

SOUTH CALDECOTTE, MILTON KEYNES

BOTANICAL ASSESSMENT OF GRASSLAND

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On behalf of: Aspect Ecology Ltd

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1 Introduction

1.1 Blackstone Ecology has been commissioned to undertake a botanical survey and assessment of two fields at a site at South Caldecotte, Milton Keynes (NGR: SP 89112 34019). The two fields are identified on the MAGIC database as supporting Lowland Meadow priority habitat, on the basis of a survey undertaken by English Nature in 1993. Although the survey was not undertaken in line with standard NVC methodologies (i.e. it was not a quadrat-based survey) the vegetation was provisionally identified as MG5b, although the low diversity of much of the field suggested affinities to MG6 grassland¹.

1.2 In July 2018 Aspect Ecology undertook an in-house botanical assessment of these fields, reported in *South Caldecotte, Milton Keynes Ecological Appraisal* (Aspect Ecology Ltd, June 2019). Results from a series of five quadrat surveys within each field were analysed using MAVIS² to assist in classification of the NVC communities present. The analysis indicated that the grassland present in both fields was a poor match to MG5, with a slightly closer (but still poor) match for both fields being the semi-improved MG6 community.

1.3 The present survey has been commissioned to provide an independent assessment of the grassland type(s) present and to assess their condition. In particular, the survey was intended to identify whether the fields support MG5 grassland (one of the unimproved grassland communities which comprise Lowland Meadow priority habitat) and, if so, to ascertain its condition.

¹ A Preliminary Botanical Survey and Assessment of Unimproved Grassland in Buckinghamshire. English Nature. 1993

² Modular Analysis of Vegetation Information System, CEH 2016

2 Methodology

2.1 The survey was undertaken on 10th June 2020 by Dr Ian Johnson, an experienced botanist with a particular interest in lowland grasslands. Weather conditions were calm and largely dry, with a brief spell of light rain.

2.2 The larger, southern field, F3, had been cattle grazed until shortly before the survey. Consequently, the sward was generally short (<5cm). Field F4, adjoining to the north, had not been grazed for a number of weeks and the sward was longer, generally being approximately 30cm high.

2.3 An initial walkover survey of field F4 was undertaken, recording all plant species noted within the field boundaries. During the walkover, areas considered to support a homogeneous plant community were identified; these were then subject to more detailed survey, using a series of five 2mx2m quadrats, recording all vascular plant species present within each quadrat, together with an estimate of the level of ground cover provided by each species, using the Domin scale (See Table 2.1). The same procedure was then followed for Field F3.

Table 2.1 Domin Scale to record species cover

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

2.4 Within field F4 it was noted that certain prominent plant species (e.g. Oxeye Daisy *Leucanthemum vulgare*) tended to occur in patches, rather than having a uniform distribution across the field. However, these patches were well distributed within the grassland and did not appear to relate to other variation within the sward. Accordingly, it was concluded that the field could be considered to be a homogeneous stand of vegetation, other than within close proximity (1-2m) to boundary hedgerows and scrub. A single series of five quadrats was, therefore, surveyed within F4. The quadrats were spaced out to provide samples across the field (see Plan 1) but the precise location of each quadrat was selected at random.

2.5 In the case of F3, the field supports distinct ridge and furrow across most of its area. It was apparent from scanning the field that the ridge tops supported a more extensive and diverse herb community than the bottom of the furrows. A number of areas within F3 also showed signs of disturbance, including the loss of the ridge and furrow pattern and a higher incidence of weed species, particularly docks *Rumex* spp. and thistles *Cirsium* spp.. It was also noted that the area west of the in-field Oak tree generally appeared somewhat disturbed, with a higher frequency of ruderal and injurious weed species and of lower quality than grassland to the east.

2.6 Since the aim of the survey was to identify whether unimproved grassland was present within these fields, detailed NVC survey within F3 was restricted to the more diverse, undisturbed areas of the field. While survey was restricted to the undisturbed ridges within F3, quadrats were well spaced across the field east of the mature Oak *Quercus* (see Plan 1), with the precise locations of each quadrat again being selected at random.

Constraints

2.7 Not all species are apparent throughout the year, but the survey was undertaken at the optimum time of year for such work, in reasonable weather conditions. Recent cattle grazing of F3 may have slightly constrained grass identification, but is not considered to have significantly impeded identification of herb species.

3 Results

3.1 Lists of all species recorded within each field are provided within Annex 1, together with full data from the five quadrat surveys undertaken in each field. Survey results are considered for each field below

Field F3

3.2 A total of 35 plant species were recorded within F3, including 25 forb species. The number of species recorded within each quadrat ranged from 12 to 16, with a mean of 14.6 species per quadrat. Of the 35 species recorded across F3, 27 (77%) were present within one or more quadrat.

3.3 Results of the analysis using MAVIS are shown below, with screen shots of the results also provided at Annex 1. Based on the MAVIS analysis, the grassland community within F3 most closely matches MG6 *Lolium perenne-Cynosurus cristatus* grassland, with a 'fair' goodness-of-fit (matching coefficient of 64.93).

Table 1 MAVIS output: Field F3

NVC Community	Matching Coefficient
MG6	64.93
MG6b	64.81
MG6a	64.52
MG4b	57.86
MG5a	55.87
MG5	55.67
MG7	54.86
MG4v2	53.82
MG7c	53.45
MG6cc	53.37

Field F4

3.4 A total of 60 herbaceous species were recorded within F4, including 16 grass, 2 sedge and a wood-rush species. Numbers of species recorded within quadrats ranged from 15 to 30, with an average of 21 species per quadrat. Of the species recorded within the whole field, 39 (65%) were recorded within one or more quadrat.

3.5 Results of the MAVIS analysis are shown below, with screen shots of the results also provided at Annex 1. Based on the MAVIS analysis, the grassland community within F4 most closely matches MG6 *Lolium perenne-Cynosurus cristatus* grassland, with a 'fair' goodness-of-fit (matching coefficient of 62.57).

3.6 The survey results, including the results of the MAVIS analysis are considered further within Section 4 below.

Table 2 MAVIS output: Field F4

NVC Community	Matching Coefficient
MG6a	62.57
MG6	59.67
MG6b	58.86
MG5a	57.52
MG5	55.60
MG4b	55.38
MG5b	54.94
MG6c	53.99
MG4a	52.85
MG5c	52.52

4 Discussion

4.1 Although the swards of fields F3 and F4 have some similarities, that of F4 appears considerably more diverse. Therefore, the two fields are discussed separately.

Field F3

4.2 The species recorded within F3 on initial inspection appear to reflect those found within the MG5 *Cynosurus cristatus-Centaurea nigra* Lowland Meadow grassland community. Indeed, all eleven of the constant species listed within the floristic table for MG5³ are present within the sward, and five were recorded as constant species, as would be anticipated if the sward were an MG5 community. The number of species recorded within each quadrat (12 to 16) also fall within the expected range for MG5, albeit at the lower end of the range recorded within the floristic table (12-38).

4.3 However, upon a closer inspection, the sward also shows marked discrepancies from the MG5 community, as reflected in the results of the MAVIS analysis. Six of the MG5 constant species are present at a reduced frequency, three being recorded only in a single quadrat. (It may also be noted in respect of the MG5 constant species, that all are common and widespread and occur in a great many grassland community types. Further, the survey recorded none of the less common species that are largely restricted to unimproved grasslands).

4.4 Perhaps of greater significance is the relative scarcity of other positive indicators of the MG5 community. Of the 34 species recorded in F3 as a whole, three are injurious weeds (Creeping and Spear Thistles and Broad-leaved Dock) while another four are either negative indicators or ruderal species with no particular affinity to the MG5 community, namely Creeping Buttercup *Ranunculus repens*, Greater Plantain *Plantago major*, Scented Mayweed *Matricaria recutita* and Hedge Mustard *Sisymbrium officinale*. Meadow Barley *Hordeum secalinum* is also not listed in the MG5 floristic table, but is nonetheless understood to occasionally occur at moderate to high frequency in some examples of MG5.

4.5 The species recorded within F3 are also very largely characteristic of the semi-improved MG6 *Lolium perenne-Cynosurus cristatus* grassland and the relatively low level of cover provided by forbs is consistent with this community, White Clover *Trifolium repens* achieving higher levels of cover than any other forb. The frequency and abundance of Perennial Rye-grass (constant within the sward with cover at Domin 5-7), in combination with the frequency and abundance of White Clover is indicative of some level of agricultural improvement⁴.

4.6 As Rodwell (1992) notes, there is a complete gradation between rich, unimproved stands of MG5 and very species-poor, agriculturally improved grassland and "in many cases, the best that can be hoped for is to place a stand at particular points along a line of continuous variation". The use of computer programmes such as MAVIS provides a means of doing this in an objective manner.

4.7 The conclusion from MAVIS that field F3 supports semi-improved MG6 grassland is supported by consideration of the neutral grasslands key (28a-d) within the UK Habitat

³ British Plant Communities Volume 3: Grasslands and Montane Communities 1992 (Rodwell, J.S., Ed)

⁴ See, e.g., Key 2a in Farm Environment Plan (FEP) Manual, Natural England 2010

Classification (May, 2018), with the abundance of Perennial Rye-grass and White Clover being significant, as is the relative lack of forb indicator species for MG5 such that UK Habitat codes 29b / 30e most accurately reflect the community (see Annex 2). The level of plant diversity within the quadrats, at less than 15 species 4m², is further evidence that the sward most closely resembles MG6 grassland.

4.8 Having considered the results of the quadrat survey, together with the walkover assessment of the wider sward within F3, there is no clear reason why the conclusions of the MAVIS analysis should be discounted. It is concluded that the sward within field F3 is best considered as an example of an MG6 community, albeit one of moderate species-richness.

Field F4

4.9 As with F3, the results of the MAVIS analysis indicate that the sward of field F4 is best described as an MG6 community. This output is somewhat surprising and therefore close attention should be paid to the floristic keys (Rodwell 1992), especially given the presence within the sward of a number of indicators of MG5 or other unimproved grassland, including Oxeye Daisy *Leucanthemum vulgare*, Great Burnet *Sanguisorba officinale*, Rough Hawkbit *Leontodon hispidus*, Lady's Bedstraw *Galium verum*, Pignut *Conopodium majus* and Quaking Grass *Briza media*.

4.10 As noted above, the distribution of some forb species was noted to be 'patchy' within F4, although without a clear pattern that would justify dividing the sward into two or more distinct types to be sampled separately. As such, the field was treated as supporting a homogenous stand of vegetation and quadrats were set at random across the field.

4.11 A review of the results of the quadrat survey reveal a complete absence within the quadrats of three of the indicator species noted above, with the other three, Rough Hawkbit, Great Burnet and Oxeye Daisy, each being restricted to a single quadrat. It is considered that this result from the quadrat sampling does not accurately reflect the abundance of at least some of these species within the wider sward, with Oxeye Daisy, Lady's Bedstraw and Rough Hawkbit being considered at least occasional and locally frequent.

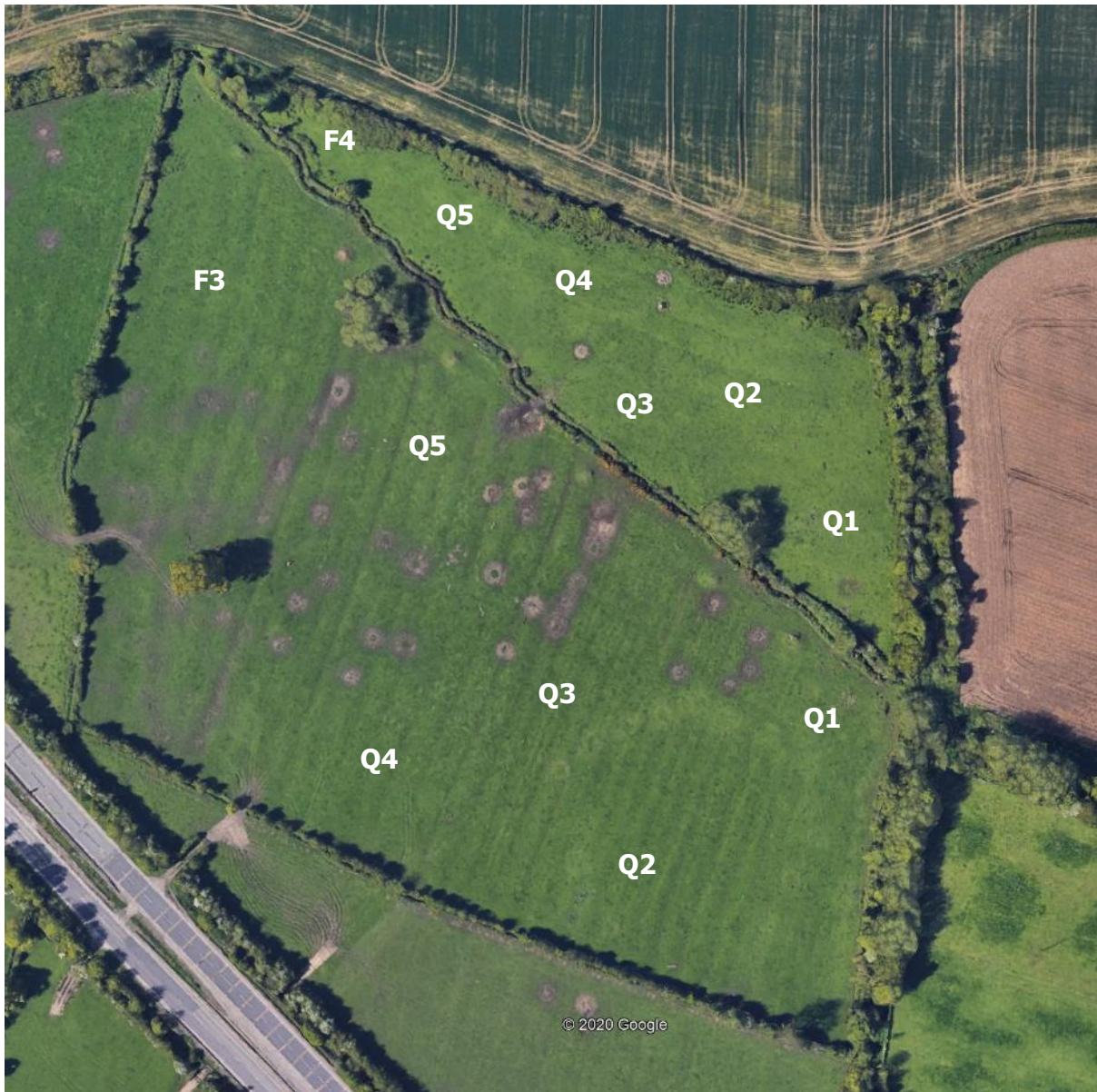
4.12 The diversity of plants within the quadrats in F4 averaged 21 species, suggesting the sward more closely resembles an unimproved grassland. This is represented by habitat code 28b of the UK Habitat Classification (see Field Key at Annex 2).

4.13 Following the key to mesotrophic grasslands within Rodwell (1992) the sward keys out as the MG5 community. On the basis of this and the above observations, it is considered that F4 supports an unimproved neutral grassland sward closely resembling MG5, but that the sward is in sub-optimal condition.

4.14 Apart from the patchy distribution of a number of herb species within the sward, the frequency and abundance of Perennial Rye-grass is higher than would be expected (present in 100% of quadrats with Domin scores of 3-7). This suggests that the sward may have been subject to some disturbance which has locally reduced levels of cover of some of the species indicative of unimproved grassland. Alternatively, or in addition, the grassland may have been subject to some attempts at improvement or to mismanagement (in relation to the nature conservation ideal), possibly through over-application of farmyard manure or through chemical treatments, or through inappropriate stocking levels.

4.15 Regardless of how the present condition of the sward has been arrived at, what can be concluded is that, in the author's opinion, the grassland within field F4 is best considered to represent an MG5 grassland in poor to moderate condition.

PLAN 1: Quadrat Locations



Annex 1: Survey Results

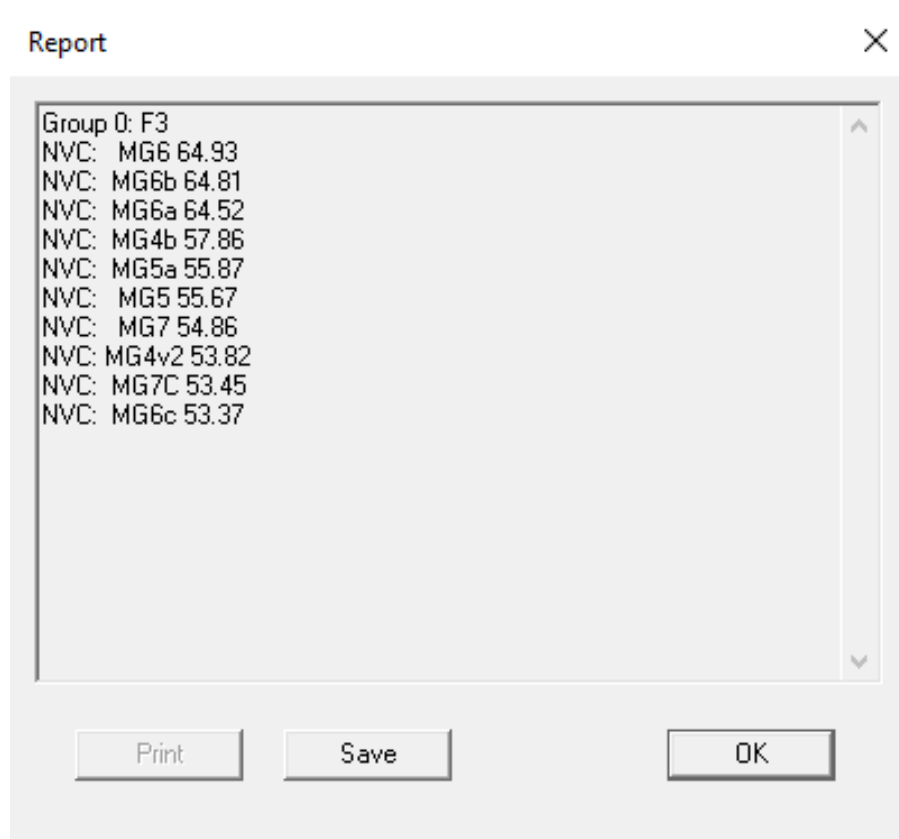
Field F3: Quadrat Results Summary

Species	Domin Cover Value per Quadrat					Summary
	Q1	Q2	Q3	Q4	Q5	
<i>Lolium perenne</i>	5	5	7	7	6	V (5-7)
<i>Trifolium pratense</i>	4	3	-	2	2	IV (2-4)
<i>Trifolium repens</i>	6	7	4	3	2	V (2-7)
<i>Leontodon saxatilis</i>	3	-	-	-	-	I (3)
<i>Cerastium fontanum</i>	3	3	2	-	-	III (2-3)
<i>Cynosurus cristatus</i>	6	3	4	3	4	V (3-6)
<i>Holcus lanatus</i>	4	-	-	-	-	I (4)
<i>Cirsium vulgare</i>	3	-	2	-	-	II (2-3)
<i>Ranunculus acris</i>	3	2	-	1	-	III (1-3)
<i>Centaurea nigra</i>	1	-	-	3	2	III (1-3)
<i>Poa trivialis</i>	3	-	3	3	2	IV (2-3)
<i>Hordeum secalinum</i>	3	-	-	-	-	I (3)
<i>Ranunculus repens</i>	1	-	-	-	-	I (1)
<i>Agrostis capillaris</i>	7	7	7	6	6	V (6-7)
<i>Lotus corniculatus</i>	-	3	5	5	4	IV (3-5)
<i>Plantago lanceolata</i>	-	3	4	4	4	IV (3-4)
<i>Plantago major</i>	-	3	-	-	-	I (3)
<i>Anthoxanthum odoratum</i>	-	2	-	-	-	I (2)
<i>Achillea millefolium</i>	-	3	3	5	4	IV (3-5)
<i>Hypochaeris radicata</i>	-	-	3	2	3	III (2-3)
<i>Leontodon autumnalis</i>	-	-	3	3	2	III (2-3)
<i>Taraxacum agg.</i>	-	-	1	-	-	I (1)
<i>Dactylis glomerata</i>	-	-	1	-	-	I (1)
<i>Rumex acetosa</i>	-	-	1	2	1	III (1-2)
<i>Stellaria media</i>	-	-	-	1	1	II (1)
<i>Festuca rubra</i>	-	-	-	2	1	II (1-2)
<i>Geranium dissectum</i>	-	-	-	-	1	I (1)
Total species	14	12	15	16	16	

Field F3: All Plant Species recorded

<i>Agrostis capillaris</i>	Common Bent
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
<i>Cynosurus cristatus</i>	Crested Dog's-tail
<i>Dactylis glomerata</i>	Cock's-foot
<i>Festuca rubra</i>	Red Fescue
<i>Holcus lanatus</i>	Yorkshire Fog
<i>Hordeum secalinum</i>	Meadow Barley
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Poa trivialis</i>	Rough Meadow-grass
<i>Carex hirta</i>	Hairy Sedge
<i>Achillea millefolium</i>	Yarrow
<i>Centaurea nigra</i>	Black Knapweed
<i>Cirsium arvense</i>	Creeping Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Cerastium fontanum</i>	Common Mouse-ear
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill
<i>Helminthotheca echioides</i>	Bristly Ox-tongue
<i>Hypochaeris radicata</i>	Cat's-ear
<i>Leontodon autumnalis</i>	Autumn Hawkbit
<i>Leontodon saxatilis</i>	Lesser Hawkbit
<i>Lotus corniculatus</i>	Bird's-foot Trefoil
<i>Matricaria recutita</i>	Scented Mayweed
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Plantago major</i>	Greater Plantain
<i>Potentilla repens</i>	Creeping Cinquefoil
<i>Prunella vulgaris</i>	Selfheal
<i>Ranunculus acris</i>	Meadow buttercup
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Rumex acetosa</i>	Common Sorrel
<i>Rumex obtusifolius</i>	Broad-leaved Dock
<i>Sisymbrium officinale</i>	Hedge Mustard
<i>Stellaria media</i>	Chickweed
<i>Taraxacum</i> agg.	Dandelion
<i>Trifolium pratense</i>	Red Clover
<i>Trifolium repens</i>	White Clover

Field F3: MAVIS Report



Field F4: Quadrat Results Summary

Species	Domin Cover Value per Quadrat					Summary
	Q1	Q2	Q3	Q4	Q5	
<i>Alopecurus pratensis</i>	2	-	-	3	4	III (2-4)
<i>Poa annua</i>	1	1	-	1	-	III (1)
<i>Leucanthemum vulgare</i>	3	-	-	-	-	I (3)
<i>Sanguisorba officinalis</i>	3	-	-	-	-	I (3)
<i>Cynosurus cristatus</i>	5	4	7	-	5	IV (4-7)
<i>Lotus corniculatus</i>	3	2	4	3	5	V (2-5)
<i>Cerastium fontanum</i>	2	1	-	3	3	IV (1-3)
<i>Trifolium pratense</i>	5	3	2	2	3	V (2-5)
<i>Potentilla reptans</i>	3	-	-	-	-	I (3)
<i>Centaurea nigra</i>	3	4	3	5	5	V (3-5)
<i>Holcus lanatus</i>	4	5	4	5	5	V (4-5)
<i>Achillea millefolium</i>	4	3	4	3	3	V (3-4)
<i>Lolium perenne</i>	3	5	7	7	4	V (3-7)
<i>Dactylis glomerata</i>	1	3	4	3	4	V (1-4)
<i>Agrostis capillaris</i>	7	7	5	7	6	V (5-7)
<i>Ranunculus repens</i>	3	4	3	3	4	V (3-4)
<i>Trifolium repens</i>	3	2	2	-	2	IV (2-3)
<i>Plantago lanceolata</i>	3	3	3	4	5	V (3-5)
<i>Senecio jacobaea</i>	1	-	-	-	-	I (1)
<i>Hordeum secalinum</i>	1	-	-	3	-	II (1-3)
<i>Prunella vulgaris</i>	3	-	-	-	-	I (3)
<i>Leontodon hispidus</i>	2	-	-	-	-	I (2)
<i>Ranunculus acris</i>	2	3	-	1	-	III (1-3)
<i>Cirsium vulgare</i>	1	1	-	1	1	IV (1)
<i>Leontodon saxatilis</i>	1	-	-	-	1	II (1)
<i>Geranium dissectum</i>	1	-	-	-	-	I (1)
<i>Sonchus oleraceus</i>	1	-	-	1	-	II (1)
<i>Helminthotheca echioides</i>	1	-	-	-	-	I (1)
<i>Poa pratensis</i>	1	-	-	-	3	II (1-3)
<i>Hypochaeris radicata</i>	1	-	3	-	1	III (1-3)
<i>Cirsium arvense</i>	-	3	-	-	-	I (3)
<i>Plantago major</i>	-	1	-	-	-	I (1)
<i>Carex spicata</i>	-	2	-	-	-	I (2)
<i>Poa trivialis</i>	-	3	-	-	-	I (3)
<i>Luzula campestris</i>	-	-	2	-	-	I (2)
<i>Festuca rubra</i>	-	-	3	2	4	III (2-4)
<i>Convolvulus arvensis</i>	-	-	-	1	-	I (1)
<i>Phleum bertolonii</i>	-	-	-	2	-	I (2)

<i>Rumex acetosa</i>	-	-	-	-	1		I (1)
Total species	30	20	15	20	20		

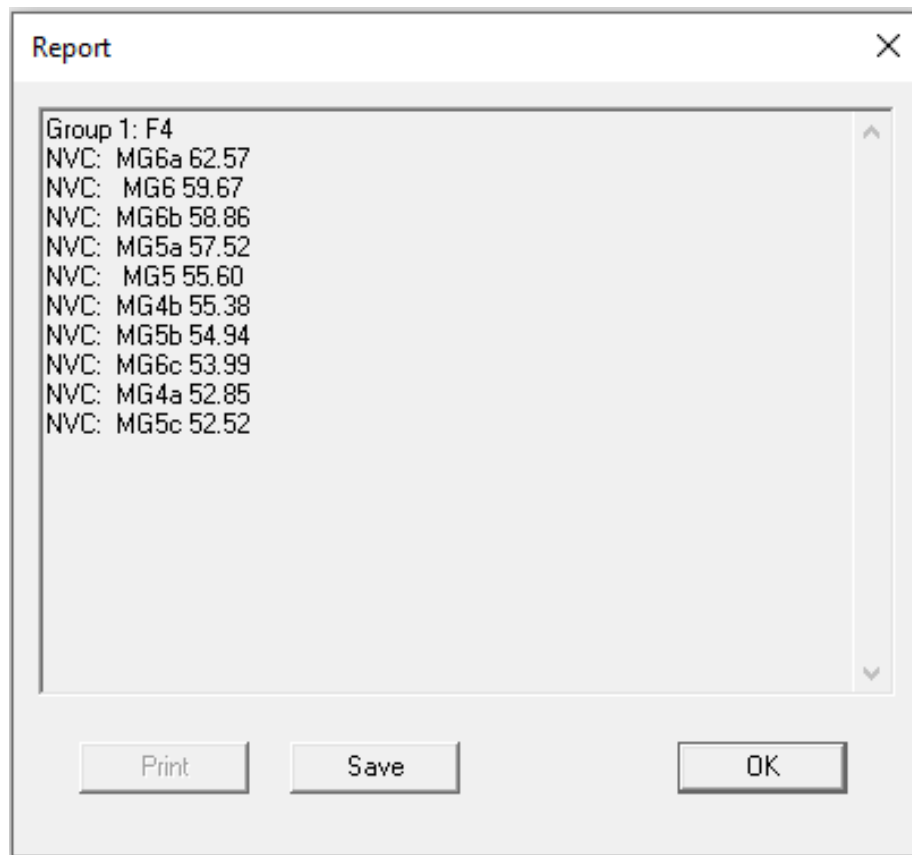
Field F4: All Plant Species recorded

<i>Agrostis capillaris</i>	Common Bent
<i>Alopecurus pratensis</i>	Meadow Foxtail
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
<i>Briza media</i>	Quaking Grass
<i>Bromus hordeaceus</i>	Soft Brome
<i>Cynosurus cristatus</i>	Crested Dog's-tail
<i>Dactylis glomerata</i>	Cock's-foot
<i>Festuca rubra</i>	Red Fescue
<i>Holcus lanatus</i>	Yorkshire Fog
<i>Hordeum secalinum</i>	Meadow Barley
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Phleum bertolonii</i>	Smaller Cat's-tail
<i>Poa annua</i>	Annual Meadow-grass
<i>Poa pratensis</i>	Smooth Meadow-grass
<i>Poa trivialis</i>	Rough Meadow-grass
<i>Trisetum flavescens</i>	Yellow Oat-grass
<i>Carex hirta</i>	Hairy Sedge
<i>Carex spicata</i>	Spiked Sedge
<i>Luzula campestris</i>	Field Wood-rush
<i>Achillea millefolium</i>	Yarrow
<i>Arctium</i> sp.	Burdock
<i>Bellis perennis</i>	Daisy
<i>Carduus crispus</i>	Wetted Thistle
<i>Centaurea nigra</i>	Black Knapweed
<i>Cirsium arvense</i>	Creeping Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Cerastium fontanum</i>	Common Mouse-ear
<i>Conopodium majus</i>	Pignut
<i>Convolvulus arvensis</i>	Field Bindweed
<i>Galium verum</i>	Lady's Bedstraw
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill
<i>Geranium molle</i>	Dove's-foot Crane's-bill
<i>Helminthotheca echioides</i>	Bristly Ox-tongue
<i>Heracleum sphondylium</i>	Hogweed
<i>Hypochaeris radicata</i>	Cat's-ear

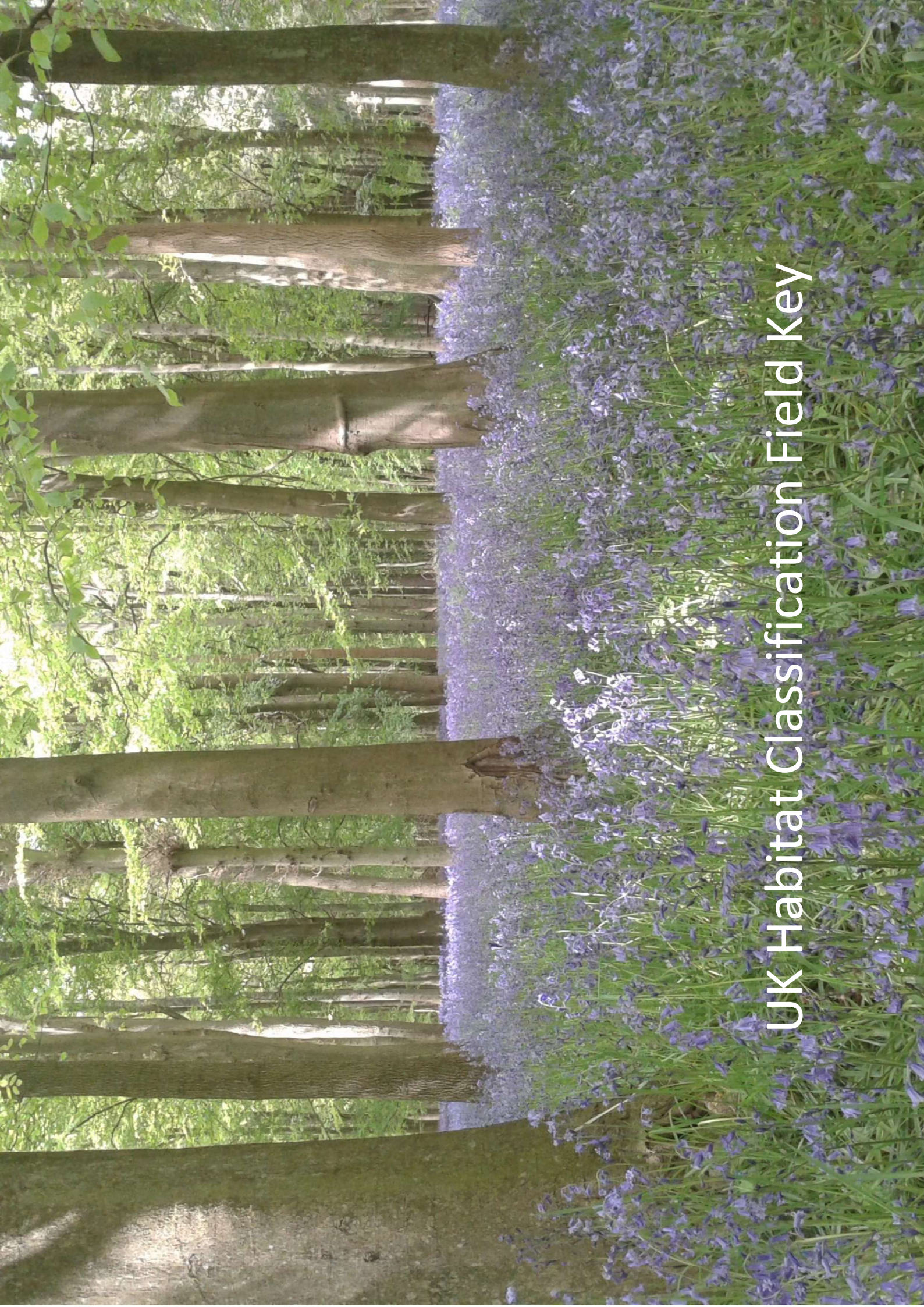
Field F4: All Plant Species recorded (cont.)

<i>Lathyrus pratensis</i>	Meadow Vetchling
<i>Leontodon saxatilis</i>	Lesser Hawkbit
<i>Leontodon hispidus</i>	Rough Hawkbit
<i>Leucanthemum vulgare</i>	Oxeye Daisy
<i>Lotus corniculatus</i>	Bird's-foot Trefoil
<i>Matricaria recutita</i>	Scented Mayweed
<i>Medicago lupulina</i>	Black Medick
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Plantago major</i>	Greater Plantain
<i>Potentilla reptans</i>	Creeping Cinquefoil
<i>Prunella vulgaris</i>	Selfheal
<i>Ranunculus acris</i>	Meadow buttercup
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Rumex acetosa</i>	Common Sorrel
<i>Rumex obtusifolius</i>	Broad-leaved Dock
<i>Sanguisorba officinalis</i>	Great Burnet
<i>Senecio jacobaea</i>	Common Ragwort
<i>Silene dioica</i>	Red Campion
<i>Sisymbrium officinale</i>	Hedge Mustard
<i>Sonchus oleraceus</i>	Smooth Sow-thistle
<i>Stellaria graminea</i>	Lesser Stitchwort
<i>Trifolium pratense</i>	Red Clover
<i>Trifolium repens</i>	White Clover
<i>Urtica dioica</i>	Common Nettle
<i>Vicia sativa ssp. segetalis</i>	Common Vetch
<i>Prunus spinosa</i>	Blackthorn
<i>Rubus fruticosus agg.</i>	Bramble

Field F4: MAVIS Report



Annex 2: Extract from UK Habitat Classification Field Key



UK Habitat Classification Field Key

FIRST DIVISION FOR GRASSLANDS UNDER REGULAR MANAGEMENT		Numbered links plus Broad and Priority Habitats	Scottish EUNIS Code	UK Hab Code	NVC units (indicative list only)
27h	Halophytic species (Ellenberg salt values >0 – see postscript 1) in inland situations	19			
27i	Metallophytes present e.g. Spring Sandwort (<i>Minuartia verna</i>), Field Pennycress (<i>Thlapsi arvensis</i>), Thrift (<i>Armeria maritima</i>), Sea-campion (<i>Silene uniflora</i>), Alpine Pennycress (<i>Thlapsi caerulescens</i>), Alpine Catchfly (<i>Lychnis alpina</i>), Shetland Mouse-ear (<i>Cerastium nigrescens</i>)	Back to 26f			
28a-d	DIVISION OF PRIORITY HABITAT NEUTRAL GRASSLANDS FROM NEUTRAL AND IMPROVED GRASSLANDS	29			
28a	Productive grasses and White Clover (<i>Trifolium repens</i>) usually (see below) predominate mainly Rye Grasses (<i>Lolium</i>), Timothy (<i>Phleum</i>), Cocksfoot (<i>Dactylis glomerata</i>), Yorkshire Fog (<i>Holcus lanatus</i>), False Oat Grass (<i>Arrhenatherum elatius</i>) and the larger Fescues (<i>Festuca</i> spp.). Common Bent (<i>Agrostis capillaris</i>), Crested Dog's-tail (<i>Cynosurus cristatus</i>) and Sweet Vernal Grass (<i>Anthoxanthum odoratum</i>) may be present at the less fertile end of the gradient. In wet grasslands Soft Rush (<i>Juncus effusus</i>), Tufted Hair-grass (<i>Deschampsia cespitosa</i>), Floating Sweet Grass (<i>Glyceria fluitans</i>), Marsh Foxtail (<i>Alopecurus geniculatus</i>) and Tall Fescue (<i>Festuca arundinacea</i>) may be abundant. Varies from pure grass to moderately species rich grassland but hay meadow Priority Habitat indicators are always rare or absent. Some fields may be dominated by Buttercup (<i>Ranunculus</i> spp.) and/or White Clover (<i>Trifolium repens</i>).	Annex I 6510 – Lowland hay meadows (Alopecurus pratensis – Sanguisorba officinalis). Lowland hay meadows Priority Habitat (Neutral Grassland BH)	E2.212	g3a5	MG4, MG5, MG8
28b	Cover of Rye grass (<i>Lolium perenne</i>), White Clover (<i>Trifolium repens</i>) and sown Red Clover (<i>T. pratense</i>) usually less than 10% cover. Typically rich in forb species (>15 m ²) with frequent Priority Habitat lowland meadow indicators including: Meadow Vetchling (<i>Lathyrus pratensis</i>), Bird's-foot Trefoil (<i>Lotus corniculatus</i>), Ox-eye Daisy (<i>Leucanthemum vulgare</i>), Lady's Bedstraw (<i>Galium verum</i>), Cowslip (<i>Primula veris</i>), Black Knapweed (<i>Centaurea nigra</i>), Rough Hawkbit (<i>Leontodon hispidus</i>), Bulbous Buttercup (<i>Ranunculus bulbosus</i>) or on flood meadows some of Marsh-marigold (<i>Caltha palustris</i>), Great Burnet (<i>Sanguisorba officinalis</i>), Meadowsweet (<i>Filipendula ulmaria</i>) and Meadow Foxtail (<i>Alopecurus pratensis</i>). Note that vegetation dominated by <i>F. ulmaria</i> keys out at 22e.	Annex 6520 – Mountain Hay Meadows. Upland hay meadows Priority Habitat (Neutral Grassland BH)	E2.242	g3b5	MG3, MG8 (upland form)
28c	Cover of grass species and clover usually less than 50% cover with a high proportion of Priority Habitat upland meadow indicators such as Wood Cranesbill (<i>Geranium sylvaticum</i>), Lady's Mantles (<i>Alchemilla</i> spp.), Yellow Oat Grass (<i>Trisetum flavescens</i>), Pignut (<i>Conopodium majus</i>) and Sweet Vernal Grass (<i>Anthoxanthum odoratum</i>) or Globeflower (<i>Trollius europaeus</i>) and Northern Hawksbeard (<i>Crepis mollis</i>)	Fen, Marsh, Swamp Broad Habitat (BH)	D5.3?	f2	(secondary codes 182, 183 or 185 are possible)
28d	Neutral flushes typically marking enriched springlines and water seepage zones in lowland or upland situations. Acidic and calcareous indicators are absent or rare. Characteristic species include Creeping Bent (<i>Agrostis stolonifera</i>), Calliigonella cuspidata, Greater Bird's-foot trefoil (<i>Lotus pedunculatus</i>), Blinks (<i>Montia Fontana</i>), Marsh Foxtail (<i>Alopecurus geniculatus</i>), Jointed Rush (<i>Juncus articulatus</i>), Toadrush (<i>J. bufonius</i>), Floating Sweet Grass (<i>Glyceria fluitans</i>), Meadow Buttercup (<i>Ranunculus acris</i>).				

29a-b	DIVISION OF NEUTRAL AND IMPROVED GRASSLANDS	Numbered links plus Broad and Priority Habitats	Scottish EUNIS Code	UK Hab Code	NVC units (indicative list only)
29a	Palatable grasses dominate mainly Rye grasses (<i>Lolium</i> spp.), Timothy (<i>Phleum pratense</i>), Cocksfoot (<i>Dactylis glomerata</i>), Crested Dog's-tail (<i>Cynosurus cristatus</i>), Yorkshire Fog (<i>Holcus lanatus</i>). Grass cover usually over 75%. Broadleaved species restricted mainly to White Clover (<i>Trifolium repens</i>), Creeping Buttercup (<i>Ranunculus repens</i>), Greater Plantain (<i>Plantago major</i>), Dandelion (<i>Taraxacum</i>), Broad-leaved Dock (<i>Rumex obtusifolius</i>) and Chickweed (<i>Stellaria media</i>). Fertile but wetter situations may support occasional Soft Rush (<i>Juncus effusus</i>) or Hard Rush (<i>J. inflexus</i>), Floating Sweet Grass (<i>Glyceria fluitans</i>), Creeping Bent (<i>Agrostis stolonifera</i>) and Rough Meadow Grass (<i>Poa trivialis</i>), but accompanying species will always indicate high fertility. Species poor <9 species m ² .	Improved Grassland (BH)	E2.6	g4	MG6, MG7
29b	Palatable grasses predominate, usually Rye Grasses (<i>Lolium</i> spp.), White Clover (<i>Trifolium repens</i>) and Timothy (<i>Phleum pratense</i>) 40% or below and other grasses more prominent such as Crested Dog's-tail (<i>Cynosurus</i>), Common Bent (<i>Agrostis capillaris</i>), Yellow Oat Grass (<i>Trisetum flavescens</i>), Soft Brome (<i>Bromus hordeaceus</i>) and Sweet Vernal Grass (<i>Anthoxanthum odoratum</i>). Semi-improved but wetter situations may support abundant Soft Rush (<i>Juncus effusus</i>) or Hard Rush (<i>J. inflexus</i>), Floating Sweet Grass (<i>Glyceria fluitans</i>), Creeping Bent (<i>Agrostis stolonifera</i>) and Rough Meadow Grass (<i>Poa trivialis</i>). Total grass cover usually between 50 and 75%. Forbs up to 50% cover and associated with less fertile soil e.g. Ribwort Plantain (<i>Plantago lanceolata</i>), Sorrel (<i>Rumex acetosa</i>), Meadow Buttercup (<i>Ranunculus acris</i>), Creeping Buttercup (<i>R. repens</i>), Self-heal (<i>Prunella vulgaris</i>), Yarrow (<i>Achillea millefolium</i>), Silverweed (<i>Potentilla anserina</i>), Meadow Thistle (<i>Cirsium palustre</i>) and Lady's smock (<i>Cardamine pratensis</i>). However, indicators of the two hay meadow Priority Habitats will be rare or absent.	30			
29c	False Oat Grass (<i>Arrhenatherum elatius</i>) abundant. Total grass cover usually between 50 and 75%. Forbs up to 50% cover and associated with less fertile soil e.g. Ribwort Plantain (<i>Plantago lanceolata</i>), Sorrel (<i>Rumex acetosa</i>), Meadow Buttercup (<i>Ranunculus acris</i>), Creeping Buttercup (<i>R. repens</i>), Self-heal (<i>Prunella vulgaris</i>), Yarrow (<i>Achillea millefolium</i>), Silverweed (<i>Potentilla anserina</i>), Silverweed (<i>Potentilla anserina</i>). Often associated with formerly disturbed sites, road verges etc.	Neutral Grassland	E2.2	g3c5	
30a-e	OTHER NEUTRAL GRASSLANDS				
30a	Recently sown mixtures of light grasses for agri-environment schemes or habitat creation/restoration such as Sweet Vernal Grass (<i>Anthoxanthum odoratum</i>), Smooth Meadow Grass (<i>Poa pratensis</i>), Red Fescue (<i>Festuca rubra</i>), Crested Dog's-tail (<i>Cynosurus cristatus</i>) and Yellow Oat Grass (<i>Trisetum flavescens</i>). Grass cover 50-100%. Herb species rare or absent. Often on sown field margins.	Arable Field Margins Priority Habitat (if on margin). (Neutral Grassland BH)	No code	c1a5 or g3	
30b	As above but with high cover of sown mixtures of legumes such as Red Clover (<i>Trifolium pratense</i>), Alsike Clover (<i>T. hybridum</i>) and Bird's-foot Trefoil (<i>Lotus corniculatus</i>). Often on sown field margins.	Arable Field Margins Priority Habitat (if on margin). (Neutral Grassland BH)	No Code	c1a6 or g3	
30c	Wet meadows with frequent to dominant cover of rushes but not waterlogged (see wetland key) nor species rich (see 31a) often with Yorkshire Fog (<i>Holcus lanatus</i>)	Neutral Grassland (BH)	E3.4131	g3c8 secondary code 14 15	M22, M23b, MG8

OTHER NEUTRAL GRASSLANDS (continued)		Numbered links plus Broad and Priority Habitats	Scottish EUNIS Code	UK Hab Code	NVC units
30d	Meadows with abundant Tufted Hairgrass aka Hassock (<i>Deschampsia cespitosa</i>) and Yorkshire Fog (<i>Holcus lanatus</i>)	Neutral Grassland (BH)	E3.4131	g3c7	MG9
30e	Description as 29b but not one of 30a-d. Moderate number of species (9-15 m ⁻²). Rye Grass (<i>Lolium perenne</i>) and Crested Dog's-tail (<i>Cynosurus cristatus</i>) are often abundant.	Neutral Grassland (BH)	E2.112	g3c6	MG6, MG9-13
31a-f CALCAREOUS GRASSLANDS					
31a	Vegetation on dry ground with scattered sedges and many species indicative of calcareous soils present. Can be relatively species poor (CG4) but more often species rich with >50% forb cover. On calcareous soils, usually rendzinas on chalk or limestone in lowland Britain. Indicators include Upright Brome (<i>Bromopsis erecta</i>), Tor-grass (<i>Brachypodium pinnatum</i>), Fairy Flax (<i>Linum catharticum</i>), Salad Burnet (<i>Sanguisorba minor</i>), Carline Thistle (<i>Carlina vulgaris</i>), Stemless Thistle (<i>Cirsium acaule</i>), Horseshoe Vetch (<i>Hippocrepis comosa</i>) and Squinancywort (<i>Asperula cynanchica</i>), Dropwort (<i>Filipendula vulgaris</i>), Lady's Bedstraw (<i>Galium verum</i>), Quaking Grass (<i>Briza media</i>), Crested Hair-grass (<i>Koeleria macrantha</i>) and Rockrose (<i>Helianthemum nummularium</i>).	Annex I 6210 - Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia). Lowland Calcareous Grassland Priority Habitat (Calcareous Grassland BH)	E1.26	g2a5	CG1-CG7,CG10
31b	As 31a but often low in species richness. Often dominated by Blue Moor-grass (<i>Sesleria caerulea</i>) with Sheep's Fescue (<i>Festuca ovina</i>), Thyme (<i>Thymus polytrichus</i>), Limestone Bedstraw (<i>Galium sternerii</i>) and Common Bent (<i>Agrostis capillaris</i>) characteristic. Stands may comprise a confusing mix of species indicative of acidic and calcareous conditions. Arctic-Alpine species absent or very rare.	Annex I 6210 - Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Upland Brometalia). Calcareous Grassland Priority Habitat (Calcareous Grassland BH)	E1.26	g2b7	CG8,CG9
31c	As above (31a and 31b) but with Juniper (<i>Juniperus communis</i>) present at <30% cover.	Annex I 5130 - Juniperus communis formations on heaths or calcareous grasslands. Lowland Calcareous Grassland Priority Habitat.	F3.16#1	g2a5 or g2b7 secondary code 22	
31d	Arctic-Alpine plants, such as Alpine Lady's-mantle (<i>Alchemilla alpina</i>), Alpine Bistort (<i>Persicaria vivipara</i>) and Moss Campion (<i>Silene acaulis</i>). Mountain Avens (<i>Dryas octopetala</i>) forming grass/sedge 'heath' where conditions are harsh either at sea-level (in north west of Scotland) or high altitudes. Rare species include Scottish Primrose (<i>Primula scotica</i>).	Annex I 6170 – Alpine and sub-alpine calcareous grasslands. Upland Calcareous Grassland Priority Habitat (Calcareous Grassland BH)	E4.12€	g2b5	CG11-CG14
31e	Localised areas of vegetation, often visibly associated with seepage zones where water movement is vertical (topogenous mires) or lateral (soligenous mires). Usually with several sedge species and species of wet calcareous soils, springs and flushes including many bryophytes (see note on page 2 for Transition Fens/Alkaline Fens.	Wetland key section - 50			
31f	If not 31a-31e move on or consider 30e				