.1.1 This section should be read with reference to **Figure 9.1**.
- 3.1.2 A review of NRW and 'MAGIC' websites identifies that the Site does not form part of any statutory designated site for nature conservation with ecological qualifying features.
- 3.1.3 **Table 3.1** summarises statutory designated sites with ecological (habitats and/or vegetation) qualifying features.
- 3.1.4 Distances specified within **Table 3.1** are taken from the Site boundary to the designation boundary at its nearest point.

Table 3.1: Designated sites for nature conservation within 10km.

SAC – Special Areas of Conservation; LNR – Local Nature Reserve; SSSI – Site of Special Scientific Interest.

Designated Site	Distance and Direction from the Site	Ecological Qualifying Features
European Sites		
Crymlyn Bog SAC and Ramsar	8.3km south-west	Alder woodlands on floodplains. Calcium-rich fen dominated by great fen sedge. Very wet mires often including visible quaking surface.
Nationally Designated Sites		

Designated Site	Distance and Direction from the Site	Ecological Qualifying Features
Bryn Tip LNR	3.78km south	Former colliery site supporting rare and protected species, including bee orchids
Eaglesbush Valley LNR	4.57km west	Oak woodland valley.
Fforest Goch Bog SSSI	7.5km north-west	Lowland raised bog.
Cwm du Woodlands SSSI	8.05km south-east	Ancient sessile oakwood valley.
Crymlyn Burrows SSSI	8.2km south-west	Sand dune, saltmarsh and carr habitat with plants with local distribution, including rock sea lavender, dittander, rock hutchinsia and round-leaved wintergreen.
Pant-y-Sais SSSI and LNR	8.32km south-west	Lowland fen with a range of fenland communities including flowering rush, which is rare in the county.
Mynydd Ty-Isaf SSSI, Rhondda SSSI	8.48km east	Arctic-alpine and other plant species of local distribution in Wales. One of most southerly records in Britain for parsley fern.
Craig y Llyn SSSI	8.64km north-east	Montane botanical species.
Cilybebyll SSSI	9.05km north-west	Species-rich grassland and wet pastures, which host several uncommon plants.
Cors Crymlyn/Crymlyn Bog SSSI	9.33km south-west	Fen (topogenous mire) communities. Wet woodland. Nationally rare slender cotton-grass.
Nant y Rhos SSSI	9.82km north	Species-rich fen meadow vegetation including large populations of meadow thistle and whorled caraway.

Non-statutory Designated Sites for Nature Conservation

3.1.5 In consultation with the SEWBRC the Site is located within 1km of three Sites of Importance in Nature Conservation (SINC), with one SINC within the Site, and a second SINC adjoining the Site (as shown on **Figure 9.7**).

3.1.6 **Table 3.2** lists the SINC, with a description of each provided.

Table 3.2: Non-statutory designated sites for nature conservation.

SINC	Distance and Direction from the site	Description
Tyle'r Waun	In the east of the Site.	Qualifying features are blanket bog and reptiles. The SINC comprises modified blanket bog, valley mire, marshy grassland and acid grassland. Sheep-

SINC	Distance and Direction from the site	Description
		grazing and suspected burning have reduced dwarf shrub cover.
Cwm Blaenpelenna	Adjoins part of the northern Site boundary.	Qualifying features are mosaic habitats, open mosaic on previously developed land (ex-colliery site) and invertebrates (nine species of conservation importance). SINC affected by scrub/tree encroachment which is reducing extent of open habitat.
Tonmawr Minewater Treatment & Surrounding Habitats	Adjacent to the western Site boundary, separated from the Site by a road network.	Qualifying features are scrub communities, lowland heathland, reedbeds and herptiles. SINC affected by scrub/tree encroachment which is threatening grassland and heathland.

Existing Protected and Notable Botanical Species Records

- 3.1.7 A summary of the notable botanical species records from SEWBRC is provided in **Table 3.3**, with invasive/non-native botanical records from SEWBRC provided in **Table 3.4**. Records are presented in **Figures 9.2a** and **9.2d**.

Table 3.3: Desk study records returned by SEWBRC – notable botanical species.

Taxon Group	Species	No. of Records (and dates)	Notes ²
Moss	<i>Campylium protensum</i>	1 (2014)	Within the Site.
Flowering plant	Knotted pearlwort	10 (2012, 2014-17)	Within the Site.
Flowering plant	Little kneeling eyebright	1 (2014)	Within the Site.
Moss	Nicholson's beard-moss	3 (2012, 2016)	Within the Site.
Flowering plant	Pyramidal orchid	1 (2021)	Within the Site.
Fern	Royal fern	2 (2014, 2017)	Within the Site.
Flowering plant	Small cudweed	7 (2012, 2014-2021)	Within the Site.
Moss	Strict hair-cup	2 (2012)	Within the Site.
Flowering plant	White water-lily	4 (2012-18)	Within the Site.

² The location of the records is indicative only and sometimes relates to a grid square rather than a specific location, so the location of the species as described (and as shown in **Figures 9.2a** and **9.2d**) should not be considered as the definitive location.

Taxon Group	Species	No. of Records (and dates)	Notes ²
Flowering plant	Yellow-wort	1 (2021)	Within the Site.
Liverwort	Palmate germanderwort	2 (2016-17)	23m of the Site.
Flowering plant	Bluebell	2 (2011, 2013)	202m of the Site.
Flowering plant	Common woodrush	2 (2017, 2020)	202m of the Site.
Flowering plant	Dwarf spurge	1 (2014)	202m of the Site.
Liverwort	Least crystalwort	4 (2016-19)	202m of the Site.
Moss	Lesser potato bryum	1 (2016)	202m of the Site.
Moss	Marsh forklet-moss	3 (2013, 2019)	202m of the Site.
Flowering plant	Round-leaved mint	1 (2010)	202m of the Site.
Flowering plant	Wintergreen	1 (2018)	202m of the Site.
Fern	Beech fern	1 (2021)	455m of the Site.
Flowering plant	Slender club-rush	1 (2012)	468m of the Site.
Flowering plant	Round-leaved wintergreen	3 (2009-21)	527m of the Site.
Moss	Short-beaked wood-moss	2 (2015)	990m south of the Site.
Moss	Smaller white-moss	2 (2016, 2019)	1km from the Site.
Flowering plant	Bee orchid	1 (2019)	1.19km of the Site.
Flowering plant	Alder buckthorn	1 (2019)	1.23km of the Site.
Moss	Slender beard-moss	1 (2020)	1.41km of the Site.
Moss	Dwarf feather-moss	1 (2014)	1.41km of the Site.

Table 3.4: Desk study records returned by SEWBRC – invasive/non-native botanical species³.

Species	No. of Records (and dates)	Notes
Buddleia	5 (2012-15)	Within the Site.
New Zealand willowherb	7 (2011, 2012, 2014, 2020)	Within the Site.
Common rhododendron	9 (2012-14, 2016)	Within the Site.
Heath star moss	18 (2012-13)	Within the Site.
Himalayan balsam	5 (2010-14, 2019)	Nearest record 37m from the Site.
Wall cotoneaster	3 (2013-15)	Nearest record 169m of the Site.
Japanese knotweed	1 (2011)	202m of the Site.

³ Invasive/non-native species listed are not necessarily Schedule 9 species of the Wildlife and Countryside Act (1981).

Species	No. of Records (and dates)	Notes
Montbretia	1 (2015)	437m of the Site.

3.2 Field Surveys

Habitats

- 3.2.1 This section presents the results of baseline field surveys, including an overview of habitat types present within the habitat survey area and their distribution. The habitats between 2015, 2019 and 2021 were typically consistent, with for example, only minor changes in the extent of bracken coverage between the survey years. It should be read with reference to **Figure 9.3**.
- 3.2.2 Site photographs illustrating the habitats present are provided in **Annex 3**.
- 3.2.3 The survey area is dominated by semi-improved (species-poor) acid grassland (B1.2) and semi-improved neutral grassland (B2.2), with marshy grassland (B5) common in the west and east of the Site. There are a number of areas of continuous bracken (C1.1) and scattered scrub (A2.2)/continuous bracken (C1.1) in the west of the Site.
- 3.2.4 These grassland habitats were all considered to be species-poor and were all livestock grazed, in many cases to a heavy extent.
- 3.2.5 Woodland habitats are limited in extent in the Site, with blocks of semi-natural broad-leaved woodland (A1.1.1), coniferous semi-natural woodland (A1.2.1) coniferous plantation woodland (A1.2.2) and mixed (semi-natural) woodland (A1.3.1) principally associated with the Fforch-dwm Farm in the east of the Site. Species found within these woodlands comprise pine sp., larch sp., sycamore, willow sp., oak sp., rowan, birch sp., ash and hazel.
- 3.2.6 Coniferous plantation woodland (with areas of recently felled coniferous woodland, A4.2) is the main habitat surrounding the Site.
- 3.2.7 The Tyle'r Waun SINC in the east of the Site comprises principally of marshy grassland (B5) and semi-improved acid grassland (B1.2), but there is an area of wet modified bog (E1.7) and isolated acid/neutral flushes (E2.1).
- 3.2.8 The main watercourses within the Site comprises the Nant y Cywion in the east of the Site (which flows through the Tyle'r Waun SINC), Nant Cwm-y-pant which flows close to the Fforch-dwm Farm, Nant Blaenpelenna which flows along part of the northern and western Site boundary (MFD area), and a short stretch of the Nant Blaengweffrwd in the north-west of the Site. There is also a drainage ditch/un-named watercourse in the west of the Site.
- 3.2.9 Adjacent to the Site in the south (Grid Reference SS 81587 97102) is a series of man-made waterbodies used for filtering out contaminated mine-water before it flows into the Nant Blaenpelenna (see **Annex 4**). There are also a series of mine-water treatment waterbodies within the Tonmawr Minewater Treatment & Surrounding Habitats SINC to the west of the Site, separated from the Site by a road network.
- 3.2.10 Two areas of Himalayan balsam were recorded within the Site, as shown as Target Notes (TNs) 1 and 2 in **Figure 9.3**.
- 3.2.11 No other protected or notable plant species were recorded within the survey area.

3.3 Field Survey Results – NVC Communities

Wet modified bog

M20 *Eriophorum vaginatum* blanket bog.

- 3.3.1 The best community match for the area of wet modified bog within the Tyle'r Waun SINC in the east of the Site is M20. The community is dominated by hare's-tail cottongrass, with purple moor-grass and heath rush. The moor-grass, although covering large parts of the community is generally small and stunted and subservient to the cottongrass. Bryophytes are represented by four species of sphagnum moss, particularly *S. subnitens* and *S. inundatum*, as well as *Polytrichum commune*. Preliminary peat depths were taken and varied between 0.5 – 1m.

Marshy grassland

M23b *Juncus effusus* - *Galium palustre* rush - pasture with *Juncus effusus* sub-community.

M25a *Molinia caerulea* – *Potentilla erecta* mire: *Erica tetralix* sub-community.

M25b *Molinia caerulea* – *Potentilla erecta* mire: *Anthoxanthum odoratum* sub-community.

- 3.3.2 The best community match for the area of marshy grassland within the Tyle'r Waun SINC in the east of the Site, and for two areas on the upper plateau in the west of the Site is M23b. The community is dominated by soft rush and large hummocks of *Sphagnum fimbriatum*, with lesser amounts of *Polytrichum commune*, purple moor-grass, black sedge, Yorkshire fog, sheep's fescue and wavy hairgrass.
- 3.3.3 The best community match for the marshy grassland in the west of the Site is M25a. The community is dominated by purple moor-grass, and *Sphagnum capillifolium* is the most abundant bryophyte. Other species present in lesser amounts include wavy hairgrass, *Polytrichum commune*, tormentil and soft rush. The community covers much of the upper plateau of the MB area. Within the M25a area, is a strip of vegetation which has the best community match as M25b where although purple moor-grass dominates, sweet vernal-grass and common bent are also abundant.

Acid/neutral flush

M4 *Carex rostrata* - *Sphagnum fallax* mire.

M6b *Carex echinata* - *Sphagnum fallax* mire *Carex nigra* - *Nardus stricta* sub-community.

- 3.3.4 There are two areas of flush/mire habitat in the Tyle'r Waun SINC in the east of the Site.
- 3.3.5 One of the flush/mire areas is located close to the Nant y Cywion and the best community match is M6b. This community is dominated by *Sphagnum fallax*, and in many places the species has almost total coverage with just small spikes of star sedge or occasional round-leaved sundew, bog asphodel and bulbous rush. Mat-grass and purple moor-grass are the only constant grasses, but these have low coverage and are in stunted forms.
- 3.3.6 The second flush/mire area is located in the northern extent of the Tyle'r Waun SINC within the Site, and the best community match is M4. This community is dominated by bottle sedge and common cottongrass, with some scattered star sedge. There are patches of open water within this community, and bog pondweed is present in small amounts, as well as bogbean.

Semi-improved grassland

MG6 *Lolium perenne* - *Cynosurus cristatus* grassland *Anthoxanthum odoratum* sub-community.

U6 *Juncus squarrosus* - *Festuca ovina* grassland.

- 3.3.7 The best community match for the semi-improved neutral grassland within the survey area is MG6.
- 3.3.8 The community is dominated by white clover, common sorrel, daisy, annual meadow-grass, sweet vernal-grass, creeping buttercup and Yorkshire-fog, with occasional marsh foxtail and autumn hawkbit.
- 3.3.9 This community forms a large part of the Site and is used for livestock grazing.
- 3.3.10 The best community match for the semi-improved acid grassland within the survey area is U6.
- 3.3.11 The community is relatively species-poor and is dominated by heath rush, mat-grass and sheep's fescue, with the mosses *Polytrichum commune* and *Rhytidiadelphus squarrosus* abundant. The dominance of heath rush is an indication of the heavy grazing of other more palatable plants.
- 3.3.12 This is a dominant community within the MFD area of the Site, and is used for livestock grazing.

Summary

3.3.13 Vegetation communities present within the survey area are summarised in **Table 3.1**, along with corresponding Habitats Directive (92/43/EEC) Annex 1 Habitat types and Ground Water Dependant Terrestrial Ecosystems (GWDTE) status in accordance with SNIFFER (2009), SEPA guidance (2017)⁴ and European Commission manual (2013).

Table 3.1: Summary of vegetation communities.

NVC community	Principle corresponding Habitats Directive Annex I type/s	Corresponding Priority habitat on the Section 7 of the Environment (Wales) Act 2016	Potential dependence of community/habitat on groundwater* 1=High, 2=Moderate, 3=Low
M23b <i>Juncus effusus</i> - <i>Galium palustre</i> rush - pasture with <i>Juncus effusus</i> sub-community	None directly applies	None directly applies	1 (where not on deep peat)
M25a <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire: <i>Erica tetralix</i> sub-community	None directly applies <i>If on deep peat it may be restorable to blanket bog</i>	None directly applies	2 (where not on deep peat) 3 (if on deep peat)
M25b <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire: <i>Anthoxanthum odoratum</i> sub-community	None directly applies <i>If on deep peat it may be restorable to blanket bog</i>	None directly applies	2 (where not on deep peat) 3 (if on deep peat)
M20 <i>Eriophorum vaginatum</i> blanket bog	Blanket bog	Blanket bog	3
M6b <i>Carex echinata</i> - <i>Sphagnum fallax</i> mire <i>Carex nigra</i> - <i>Nardus stricta</i> sub-community	None directly applies	Upland flushes, fens and swamps	1

⁴ In the absence of Welsh-specific guidance.

M4 <i>Carex rostrata</i> - <i>Sphagnum fallax</i> mire	Transition mires and quaking bogs	Upland flushes, fens and swamps	3
MG6 <i>Lolium perenne</i> - <i>Cynosurus cristatus</i> grassland <i>Anthoxanthum odoratum</i> sub-community	None directly applies	None directly applies	3
U6 <i>Juncus squarrosus</i> - <i>Festuca ovina</i> grassland	None directly applies	None directly applies	2

4 REFERENCES

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ANNEX 1: SCIENTIFIC BOTANICAL NAMES

Table A1-1 provides common and scientific names of plant species included in this Technical Appendix.

Common Name	Scientific Name
Alder buckthorn	<i>Frangula alnus</i>
Annual meadow-grass	<i>Poa annua</i>
Ash	<i>Fraxinus excelsior</i>
Autumn hawkbit	<i>Leontodon hispidus</i>
Bee orchid	<i>Ophrys apifera</i>
Beech fern	<i>Phegopteris connectilis</i>
Birch sp.	<i>Betula</i> sp.
Black sedge	<i>Carex nigra</i>
Bluebell	<i>Hyacinthoides non-scripta</i>
Bog asphodel	<i>Narthecium ossifragum</i>
Bog pondweed	<i>Potamogeton polygonifolius</i>
Bogbean	<i>Menyanthes trifoliata</i>
Bog-mosses	<i>Sphagnum</i> spp.
Bottle sedge	<i>Carex rostrata</i>
Bracken	<i>Pteridium aquilinum</i>
Buddleja	<i>Buddleia davidii</i>
Bulbous rush	<i>Juncus bulbosus</i>
Common bent	<i>Agrostis capillaris</i>
Common cottongrass	<i>Eriophorum angustifolium</i>
Common rhododendron	<i>Rhododendron ponticum</i>
Common sorrel	<i>Rumex acetosa</i>
Common woodrush	<i>Luzula multiflora</i>
Creeping buttercup	<i>Ranunculus repens</i>
Daisy	<i>Bellis perennis</i>
Dittander	<i>Lepidium latifolium</i>
Dwarf feathermoss	<i>Microeurhynchium pumilum</i>
Dwarf spurge	<i>Euphorbia exigua</i>
Flowering rush	<i>Butomus umbellatus</i>
Great fern sedge	<i>Cladium mariscus</i>
Greater bird's-foot trefoil	<i>Lotus pedunculatus</i>
Hare's-tail cottongrass	<i>Eriophorum vaginatum</i>
Hazel	<i>Corylus avellana</i>
Heath star moss	<i>Campylopus introflexus</i>
Heath rush	<i>Juncus squarrosus</i>

Common Name	Scientific Name
Himalayan (Indian) balsam	<i>Impatiens glandulifera</i>
Japanese knotweed	<i>Reynoutria japonica</i>
Knotted pearlwort	<i>Sagina nodosa</i>
Larch sp.	<i>Larix</i> sp.
Least crystalwort	<i>Riccia subbifurca</i>
Lesser potato bryum	<i>Bryum subapiculatum</i>
Little kneeling eyebright	<i>Euphrasia confusa</i>
Marsh forklet-moss	<i>Dichodontium palustre</i>
Marsh foxtail	<i>Alopecurus geniculatus</i>
Mat-grass	<i>Nardus stricta</i>
Meadow thistle	<i>Cirsium dissectum</i>
Montbretia	<i>Crocasmia x crocosmiiflora</i>
New Zealand willowherb	<i>Epilobium brunnescens</i>
Nicholson's beard-moss	<i>Didymodon nicholsonii</i>
Oak sp.	<i>Quercus</i> sp.
Palmate germanderwort	<i>Riccardia palmata</i>
Parsley fern	<i>Cryptogramma crispa</i>
Pine sp.	<i>Pinus</i> sp.
Purple moor-grass	<i>Molinia caerulea</i>
Pyramidal orchid	<i>Anacamptis pyramidalis</i>
Rock hutchinsia	<i>Hornungia petraea</i>
Rock sea lavender	<i>Limonium binervosum</i>
Round-leaved mint	<i>Mentha suaveolens</i>
Round-leaved sundew	<i>Drosera rotundifolia</i>
Round-leaved wintergreen	<i>Pyrola rotundifolia</i>
Rowan	<i>Sorbus aucuparia</i>
Royal fern	<i>Osmunda regalis</i>
Sheep's fescue	<i>Festuca ovina</i>
Short-beaked wood-moss	<i>Loeskeobryum brevirostre</i>
Slender beard-moss	<i>Didymodon icmadophilus</i>
Slender club-rush	<i>Isolepis cernua</i>
Slender cottongrass	<i>Eriophorum gracile</i>
Small cudweed	<i>Filago minima</i>
Smaller white-moss	<i>Leucobryum juniperoideum</i>
Soft rush	<i>Juncus effusus</i>
Star sedge	<i>Carex echinata</i>
Strict hair-cup	<i>Polytrichum strictum</i>

Common Name	Scientific Name
Sweet vernal-grass	<i>Anthoxanthem odoratum</i>
Sycamore	<i>Acer pseudoplatanus</i>
Tormentil	<i>Potentilla erecta</i>
Wall cotoneaster	<i>Cotoneaster horizontalis</i>
Wavy hairgrass	<i>Avenella flexuosa</i>
White clover	<i>Trifolium repens</i>
White water-lily	<i>Nymphaea alba</i>
Whorled caraway	<i>Carum verticillatum</i>
Wintergreen	<i>Pyrola</i> sp.
Yellow-wort	<i>Blackstonia perfoliata</i>
Yorkshire-fog	<i>Holcus lanatus</i>

ANNEX 2: NVC SURVEY RESULTS

Tables A2-1 below outlines the Domin scale.

Table A2-1: Dominance (Domin) scale.

Code	Approximate percentage cover in quadrat
10	100%
9	75 – 99%
8	50 – 74%
7	33 – 49%
6	25 – 32%
5	15 – 24%, abundant
4	5 – 14%, abundant
3	4%, scattered
2	3%, very scattered
1	1-2%, scarce

MFD Area

Tables A2-2, to A2-8, below outline the scores for NVC survey results and NVC quadrat locations for the MFD area.

Table A2-2: Quadrat species compositions.

Quadrat	A1	A2	A3	A4	A5	Frequency
Species	Abundance					
N/A (Bare peat)			4	4		II
<i>Deschampsia flexuosa</i>				4	4	II
<i>Eriophorum angustifolium</i>		4				I
<i>Eriophorum vaginatum</i>	9	9	9	8	8	V
<i>Juncus effusus</i>		4				I
<i>Juncus squarrosus</i>	4		7	8	6	IV
<i>Molinia caerulea</i>	7	7	7	7	7	V
<i>Nardus stricta</i>		4	4		4	III
<i>Polytrichum commune</i>			4	4	6	III
<i>Sphagnum cuspidatum</i>		5		5		II
<i>Sphagnum inundatum</i>	6	5	7	6		IV

Quadrat	A1	A2	A3	A4	A5	Frequency
Species	Abundance					
<i>Sphagnum subnitens</i>	5	5		4	7	IV
<i>Sphagnum tenellum</i>				4		I
<i>Trichophorum cespitosum</i>					4	I

NVC community	M20 <i>Eriophorum vaginatum</i> blanket bog
GWDTE status	Not likely to be groundwater dependent
Annex 1 habitat?	Yes – Blanket Bog
Average peat depth	0.7m

Table A2-3: Quadrat species compositions.

Quadrat	B1	B2	B3	B4	B5	B6	Frequency
Species	Abundance						
<i>Brachythecium rutabulum</i>		5					I
<i>Carex echinata</i>		4	4				II
<i>Carex nigra</i>		4	4				II
<i>Deschampsia flexuosa</i>			4	4	5	4	IV
<i>Eriophorum angustifolium</i>		4	4				II
<i>Eriophorum vaginatum</i>			5				I
<i>Festuca ovina</i>	4		4	4			III
<i>Juncus effusus</i>	6	8	8	9	9	9	VI
<i>Molinia caerulea</i>	4	4	6	4			IV
<i>Nardus stricta</i>	4						I
<i>Polytrichum commune</i>	4	4	5	5	4	6	VI
<i>Sphagnum fallax</i>		4	4				II
<i>Sphagnum fimbriatum</i>		8	8	8	9	9	V
<i>Sphagnum subnitens</i>		9					I

NVC community	M23b <i>Juncus effusus</i> - <i>Galium palustre</i> rush-pasture <i>Juncus effusus</i> sub-community
GWDTE status	Likely to be highly groundwater dependent
Annex 1 habitat?	No

Table A2-4: Quadrat species compositions.

Quadrat	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	Frequency
Species	Abundance											
<i>Anthoxanthum odoratum</i>	6						4		4		4	IV
<i>Deschampsia cespitosa</i>							6	5		4	8	IV
<i>Deschampsia flexuosa</i>			4	4	4	4	7	5	4	4		VIII
<i>Festuca ovina</i>	5	6	6	5			4			5		VI
<i>Galium saxatile</i>	8	4										II
<i>Juncus effusus</i>								5	4	4	5	IV
<i>Juncus squarrosus</i>	8	8	8	9	9	9	5	5		8	4	X
<i>Molinia caerulea</i>	7	4	5	5	5	5						VI
<i>Nardus stricta</i>	8	9	7	5	5	5	6	8	8	8		X
<i>Polytrichum commune</i>	4	4	5	5	8	8	7	5	5	5		X
<i>Rhytidiadelphus squarrosus</i>	7	4	8	4			6	8	8	8	8	IX

NVC community	U6 <i>Juncus squarrosus</i> - <i>Festuca ovina</i> grassland
GWDTE status	Likely to be moderately groundwater dependent
Annex 1 habitat?	No

Table A2-5: Quadrat species compositions.

Quadrat	D1	D2	D3	D4	D5	Frequency
Species	Abundance					
<i>Carex echinata</i>	7	5	4	5	5	V
<i>Carex panicea</i>	4					I
<i>Deschampsia flexuosa</i>		4	4			II
<i>Drosera rotundifolia</i>	4		4			II
<i>Eriophorum angustifolium</i>	7	8	8	8	6	V
<i>Eriophorum vaginatum</i>	5	4	4	5	5	V
<i>Festuca ovina</i>	4					I
<i>Juncus bulbosus</i>		5	5	4	4	IV
<i>Juncus effusus</i>			4			I
<i>Molinia caerulea</i>	4	4	6	6	6	V
<i>Nardus stricta</i>	5	4	5	4	4	V
<i>Narthecium ossifragum</i>	4			4	4	III
<i>Polytrichum commune</i>		4				I
<i>Sphagnum fallax</i>	9	9	9	8	9	V
<i>Sphagnum subnitens</i>	4	4				II

NVC community	M6b <i>Carex echinata</i> - <i>Sphagnum fallax</i> mire <i>Carex nigra</i> - <i>Nardus stricta</i> sub-community
GWDTE status	Likely to be highly groundwater dependent
Annex 1 habitat?	No

Table A2-6: Quadrat species compositions.

Quadrat	E1	E2	E3	E4	E5	Frequency
Species	Abundance					
<i>Alopecurus geniculatus</i>	4		4		4	III
<i>Anthoxanthum odoratum</i>	5	7	5	5	6	V

Quadrat	E1	E2	E3	E4	E5	Frequency
Species	Abundance					
<i>Bellis perennis</i>	5	6	5	5	4	V
<i>Cerastium fontanum</i>	4	4	4		4	IV
<i>Cynosurus cristatus</i>				5	5	II
<i>Holcus lanatus</i>	5	7	5	6	6	V
<i>Leontodon autumnalis</i>	4	4				II
<i>Lolium perennis</i>	5	5	5	5	5	V
<i>Poa annua</i>	8	7	6	6	6	V
<i>Ranunculus acris</i>			5		4	II
<i>Ranunculus repens</i>	6	6	5	6	5	V
<i>Rumex acetosa</i>	7	6	6	6		IV
<i>Trifolium repens</i>	9	9	8	8	8	V

NVC community	MG6 <i>Lolium perenne</i> - <i>Cynosurus cristatus</i> grassland <i>Anthoxanthum odoratum</i> sub-community
GWDTE status	Unlikely to be groundwater dependent.
Annex 1 habitat?	No

Table A2-7: Quadrat species compositions.

Quadrat	F1	F2	F3	F4	F5	Frequency
Species	Abundance					
Bare peat/open water	4	4	4	4	4	V
<i>Carex echinata</i>	4	4	4	4	4	V
<i>Carex nigra</i>	4	4		4	5	IV
<i>Carex rostrata</i>	9	9	8	8	4	V
<i>Eriophorum angustifolium</i>	8	8	8	7	8	V
<i>Menyanthes trifoliata</i>					5	I
<i>Molinia caerulea</i>			4			I

Quadrat	F1	F2	F3	F4	F5	Frequency
Species	Abundance					
<i>Potamogeton polygonifolius</i>	5	5		4		III
<i>Sphagnum fallax</i>	4		4			II

NVC community	M4 <i>Carex rostrata</i> - <i>Sphagnum fallax</i> mire
GWDTE status	Not likely to be groundwater dependent
Annex 1 habitat?	Yes - Transition Mires and Blanket Bogs

Table A2-8: Quadrat locations.

Quadrat no.	Grid reference	Quadrat no.	Grid reference	Quadrat no.	Grid reference
A1	SS 83394 97843	C3	SS 82932 97867	D4	SS 83065 97929
A2	SS 83378 97853	C4	SS 82941 97856	D5	SS 83077 97913
A3	SS 83370 97857	C5	SS 82981 97785	E1	SS 82469 97736
A4	SS 83366 97857	C6	SS 82980 97779	E2	SS 82418 97734
A5	SS 83303 97851	C7	SS 82229 97686	E3	SS 82590 98081
B1	SS 83270 97831	C8	SS 82221 97707	E4	SS 82607 98039
B2	SS 83210 97825	C9	SS 82254 97704	E5	SS 82590 97996
B3	SS 83205 97820	C10	SS 82176 97710	F1	SS 83005 98478
B4	SS 83132 97834	C11	SS 82318 98033	F2	SS 83002 98501
B5	SS 83113 97858	D1	SS 83071 97916	F3	SS 83014 98488
B6	SS 83067 97893	D2	SS 83069 97917	F4	SS 82982 98470
C1	SS 83284 97837	D3	SS 83063 97929	F5	SS 83014 98483
C2	SS 82972 97947				

MB Area

Tables A2-9, to A2-12, below outline scores for NVC survey results and NVC quadrat locations for the MB area.

Table A2-9: Quadrat species compositions.

Quadrat	A1	A2	A3	A4	A5	Frequency
Species	Abundance					
<i>Agrostis capillaris</i>	7	8	6	6	7	V
<i>Anthoxanthum odoratum</i>	8	9	8	8	8	V
<i>Cerastium fontanum</i>		2		2		II
<i>Cirsium vulgare</i>			2		2	II
<i>Cynosuretum cristati</i>	4	4	5	5	4	V
<i>Deschampsia flexuosa</i>			4			I
<i>Festuca rubra</i>	4	4	4		4	IV
<i>Holcus lanatus</i>	7	6	6	7	6	V
<i>Juncus effusus</i>		4		4		II
<i>Lotus pendunculatus</i>	8	7	7	7	5	V
<i>Luzula multiflora</i> ssp. <i>Congesta</i>		1				I
<i>Ranunculus repens</i>	6	7	7	6	5	V
<i>Rhytidiadelphus loreus</i>	8	7	5	6	7	V
<i>Rumex acetosa</i>	4		4		4	III
<i>Trifolium repens</i>	6	7	7	7	4	V

NVC community	MG6 <i>Lolium perenne</i> - <i>Cynosurus cristatus</i> grassland <i>Anthoxanthum odoratum</i> sub-community
GWDTE status	Unlikely to be groundwater dependent
Annex 1 habitat?	No

Table A2-10: Quadrat species compositions.

Quadrat	B1	B2	B3	Frequency
Species	Abundance			
<i>Agrostis capillaris</i>	4		4	II
<i>Anthoxanthum odoratum</i>		4	4	II
<i>Carex nigra</i>	7	6	4	III
<i>Cirsium vulgare</i>	4	5	5	III
<i>Deschampsia flexuosa</i>	4	4		II
<i>Digitalis purpurea</i>		4	4	II
<i>Eriophorum angustifolium</i>	4			I
<i>Festuca rubra</i>	4	4		II
<i>Galium palustre</i>	4	4	4	III
<i>Holcus lanatus</i>	7	6	6	III
<i>Juncus effusus</i>	9	9	8	III
<i>Molinia caerulea</i>	7	6	7	III

NVC community	M23b <i>Juncus effusus</i> - <i>Galium palustre</i> rush-pasture <i>Juncus effusus</i> sub-community
GWDTE status	Likely to be highly groundwater dependent
Annex 1 habitat?	No

Table A2-11: Quadrat species compositions.

Quadrat	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	Frequency
Species	Abundance													
<i>Anthoxanthum odoratum</i>	4		4		4		4		4	4	4	4	4	IX
<i>Deschampsia flexuosa</i>	4				4		4		4		4	4	4	VII
<i>Erica tetralix</i>						4							4	II
<i>Eriophorum angustifolium</i>	4			4		4				4		4		V
<i>Galium palustre</i>									4	4		4		III
<i>Holcus lanatus</i>			4	4		4			4		4			V
<i>Juncus effusus</i>	4	4	4		4			5	4		4	4		VIII
<i>Molinia caerulea</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	XIII
<i>Pleurozium schreberi</i>			4							4				II
<i>Polytrichum commune</i>	4	5	5	4	4				5	5		4	4	IX
<i>Potentilla erecta</i>	5			5	4	5		4	5		5		5	VIII

NVC community	M25a <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire: <i>Erica tetralix</i> sub-community
GWDTE status	Likely to be groundwater dependent (where not on deep peat)
Annex 1 habitat?	Yes, <i>Molinia</i> meadows on calcareous, peaty or clayey silt-laden soils (<i>Molinion caeruleae</i>)

Table A2-12: Quadrat species compositions.

Quadrat	D1	Frequency
Species	Abundance	
<i>Agrostis capillaris</i>	7	I
<i>Anthoxanthum odoratum</i>	6	I
<i>Festuca rubra</i>	5	I
<i>Galium palustre</i>	4	I
<i>Holcus lanatus</i>	5	I
<i>Molinia caerulea</i>	9	I
<i>Potentilla erecta</i>	5	I
<i>Rhytiadelphus loreus</i>	4	I

NVC community	M25b <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire: <i>Anthoxanthum odoratum</i> sub-community
GWDTE status	Likely to be groundwater dependent (where not on deep peat)

Annex 1 habitat?	Yes, <i>Molinia</i> meadows on calcareous, peaty or clayey silt-laden soils (<i>Molinion caeruleae</i>)
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Table A2-13: Quadrat locations.

Quadrat no.	Grid reference	Habitat
A1	SS8048397354	MG6
A2	SS8047597336	MG6
A3	SS8049997313	MG6
A4	SS8070997431	MG6
A5	SS8080497507	MG6
B1	SS8063897506	M23b Rush pasture
B2	SS8060897499	M23b Rush pasture
B3	SS8062997485	M23b Rush pasture
C1	SS8078197673	M25a
C2	SS8081597655	M25a
C3	SS8086997623	M25a
C4	SS8096497705	M25a
C5	SS8101797666	M25a
C6	SS8100597582	M25a
C7	SS8103997526	M25a
C8	SS8104297470	M25a
D1	SS8104297426	M25b
C9	SS8100497370	M25a
C10	SS8084997345	M25a
C11	SS8096897313	M25a
C12	SS8101597266	M25a
C13	SS8100197213	M25a

ANNEX 3: SITE PHOTOGRAPHS

Photograph no.	Description	Photograph
Photograph 1	Wet modified bog in the east of the survey area. Part of the MFD area.	
Photograph 2	Marshy grassland in the east of the survey area. Part of the MFD area.	
Photograph 3	Semi-improved acid grassland within the MFD area.	

Photograph no.	Description	Photograph
Photograph 4	Flush/mire in the east of the survey area. Part of the MFD area.	
Photograph 5	Coniferous plantation which is common on the periphery of the survey area. Part of the MFD area.	
Photograph 6	Mixed plantation woodland, common in the north-west of the survey area along the Nant Blaenpelenna valley. Part of the MFD area.	

Photograph no.	Description	Photograph
Photograph 7	One of the notable watercourses flowing through the survey area. Part of the MFD area.	
Photograph 8	Stretch of intact species-poor hedgerow in the centre of the survey area. Part of the MFD area.	
Photograph 9	Semi-improved acid grassland with scattered bracken in the west of the survey area. Part of the MFD area.	

Photograph no.	Description	Photograph
Photograph 10	Marshy grassland within the upper plateau of the MB area.	
Photograph 11	Bracken, a common habitat in the west and south of the MB area.	

Photograph no.	Description	Photograph
Photograph 12	North-western part of MB area, neutral grassland, bracken and scattered scrub.	

ANNEX 4: POND DESCRIPTIONS

Pond Location	Description	Photograph
SS 81585 97116	In the south-west of the survey area (offsite) there is a waterbody, which is separated from the Site by a stream. The waterbody is 120m x 30m, with good water quality, good terrestrial habitat and 80% macrophyte cover. This is a waterbody used as a filter system for treating contaminated mine-water flowing into the River Pelenna.	