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NATIONAL VEGETATION CLASSIFICATION SURVEY

At

Cae'r Glaw Quarry – Proposed Extension Area
Holyhead Road
Gwalchmai
Anglesey
LL65 4PW

NGR: SH 38512 77319

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CONTENTS

EXECUTIVE SUMMARY **3**
1 INTRODUCTION **5**
1.1 Author, surveyors and qualifications 5
1.2 Survey objectives 5
1.3 Proposed development 5
1.4 Structure of the report 6
2 METHODOLOGY **7**
2.1 Field survey 7
2.2 Analysis of field data 8
2.3 Comparison with selection criteria for wildlife sites in Wales 8
2.4 Comparison with habitats of principal importance 8
2.5 Comparison with Annex 1 habitats 9
2.6 Survey limitations 9
3 RESULTS **10**
3.1 Dense scrub 10
3.2 Semi-improved acid grassland 10
3.3 *Molinia* marshy grassland 12
3.4 Continuous bracken 13
3.5 Modified bog 13
3.6 Neutral / acidic flush 14
3.7 Valley mire 15
3.8 Standing water 16
4 EVALUATION AND RECOMMENDATIONS **17**
4.1 Evaluation of results 17
4.2 Recommendations 18
5 CONCLUSION **19**
6 REFERENCES **20**
APPENDICES **21**
Appendix 1 – Quadrat survey locations 21
Appendix 2 – Photographs 22
Appendix 3 – Survey results 23

EXECUTIVE SUMMARY

This report is written by Tom Kenwright BSc MSc, Senior Ecologist for United Environmental Services Ltd (UES). UES were commissioned to undertake a national vegetation classification (NVC) survey of a parcel of land known as the proposed extension area at Cae'r Glaw Quarry, Holyhead Road, Gwalchmai, Anglesey. The development The development proposals are for the extension of the existing granite quarry, to allow mineral extraction from an area to the north of the existing quarry, together with the consolidation of this new extraction area with the extant mineral planning permission in force on the wider quarry area. The proposed extension area is approximately 6.89ha in size, which will be quarried in five phases over a period of more than 10 years.

A preliminary ecological appraisal (PEA) including an extended phase 1 habitat survey undertaken of the site in June and July 2021 identified numerous notable habitats which could potentially qualify as habitats of principal importance or European protected Annex 1 habitats. Following this, all habitats on site with the potential to qualify as protected habitats and that could be adversely impacted by the proposed development were subject to an NVC survey on the 9th June and 12th July 2021.

The NVC system provides a comprehensive classification of natural and semi-natural habitats. Quadrats were used to collect data on the abundance and frequency of plant species within the target habitats. This information was then analysed using NVC community / sub-community descriptions as each NVC community type is uniquely defined by a particular combination of frequency and abundance values. The survey was carried out to recognised guidelines, timings and weather conditions. The proposed extension area boundary has been amended on a number of occasions, in some cases to reduce impacts on ecological receptors. As such, the survey boundary of this report covers a greater area than is to be quarried and some of the habitats surveyed are now due to be retained.

The NVC survey found the following habitats to be present on site:

- W23 *Ulex Europaeus – Rubus fruticosus* scrub
- U1 *Festuca ovina - Agrostris capillaris - Rumex acetosella* grassland
- U4 *Festuca ovina - Agrostris capillaris - Galium saxatile* grassland
- MG6b *Lolium perenne - Cynosurus cristatus* grassland (*Anthoxanthum oderatum* sub-community)
- M25 *Molinia caerulea - Potentilla erecta* mire
- U20 *Pteridium aquilinum – Galium saxatile*
- M29 *Hypericum elodes – Potamogeton polygonifolius* soakway
- M23 *Juncus effusus/acutiflorus – Galium palustre* mire

However, the most ecologically valuable vegetative communities (M23 valley mire, M29, M25 and U4) will now be retained following their identification and the subsequent change of the development boundary. The NVC survey concluded that the communities due to be lost to the proposals are generally of low ecological significance.

It is considered that the proposed development will no impact on any habitats or vegetative communities of European importance and will have very limited impact on habitats or vegetative communities of national importance, with all habitats to be impacted being species-poor and of low quality. It is considered that the loss of some habitats of regional or local importance can be adequately compensated for though habitat creation and enhancement, with specific compensation for the loss of the M23 flushes having already been implemented.

This report should be read in conjunction with appendices 1 to 3, which give visual representation of the survey results and full species lists of each vegetative community surveyed.

1 INTRODUCTION

1.1 Author, surveyors and qualifications

This report is compiled and written by Tom Kenwright BSc MSc, UES Senior Ecologist. Tom holds a level 5 Botanical Society for Britain and Ireland (BSBI) field identification skills certificate (FISC), which certifies him as competent to undertake phase 1 habitat and national vegetation classification (NVC) surveys.

Other surveyors present include:

- Toby Hart BSc MCIEEM PIEMA, UES Managing Director. Toby holds a level 6 BSBI FISC, which certifies him as competent to undertake phase 1 habitat and NVC surveys.

1.2 Survey objectives

UES was commissioned in 2021 to conduct site surveys which include the following activities:

- Identify any botanical species of international, national and local importance with an emphasis on species native to Anglesey
- Identify and classify the habitat types and vegetation communities present on site and assess their ecological diversity
- Provide information to assess and mitigate any potential impacts on any habitats of conservation significance which may be present on site

A phase 1 habitat survey undertaken as part of a PEA walkover survey was concurrently undertaken of the site to assess the habitat types present on site and to inform the scope of the NVC survey.

1.3 Proposed development

The development proposals are for the extension of the existing granite quarry, to allow mineral extraction from an area to the north, together with the consolidation of this new extraction area with the extant mineral planning permission in force on the wider quarry area. The proposed extension area is approximately 6.89ha in size, which will be quarried in five phases over a period of more than 10 years.

This proposed extension that is the subject of this assessment is an alternative to an extension to the north-west of the existing quarry, for which planning permission was granted by Anglesey Council in December 2019 (planning reference 48C79J). As part of the previously approved extension, a suite of ecology surveys was undertaken of the proposed extension area, including an NVC survey undertaken by UES in 2016.

1.4 Structure of the report

This report sets out the methodology, results, and recommendations in relation to a specific survey. Recommendations are in line with statutory legislation and planning policy objectives.

This report should be read in conjunction with appendices 1 to 3, which give visual representation of the survey results and full species lists of each vegetative community surveyed.

2 METHODOLOGY

2.1 Field survey

Immediately prior to the NVC survey, a brief walkover survey undertaken as part of a PEA was undertaken and involved a systematic walk over the study area, to classify the broad habitat types present and to identify habitats requiring further detailed botanical assessment.

The detailed NVC survey was undertaken on 9th June 2021 by Tom Kenwright and Toby Hart and on the 12th July 2021 by Tom Kenwright. The survey was carried out to recognised guidelines, timings and weather conditions with particular reference to the National Vegetation Classification: Users' handbook (Rodwell, 2006).

Following the initial habitat surveys, the site was found to contain seven distinct habitat types that required further assessment to determine the botanical community present and to assess its ecological importance. Detailed further assessments were not undertaken of the scrub and bracken communities present as these communities are species-poor and could be fully assessed without further quadrat data.

Sampling of the vegetation was undertaken according to the methodology detailed in the NVC Users' Handbook (Rodwell, 2006). This involved recording the plant species present within a series of 2m x 2m quadrats, which were placed within what were visually considered to be stands of homogenous vegetation. A minimum of five quadrats were recorded in each area where the vegetation was considered to potentially be representative of a distinct vegetation community. Quadrat locations were purposefully chosen to avoid sampling ecotone and mosaic habitats that contain boundaries between communities or that are undergoing ecological succession and are in a transitional state.

All plants recorded within a quadrat were assigned a DOMIN score, based on the percentage cover. The DOMIN scale is as follows:

Table 1 – The DOMIN scale of cover / abundance

COVER PERCENTAGE (%)	DOMIN SCORE
91 - 100	10
76 – 90	9
51 – 75	8
34 – 50	7
26 – 33	6
11 – 25	5
4 – 10	4
<4 (many individuals)	3
<4 (several individuals)	2
<4 (few individuals)	1

Species that are absent from a sample, but are present in the homogenous stand of vegetation containing the sample were also recorded (see Appendix 3).

Frequencies were then assigned to each species recorded in each surveyed vegetative community based on how many quadrats the species was present within. The frequencies are as follows:

Table 2 – Species frequency classes and descriptions

PRESENCE OF SPECIES IN QUADRATS (%)	FREQUENCY CLASS	DESCRIPTION
1 – 20 (i.e. 1 stand in 5)	I	Scarce
21 - 40	II	Occasional
41 - 60	III	Frequent
61 - 80	IV	Constant
81 - 100	V	Constant

The plant communities on site were then classified according to NVC standards, taken from Volumes 1-5 of British Plant Communities (Rodwell, 2008).

2.2 Analysis of field data

Following the completion of the field work, the plant communities surveyed were then classified according to NVC standards. This analysis was based on the following:

- The largely dichotomous key to vegetative communities within the British Plant Communities Vol. 1 – 5.
- Comparison of floristic tables and community descriptions within the British Plant Communities Vol. 1 – 5.
- Computer analysis using the Modular Analysis of Vegetation Information System (MAVIS) software package, created by the Centre for Ecology and Hydrology (CEH).
- Surveyor experience.

2.3 Comparison with selection criteria for wildlife sites in Wales

Within Wales, non-statutory designated sites that have biological designation features (opposed to geological features) are referred to as Wildlife Sites, with Sites of Interest for Nature Conservation (SINC) also being a recognised term used to describe wildlife sites when owner's agreement, funding and a management plan haven't been secured. No specific selection criteria are available for Wildlife Sites within Anglesey and so the habitats on site have been compared with the 'Wildlife Sites Guidance Wales, A Guide to Develop Local Wildlife Systems in Wales' (Wales Biodiversity Partnership, 2008).

2.4 Comparison with habitats of principal importance

The presence of any Habitats of Principal Importance for the conservation of biodiversity as listed within Section 7 of the Environment (Wales) Act 2016 were determined by comparing the surveyed habitats against the published definitions and qualifying criteria (formerly UK Biodiversity Action Plan (BAP) Priority Habitats).

2.5 Comparison with Annex 1 habitats

The presence of any habitats listed within Annex I of the Habitats Directive (also known as the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) and transposed into UK law by the Conservation of Habitats and Species Regulations 2017, were determined by considering the recorded habitats against the published criteria for Annex I habitats.

2.6 Survey limitations

The survey was undertaken on the 9th June 2021 and 12th July 2021, within the optimal survey period for grassland, heathland and wetland habitats. The site is managed through sheep grazing, however the relatively low intensity of the grazing regime ensured sufficient vegetative material was available, allowing a robust and accurate assessment of habitats.

3 RESULTS

3.1 Dense scrub

Large stands of dense gorse scrub are present across the site. These stands of gorse comprise a mix of both European gorse *Ulex europaeus* and western gorse *Ulex gallii*, with other species recorded within this community being limited to bramble *Rubus fruticosus agg.,* bracken *Pteridium aquilinum* and the grassland species that are ubiquitous to the surrounding sheep-grazed grassland.

Given the low species-diversity of this community and the ease of comparing the community to floristic tables, quadrat data was not collected and analysis using the MAVIS software was not undertaken. It is considered that the community fits the W23 *Ulex Europaeus – Rubus fruticosus* scrub community.

The wildlife selection criteria for Wales states that 'a particular case can be made for the selection of extensive, and diversely structured stands of gorse (Ulex europaeus; *Ulex galli*), even when few other woody species or other vascular plants of interest are present'. The stands of gorse on site are not particularly extensive and lack structural diversity, almost entirely being comprised of mature shrubs. As such, it is considered that the areas of dense gorse scrub do not meet the criteria for selection as a local wildlife site.

This habitat is not considered to meet the criteria to qualify as any habitat of principal importance or Annex 1 habitat.

3.2 Semi-improved acid grassland

Large parts of the site, particularly the western section, comprise sheep-grazed semi-improved grassland. Two visually distinct grassland communities were observed across the site; grassland lying on flat or gently sloping ground that is subject to moderate levels of grazing and grassland that is only present on the small hills formed from underlying granite and surrounding the rocky granite outcrops present across the site, some of which appears to be subject to a lower intensity of grazing.

Rocky outcrop grassland

The rocky outcrop grassland is limited to small, scattered pockets within the surrounding sheep-grazed grassland and within the mosaic of bracken and gorse scrub that dominate the majority of the site. This grassland is considered to comprise two distinct grassland communities, influenced by the level of agricultural improvement and intensity of sheep-grazing. The pockets within the boundary of the proposed development site are considered to best fit the U1 *Festuca ovina* - *Agrostris capillaris* - *Rumex acetosella* grassland community.

Some of these areas that lie within the eastern section of the survey boundary but outside of the development boundary better resemble the U4 *Festuca ovina* - *Agrostris capillaris* - *Galium saxatile* grassland community.

Both of these communities are superficially similar and are broadly characterised by the dominance of sheep's fescue *Festuca ovina* and common bent *Agrostis capillaris*. However, upon detailed inspection, the areas of grassland that lie outside of the development boundary are distinct, as evidenced by the presence of constant and abundant sweet vernal

grass *Anthoxanthum oderataum* and a reduced abundance and constancy of sheep's sorrel *Rumex acetosella*.

This subtle difference in grassland communities across the site is considered to be a result of the sheep grazing and potential historical agricultural improvement of the western section. The eastern section of the site that lies outside of the proposed development boundary appears to be subject to a lower intensity of sheep grazing, likely due to reduced accessibility from the intervening valley mire and the exposed granite cliffs.

All areas of U1 grassland on site are considered to be relatively low-quality examples of this community. The grassland is lacking characteristic indicator species such as heath bedstraw *Galium saxatile* and tormentil *Potentilla erecta* and has a high abundance of mesotrophic species indicative of improvement such as perennial ryegrass *Lolium perenne*, Yorkshire fog *Holcus lanatus* and white clover *Trifolium repens*. These areas only contain two species listed on the Welsh Wildlife Site Selection Criteria Guidance list of lowland acid grassland indicator species and hence do not meet the criteria to be classified as unimproved, failing to meet the criteria for local wildlife site selection.

The areas of U4 grassland support more species indicative of unimproved conditions and contain seven species listed on the Welsh Wildlife Site Selection Criteria Guidance list of lowland acid grassland indicator species and hence meet the criteria to be classified as unimproved, fitting the criteria for selection as a local wildlife site. These species include: common heather *Calluna vulgaris*, bell heather *Erica cinerea*, sheep's fescue, heath bedstraw, heath milkwort *Polygala serpyllifolia*, tormentil and sheep's sorrel.

Both areas of grassland are considered to meet the broad definition of the lowland acid grassland habitat of principal importance, however the U1 grassland is considered to be of low value as it is very species-poor, showing signs of agricultural improvement and all stands are small and sporadic.

Both areas of grasslands do not qualify as any habitats of European importance as listed under Annex I of the Habitats Directive.

Sheep-grazed grassland

This grassland is subject to moderate levels of sheep-grazing, with the entirety of the sward being short during all survey visits. The grassland is relatively species-poor and is dominated a low number of competitive grasses. The majority of the species present are indicative of neutral conditions, however some acidic indicator species are present in low abundances and hence the grassland was mapped as acidic during the PEA survey.

Due to the dominance of mesotrophic grassland species and the high abundance of perennial ryegrass within the sward, it is considered that the community present is most accurately described as being the MG6 *Lolium perenne - Cynosurus cristatus* grassland community. The presence of some acidic indicator species in very low abundances hints towards the grassland being in the later stage of transitioning into this community from a previous acidic community, caused by historic agricultural improvement and the continued management of the site through sheep-grazing. The previous acidic community present was likely the U1 or U4 communities which remain on site but are now isolated to less accessible sections of the site or within the immediate vicinity of granite outcrops. It is considered that the grassland most closely fits the MG6b *Lolium perenne – Anthoxanthum oderatum* sub-community, which represents one of the richer sub-communities of MG6 grassland.

All areas of MG6b grassland on site are considered to be relatively low-quality examples of this community and have a high abundance of mesotrophic species indicative of

improvement such as perennial ryegrass, Yorkshire fog and white clover. As this grassland is predominantly mesotrophic, but shows contains indicators of an acidic community, it has been assessed against Welsh Wildlife Site Selection Criteria guidance for both lowland acid grassland and lowland neutral meadow grassland. The entire area of this grassland community within the survey are only contains five species from the acid grassland indicator list; sheep's sorrel, sheep's fescue, heath wood-rush *Luzula multiflora*, tormentil and heath-spotted orchid *Dactylorhiza maculata*, and six species from the neutral grassland indicator list; pignut *Conopodium majus*, heath-spotted orchid, common cat's-ear *Hypochaeris radicata*, common bird's-foot trefoil *Lotus corniculatus*, spreading meadow grass *Poa humilis* and tormentil. All of the indicator species observed are present in very low abundances and are very scattered and sporadic amongst the mesotrophic species that dominate. As such, it is considered that this grassland doesn't meet the local wildlife site selection criteria.

The MG6b grassland on site is not considered to meet the criteria to qualify as either the lowland acid grassland or the lowland meadow habitat of principal importance.

All areas of grasslands on site fail to qualify as any habitats of European importance as listed under Annex I of the Habitats Directive.

The results of the survey, including a full species list found within the quadrats, is provided at Appendix 3.

3.3 *Molinia* marshy grassland

This grassland is subject to low levels of sheep-grazing, which is limited by the reduced accessibility due to the adjacent valley mire. Due to the dominance of purple moor-grass *Molinia caerulea* with constant tormentil, it is considered that the community present is the M25 *Molinia caerulea - Potentilla erecta* mire community. This represents one of the more species-poor purple moor-grass dominated communities, as is evidenced on site by its obvious dominance. A number of other species were recorded however these are limited to species characteristic of the community or are scarce and are scattered throughout the sward.

The Welsh Wildlife Site Selection Criteria guidance lists the M25 community as having potential to qualify a site as a wildlife site, however it highlights that species-poor examples dominated by purple moor-grass and lacking any uncommon species should not generally be considered as good candidates for selection. The selection criteria defines species-rich examples of this community as those that contain 12 or more indicator species from the list provided, however additional regard should be given to sites containing particular indicators of quality such as saw-wort *Serratula tinctoria*, petty-whin *Genista anglica*, lousewort *Pedicularis sp.* and bog asphodel *Narthecium ossifragum*. The M25 community on site was found to contain the following 18 indicator species: marsh violet *Viola palustris*, creeping willow *Salix repens*, tormentil, bog asphodel, purple moor-grass, heath wood-rush, greater bird's-foot trefoil *Lotus pedunculatus*, compact rush *Juncus conglomeratus*, sharp-flowered rush *Juncus acutiflorus*, marsh bedstraw *Galium palustre*, cross-leaved heath *Erica tetralix*, narrow buckler-fern *Dryopteris carthusiana*, heath spotted orchid, common yellow sedge *Carex demissa*, tawny sedge *Carex hostiana*, carnation sedge *Carex panicea*, glaucous sedge *Carex flacca* and flea sedge *Carex pulicaris*. As such, the M25 mire community on site is considered to be species-rich and is considered to meet the criteria for selection as a local wildlife site.

The M25 mire community on site meets the definition and is considered to qualify as the purple moor-grass and rush pasture habitat of principal importance. However, it should be

noted that the M25 community on site is lacking all of the 'key' botanical species that are listed for this habitat nationally.

Purple moor-grass and rush pasture habitats are listed as an Annex 1 habitat, however this only applies to those supporting the M24 *Molinia caerulea – Cirsium dissectum* fen-meadow or the M26 *Molinia caerulea – Crepis paludosa* mire communities. As such, the habitat present on site is not considered to meet the criteria to qualify as an Annex 1 habitat.

The results of the survey, including a full species list found within the quadrats, is provided at Appendix 3.

3.4 Continuous bracken

Large areas of the site, particularly those within the survey boundary but outside of the development boundary, are dominated by dense stands of bracken, growing over the semi-improved acid grassland. During the spring when the bracken was still short, the grassland was assessed and was found to be similar to the other areas of semi-improved grassland on site, with the exception of the area to the east of the valley mire, which supported occasional spring quill *Scilla verna*, pignut, lesser stitchwort *Stellaria graminea*, heath bedstraw, greater stitchwort *Stellaria holostea*, English bluebell *Hyacinthoides non-scripta* and foxglove *Digitalis purpurea*.

Given the low species-diversity of this community and the ease of comparing the community to floristic tables, quadrat data was not taken. It is considered that the community best fits the U20 *Pteridium aquilinum – Galium saxatile* community.

The Welsh Wildlife Site Selection Criteria guidance states that stands of bracken which do not have a very dense, deep litter layer beneath the fern canopy can support a shade-tolerant ground flora of botanical interest. The selection criteria suggests that stands of bracken with a species-rich ground flora should be considered for selection. In the absence of associated species of interest, most examples of bracken cover would not qualify for wildlife site selection, although they may form part of a mosaic with other qualifying habitats. With the exception of the area that lies within the eastern section of the survey boundary but outside of the development boundary (as described above), all areas of continuous bracken on site do not have a particularly species-rich ground flora and are not considered to meet the criteria to qualify as a feature for local wildlife site selection.

This habitat is not considered to meet the criteria to qualify as any habitat of principal importance or Annex 1 habitat.

3.5 Modified bog

A small area of modified bog is present within a shallow depression along the eastern edge of the survey boundary, lying outside of the proposed development boundary. This bog was damp but mostly dry at the time of the surveys and is subject to some, albeit minor grazing. *Sphagnum spp.* are present across the bog, however coverage is limited and large areas of the bog predominantly comprise exposed peat with a sparse covering of common cotton-grass *Eriophorum angustifolium*. A small number of purple moor-grass and cross-leaved heath hummocks are present within the centre of the bog, with encroaching western gorse. Bogbean *Menyanthes trifoliata* and marsh St-John's-wort *Hypericum elodes* were the only other frequent species, being locally abundant in some areas.

The vegetation community within this small bog area is considered to most accurately represent the M29 *Hypericum elodes – Potamogeton polygonifolius* soakway community. This community is more commonly associated with mires or pools within bogs, opposed to being a dominant community type to form a bog. The Welsh Wildlife Site Selection Criteria guidance lists vegetative communities associated with both blanket and raised bogs, neither of which lists the M29 community. Despite this, the M29 community is listed under those that can meet the selection criteria as a lowland fen habitat, provided they are not grossly modified by agricultural improvement. The M29 community present on site appears to have been subject to some modification through agriculture, particularly trampling from grazing sheep, which appears to have reduced the cover of sphagnum and resulted in large unvegetated or sparsely vegetated areas. As such, it is unclear if this community meets the criteria for selection.

The results of the survey, including a full species list found within the quadrats, is provided at Appendix 3.

3.6 Neutral / acidic flush

There are numerous flushes across the site, the vast majority of which are species-poor and are dominated by soft rush *Juncus effusus* and / or sharp-flowered rush. All flushes on site are considered to comprise the same vegetation community, however a small number contain more species-rich examples (see Appendix 1 – Target Notes 1 and 2), only one of which lies within the proposed development boundary.

The vegetation within the flushes on site is considered to accurately fit the description of the M23 *Juncus effusus/acutiflorus – Galium palustre* mire community. This conclusion has been reached due to the co-dominance of soft rush and sharp-flowered rush, in addition to the presence of constant indicator species such as Yorkshire fog, marsh bedstraw and greater bird's-foot trefoil.

The Welsh Wildlife Site Selection Criteria guidance suggests that all species-rich examples of the M23 community should be considered for selection as they form part of the Purple moor-grass and rush pasture habitat type. The selection criteria defines species-rich examples of this community as those that contain 12 or more indicator species from the list provided. The M23 community samples on site were taken from the most species-rich examples of this community present within the survey boundary and were found to contain the following 24 indicator species: sneezewort *Achillea ptarmica*, oval sedge *Carex ovalis*, tawny sedge, glaucous sedge, carnation sedge, flea sedge, heath-spotted orchid, common spike-rush *Eleocharis palustris*, marsh bedstraw, marsh pennywort *Hydrocotyle vulgaris*, sharp-flowered rush, compact rush, greater bird's-foot trefoil, heath wood-rush, ragged robin *Silene flos-cuculi,* water mint *Mentha aquatica*, bogbean, creeping forget-me-not *Myosotis secunda*, bog asphodel, tormentil, marsh cinquefoil *Comarum palustre*, lesser spearwort *Ranunculus flammula*, bog stitchwort *Stellaria alsine* and marsh speedwell *Veronica scutellata*. As such, at least some areas of the M23 mire communities on site are considered to be species-rich and are considered to meet the criteria for selection as a local wildlife site. Despite, this, the majority of the smaller flushes on site are obviously species-poor and are dominated by soft of sharp-flowered rush. It is considered that some of these areas will not meet the selection criteria.

The selection criteria for wildlife sites in Wales also suggests that the M23 community can qualify as a selection feature as an example of lowland fen. The criteria suggests that all examples of undesignated fen habitat meet the criteria for selection, providing they are not grossly modified by agricultural improvement.

The more species-rich areas of M23 mire community on site meet the definition and are considered to qualify as a constituent of either the purple moor-grass and rush pasture habitat of principal importance or the lowland fen habitat of principal importance. However, it should be noted that the M23 community on site lacks all of the 'key' botanical species that are listed for the purple moor-grass and rush pasture habitat nationally and lack the presence of sphagnum or peat, which is a key designation feature within the lowland fen habitat definition.

The results of the survey, including a full species list found within the quadrats, is provided at Appendix 3.

3.7 Valley mire

Similar to the acidic / neutral flushes, the vegetation within the valley mire that runs through the eastern section of the survey boundary, but lies outside of the proposed development boundary, is considered to accurately fit the description of the M23 community. This conclusion has been reached due to the co-dominance of soft rush and sharp-flowered rush, in addition to the presence of constant Yorkshire fog, marsh bedstraw and greater bird's-foot trefoil.

The Welsh Wildlife Site Selection Criteria guidance suggests that all species-rich examples of the M23 community should be considered for selection as they form part of the Purple moor-grass and rush pasture habitat type. The selection criteria defines species-rich examples of this community as those that contain 12 or more indicator species from the list provided. The M23 community samples taken from the valley mire were found to contain the following 34 indicator species: cuckoo flower *Cardamine pratensis*, yellow pimpernel *Lysimachia nemorum*, marsh marigold *Caltha palustris* common sedge *Carex nigra*, oval sedge, brown sedge Carex disticha, common cotton-grass, tawny sedge, glaucous sedge, carnation sedge, star sedge *Carex echinata*, flea sedge, common spike-rush, purple moor-grass, floating sweet-grass *Glyceria fluitans*, marsh St John's-wort, marsh bedstraw, marsh pennywort, sharp-flowered rush, compact rush, wild angelica *Angelica sylvestris*, meadowsweet *Filipendula ulmaria*, marsh ragwort *Jacobaea aquatica*, greater bird's-foot trefoil, heath wood-rush, ragged robin, water mint, bogbean, creeping forget-me-not, marsh cinquefoil, marsh horsetail *Equisetum palustre*, lesser spearwort, bog stitchwort and marsh speedwell. As such, this valley mire is considered to be particularly species-rich and is considered to meet the criteria for selection as a local wildlife site.

The selection criteria for wildlife sites in Wales also suggests that the M23 community can qualify as a selection feature as an example of lowland fen. The criteria suggests that all examples of undesignated fen habitat meet the criteria for selection, providing they are not grossly modified by agricultural improvement.

The M23 community within the valley mire meets the definition and is considered to qualify as a constituent of either the purple moor-grass and rush pasture habitat of principal importance or the lowland fen habitat of principal importance. However, it should be noted that the valley mire on site lacks all of the 'key' botanical species that are listed for the purple moor-grass and rush pasture habitat nationally and lacks the presence of sphagnum or peat, which is a key designation feature within the lowland fen habitat definition.

The results of the survey, including a full species list found within the quadrats, is provided at Appendix 3.

3.8 Standing water

The areas of ephemeral standing water from which quadrat data was taken were found to best fit the M23 community, with some areas showing affinity to the M29 community, both of which are described above in previous sections. As these features are present within larger areas of M23 mire (valley mire or neutral / acidic flushes) they are considered to form a component part of those communities / habitats and are not discussed further as independent vegetative communities.

The results of the survey, including a full species list found within the quadrats, is provided at Appendix 3.

4 EVALUATION AND RECOMMENDATIONS

4.1 Evaluation of results

The detailed botanical survey of the habitats present on site have found the following vegetative communities to be present within the survey boundary:

- W23 *Ulex Europaeus – Rubus fruticosus* scrub
- U1 *Festuca ovina - Agrostris capillaris - Rumex acetosella* grassland
- U4 *Festuca ovina - Agrostris capillaris - Galium saxatile* grassland
- MG6b *Lolium perenne - Cynosurus cristatus* grassland (*Anthoxanthum oderatum* sub-community)
- M25 *Molinia caerulea - Potentilla erecta* mire
- U20 *Pteridium aquilinum – Galium saxatile*
- M29 *Hypericum elodes – Potamogeton polygonifolius* soakway
- M23 *Juncus effusus/acutiflorus – Galium palustre* mire

However, following the initial identification of the habitats present and their ecological importance, the site boundary has been amended to allow the retention of some habitats. Habitats present within the proposed development boundary are limited to:

- W23 *Ulex Europaeus – Rubus fruticosus* scrub
- U1 Festuca ovina - Agrostris capillaris - Rumex acetosella grassland
- MG6b *Lolium perenne - Cynosurus cristatus* grassland (*Anthoxanthum oderatum* sub community)
- U20 *Pteridium aquilinum – Galium saxatile*
- M23 *Juncus effusus/acutiflorus – Galium palustre* mire

Details of whether or not the habitats / vegetative communities present within the proposed development area meet the criteria to qualify as selection features for designated sites is detailed below in Table 3.

Table 3 – Qualifying status of vegetative communities within the proposed development area.

COMMUNITY	WILDLIFE SITE	HABITAT OF PRINCIPLE IMPORTANCE	ANNEX 1 HABITAT
W23 scrub	No	No	No
U1	No	Potentially (low quality)	No
MG6b	No	No	No
U20	No	No	No
M23	Yes	Yes (low quality)	No

The proposed development site has an area of approximately 6.89ha, all of which will be lost as part of the proposed quarry extension works. Table 4 below shows the approximate area of each habitat / vegetative community that is due to be lost as part of the development.

Table 4 – Total area of each habitat / vegetative community due to be removed as part of the proposed development.

COMMUNITY	Area lost (ha)
W23 scrub	0.58
U1	1.15

MG6b	3.51
U20	1.17
M23	0.48

Of the habitats / vegetative communities due to be lost, only the M23 mire community within the acidic / neutral flushes is considered to meet the criteria for selection for wildlife sites and to qualify as a habitat of principal importance. Despite this, the majority of this habitat present on site is species-poor and the majority of the species-rich areas that were surveyed now fall outside of the development boundary and will be retained as part of the proposals. Furthermore, only a small area of this habitat (0.48ha) is due to be removed.

Whilst is it considered that the U4 acidic grassland community present on site may qualify as the acidic grassland habitat of principal importance, the definition is vague and the grassland is generally species-poor, as evidenced by it not meeting the criteria for selection as a wildlife site qualifying feature.

As such, it is considered that the proposed development will no impact on any habitats or vegetative communities of European importance and will have very limited impact on habitats or vegetative communities of national importance, with all habitats to be impacted being species-poor and low quality. It is considered that the loss of some habitats of regional or local importance can be adequately compensated for though habitat creation and enhancement, with an ecological enhancement achievable, as detailed in Section 4.2 below.

4.2 Recommendations

To compensate for the loss of habitats on site, two areas land within the wider quarry site have been allocated for compensatory habitat creation and enhancement. These areas are larger than the proposed development footprint (combined area of 9.7ha) and will seek to offset any impacts over the long term.

The focus of habitat creation and enhancement are primarily to benefit reptiles and amphibians that will be translocated from the proposed development site. This involves the creation, enhancement and long-term management of a mosaic of grassland, ponds, wetland marshy areas, woodland, scrub, heathland and dense bracken habitats. Due to the low value of the habitats present, it is considered that this will provide sufficient compensation for the habitats that will be lost to facilitate the proposals, in addition to providing an ecological enhancement. To specifically compensate for the loss of mire communities, a large marshy area that retains standing water throughout the year has been created within the compensation area and already supports many of the indicator species present on site e.g. marsh cinquefoil, sharp-flowered rush, ragged robin etc., in addition to others that have been recorded within the habitats due to be removed, such as lesser marshwort *Apium inundatum*.

Following the granting of the planning permission for the previous extension area, some of the proposed habitat creation and enhancement works have already been undertaken, despite the proposed quarry extension never taking place. The full details of the habitat creation and management works that have already and are due to be undertaken are detailed in Landscape and Ecology Management Plan (LEMP) that has been prepared for the application (see report reference UES02936/06).

5 CONCLUSION

An NVC survey was undertaken of habitat with the potential to be adversely impacted by the proposed development of a parcel of land know as the extension area of the Cae'r Glaw Quarry.

The NVC survey found the following habitats to be present on site:

- W23 *Ulex Europaeus – Rubus fruticosus* scrub
- U1 *Festuca ovina - Agrostris capillaris - Rumex acetosella* grassland
- U4 *Festuca ovina - Agrostris capillaris - Galium saxatile* grassland
- MG6b *Lolium perenne - Cynosurus cristatus* grassland (*Anthoxanthum oderatum* sub-community)
- M25 *Molinia caerulea - Potentilla erecta* mire
- U20 *Pteridium aquilinum – Galium saxatile*
- M29 *Hypericum elodes – Potamogeton polygonifolius* soakway
- M23 *Juncus effusus/acutiflorus – Galium palustre* mire

However, the most ecologically valuable vegetative communities (M23 valley mire, M29, M25 and U4) will now be retained following their identification and the subsequent change of the development boundary. The NVC survey concluded that the communities due to be lost to the proposals are generally of low ecological significance.

It is considered that the proposed development will no impact on any habitats or vegetative communities of European importance and will have very limited impact on habitats or vegetative communities of national importance, with all habitats to be impacted being species-poor and of low quality. It is considered that the loss of some habitats of regional or local importance can be adequately compensated for though habitat creation and enhancement, with specific compensation for the loss of the M23 flushes having already been implemented.

6 REFERENCES

Rodwell, J.S. (2006). *NVC Users' Handbook.* JNCC.

Rodwell, J.S. (2008). *British Plant Communities. Volume 1: Woodlands and scrub.* Cambridge University Press.

Rodwell, J.S. (2008). *British Plant Communities. Volume 2: Mires and heaths.* Cambridge University Press.

Rodwell, J.S. (2008). *British Plant Communities. Volume 3: Grasslands and montane communities.* Cambridge University Press.

Rodwell, J.S. (2008). *British Plant Communities. Volume 4: Aquatic communities, swamps and tall-herb fens.* Cambridge University Press.

Rodwell, J.S. (2008). *British Plant Communities. Volume 5: Maritime communities and vegetation of open habitats.* Cambridge University Press.

Wales Biodiversity Partnership (2008). *'Wildlife Sites Guidance Wales, A Guide to Develop Local Wildlife Systems in Wales'*

APPENDICES

Appendix 1 – Quadrat survey locations

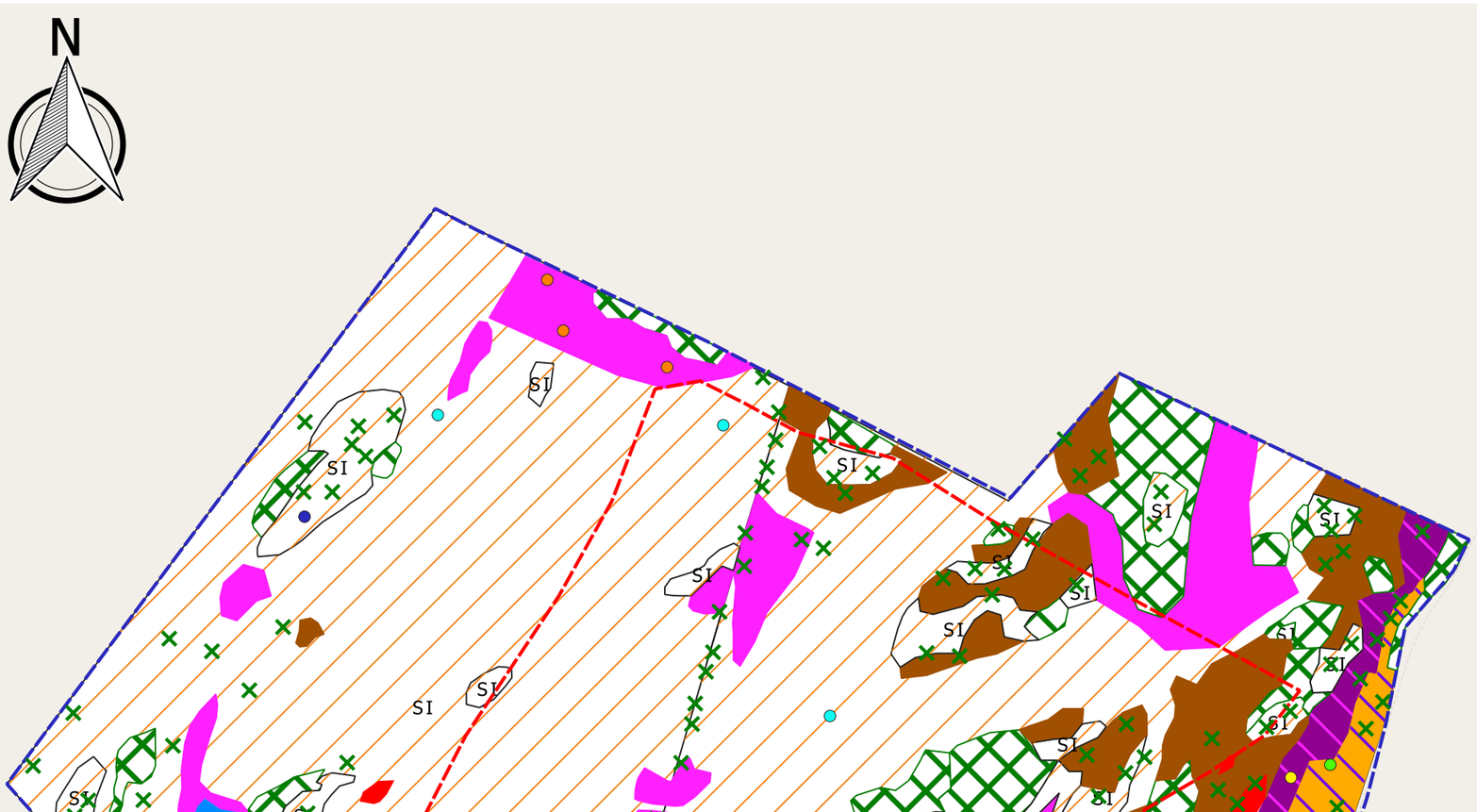
Target Note 1 - Species-rich flush contain two ephemeral ponds.

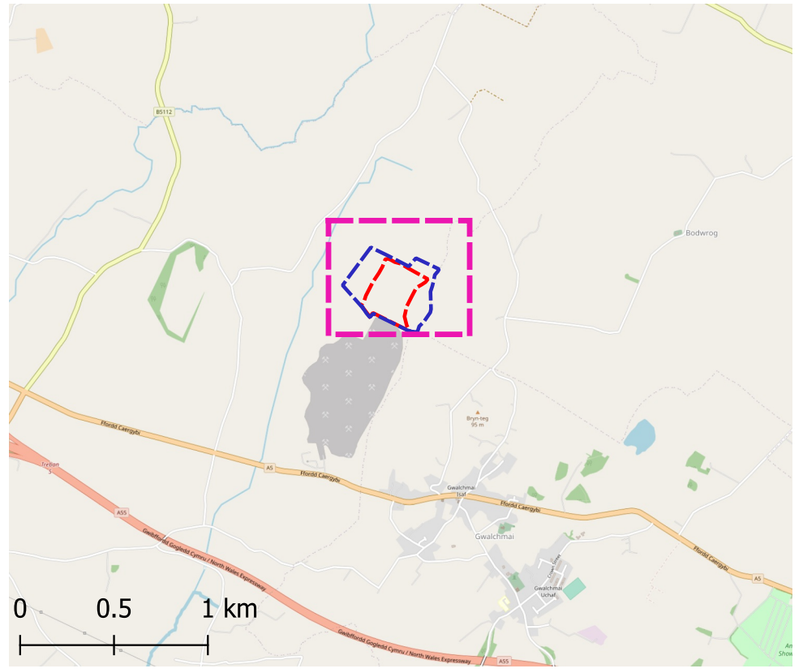
Target Note 2 - Species rich flush containing Pond 1

Target Note 3 - Single badger scat

NVC Survey Quadrat Locations

Site: Cae'r Glaw Quarry Extension Area
NGR: SH 38485 77366
Author: Tom Kenwright
Date: 12/07/2021





KEY:

- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- B1.2 - Semi-improved acid grassland
- B5 - Marsh/marshy grassland
- C1.1 - Continuous braken
- E1.8 - Dry modified bog
- E2.1 - Neutral / acidic flush
- E3.1 - Fen - valley mire
- G1 - Standing water
- I1.4.1 - Other exposure - acid/neutral
- J2.5 - Wall
- Development boundary
- Survey boundary
- Target Notes
- Acidic / neutral flush quadrat
- Modified bog quadrat
- Molinia marshy grassland quadrat
- Rocky outcrop acid grassland quadrat
- Sheep-grazed acid grassland quadrat
- Standing water quadrat
- Valley mire quadrat

NVC Survey Quadrat Locations

Site: Cae'r Glaw Quarry Extension Area
NGR: SH 38485 77366
Author: Tom Kenwright
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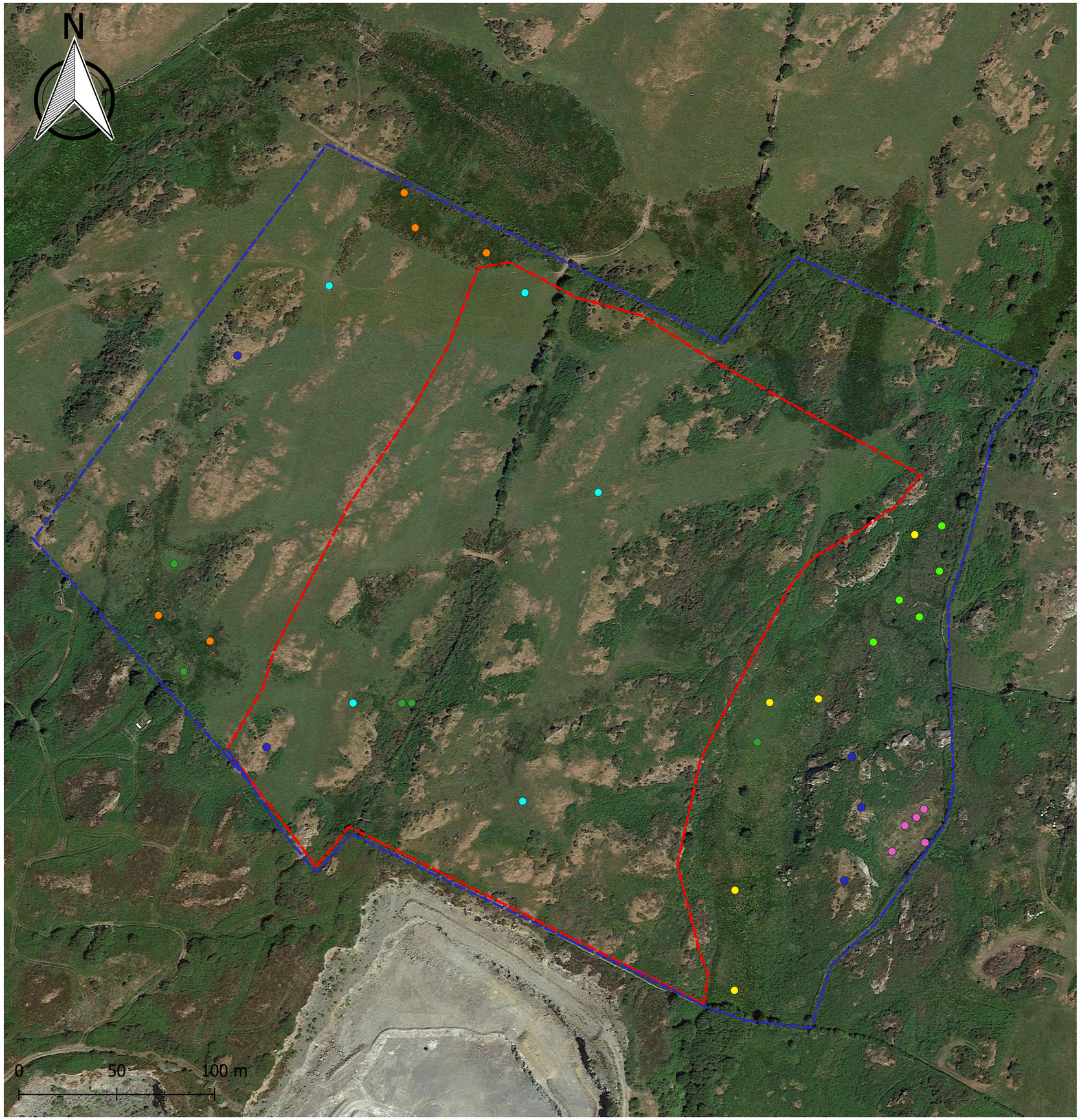

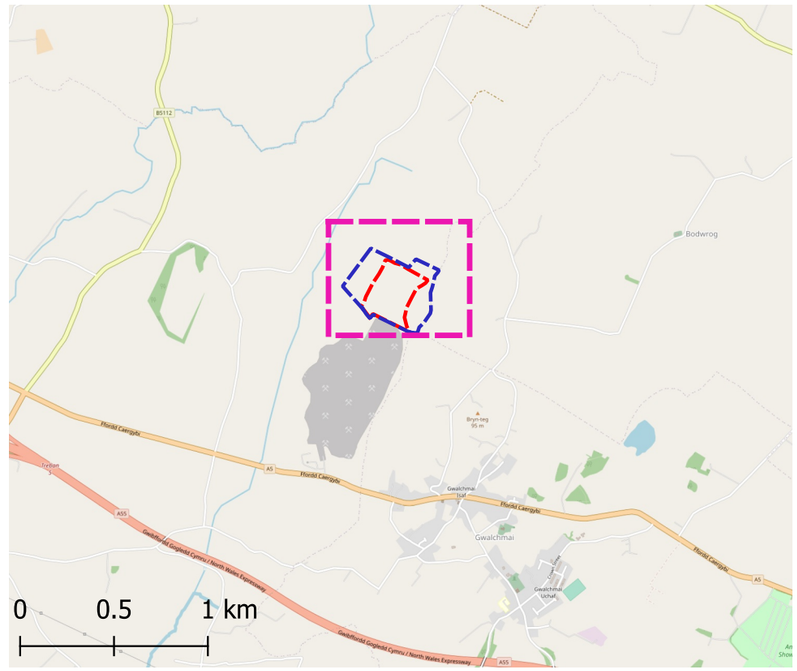

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- I1.4.1 - Other exposure - acid/neutral
- J2.5 - Wall
- Development boundary
- Survey boundary
- Target Notes
- Acidic / neutral flush quadrat
- Modified bog quadrat
- Molinia marshy grassland quadrat
- Rocky outcrop acid grassland quadrat
- Sheep-grazed acid grassland quadrat
- Standing water quadrat
- Valley mire quadrat

Appendix 2 – Photographs

Photograph 1 – Example of W23 dense gorse scrub community present across the site.

Photograph 2 – Showing the sheep-grazed MG6b grassland community that covers a large proportion of the site.

Photograph 3 – Showing the sheep-grazed MG6b grassland community that covers a large proportion of the site.

Photograph 4 – Showing the U4 grassland community present on the mounds created by granite outcrops, lying outside the development boundary.

Photograph 5 – Showing the U1 grassland community present on the mounds created by granite outcrops, lying within the development boundary.

Photograph 6 – Looking north across the M25 purple moor-grass community within the north-eastern section of the survey boundary, located outside of the development boundary.

Photograph 7 – Showing the U20 dense bracken community present across the site.

Photograph 8 – Example of M23 neutral / acidic flushes that are present across the site.

Photograph 9 – Looking north along the M23 valley mire present within the eastern section of the survey boundary but outside of the development boundary.

Photograph 10 – Showing the boundary between the M25 purple moor-grass (background) and the M23 valley mire (foreground) communities.

Photograph 11 – Showing the boundary between the M23 valley mire and the U20 dense bracken communities on the valley slopes that lies outside of the development boundary.

Photograph 12 – Example of the M23 / M29 pools of ephemeral standing water that are present amongst the M23 valley mire and acidic / neutral flush habitats.

Appendix 3 – Survey results

Sheep-grazed grassland (MG6b)

Survey Date: 12/07/2021
Sample area (Metres): 2x2

Latin name	Common name	DOMIN score					Frequency (%)	Frequency (score)	Frequency (description)
		1	2	3	4	5			
Lolium perenne	Perennial rye-grass	7	5	5	4	7	100.0	V	Constant
Holcus lanatus	Yorkshire fog	7	7	8	6	7	100.0	V	Constant
Trifolium repens	White clover	5	4	4	6	4	100.0	V	Constant
Poa humilis	Spreading meadow-grass	4	3	4	4	4	100.0	V	Constant
Cynosurus cristatus	Crested dog's-tail	2	5	2	2	4	100.0	V	Constant
Agrostis capillaris	Common bent	2	4	4	5	4	100.0	V	Constant
Anthoxanthum odoratum	Sweet vernal-grass	1	1	5	5	4	100.0	V	Constant
Cirsium arvense	Creeping thistle	5	5	2		1	80.0	IV	Constant
Cerastium fontanum	Common mouse-ear	4	3	2		4	80.0	IV	Constant
Ranunculus repens	Creeping buttercup	2	3	3		2	80.0	IV	Constant
Rumex acetosella	Sheep's sorrel				1	1	40.0	II	Occasional
Carex binervis	Green-ribbed sedge				1		20.0	I	Scarce
Potentilla erecta	Tormentil				4		20.0	I	Scarce
Cirsium palustre	Marsh thistle				1		20.0	I	Scarce
Festuca ovina	Sheep's fescue				4		20.0	I	Scarce
Achillea millefolium	Yarrow					2	20.0	I	Scarce

Additional Species recorded outside of quadrats

Latin name	Common name
Veronica chamaedrys	Germander speedwell
Lotus corniculatus	Common bird's-foot trefoil
Luzula multiflora	Heath wood-rush
Trifolium dubium	Lesser trefoil
Hypochaeris radicata	Common cat's-ear
Jacobaea vulgaris	Common ragwort
Viola riviniana	Common dog-violet
Stellaria media	Common chickweed
Urtica dioica	Common nettle
Conopodium majus	Pignut

Rocky outcrop grassland (U1 & U4)

Survey Date: 12/07/2021
Sample area (Metres): 2x2

Latin name	Common name	DOMIN score					Frequency (%)	Frequency (score)	Frequency (description)
		1	2	3	4	5			
Agrostis capillaris	Common bent	8	5	5	4	4	100.0	V	Constant
Poa humilis	Spreading meadow-grass	4	4	4	2	1	100.0	V	Constant
Festuca ovina	Sheep's fescue	4	5	7	4	7	100.0	V	Constant
Rumex acetosella	Sheep's sorrel	2	7	5	3	2	100.0	V	Constant
Anthoxanthum odoratum	Sweet vernal-grass	2	1	4	5	5	100.0	V	Constant
Sedum anglicum	English stonecrop	4	3	5	6	5	100.0	V	Constant
Holcus lanatus	Yorkshire fog	4		2	2	2	80.0	IV	Constant
	Bare rock		4	5	6	4	80.0	IV	Constant
Polytrichum sp.	Polytrichum moss		5	5	4	2	80.0	IV	Constant
Bryophyta sp.	Mosses		4	5	5	5	80.0	IV	Constant
Lolium perenne	Perennial rye-grass	2		2			40.0	II	Occasional
Cirsium vulgare	Spear thistle	1			1		40.0	II	Occasional
Cladonia sp.	Cladonia lichen			5		3	40.0	II	Occasional
Cerastium fontanum	Common mouse-ear	2					20.0	I	Scarce
Poa annua	Annual meadow-grass		1				20.0	I	Scarce
Ulex gallii	Western gorse				2		20.0	I	Scarce
Calluna vulgaris	Common heather					4	20.0	I	Scarce
Erica cinerea	Bell heather					4	20.0	I	Scarce

Additional Species recorded outside of quadrats

Latin name	Common name
Galium saxatile	Heath bedstraw
Carex binervis	Green-ribbed sedge
Digitalis purpurea	Foxglove
Polygala serpyllifolia	Heath milkwort
Trifolium repens	White clover
Ulex europaeus	European gorse

Molinia marshy grassland (M25)

Survey Date: 12/07/2021
Sample area (Metres): 2x2

Latin name	Common name	DOMIN score					Frequency (%)	Frequency (score)	Frequency (description)
		1	2	3	4	5			
Molinia caerulea	Purple moor-grass	8	5	10	7	7	100.0	V	Constant
Luzula multiflora	Heath wood-rush	2	2	1	2	2	100.0	V	Constant
Potentilla erecta	Tormentil	2	2	3	4	2	100.0	V	Constant
Carex hostiana	Tawny sedge	4		2	3	5	80.0	IV	Constant
Carex pulicaris	Flea sedge	4		1	2	2	80.0	IV	Constant
Anthoxanthum oderatum	Sweet vernal-grass	4	4		5	4	80.0	IV	Constant
Carex panicea	Carnation sedge	1		1	4	4	80.0	IV	Constant
Lotus pedunculatus	Greater bird's-foot trefoil	2	5		3	1	80.0	IV	Constant
Juncus acutiflorus	Sharp-flowered rush		5	4	5	4	80.0	IV	Constant
Ulex gallii	Western gorse		2		4	4	60.0	III	Frequent
Erica tetralix	Cross-leaved heath			4	4	2	60.0	III	Frequent
Poa trivialis	Rough meadow-grass	2	4				40.0	II	Occasional
Salix repens	Creeping willow	1		2			40.0	II	Occasional
Cirsium palustre	Marsh thistle	1	1				40.0	II	Occasional
Juncus effusus	Soft rush	4	2				40.0	II	Occasional
Holcus lanatus	Yorkshire fog	2	4				40.0	II	Occasional
Sphagnum sp.	Sphagnum moss			2		2	40.0	II	Occasional
Carex demissa	Common yellow sedge			2		1	40.0	II	Occasional
Festuca ovina	Sheep's fescue	4					20.0	I	Scarce
Cynosurus cristatus	Crested dog's-tail	2					20.0	I	Scarce
Poa humilis	Spreading meadow-grass	1					20.0	I	Scarce
Juncus conglomeratus	Compact rush		6				20.0	I	Scarce
Calluna vulgaris	Common heather		4				20.0	I	Scarce
Dryopteris carthusiana	Narrow buckler-fern		2				20.0	I	Scarce
Galium palustre	Marsh bedstraw		2				20.0	I	Scarce
Epilobium palustre	Marsh willowherb		1				20.0	I	Scarce
Agrostis capillaris	Common bent		2				20.0	I	Scarce
Viola palustris	Marsh violet		2				20.0	I	Scarce
Carex flacca	Glaucous sedge			2			20.0	I	Scarce
Digitalis purpurea	Foxglove				1		20.0	I	Scarce

Additional Species recorded outside of quadrats

Latin name	Common name
Crataegus monogyna	Hawthorn
Rubus fruticosus agg.	Bramble
Narthecium ossifragum	Bog asphodel
Dactylorhiza maculata	Heath spotted-orchid

Modified bog (M29)

Survey Date: 12/07/2021
Sample area (Metres): 2x2

Latin name	Common name	DOMIN score					Frequency (%)	Frequency (score)	Frequency (description)
		1	2	3	4	5			
Sphagnum sp.	Sphagnum moss	8	5	4	4	3	100.0	V	Constant
Eriophorum angustifolium	Common cotton-grass	5	4	8	4	3	100.0	V	Constant
Menyanthes trifoliata	Bogbean	4	5	2	5	1	100.0	V	Constant
Carex rostrata	Bottle sedge	1	1	1	1	1	100.0	V	Constant
Hypericum elodes	Marsh St John's-wort	4	4	6		8	80.0	IV	Constant
Agrostis stolonifera	Creeping bent	3		2	2	1	80.0	IV	Constant
Erica tetralix	Cross-leaved heath		4	1	5	1	80.0	IV	Constant
Molinia caerulea	Purple moor-grass		4	1	5	1	80.0	IV	Constant
Carex nigra	Common sedge	1	2			3	60.0	III	Frequent
Deschampsia cespitosa	Tufted hair-grass			1	2	4	60.0	III	Frequent
Juncus effusus	Soft rush	5	2				40.0	II	Occasional
Polytrichum sp.	Polytrichum moss	4			5		40.0	II	Occasional
Carex echinata	Star sedge	4				1	40.0	II	Occasional
Epilobium palustre	Marsh willowherb	2	2				40.0	II	Occasional
Narthecium ossifragum	Bog asphodel		1		3		40.0	II	Occasional
Potamogeton polygonifolius	Bog pondweed		2			5	40.0	II	Occasional
Galium palustre	Marsh bedstraw			1		1	40.0	II	Occasional
Eleocharis multicaulis	Many-stalked spike-rush			1	3		40.0	II	Occasional
Ulex gallii	Western gorse			1			20.0	I	Scarce
Comarum palustre	Marsh cinquefoil					4	20.0	I	Scarce

Additional Species recorded outside of quadrats

Latin name	Common name
Salix repens	Creeping willow
Potentilla erecta	Tormentil
Luzula multiflora	Heath wood rush
Juncus conglomeratus	Compact rush
Viola palustris	Marsh violet
Juncus acutiflorus	Sharp-flowered rush

Neutral / acidic flush (M23)

Survey Date: 12/07/2021
Sample area (Metres): 2x2

Latin name	Common name	DOMIN score					Frequency (%)	Frequency (score)	Frequency (description)
		1	2	3	4	5			
Holcus lanatus	Yorkshire fog	5	5	5	5	6	100.0	V	Constant
Agrostis stolonifera	Creeping bent	4	2	3	2	2	100.0	V	Constant
Juncus acutiflorus	Sharp-flowered rush	8	8	7	6	8	100.0	V	Constant
Juncus conglomeratus	Compact rush	2	1	5	6	2	100.0	V	Constant
Lotus pedunculatus	Greater bird's-foot trefoil	4	4	5	4	3	100.0	V	Constant
Anthoxanthum odoratum	Sweet vernal-grass	4	2	3	1	3	100.0	V	Constant
Poa trivialis	Rough meadow-grass	2	2	2	1	1	100.0	V	Constant
Deschampsia cespitosa	Tufted hair-grass	2	4	2	3	4	100.0	V	Constant
Galium palustre	Marsh bedstraw	1	1		5		60.0	III	Frequent
Holcus mollis	Creeping soft-grass		1	2	1		60.0	III	Frequent
Cirsium palustre	Marsh thistle			1	3	1	60.0	III	Frequent
Juncus effusus	Soft rush	2			4		40.0	II	Occasional
Stellaria alsine	Bog stitchwort			3	3		40.0	II	Occasional
Luzula multiflora	Heath wood-rush			1		1	40.0	II	Occasional
Ranunculus flammula	Lesser spearwort		3				20.0	I	Scarce
Silene flos-cuculi	Ragged robin				2		20.0	I	Scarce
Carex leporina	Oval sedge				1		20.0	I	Scarce
Carex hostiana	Tawny sedge					2	20.0	I	Scarce
Ranunculus acris	Meadow buttercup					1	20.0	I	Scarce
Potentilla erecta	Tormentil					2	20.0	I	Scarce
Carex pulicaris	Flea sedge					1	20.0	I	Scarce

Additional Species recorded outside of quadrats

Latin name	Common name
Carex panicea	Carnation sedge
Carex flacca	Glaucous sedge
Carex demissa	Common yellow sedge
Hydrocotyle vulgaris	Marsh pennywort
Prunella vulgaris	Self-heal
Juncus bulbosus	Bulbous rush
Epilobium palustre	Marsh willowherb
Myosotis secunda	Creeping forget-me-not
Mentha aquatica	Water mint
Comarum palustre	Marsh cinquefoil
Veronica scutellata	Marsh speedwell
Menyanthes trifoliata	Bogbean
Narthecium ossifragum	Bog asphodel
Danthonia decumbens	Heath-grass
Dactylorhiza maculata	Heath spotted-orchid
Achillea ptarmica	Sneezewort
Eleocharis palustris	Common spike-rush
Potamogeton polygonifolius	Bog pondweed
Isolepis fluitans	Floating club-rush

Valley mire (M23)

Survey Date: 12/07/2021
Sample area (Metres): 2x2

Latin name	Common name	DOMIN score					Frequency (%)	Frequency (score)	Frequency (description)
		1	2	3	4	5			
Juncus effusus	Soft rush	8	6	5	6	5	100.0	V	Constant
Epilobium palustre	Marsh willowherb	2	3	1	3	1	100.0	V	Constant
Lotus pedunculatus	Greater bird's-foot trefoil	2	5	2	4	4	100.0	V	Constant
Galium palustre	Marsh bedstraw	4	4	2	3	4	100.0	V	Constant
Silene flos-cuculi	Ragged robin	2	1	2	3	4	100.0	V	Constant
Stellaria alsine	Bog stitchwort	4	4	1	3	2	100.0	V	Constant
Poa trivialis	Rough meadow-grass	4	5	5	4	5	100.0	V	Constant
Juncus acutiflorus	Sharp-flowered rush	3	4	5	5	5	100.0	V	Constant
Agrostis stolonifera	Creeping bent	1	4	4	2	1	100.0	V	Constant
Cardamine pratensis	Cuckoo flower	1		3	3	2	80.0	IV	Constant
Caltha palustris	Marsh marigold	3	1		1	2	80.0	IV	Constant
Cirsium palustre	Marsh thistle	1	1	1	1		80.0	IV	Constant
Carex nigra	Common sedge		1	2	2	2	80.0	IV	Constant
Holcus lanatus	Yorkshire fog		4	5	5	5	80.0	IV	Constant
Mentha aquatica	Water mint	4	3			1	60.0	III	Frequent
Ranunculus repens	Creeping buttercup	2	2			1	60.0	III	Frequent
Anthoxanthum odoratum	Sweet vernal grass		1	5	2		60.0	III	Frequent
Comarum palustre	Marsh cinquefoil			3	2	4	60.0	III	Frequent
Equisetum fluviatile	Water horsetail	1	1				40.0	II	Occasional
Myosotis secunda	Creeping forget-me-not		4		2		40.0	II	Occasional
Veronica scutellata	Marsh speedwell		2		1		40.0	II	Occasional
Eleocharis palustris	Common spike-rush		2		2		40.0	II	Occasional
Epilobium hirsutum	Greater willowherb	2					20.0	I	Scarce
Molinia caerulea	Purple moor-grass			5			20.0	I	Scarce
Luzula multiflora	Heath wood-rush			1			20.0	I	Scarce
Carex echinata	Star sedge					2	20.0	I	Scarce
Eriophorum angustifolium	Common cotton-grass					1	20.0	I	Scarce
Festuca rubra	Red fescue					4	20.0	I	Scarce

Additional Species recorded outside of quadrats

Latin name	Common name
Carex pulicaris	Flea sedge
Carex leporina	Oval sedge
Carex panicea	Carnation sedge
Carex flacca	Glaucous sedge
Deschampsia cespitosa	Tufted hair-grass
Glechoma hederacea	Ground ivy
Lysimachia nemorum	Yellow pimpernel
Ajuga reptans	Bugle
Hypericum elodes	Marsh St John's-wort
Isolepis fluitans	Floating club-rush
Menyanthes trifoliata	Bogbean
Glyceria fluitans	Floating sweet grass
Alopecurus geniculatus	Marsh foxtail
Cardamine flexuosa	Wavy bittercress
Ranunculus flammula	Lesser spearwort
Equisetum palustre	Marsh horsetail
Callitriche sp.	Water starwort
Angelica sylvestris	Wild angelica
Filipendula ulmaria	Meadowsweet
Carex hostiana	Tawny sedge
Hydrocotyle vulgaris	Marsh pennywort
Jacobaea aquatica	Marsh ragwort
Ranunculus acris	Meadow buttercup
Juncus conglomeratus	Compact rush
Carex disticha	Brown sedge
Cerastium fontanum	Common mouse-ear

Standing water (M23 & M29)

Survey Date: 12/07/2021
Sample area (Metres): 2x2

Latin name	Common name	DOMIN score					Frequency (%)	Frequency (score)	Frequency (description)
		1	2	3	4	5			
Menyanthes trifoliata	Bogbean	8	5	7	7	8	100.0	V	Constant
Juncus acutiflorus	Sharp-flowered rush	3	4	5	4	1	100.0	V	Constant
Galium palustre	Marsh bedstraw	2	4	3	2	3	100.0	V	Constant
Veronica scutellata	Marsh speedwell	1	3	3	3	1	100.0	V	Constant
Isolepis fluitans	Floating club-rush	5	4	5		5	80.0	IV	Constant
Glyceria fluitans	Floating sweet-grass	4	6	4	7		80.0	IV	Constant
Ranunculus flammula	Lesser spearwort	2	2	4		2	80.0	IV	Constant
Potamogeton polygonifolius	Bog pondweed	5	6	2			60.0	III	Frequent
Juncus effusus	Soft rush	5		2		6	60.0	III	Frequent
Hypericum elodes	Marsh St John's-wort	1	2			4	60.0	III	Frequent
Agrostis stolonifera	Creeping bent		2		2	2	60.0	III	Frequent
Comarum palustre	Marsh cinquefoil		2	1		4	60.0	III	Frequent
Myosotis secunda	Creeping forget-me-not			2	3	2	60.0	III	Frequent
Lotus pedunculatus	Great bird's-foot trefoil			2		4	40.0	II	Occasional
Poa trivialis	Rough meadow-grass				1	4	40.0	II	Occasional
Sphagnum sp.	Sphagnum moss		2				20.0	I	Scarce
Epilobium palustre	Marsh willowherb					3	20.0	I	Scarce
Silene flos-cuculi	Ragged robin					3	20.0	I	Scarce
Stellaria alsine	Bog stitchwort					3	20.0	I	Scarce
Cardamine pratensis	Cuckoo flower					2	20.0	I	Scarce
Caltha palustris	Marsh marigold					1	20.0	I	Scarce
Carex nigra	Common sedge					1	20.0	I	Scarce
Holcus lanatus	Yorkshire fog					2	20.0	I	Scarce
Eleocharis palustris	Common spike-rush					1	20.0	I	Scarce