Botanical Surveys of Middlewick Ranges

Report to Colchester City Council

December 2024

Dr Giles Groome CEcol CEnv MCIEEM
Consultant Ecologist

Bargate Cottage
Churt Road
Churt
Farnham
GU10 2QT
giles.groome@btinternet.com

EXECUTIVE SUMMARY

Giles Groome, Consultant Ecologist was commissioned by Colchester City Council to undertake botanical surveys of approximately 213ha of land referred to collectively as the Middlewick Ranges (the 'Survey Site').

Surveys were broken down into two parts. 'Survey Area 1', the area within the Emerging Local Plan (2017-2033) allocated for housing development, was subject to both National Vegetation Classification (NVC) mapping and species recording conducted across the 2024 survey season (April-September).

'Survey Area 2', covering the entire Survey Site, was subject only to the recording of vascular plants during time-limited walkover surveys conducted in the first week of June from 12 pre-defined 'Component Survey Areas'. Species recording during this element of the study was largely undertaken to provide plant records to be used in later analyses of invertebrate data, the results of which will be made available in a separate report.

27 NVC communities, including five non-referable classifications, were mapped across the 83.6ha of Survey Area 1. These have been classified within six broad habitat-types: grassland, scrub, woodland, ruderal, bare ground, and hardstanding and buildings.

Grassland, the most widespread habitat, falls within nine NVC communities. The largest, U1d, covers 20.2ha and comprises mostly species-rich Red Fescue dominated acid grassland. Often superficially very similar, Red Fescue dominated MG6b covers 18.9ha and is only moderately species-rich. The third most cover abundant grassland community, U1b, covers 12.2ha and is largely confined to areas that were surface soil stripped during the creation of the ranges in the late-1800's and early-1900's. Ranging from coarse, where stands have not been mown for at least three years, to very open and locally lichen-rich, swards are for the most part species-rich.

To provide quantitative data gathered using a repeatable methodology, ten 2x2m quadrat samples were recorded from U1d and MG6b, and eight from the smaller area of U1b.

The fourth most common grassland community across Survey Area 1, MG1a, covers 2ha and comprises mostly species-poor, unmown, False Oat-grass dominated grassland that has developed in areas of past soil disturbance. The only other grassland classification covering >0.5ha in area is MG6a. This comprises species-poor Yorkshire-fog, Common Bent and/or Red Fescue dominated grassland that is restricted to areas of past and/or on-going disturbance, particularly along and besides paths and tracks. Five 2x2m quadrats were sampled across each of these communities.

MG1b, MG1e, MG7b and MG10a collectively cover less than 0.5ha and, with the exception of MG1e, are species-poor. Due to their small size, no quadrat samples were recorded from any of these classifications.

Eight scrub communities were mapped during fieldwork. Covering 7.5ha and over 70% of all mapped scrub across Survey Area 1, the largest community is Gorse and/or Broom dominated W23a, almost all of which has developed in areas of past soil disturbance associated with former range groundworks. Often lying between W23a and open grassland, within which most stands have only recently become established, Gorse dominated W23b is the second most common scrub community. All other scrub classifications, W21a, W22a, W24a, W24b, W25a and W25b, cover less than 0.5ha each and are variably dominated by English Elm, Hawthorn, Blackthorn, Brambles and/or Bracken.

Other than where associated with former field boundaries, all stands of woodland are of a recent or very recent secondary origin. The most common are W10c and W10d which cover 8.4ha and 7.4ha, respectively. The former is largely dominated by Pedunculate Oak over field layer Common Ivy with an understorey that includes locally abundant Holly. The latter is dominated by Pedunculate Oak over a field layer dominated by grasses. All stretches of W10a, which covers 0.7ha in area, have developed from sections of out-grown former field boundary hedgerows. These too are dominated by canopy Pedunculate Oak but here with a mixed field layer in which Ivy and grasses are subordinate in cover to other taxa.

The final woodland community is W6b. This is confined to a section of wet woodland flanking the Birch Brook toward the south-west of Survey Area 1. Covering 0.4ha and fed both by the floodwaters of Birch Brook and spring seepages arising within and to the south of it, stands are for the most part dominated by canopy Crack Willow with Pedunculate Oak on drier levees.

Only one ruderal classification was mapped during fieldwork comprising two stands of Common Nettle-Cleavers dominated OV24a and covering a total area <0.1ha.

All other classifications mapped during Survey Area 1 fieldwork are largely unvegetated and not referable to the NVC: ‘Bare Ground’, ‘Buildings’, ‘Concrete Hardstanding’, ‘Pea Shingle’ and ‘Surfaced Track’.

354 species of vascular plant, including sub-species and varieties, were recorded across Survey Area 1 during fieldwork. Of these 26 are, or have been, regarded as nationally and/or county rare, scarce and/or threatened according to published sources. However, records relating to the status of species in Essex are long out-of-date and a number of taxa reported to be Essex Rare are almost certainly neither Rare nor Scarce in the county.

Fieldwork across Survey Area 2 was restricted to the recording of vascular plants during time-limited surveys from 12 pre-defined ‘Component Survey Areas’. Species totals for each Component Survey Area ranged from 70 to 165. In total, 361 taxa were recorded.

The combined total for Survey Areas 1 and 2 was 418 species, of which 36 are, or have been, regarded as nationally and/or county rare, scarce and/or threatened according to published sources. Again, however, this figure is higher than the true number of rare/scarce/threatened species.

32.4ha of Survey Area 1 falls within the Priority Habitat of Lowland Dry Acid Grassland. Composed solely of mostly species-rich U1b and U1d, this Priority Habitat is of ‘high botanical nature conservation value’ and eligible for selection as a Site of Special Scientific Interest (SSSI). Whilst the Priority Habitats of Lowland Mixed Deciduous Woodland, Wet Woodland, Hedgerows and Lowland Meadows are also present within Survey Area 1, none are automatically eligible for SSSI selection.

Given the importance of the Lowland Dry Acid Grassland, the reported presence of at least 1% of the UKs Nightingale population and past records of Endangered and Vulnerable invertebrates, it is highly recommended that priority be given to consultation with Natural England regarding the possible future designation of Middlewick Ranges as an SSSI and the implications that this may have for all interested parties.

In the interim, management is required to maintain the nature conservation interest of extant grassland, larger stands of scrub and areas of bare ground, the quality of which will otherwise deteriorate rapidly.

CONTENTS

1 INTRODUCTION

1.1 Background

Giles Groome, Consultant Ecologist was commissioned by Colchester City Council (CCC) to undertake botanical surveys of approximately 213ha of land referred to collectively as the Middlewick Ranges (the 'Survey Site' or simply 'Site')[1]. The commission follows the allocation of c.84ha of this land within CCC's Emerging Local Plan (2017-2033) for housing development and the production of an 'Ecological Evidence Base Report' (Stantec 2020), which has since been described as "fundamentally and fatally flawed" (Essex Field Club and Colchester Natural History Society 2024).

Surveys were broken down into two parts (Map 1). 'Survey Area 1' (centre site grid reference TM009227) covers the 83.6ha of the allocation land and was subject to both National Vegetation Classification (NVC) mapping and species recording conducted across the 2024 survey season (April-September[2]). Given the considerable criticism of the way that grassland in particular was assessed by Stantec (2020), quadrat sampling of all grassland communities >0.5ha in area was conducted to provide quantitative data gathered using a replicable methodology.

'Survey Area 2' (centre site grid reference TM012223) covers the entire Survey Site and was only the subject of vascular plant recording during time-limited walkover surveys conducted in the first week of June from pre-defined 'Component Survey Areas' (Edwards 2024). Whilst the results provide a record of what is likely to be the majority of species present within these areas, the primary aim of surveys was to provide plant records that will be used in later analyses of invertebrate data (Dodd *et al* in prep.).

1.1.1 Geology and Soils

The Survey Site overlies a bedrock of mostly silty clays and clays with some silts, sands, gravels and calcareous mudstones of the Thames Group (British Geological Survey 2024). Across most of the Site these are overlain by superficial deposits, comprising mostly sands and gravels, of the Kesgrave Catchment Subgroup of the Dunwich Group. Far south-western parts of Survey Area 2 are overlain by fine- to very fine-grained aeolian Coversands. Most central-southern stands within the valley of the Birch Brook support no overlying superficial deposits other than a very narrow band of valley bottom Intertidal Deposits (British Geological Survey 2024).

Soils across the Survey Site are bulk classified as gleyic argillic brown earths of the Wix association, which ranges from freely drained sandy soils to slowly permeable loamy clays (Soil Survey of England and Wales 1983). Central areas within the valley of the Birch Brook, however, presumably support unmapped pelo-stagnogleys similar to those of the Windsor association, albeit with a stream valley bottom that includes redeposited gravels.

Bullet traps within the stop butts appear from survey to be dressed with gravel-free sand imported from beyond the Survey Site; although the earthworks themselves are undoubtedly composed of redeposited substrates surface stripped from south of the butts and, more locally, from range floors and trenches associated with target galleries to the north (see LiDAR imagery presented in Figure 12, Wessex Archaeology 2020). The majority of firing butts appear to have no such contiguous borrow pits and may have been created using substrates surface stripped from the same locations as the stop butts and/or from other depressions evident on LiDAR imagery (Wessex Archaeology 2020).

1.1.2 Landuse

Historical and archaeological evidence suggests that the Survey Site was managed as arable and/or pasture for many centuries prior to military acquisition with archaeological spot finds dating back to as early as the Neolithic period (Wessex Archaeology 2020). Excavations to the west of the Site have revealed the remains of Iron Age field systems, some of which were later modified during the Roman occupation (Wessex Archaeology 2020), and some cropmarks within southern parts of the Survey Site possibly date back to as early as the Bronze Age (WA Heritage 2008). However, most former fields, the ridge-and-furrow patterning of

[1] The Survey Site includes much, but not all, of the MOD owned Middlewick Ranges as well as some land that lies beyond it.
[2] It had been hoped to begin recording in March but the GIS data required for surveys was not available until mid-April.

a number of which can be seen on aerial photographs to this day[3], are likely of a post-Medieval origin (Wessex Archaeology 2020). The Redoubt situated in the far south-west of Survey Area 1 is thought to date from the Siege of Colchester in 1648 (Wessex Archaeology 2020).

Following Government acquisition of most of the Site, beginning as early as 1855/6 with the purchase of Middlewick Farm, most of Survey Area 1 was, until 2021, used as a military firing range (Wessex Archaeology 2020). Originally there were just one or two ranges, as depicted on the 1st edition OS map in 1881. However, this increased to six by the end of the 1890's (Wessex Archaeology 2020)[4]. All are shown on the 1924 OS map, three of which supported firing butts extending 600 yards, one 800 yards, and two 1000 yards. However, by the time of the 1958 map one of the 600 yard ranges had been reduced to 500 yards and one of the 1000 yard ranges to 800 yards[5]. The 1967 OS map (available at https://maps.nls.uk/, accessed 30th September 2024) showed a near identical picture, except that the most westerly range now extended only 700 yards, not 800.

Land remained in agricultural use, presumably being managed for hay and/or pasture, beyond the ranges until sometime between 1881 and 1924 when most of the Survey Site south of Birch Brook was depicted as a 'Manoeuvre Ground' (Wessex Archaeology 2020)[6]. However, this usage does not appear to have lasted long with the 1958 OS map depicting southern fields as once again agricultural[7]. The 1967 OS map shows the most south-westerly field as a 'Sports Ground' (https://maps.nls.uk/, accessed 30th September 2024). This was presumably more regularly mown than other fields at this time; which most likely reverted to being hay cut and/or livestock grazed.

Beyond MOD owned land toward the far south-east of Survey Area 2, north of the Birch Brook, three formerly depicted agricultural fields within eastern parts of Survey Component Areas 9, 10 and 11 (Map 10) were shown as supporting mineral workings on the 1958 and 1967 OS maps.

Various structures were built in and around the Survey Site during the Second World War. Of particular relevance to this study were the construction of two pill boxes, both of which remain extant and were mapped during fieldwork, and an anti-tank ditch that extended west-east across central-northern parts of Survey Area 1 and was up to 20 feet wide and 10 feet deep, but back-filled following WWII (Wessex Archaeology 2020).

The 1839 Tithe map shows no woodland anywhere within Middlewick Ranges (WA Heritage 2008); although, not being MOD owned, far eastern parts are excluded from the WA Heritage reproduction. However, it is within this part of the Site that the only woodland shown on the 1881 OS map is present: labelled 'Birch Grove' and lying within eastern parts of Survey Component Area 10 of Survey Area 2 (Map 10). A number of enclosed land parcels are present westward from here; some of which are depicted as rough grassland. By the time of the 1958 OS map almost all these supported woodland (https://maps.nls.uk/, accessed 30th September 2024), suggesting that they developed as such following abandonment rather than as plantation.

The only woodland depicted to the west of Survey Area 1 on the 1958 OS map lay between Birch Brook and the Redoubt. A little scrub is shown to the north of Birch Brook. However, by the time of the 1967 OS map most western stands had become wooded. Only two stands of woodland that remain extant were depicted within non-boundary parts of Survey Area 1 at this time: a very small stand in what is now W10c woodland to the north-west (Map 4) and the block of W10a woodland in the centre-north of Map 5. A small clump of trees was shown in an area to the north of mapped MG10a (Map 5) but this now supports grassland[8].

[3] Almost all Google Earth imagery captured between 2000-2022 shows ridge-and-furrow patterning, often within clearly defined field boundaries, across central parts of Survey Area 1.
[4] Wessex Archaeology (2020) state there were five ranges but there were in fact six; two parallel ranges sharing a single stop butt.
[5] A 7th range in the form of a small rectangular revolver range (Wessex Archaeology 2020) was shown on the 1958 OS map in the region of the stand of mapped W23a within what is otherwise now woodland to the west of Survey Area 1 (Map 7). It was not depicted again on later maps. LiDAR imagery suggests an 8th range was once present to the south-east of Survey Area 1 where stands are now dominated by W23a to the west of mapped W22a (Map 6). This has not been depicted on any maps available for review.
[6] Gravel pits were depicted on OS maps in an area that is now woodland to the south-east of the Redoubt between 1897 and 1938 (the 1958 map depicts them as disused).
[7] The field between Survey Area 1 and Birch Brook is, however, labelled 'Manoeuvre Ground' on the 1958 map whereas it was not on the 1924 map.
[8] This could be an OS mapping error and it may be the case that the clump of trees depicted away from the boundary was actually on the boundary and formed part of the stand of W10a that is present today.

Google Earth imagery (accessed 30th September 2024) shows that in 2000 there was little woodland to the north of Survey Area 1 between the fenced range and mown meadow south of Abbot's Road, other than the block of present-day W10c (Map 4); although numerous, mostly scattered juvenile trees were present in grassland that was evidently no longer being mown. W10d woodland has thus largely developed here over the past 20-25 years as a result of the abandonment of mowing. There is no evidence of it being planted. Elsewhere there has been little change in woodland extent other than by way of canopy closure; most clearly seen to the west of Survey Area 1.

W23a scrub in the same northern part of Survey Area 1 as that described in the previous paragraph has also largely developed here over the past 20-25 years; although there are signs that parts were already extant in 2000, albeit in juvenile form. A similar picture appears elsewhere within Survey Area 1 with most extant scrub appearing to be already present in juvenile form in 2000. However, almost all of these areas were evidently the subject of scrub management with various clearances taking place between 2000 and 2005, 2005 and 2006, 2009 and 2012, and 2014 and 2017; but not obviously since.

Grassland across most of Survey Area 1 has probably been mown since agricultural management ended following Government acquisition[9]. Between 2000 and 2006, prior to the installation of the extant range fence, aerial imagery suggests that much of the grassland across the Survey Area may have been regularly mown, presumably with arisings left in-situ, despite the two most easterly ranges, along with the 1000 yard range, apparently having been abandoned prior to 2000. However, in 2009, despite the fence still not having been installed, only the area that is now fenced appears to have been regularly mown; although grassland within a central strip between active ranges, as well as to the north and north east of the present-day fence, was not cut at the time of image capture[10]. Between 2012 (the first image showing the range fence as it appears today) and 2021 grassland beyond the fence appears to have been annually hay cut. Within the fence all or almost all grassland appears to have continued to have been regularly mown, again presumably with arisings left in-situ, up until 2020[11]. Following closure of the ranges, only part of the fenced area appears to have been mown in 2021. Survey evidence suggests none has been cut since. Beyond it, most was hay cut in July 2024.

Whilst most of the fields across the Survey Site beyond Survey Area 1 appear to have changed little since 2000, all apparently being annually (perhaps occasionally biennially) hay/silage cut, there are three notable exceptions: 1) the western part of the westernmost field included within Survey Component Area 8 (Map 10) was all open grassland in 2000 but has gradually ceded to scrub, albeit with relict coarse grassland, since apparent abandonment between 2018 and 2020; 2) Survey Component Area 9 (Map 10) was largely open grassland in 2000[12] but, following no obvious sward management since, has become heavily scrubbed over[13]; 3) South-eastern parts of Component Survey Area 10 (Map 10) were similarly open grassland in 2000 but have since all scrubbed over; although some of the juvenile trees/shrubs here have evidently been planted. Survey evidence suggests that eastern parts of the two most easterly fields within Survey Component Area 8 (Map 10), both of which lie outside MOD ownership, were, prior to June 2024 survey, not hay cut for at least 2-3 years.

There appears to have been little woodland management across the Survey Site in recent years other than what appears to have been woodland understorey cleaning to the south-west of Component Survey Area 6, east-south-east of the Redoubt. Other understorey cleaning may have taken place within western stands of W10c to the west of Survey Area 1 but the only obvious management here relates to maintenance cutting either side of the range fence.

[9] A local resident questioned during fieldwork could not recollect livestock ever being grazed at Middlewick Ranges during the 50 years she had lived in the area.
[10] The date given for the 2009 image is 1/1/09. However, it was quite clearly captured during summer.
[11] In 2017 the entire fenced range was said to be mown on a three-weekly basis between May and October with arisings left in-situ (Stantec 2020).
[12] Most of Component Survey Area 9 appears to overlie the arisings of the excavated lake (presumably the flooded remains of former mineral workings that were excavated at some point between 1967 and 2000) to the north of the Survey Component Area; although materials from elsewhere may also have been deposited here.
[13] The car park in the north-western corner of this area was created (apparently from bare ground) between 2000 and 2005.

1.2 Study Objectives

Survey Area 1

- To map homogenous stands of vegetation across the Survey Area using the NVC as set out by Rodwell (1991 *et seq*).
- To record representative 2x2m quadrats from all grassland communities exceeding 0.5ha in area.
- To map the locations of rare/scarce/threatened species, as defined by Essex Field Club (2002, updated 2009) and/or JNCC (2023).
- To compile a vascular plant species list with frequency/abundance defined using the DAFOR scale.
- To provide NVC maps and brief descriptions of the communities mapped.
- To provide an evaluation of the nature conservation value of habitats, communities and species.

Survey Area 2

- To compile vascular plant species lists for each of the 12 component survey areas defined by Edwards (2024) during time-limited walkover surveys.

1.3 Personnel

All surveys, data digitisation and reporting were conducted by Dr Giles Groome CEcol CEnv MCIEEM; an independent consultant ecologist with over 30 years' experience of professional ecological survey, assessment and management.

1.4 Report Presentation

Throughout this report all species are referred to by their scientific names following the nomenclature of Stace (2019), BBS (2021) and BLS (2019). NVC nomenclature, some of which dates back over 30 years, has been changed accordingly (Appendix I). The species list in Appendix IV provides an effective checklist with both Latin taxon and common English names. Bryophytes and lichens, which were not surveyed in full, are rarely referred to by common English names (most lichen species do not have them) and are excluded.

In line with SSSI selection criteria, the term "species-rich grassland" refers to grasslands that support 15 or more species per $4m^2$ (Jefferson *et al* 2019). For the purpose of this report the term "species-poor" refers to grasslands that support 8 or fewer species per $4m^2$ and "moderately species-rich grassland" to those that support between 9 and 14 species. "Very species-rich grassland" is used to refer to grasslands that support 25 or more species per $4m^2$; "extremely species-rich" to those that support 40 or more; and "exceptionally species-rich" 55 or more.

1.5 Electronic Data

The following data have been supplied in electronic format:

- Report (PDF format)
- Stand-alone species lists for Survey Areas 1 and 2 (MSExcel workbook)
- Stand-alone report maps (Maps 1-11) (JPEG format)
- Quadrat photographs (JPEG format)
- GIS map data (MapInfo v7.5 .tab format and .shp files)

2 METHODOLOGY

2.1 Fieldwork

Survey Area 1 was surveyed during the course of fieldwork undertaken on 17th, 19th and 29th April; 3rd, 20th, 21st and 23rd May; 3rd June; 2nd, 3rd, 24th and 31st July; 14th August; and 11th September 2024. Survey Area 2 was surveyed on consecutive days between 10th and 14th June 2024.

2.1.1 Survey Area 1: NVC Mapping

Following the guidelines given by Rodwell (2006) for experienced surveyors, homogenous stands of vegetation, as defined by the National Vegetation Classification (NVC) set out by Rodwell (1991 *et seq*), were identified in the field during walkover surveys and boundaries drawn on to an aerial photograph (captured April 2022) overlain by OS Mastermap data at a scale of 1:2000. Where vegetation was plainly heterogeneous and/or where it did not fit within the framework of existing NVC classifications a transition/mosaic of communities or non-referable classification was mapped.

2.1.2 Survey Area 1: Quadrat Recording

The locations of between 5 and 10 quadrats, depending on the extent of each community, were selected from across mapped U1b, U1d, MG1a, MG6a and MG6b (Section 3.2.1) following NVC digitisation (Section 2.2.2). Location selection was undertaken on a broadly stratified random basis to ensure as wide a geographic coverage as possible and avoid surveyor bias. For the two most extensive classifications, U1d and MG6b, half of quadrat locations were chosen to sample vegetation within the fenced range and half outside. For U1b half of quadrat locations were chosen to sample pioneer vegetation and half established grassland.

At each pre-determined location a 2x2m quadrat was set out using tapes fixed by corner pegs. In taller swards pea sticks were inserted close to corners so that the quadrat would be visible in photographs. It was then photographed from its southern side and grid reference recorded using a hand-held Garmin Etrex GPS. Angle of slope was recorded using a gun clinometer and aspect by compass bearing. Vegetation height was measured using a 30cm wide, 200g drop disk with dowel.

All species of vascular plant, bryophyte and macro-lichen were identified from within each quadrat and cover assessed using the Domin scale (*sensu* Dahl & Hadač 1941)[14]:

Percentage cover	Domin value
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

The floristic tables given in Section 3.2.1 combine the data recorded to a given frequency (or constancy) value:

Percentage frequency	Frequency (Constancy)
>80	V
60-80	IV
40-60	III
20-40	II
<20	I

The table variable ‘Species per Quadrat’ is a count of the total number of species within each quadrat. The figure under the column heading ‘Frequency’ is the mean number of species per quadrat.

[14] Where necessary samples, especially of lichens, were collected for microscopic and/or chemical examination.

2.1.3 Survey Area 1: Species Recording

Species recording was undertaken during both walkover surveys and quadrat recording. Where ever possible species were recorded to specific or, where relevant (and possible), sub-specific or variant level. However, no attempt was made to record micro-species of the aggregate taxa *Rubus fruticosus* or *Taraxacum*.

Species frequency/abundance was defined using the DAFOR scale:

D	Dominant
A	Abundant
F	Frequent
O	Occasional
R	Rare
(L	Locally)

Bryophytes and lichens were only recorded where they may have been important in NVC determination and during quadrat recording.

The locations of nationally and/or county rare, scarce and/or threatened species, as defined by Essex Field Club (2002, updated 2009), and/or Stewart *et al* (1994), Cheffings & Farrell (2005) and Stroh *et al* (2014), as updated (JNCC 2023), were marked on to the aerial photograph used during fieldwork for later digitisation. Whilst *Erophila glabrescens* is not included amongst these taxa it too was mapped.

2.1.4 Survey Area 2: Species Recording

The boundaries of the 12 Component Survey Areas comprising Survey Area 2 (Map 10, Table 1) were drawn up in QGIS by Edwards Ecological and Data Services and imported into MapInfo GIS where they were overlain onto aerial photographs (captured April 2022) and OS Mastermap data and printed at a scale of 1:2750.

Table 1 – Component Survey Areas of Survey Area 2

	Component Survey Area	Approximate Area (ha)	Survey Duration (hrs)
1	Enclosed Grassland (North)	28.5	6
2	Butts (North)	14.4	4
3	Wet Woodland (North)	9.1	4
4	Woodland Edge and Hedgerows (North)	15.0	4
5	Public Grassland (North)	14.0	4
6	Wet Woodland (Centre)	13.0	4
7	Woodland Edge and Hedgerows (Centre)	14.1	4
8	Grassland (Centre)*	10.9	4
9	Special (South)	2.6	2
10	Wet Woodland (South)	7.7	4
11	Woodland Edge and Hedgerows (South)	31.2	6
12	Grassland (South)	51.4	6

Each Component Survey Area was surveyed over the course of 2-6 hours depending on size and anticipated vegetation complexity. Survey duration was fixed prior to fieldwork.

Less attention to sub-species recording was made during fieldwork than during surveys of Survey Area 1 to ensure that as many species as possible were recorded in the time available. Again no attempt was made to record micro-species of the aggregate taxa *Rubus fruticosus* or *Taraxacum*. Non-flowering *Centaurea debeauxii*/*nigra* and *Galeopsis bifid*/*tetrahit* could not be separated. In one Component Survey Area, juvenile *Rosa canina* agg. could not be determined to species level. Due to the speed that recording was undertaken, no attempt was made to record species frequency/abundance.

2.2 Data Input and Analysis

2.2.1 Survey Area 1: Data Input

All species and quadrat data were entered into Excel spreadsheets following survey and double-checked for accuracy.

2.2.2 Survey Area 1: GIS Mapping

The boundaries of NVC classifications mapped on to the aerial photograph in the field were redrawn in MapInfo v7.5 GIS as polygons, and the locations of rare/scarce/threatened species and quadrats as point data.

2.2.3 Survey Area 1: MATCH Analysis

The results of quadrat recording were compiled in the form of floristic tables and analysed (against all community-types, not just grasslands) using the computer program MATCH (Malloch 1999).

2.2.4 Survey Area 2: Data Input

All species data were entered into an Excel spreadsheet following survey and double-checked for accuracy.

The total number of taxa and rare/scarce/threatened species for each Component Survey Area were calculated using the COUNTA function in Excel.

2.3 Constraints and Limitations

2.3.1 Access Limitations

Most scrub and woodland across the Survey Site has seen little by way of recent management and access to parts can be very limited. This is particularly true in parts of Survey Area 2 which were only surveyed in mid-June when vegetation would have been close to being at its densest. By contrast, all woodland and scrub in Survey Area 1 was surveyed in April and May. Nevertheless, some of the largest expanses of W23a, which can be all but impenetrable at any time of year, likely include small stands of vegetation other than W23a.

2.3.2 Species Recording Limitations

Whilst every effort was made to record all vascular plant species present, it is inevitable that some species, especially those with an exceptionally limited distribution and/or those confined to areas with restricted access, will have been overlooked. However, the likelihood of missing a species will have been considerably reduced within Survey Area 1 by undertaking fieldwork over the course of multiple visits between April and September[15]. Across Survey Area 2, only those taxa extant at the time of mid-June recording will have been recorded. Any strictly vernal species will have been missed.

2.3.3 Vegetation not Referable to the NVC

As with most site surveys, some stands of vegetation do not fit within the framework of the NVC. For these, transitional and/or mosaic or non-referable classifications have been mapped, for example, ‘Bare Ground’ and ‘Pea Shingle’. Creating unique classifications can impose constraints on how they are best assessed, e.g. as BAP/s.41 Priority Habitats, and how future changes in composition are measured.

[15] Nevertheless, some species, albeit mostly non-native taxa such as *Crocus tommasinianus* and *Eranthis hyemalis*, will have already disappeared by the time recording began in mid-April.

3 RESULTS

3.1 Survey Area 1: Summary of NVC Mapping

27 NVC communities, including five non-referable classifications, were mapped across Survey Area 1 during fieldwork. Map 2 provides an overview of the broad habitats within which classifications were mapped. Maps 3-8 show the distribution of the classifications themselves. A summary is given in Table 2.

Table 2 – Summary of mapped NVC communities and non-referable classifications

Classification	Area (ha)	No. Stands	Classification	Area (ha)	No. Stands
'Bare Ground'	0.57	10	U1d	20.19	42
'Building'	0.13	8	W6b	0.40	1
'Concrete Hardstanding'	0.01	1	W10a	0.69	4
MG1a	1.99	35	W10c	8.37	8
MG1b	0.18	4	W10d	7.39	29
MG1e	0.02	2	W21a	0.44	17
MG6a	0.88	21	W22a	0.43	7
MG6b	18.94	45	W23a	7.54	23
MG7b	0.28	7	W23b	1.32	23
MG10a	0.01	1	W24a	0.42	20
OV24a	0.06	2	W24b	0.02	2
'Pea Shingle'	0.13	12	W25a	0.28	4
'Surfaced Track'	0.56	1	W25b	0.19	1
U1b	12.16	20	TOTAL	83.60	350

3.2 Survey Area 1: Community Descriptions

The following sections are broken down by broad habitat-type as per Map 2. Map 3 provides an overview of the communities mapped. Maps 4-8 provide greater detail.

3.2.1 Grassland

Nine grassland classifications were mapped during fieldwork (Maps 4-8). Map 3 shows the locations of recorded quadrats.

MG1a (*Arrhenatherum elatius* grassland, *Festuca rubra* sub-community)

MG1a is scattered across Survey Area 1, almost exclusively from within stands that are no longer mown and which have been the subject of past soil disturbance. It is thus most commonly associated with long disused firing butts, formerly disturbed abandoned range floors and ditches. Swards, most of which are markedly coarse, range from very species-poor to species-rich but are typically only moderately species-rich (Figure 1).

Arrhenatherum elatius is the most common graminoid of mapped MG1a, more-or-less always supporting in excess of 10% cover, usually >50% and not uncommonly >90%. In deed the only stand not dominated by it is the long disused firing butt to the north-west of the Survey Area (NW of Quadrat U1d-6, Map 3), which is instead dominated by *Schedonorus arundinaceus*[16]. *Agrostis capillaris, Holcus lanatus* and *Dactylis glomerata* are present in +/-all mapped stands; each being locally cover abundant. *Festuca rubra* ssp. *rubra* and *Poa trivialis* are also quite common and both locally abundant. *Holcus mollis* is much more localised with *Lolium perenne* confined to swards that are visitor trampled. Other graminoids include mostly very infrequent *Poa pratensis, Anthoxanthum odoratum, Carex muricata* ssp. *pairae* and *Agrostis stolonifera*.

[16] *Schedonorus arundinaceus* dominated grasslands that fall within an unpublished variant of MG1a are widespread but not common across South East England (pers. obs.).

Figure 1 – Moderately species-rich MG1a (Quadrat MG1a-3) on long-disused, unmown firing butt

Most MG1a is forb-poor, supporting scattered *Rumex acetosa* ssp. *acetosa, Jacobaea vulgaris, Achillea millefolium* and *Plantago lanceolata*. *Chamaenerion angustifolium* is abundant (becoming locally dominant by September) in the stand to the south-west of Quadrat MG6a-4 (Map 3). In the richest stands of the community (where Quadrat MG1a-2 was recorded), *Hypericum perforatum* and *Clinopodium nepeta* are locally very common[17]. Other, mostly very sparsely scattered, associates include *Silene latifolia* ssp. *alba, Cirsium vulgare, Vicia sativa* ssp. *segetalis, Stellaria graminea, Conium maculatum, Malva sylvestris* and *Anthriscus sylvestris*. *Centaurea nigra* is present in small quantity to the south of mapped MG1e. By contrast to MG1a nationally, *Heracleum sphondylium* ssp. *sphondylium* and *Cirsium arvense* rare.

The little surveyed bryoflora is mostly composed of competitive, shade tolerant taxa, notably *Kindbergia praelonga* and *Brachythecium rutabulum*, with patchy *Pseudoscleropodium purum*. Macro-lichens are absent.

Given its history of management neglect, MG1a supports scattered woody species, most commonly *Rubus fruticosus* agg. and seedling/sapling *Quercus robur*, and in places the community is likely to rapidly cede to W24b (and thence W24a). Other encroachment woody species include juvenile *Crataegus monogyna, Cytisus scoparius* and, on the margins of scrub, suckering *Ulmus procera* and *Prunus spinosa*.

Given its coarse, locally rank, nature, MG1a likely supports relatively high numbers of small mammals and vole activity was observed in all but one quadrat during recording. Ant hills were present in four of the five quadrats.

Based on the five quadrats recorded during fieldwork, a floristic table for mapped MG1a within Survey Area 1 is given below.

[17] *Clinopodium nepeta* is almost wholly restricted to MG1a within Survey Area 1.

MG1a Quadrats	1	2	3	4	5	Frequency
Date	02/07/2024	02/07/2024	02/07/2024	02/07/2024	02/07/2024	
Grid Ref (GPS)	TM 00816 23216	TM 00484 23063	TM 01251 22990	TM 0368 22653	TM 01556 22601	
GPS Error (+/-m)	3	3	3	3	4	
Slope (°)	+/-flat	+/-flat	+/-flat	+/-flat	+/-flat	
Aspect (°)	n/a	n/a	n/a	n/a	n/a	
Sward Height (cm)	42	118	88	112	60	
Arrhenatherum elatius	10	8	8	10	8	V
Holcus lanatus		3	8	1	4	IV
Agrostis capillaris	2	4	3		7	IV
Dactylis glomerata		4	2		4	III
Rumex acetosa ssp. *acetosa*	1	2	1			III
Kindbergia praelonga	4	3	1			III
Festuca rubra ssp. *rubra*		2	4			II
Jacobaea vulgaris		1	4			II
Brachythecium rutabulum	4	2				II
Holcus mollis		3				I
Poa trivialis			2			I
Achillea millefolium			3			I
Cirsium vulgare		4				I
Clinopodium nepeta		6				I
Convolvulus arvensis		1				I
Galium aparine					3	I
Hypericum perforatum		6				I
Plantago lanceolata		2				I
Silene latifolia ssp. alba		4				I
Stellaria graminea					4	I
Vicia sativa ssp. *segetalis*		3				I
Quercus robur seedling/sapling		1				I
Rubus fruticosus agg.		1				I
Bryum capillare		2				II
Lophocolea semiteres		3				I
Species Per Quadrat	5	21	10	2	6	8.8

Running the floristic table through the key for mesotrophic grasslands given by Rodwell (1992b), it is evident that sampled swards, which support “frequent and often abundant *Arrhenatherum elatius*, *Dactylis glomerata* and *Holcus lanatus*”, fall within MG1a, supporting none of the characteristic species of MG1b-e.

MATCH analysis (Appendix V) supports this classification, giving the highest match co-efficient for all samples combined to MG1a even though no single sample scores highest for it.

MG1b (*Arrhenatherum elatius* grassland, *Urtica dioica* sub-community)

Similar to MG1a, but considerably less common at Middlewick Ranges, MG1b is largely confined to areas that have experienced past disturbance (the two largest stands overlie former firing butts). Only one stand was mown in 2024. Swards are for the most part species-poor.

Mapped stands are, *Urtica dioica* ssp. *dioica* aside, near universally dominated by *Arrhenatherum elatius* with *Dactylis glomerata, Holcus lanatus* and very locally abundant *Elymus repens*. *Agrostis capillaris, Poa trivialis* and *Festuca rubra* ssp. *rubra* are mostly uncommon. *Lolium perenne* is again restricted to trampled paths. All other graminoids, including a little *Alopecurus pratensis, Carex muricata* ssp. *pairae* and *Agrostis stolonifera*, are rare.

All MG1b stands support at least locally abundant *Urtica dioica* ssp. *dioica* with locally common *Cirsium arvense* and very locally abundant *Cirsium vulgare*. *Silene latifolia* ssp. *alba, Artemisa vulgaris, Malva sylvestris* and *Jacobaea vulgaris* are occasional with mostly sparse *Anthriscus sylvestris, Galium aparine, Heracleum sphondylium* ssp. *sphondylium, Plantago lanceolata, Achillea millefolium* and *Taraxacum* agg.

The ground layer was barely surveyed during fieldwork but appears to be markedly poor with only *Kindbergia praelonga* and *Brachythecium rutabulum* seen during surveys.

As with MG1a, a little encroachment *Rubus fruticosus* agg. and seedling/sapling *Quercus robur* are present; mostly on the margins of scrub and woodland.

MG1e (*Arrhenatherum elatius* grassland, *Centaurea nigra* agg. sub-community)

The two mapped stands of mapped MG1e are situated to the south-east of Survey Area 1 in an area abutting what appears to have once been a range but which was never depicted as such on the historical maps available for review (footnote 5, page 7). They lie just beyond the area of present-day mowing but were presumably cut in the not too distant past.

The apparently (sampling is required to be certain) species-rich stands, separated by a trampled path mapped as MG7b, are dominated by *Arrhenatherum elatius* with *Festuca rubra* ssp. *rubra, Anthoxanthum odoratum* and *Agrostis capillaris*. *Holcus lanatus* and *Dactylis glomerata* are occasional, all other graminoids are rare.

Amongst the forbs *Centaurea nigra, Achillea millefolium* and *Plantago lanceolata* are abundant with *Rumex acetosa* ssp. *acetosa* and *Hypericum perforatum*. *Ranunculus bulbosus* is occasional with, amongst others, a little *Vicia sativa* ssp. *segetalis, Trifolium pratense, Lotus corniculatus* and *Cerastium fontanum* ssp. *vulgare*.

No attempt to record ground layer bryophytes was made during fieldwork. Macro-lichens are absent.

Juvenile *Prunus spinosa* and *Rubus fruticosus* agg. are scattered, and doubtlessly increasing, on the margins of the eastern stand with sparse *Cytisus scoparius* to the west.

MG6a (*Lolium perenne-Cynosurus cristatus* grassland, typical sub-community)

MG6a is restricted to areas of past and/or on-going disturbance, particularly along and besides paths and tracks. Open field stands, such as that within which Quadrat MG6a-2 (Map 3) was recorded, may be indicative of former scrub/trees. Swards, c.75% by area of which are now unmown, are for the most part species-poor (Figure 2).

Swards are largely dominated, either singly or in combination, by *Holcus lanatus, Agrostis capillaris, Festuca rubra* ssp. *rubra* and, much more locally, *Holcus mollis*. *Phleum bertolonii, Dactylis glomerata, Bromus hordeaceus* ssp. *hordeaceus, Phleum pratense, Elymus repens, Poa trivialis* and, on the margins of MG1a, *Arrhenatherum elatius* (always at <10% cover) are locally common. *Lolium perenne* is again restricted to trampled paths. All other graminoids, including *Alopecurus pratensis, Juncus inflexus* and *Poa pratensis*, are rare or extremely local.

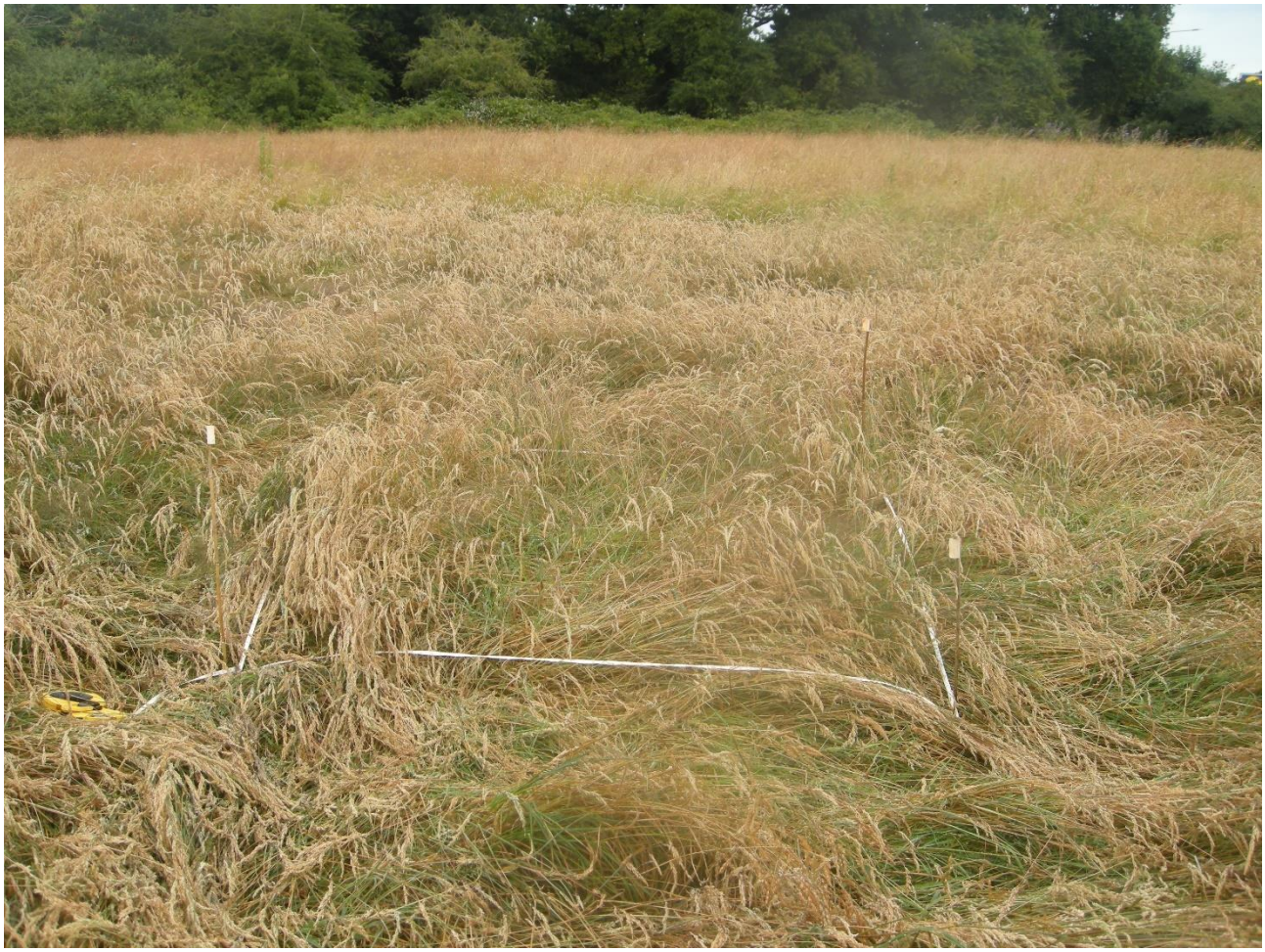
Most MG6a is forb-poor supporting scattered *Plantago lanceolata, Rumex acetosa* ssp. *acetosa, Taraxacum* agg., *Hypochaeris radicata, Achillea millefolium, Trifolium dubium, Stellaria graminea* and *Trifolium repens*. Patches of locally dense *Cirsium arvense* are present in the stand to the west of the easternmost pill box with a little *Urtica dioica* ssp. *dioica* and *Epilobium hirsutum*. All other species are very infrequent.

The ground layer of MG6a was not surveyed other than during quadrat sampling when only a very small quantity of *Kindbergia praelonga* was recorded within one quadrat.

By contrast to MG1 grassland, there is very little woody species encroachment.

Based on the five quadrats recorded during fieldwork, a floristic table for mapped MG6a within Survey Area 1 is given below.

Figure 2 – Species-poor MG6a (Quadrat MG6a-2) in past-disturbed hay cut grassland surrounded by MG6b



MG6a Quadrats	**1**	**2**	**3**	**4**	**5**	**Frequency**
Date	02/07/2024	02/07/2024	02/07/2024	02/07/2024	02/07/2024	
Grid Ref (GPS)	TM 00524 23005	TM 00893 23161	TM 01319 23129	TM 01327 22937	TM 01402 22650	
GPS Error (+/-m)	3	3	3	3	3	
Slope (°)	+/-flat	+/-flat	+/-flat	2	2	
Aspect (°)	n/a	n/a	n/a	352	87	
Sward Height (cm)	89	54	40	51	52	
Agrostis capillaris	9	4	4	2	8	V
Holcus lanatus	3	9		2	7	IV
Festuca rubra ssp. *rubra*	1	5	10			III
Phleum bertolonii	6		2			II
Arrhenatherum elatius				4	4	II
Dactylis glomerata	4		4			II
Poa trivialis			2	1		II
Hypochaeris radicata	1		1			II
Plantago lanceolata	1		2			II
Rumex acetosa ssp. *acetosa*		1	2			II
Taraxacum agg.	2		1			II
Holcus mollis				10		I
Alopecurus pratensis				3		I
Elymus repens				1		I
Lolium perenne	3					I
Achillea millefolium			4			I
Rumex obtusifolius	1					I

MG6a Quadrats	1	2	3	4	5	Frequency
Date	02/07/2024	02/07/2024	02/07/2024	02/07/2024	02/07/2024	
Grid Ref (GPS)	TM 00524 23005	TM 00893 23161	TM 01319 23129	TM 01327 22937	TM 01402 22650	
GPS Error (+/-m)	3	3	3	3	3	
Slope (°)	+/-flat	+/-flat	+/-flat	2	2	
Aspect (°)	n/a	n/a	n/a	352	87	
Sward Height (cm)	89	54	40	51	52	
Stellaria graminea				1		I
Trifolium dubium			2			I
Trifolium repens			1			I
Kindbergia praelonga			1			I
Species Per Quadrat	10	4	13	8	3	7.6

Running the floristic table through the key for mesotrophic grasslands given by Rodwell (1992b), sampled swards, which are neither species-rich nor dominated by broad-leaved grasses (*Holcus lanatus* aside) or rushes, lie somewhere between MG6 and MG7. However, as both require abundant *Lolium perenne*, the key is of little further use; although tends to suggest MG7 since *Cynosurus cristatus* is also absent.

In an update to the original classifications given by Rodwell (1992b), JNCC (2011) have highlighted that many mesotrophic grasslands that would otherwise fall within MG6 support little or no *Lolium perenne*. Whilst they suggested that most of these fall within an as yet undefined *Festuca rubra-Holcus lanatus-Anthoxanthum odoratum* community, in practice most have been placed within MG6b, or where *Anthoxanthum odoratum*, *Trisetum flavescens* and other species indicative of MG6b or MG6c are missing, MG6a (see for example Groome 2014).

MATCH analysis (Appendix VI) awards the highest match co-efficient to MG7e and the second highest to MG6a. However, the former is associated with sown grasslands (although the community can occur in heavily trampled unimproved grassland, pers. obs.) and always requires abundant *Lolium perenne*. For this reason, MG6a is regarded as the correct classification in accordance with JNCC (2011).

MG6b (*Lolium perenne-Cynosurus cristatus* grassland, *Anthoxanthum odoratum* sub-community)

MG6b is the most common community across Survey Area 1 other than U1d, from which it can be extremely difficult to separate. Indeed much MG6b appears to be derived from U1d and if swards were grazed would likely widely revert to it. Stands range from species-poor to species-rich but as a whole fall within the category of moderately species-rich (Figures 3 and 4). Approximately 60% is annually hay cut, the remainder has not been cut since 2020/21.

The community is near universally dominated by *Festuca rubra* ssp. *rubra* with *Agrostis capillaris, Luzula campestris* and *Holcus lanatus*. *Anthoxanthum odoratum* is constant in hay meadow mown stands but very localised within what are now uncut stands within the fenced range where swards are often superficially similar to MG6a. *Dactylis glomerata* and *Holcus mollis* are scattered and locally very common. *Lolium perenne* and *Poa annua* are confined to trampled paths where some patches of turf (far too small to map separately) can be close to OV21b or OV21c. *Arrhenatherum elatius* is mostly absent other than in close proximity to mapped MG1; although it appears to be increasing across the most south-easterly part of Survey Area 1 (in the region of Quadrat MG6b-10, Map 3). Besides sparsely scattered *Poa pratensis, Deschampsia cespitosa* ssp. *cespitosa* and *Carex muricata* ssp. *pairae*, all other graminoids are very infrequent. In common with most, but far from all, ungrazed MG6b in South East England, *Cynosurus cristatus* is rare.

Figure 3 – Moderately species-rich MG6b (Quadrat MG6b-3) within unmown fenced range

The most common forbs of MG6b are, especially in hay cut stands where both are more-or-less constant, *Ranunculus bulbosus* and *Rumex acetosa* ssp. *acetosa*, with *Hypochaeris radicata, Achillea millefolium* (including widespread *A.millefolium* spp. *sudetica*) and *Plantago lanceolata*. *Rumex acetosella* ssp. *pyrenaicus* is scattered throughout most mapped stands, albeit in usually very small quantity, with *Jacobaea vulgaris, Crepis capillaris* and *Lotus corniculatus*. Other, mostly sparsely scattered and/or very localised species, include *Crepis vesicaria* ssp. *taraxacifolia*, *Knautia arvensis, Silene latifolia* ssp. *alba, Stellaria graminea, Convolvulus arvensis, Linaria vulgaris, Pilosella officinarum, Trifolium dubium, Taraxacum* agg., *Vicia sativa* ssp. *segetalis, Trifolium repens* and *Veronica chamaedrys*. The only *Hypericum* x *desetangsii* recorded anywhere during fieldwork was from within MG6b to the centre-north of Survey Area 1 (Map 5).

The ground layer of MG6b is dominated, especially in hay cut stands, by *Pseudoscleropodium purum* with *Rhytidiadelphus squarrosus* and scattered *Kindbergia praelonga*. The moss *Brachythecium albicans*, which is most commonly associated with U1 grassland, is also scattered with *Brachythecium rutabulum*.

Woody species are largely absent from MG6b; although seedling/sapling/post-cut regeneration *Quercus robur* is locally frequent with developing 1.5-3.5m trees common in a stretch of unmown grassland to the north-west (the near linear stretch of MG6b within otherwise dominant U1d to the south-west of Quadrat U1d-7, Map 3). *Pteridium aquilinum* is very locally frequent on the margins of MG6b to the south-east (west of Quadrat MG6b-10, Map 3)

Based on the ten quadrats recorded during fieldwork, a floristic table for mapped MG6b within Survey Area 1 is given below.

Figure 4 – Species-rich MG6b (Quadrat MG6b-7) within hay cut grassland to the centre-north of Survey Area 1

MG6b Quadrats	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Frequency**
Date	21/05/2024	21/05/2024	21/05/2024	21/05/2024	23/05/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024	
Grid Ref (GPS)	TM 00604 22995	TM 00802 22958	TM 00969 22940	TM 01043 22713	TM 00719 22473	TM 00580 23345	TM 00977 23167	TM 01301 23042	TM 01330 22751	TM 01491 22690	
GPS Error (+/-m)	3	3	4	4	4	4	4	4	4	3	
Slope (°)	2	+/-flat	3	2	+/-flat	+/-flat	+/-flat	3	+/-flat	+/-flat	
Aspect (°)	206	n/a	94	87	n/a	n/a	n/a	141	n/a	n/a	
Sward Height (cm)	43	31	38	40	37	27	22	34	23	46	
Festuca rubra ssp. *rubra*	10	10	9	10	9	9	8	9	9	9	V
Agrostis capillaris	4	4	5	3	5	4	4	4	3	4	V
Luzula campestris	3	4	1	3		3	2	3	2		IV
Holcus lanatus	4		4			2	4	3	3	6	IV
Ranunculus bulbosus	4		4			3	4	2	3	1	IV
Rumex acetosa ssp. *acetosa*	4	2				3	4	3	3	3	IV
Pseudoscleropodium purum		3			2	7	5	3	3		III
Anthoxanthum odoratum						4	5	1	1	2	III
Achillea millefolium	4		1			4	3				II
Hypochaeris radicata	1					1		1	2		II
Plantago lanceolata	2						3		1	1	II
Rumex acetosella ssp. *pyrenaicus*		1		1	1				1		II
Rhytidiadelphus squarrosus		3	1	3			2				II
Dactylis glomerata						1		1	1		II
Jacobaea vulgaris	1					1	3				II
Brachythecium albicans				2			1	2			II
Poa pratensis	1		3								I
Crepis capillaris							1		4		I
Lotus pedunculatus	1								1		I
Kindbergia praelonga	3		1								I
Arrhenatherum elatius										4	I
Carex muricata ssp. *pairae*									4		I
Holcus mollis					4						I
Vulpia bromoides			1								I
Convolvulus arvensis										3	I
Linaria vulgaris										3	I
Pilosella officinarum									4		I
Stellaria graminea										3	I
Taraxacum agg.							1				I
Trifolium dubium							1				I
Veronica chamaedrys							1				I
Vicia sativa ssp. *segetalis*							1				I
Fraxinus excelsior seedling/sapling							1				I
Brachythecium rutabulum							1				I
Bryum rubens								1			I

MG6b Quadrats	1	2	3	4	5	6	7	8	9	10	Frequency
Date	21/05/2024	21/05/2024	21/05/2024	21/05/2024	23/05/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024	
Grid Ref (GPS)	TM 00604 22995	TM 00802 22958	TM 00969 22940	TM 01043 22713	TM 00719 22473	TM 00580 23345	TM 00977 23167	TM 01301 23042	TM 01330 22751	TM 01491 22690	
GPS Error (+/-m)	3	3	4	4	4	4	4	4	4	3	
Slope (°)	2	+/-flat	3	2	+/-flat	+/-flat	+/-flat	3	+/-flat	+/-flat	
Aspect (°)	206	n/a	94	87	n/a	n/a	n/a	141	n/a	n/a	
Sward Height (cm)	43	31	38	40	37	27	22	34	23	46	
Bryum sp. (lacking capsules)								1			I
Pohlia melanodon								1			I
Species Per Quadrat	12	6	9	5	4	11	19	13	15	10	10.4

As with MG6a, running the floristic table through the key for mesotrophic grasslands given by Rodwell (1992b) suggests that sampled swards lie somewhere between MG6 and MG7. However, as discussed above, they distinctly fall within the *Festuca rubra-Holcus lanatus-Anthoxanthum odoratum* community discussed by JNCC (2011) and can therefore be readily placed within a form of MG6b in which the *Ranunculus bulbosus* of Middlewick Ranges more-or-less replaces the *Ranunculus acris* of published accounts.

MATCH analysis (Appendix VII) broadly supports this classification, despite awarding the highest match co-efficient to the scrub community of W23b.

MG7b (*Lolium perenne* leys and related grasslands, *Lolium perenne-Poa trivialis* leys)

MG7b within Survey Area 1 is confined to heavily trampled grassland, mostly within hay cut grassland close to access pinch points. There is no evidence that swards have been agriculturally improved as is usually the case with MG7 grasslands and stands are in some respects closer to open vegetation classifications such as OV18b, OV21c and OV23c.

Universally species-poor swards are dominated by *Lolium perenne* with more-or-less constant *Poa trivialis* and variably abundant *Holcus lanatus, Dactylis glomerata, Bromus hordeaceus* ssp. *hordeaceus* and *Poa annua*.

Unlike the OV communities noted above, stands include only sparsely scattered or very localised *Plantago major* ssp. *major, Polygonum aviculare, Matricaria discoidea* ssp. *discoidea* and *Trifolium repens*; forb composition being more closely associated with the MG6 grassland through which the path sections included here usually run. Hence the most common species are typically *Plantago lanceolata, Achillea millefolium, Rumex acetosa* ssp. *acetosa* and *Ranunculus bulbosus* with occasional *Malva sylvestris* and locally frequent *Armoracia rusticana*.

No attempt was made to record ground layer bryophytes; although they appear to be largely absent. Woody species are similarly largely absent. Macro-lichens are wholly absent.

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

The single stand of mapped MG10a lies within and adjacent to a seasonally wet ditch[18] that may have once formed part of the WWII anti-tank ditch that is known to have been excavated here (Section 1.1.2); although it appears to have been relatively recently cleaned. Unmown swards are species-poor.

Central parts of the mapped stand are dominated by *Holcus lanatus* and *Juncus effusus* (almost all var. *subglomeratus*) with occasional *Poa trivialis*. Marginal to these wetter swards *Holcus mollis* is the dominant graminoid with *Alopecurus pratensis* and a little *Arrhenatherum elatius*. *Deschampsia cespitosa* ssp. *cespitosa* and *Juncus articulatus* are rare.

Ranunculus repens and *Rumex acetosa* ssp. *acetosa* are the most common forbs with locally abundant *Cirsium arvense*, scattered *Stellaria graminea* and sparse *Epilobium hirsutum*.

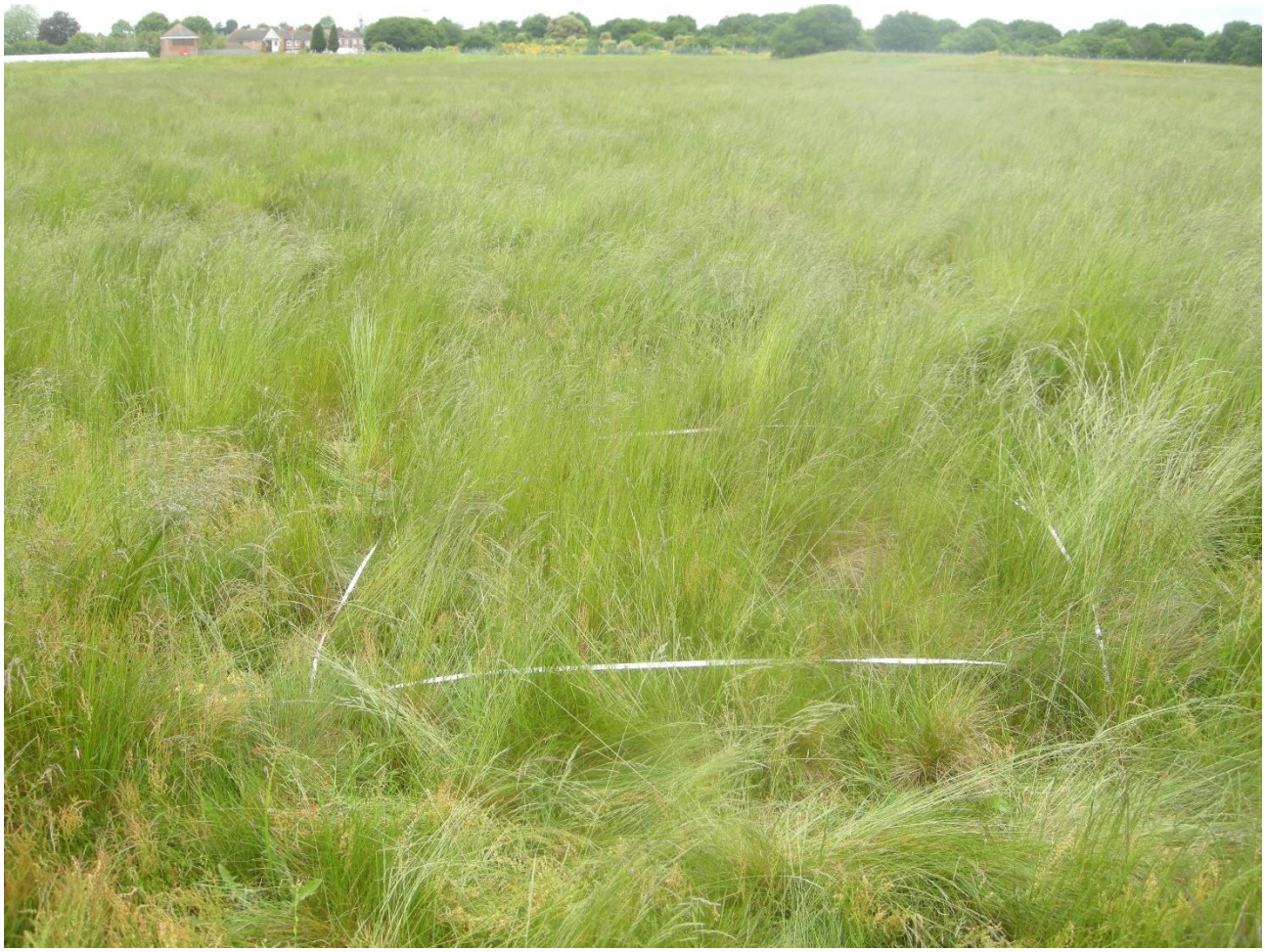
No attempt was made to record ground layer bryophytes. Woody species are largely confined to a little encroachment juvenile *Ulmus procera*. Macro-lichens are wholly absent.

U1b (*Festuca ovina* agg.*-Agrostis capillaris-Rumex acetosella* grassland, typical sub-community)

U1b is largely, but not exclusively, confined to areas that were soil stripped at the end of the 19th Century and first half of the 20th Century during the creation of range butts and lowering of range floors (Section 1.1.2). Until recently all stands were regularly mown with arisings left in-situ, but do not appear to have been cut since 2020/21. They can be divided into two broad sward-types: those that are mostly tussocky, closed and only moderately species-rich (Figure 5) and those that are mostly open, support frequent cryptogams and are species-rich to very species-rich (Figure 6). In general all can be described as atypical of U1b nationally in that *Festuca rubra* and not *Festuca ovina* agg. is the dominant fescue.

[18] The ditch remained wet throughout the extremely wet summer of 2024.

Figure 5 – Moderately species-rich U1b (Quadrat U1b-4) within unmown fenced range



Stands of the first sward-type dominate north-western parts of the mapped classification where soil stripping appears to have been less extensive, if indeed it occurred at all (see LiDAR imagery presented in Figure 12, Wessex Archaeology 2020). *Festuca rubra* ssp. *rubra* dominates almost all these stands with patchy *Holcus mollis* and more-or-less constant low-cover *Agrostis capillaris*; although the latter can be very locally dominant and in places swards are dominated by litter and bare ground. Most other graminoids, including *Luzula campestris* which is more-or-less ubiquitous in MG6b and U1d, are rare. The only common forbs are constant *Rumex acetosella* ssp. *pyrenaicus*, and scattered *Achillea millefolium* and *Hypochaeris radicata*; although occasional patches of *Pilosella officinarum* and *Plantago lanceolata* are also present. The ground layer is somewhat patchy supporting broadly constant *Hypnum lacunosum* and/or *H.jutlandicum* with scattered *Dicranum scoparium, Pseudoscleropodium purum, Rhytidiadelphus squarrosus* and *Brachythecium albicans*. Lichens are generally absent as is woody species encroachment. A return of cutting would likely see a number of these stands revert to U1d.

The second sward-type is largely confined to areas that were past soil stripped. Some of these stands are also dominated by *Festuca rubra* ssp. *rubra* but here *Festuca rubra* ssp. *commutata* is also present with sparse *Festuca filiformis, Festuca ovina* ssp. *hirtula* and *Festuca ovina* ssp. *ovina*. However, on the whole *Agrostis capillaris* is the most common graminoid with *Vulpia bromoides* and *Aira praecox*. *Nardus stricta* is very locally common but otherwise largely absent. Scattered, sometimes locally frequent, species include *Bromus hordeaceus* ssp. *hordeaceus, Holcus mollis, Polypogon monspeliensis* and *Poa annua*. *Danthonia decumbens* and *Agrostis vinealis* are rare.

Figure 6 – Species-rich pioneer U1b (Quadrat U1b-6) to the south of the stop butts

Rumex acetosella ssp. *pyrenaicus* is the most common forb found, often in considerable abundance, across the open swards that dominate here. *Hypochaeris radicata, Pilosella officinarum* and *Achillea millefolium* are frequent in more grassy stands with *Plantago lanceolata* and *Jacobaea vulgaris*. However, it is the most open swards, commonly very close in composition to U1c[19], that are the richest, supporting frequent and/or locally abundant *Plantago coronopus, Cerastium semidecandrum, Veronica arvensis, Trifolium arvense, Ornithopus perpusillus* and *Taraxacum* agg. In the most open pioneer vegetation species such as *Myosotis ramosissima, Filago germanica, Spergularia rubra, Erophila verna, Geranium pusillum, Cerastium glomeratum, Aphanes australis, Erodium cicutarium, Arenaria serpyllifolia* ssp. *serpyllifolia* (*A.leptoclados* is also present) and *Trifolium striatum* can be common. Other forbs recorded from such very open U1b (bordering on U1c[20]) include *Logfia minima, Erophila glabrescens, Leontodon saxatilis, Lepidium campestre* and *Myosotis discolor*.

The ground layer of these more open stands of U1b is characterised by the high frequency of acrocarpous mosses and, more significantly, lichens. In more grassy swards, cover is typically low and pleurocarpous mosses, notably *Hypnum lacunosum* and *Pseudoscleropodium purum*, often dominate; although *Dicranum scoparium* and *Brachythecium albicans* are frequent. Elsewhere *Polytrichum juniperinum* and, more locally, *Polytrichum piliferum* are common and, in the most open pioneer swards, one or the other (occasionally both together) can be very abundant; even dominant. Less widespread but also locally abundant are *Syntrichia ruraliformis* and, on the margins of artificial substrates, *Didymodon fallax*. *Ceratodon purpureus* is scattered but rarely abundant.

Based largely on quadrat recording, the most common macro-lichens of U1b are *Cladonia furcata* ssp. *furcata, C.fimbriata, C.ramulosa* and *Peltigera didactyla* with *Cladonia cervicornis, C.chlorophaea* and *C.floerkeana*. Other species include *Cladonia diversa, C.glauca, C.macilenta, C.subulata, Cetraria aculeata* and *Peltigera membranacea*.

[19] Small patches of turf, too small to map separately, are closest to U1c.
[20] Ibid.

Woody species are scattered across the more open stands of U1b but most common south of the former range stop butts. Juvenile *Ulex europaeus* is far and away the most frequent species and in places it can be difficult to separate U1b supporting a high cover of young *Ulex* from very recently established W23b; although such stands are rare. Seedling/sapling *Betula* spp. (probably all *B.pendula*) and *Quercus robur* are occasional with mostly sparse *Rubus fruticosus* agg. and juvenile *Cytisus scoparius*. One of only two very small patches of *Calluna vulgaris* recorded anywhere during fieldwork is present close to Quadrat U1b-1 (Map 3).

From casual observation, open pioneer U1b swards appear to support more solitary hymenopteran burrows than any other NVC classification, perhaps with the exception of 'Bare Ground', within Survey Area 1. Such areas also appear to support the greatest opportunity for early-season flower-feeding invertebrates.

Based on the eight quadrats recorded during fieldwork, a floristic table for mapped U1b within Survey Area 1 is given below.

Running the floristic table through the key to calcifugous grasslands and montane communities, taking into account that *Festuca rubra* largely replaces *Festuca ovina* agg. at Middlewick Ranges, given by Rodwell (1992b) places sampled swards squarely within U1. Sub-community classification is a little less straightforward as swards include both spring ephemerals (U1c) and more-or-less constant *Hypochaeris radicata* (U1f). However, U1c preferentials are not constant and all U1f preferentials other than *Hypochaeris* (and *Festuca rubra*) are wholly absent. This then leads to the classification of U1b.

MATCH analysis (Appendix VIII) supports this classification, awarding U1b the highest match co-efficient, although this is only a little higher than that of U1c.

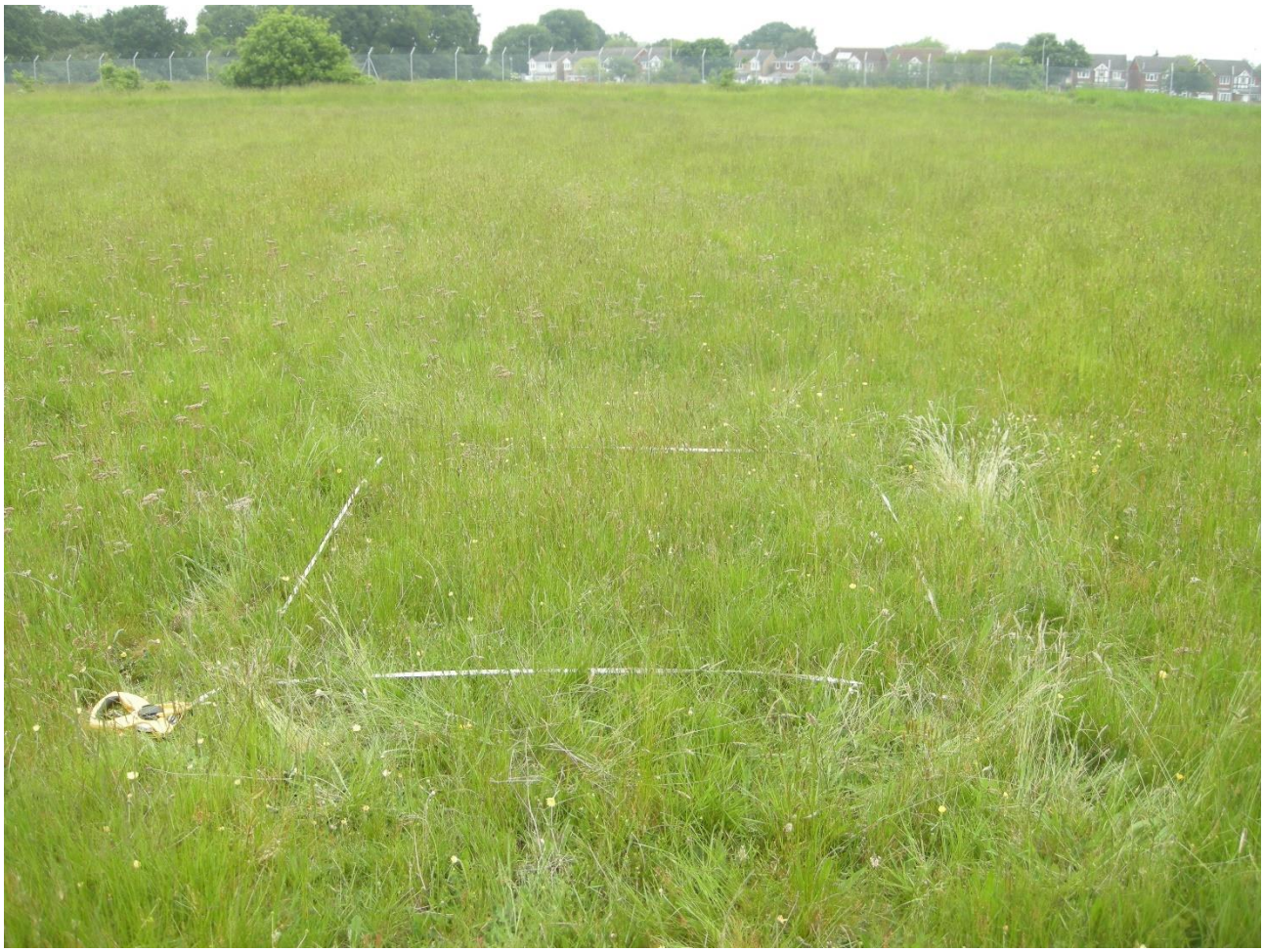
U1b Quadrats	1	2	3	4	5	6	7	8	Frequency
Date	21/05/2024	21/05/2024	21/05/2024	23/05/2024	23/05/2024	05/06/2024	05/06/2024	05/06/2024	
Grid Ref (GPS)	TM 01088 22614	TM 01104 22571	TM 00780 22422	TM 00720 22748	TM 00853 22594	TM 01168 22522	TM 01051 22464	TM 00848 22376	
GPS Error (+/-m)	3	3	3	3	4	3	4	4	
Slope (°)	4	+/-flat	2	+/-flat	17	+/-flat	4	3	
Aspect (°)	23	n/a	118	n/a	4	n/a	89	34	
Sward Height (cm)	7	2	14	43	27	4	1	11	
Agrostis capillaris	4	2	4	2	5	5	4	5	V
Rumex acetosella ssp. *pyrenaicus*	3	3	3	5	5	3	3	3	V
Hypochaeris radicata	3	2	3	1	1	2		2	V
Festuca rubra ssp. *rubra*	6	2	4	9	4				IV
Hypnum lacunosum	1		9	5	5	3			IV
Brachythecium albicans		2	1	3	3	3			IV
Aira praecox	2					3	3	3	III
Pilosella officinarum	4	3	1		4				III
Polytrichum juniperinum	5		3			7		4	III
Vulpia bromoides		2	4			3			II
Achillea millefolium		3	2			1			II
Dicranum scoparium	8			2	4				II
Polytrichum piliferum						2	8	8	II
Cladonia fimbriata	3					2		1	II
Cladonia furcata ssp. *furcata*	1		1		3				II
Cladonia ramulosa	3				2			2	II
Peltigera didactyla	2					3		1	II
Festuca ovina ssp. *ovina*	1					1			II
Cerastium semidecandrum		3					1		II
Jacobaea vulgaris			1		3				II
Ornithopus perpusillus	3		3						II
Plantago coronopus		3	4						II
Plantago lanceolata		1	4						II
Spergularia rubra						2	2		II
Veronica arvensis		2				1			II
Betula spp. seedling/sapling						1		1	II
Ulex europaeus seedling/sapling							1	5	II
Ceratodon purpureus						3	3		II
Pseudoscleropodium purum	3			2					II
Syntrichia ruraliformis		8	2						II
Cladonia cervicornis						3	3		II
Cladonia chlorophaea						2		2	II
Cladonia floerkeana	1							1	II
Bromus hordeaceus ssp. *hordeaceus*		3							I
Festuca filiformis	1								I

U1b Quadrats	1	2	3	4	5	6	7	8	Frequency
Date	21/05/2024	21/05/2024	21/05/2024	23/05/2024	23/05/2024	05/06/2024	05/06/2024	05/06/2024	
Grid Ref (GPS)	TM 01088 22614	TM 01104 22571	TM 00780 22422	TM 00720 22748	TM 00853 22594	TM 01168 22522	TM 01051 22464	TM 00848 22376	
GPS Error (+/-m)	3	3	3	3	4	3	4	4	
Slope (°)	4	+/-flat	2	+/-flat	17	+/-flat	4	3	
Aspect (°)	23	n/a	118	n/a	4	n/a	89	34	
Sward Height (cm)	7	2	14	43	27	4	1	11	
Holcus mollis					7				I
Juncus tenuis		1							I
Lolium perenne		1							I
Nardus stricta	2								I
Arenaria serpyllifolia ssp. serpyllifolia		1							I
Cerastium glomeratum		1							I
Epilobium brachycarpum		1							I
Erigeron canadensis		3							I
Erodium cicutarium		4							I
Erophila verna		3							I
Geranium molle		1							I
Geranium rotundifolium		1							I
Medicago lupulina		2							I
Taraxacum agg.		2							I
Trifolium arvense		5							I
Trifolium micranthum			1						I
Trifolium striatum			1						I
Viola arvensis		1							I
Bryum sp. (lacking capsules)						2			I
Campylopus introflexus	3								I
Didymodon fallax		7							I
Didymodon insulanus		1							I
Hypnum jutlandicum	3								I
Kindbergia praelonga					3				I
Lophocolea semiteres					3				I
Rhytidiadelphus squarrosus				3					I
Cetraria aculeata	1								
Cladonia diversa								3	I
Cladonia glauca								1	I
Cladonia macilenta						1			I
Cladonia subulata								1	I
Peltigera membranacea						1			I
Species Per Quadrat	22	30	18	9	14	22	9	16	17.5

U1d (*Festuca ovina* agg.-*Agrostis capillaris-Rumex acetosella* grassland, *Anthoxanthum odoratum-Lotus corniculatus* sub-community)

Covering close to a quarter of the area that was NVC-mapped during fieldwork, U1d is the most common community across Survey Area 1. Approximately 55% was until 2020/21 mown regularly with arisings left in-situ; the remainder continues to be mown annually with arisings removed. Unlike U1b, almost none appears to have been the subject of past soil stripping. Swards range from species-poor to very species-rich but in general fall within the category of species-rich (Figures 7 and 8). As with U1b, the U1d at Middlewick Ranges can be regarded as atypical of the community nationally in that *Festuca rubra* and not *Festuca ovina* agg. is the dominant fescue.

Figure 7 – Species-rich U1d (Quadrat U1d-2) within unmown fenced range



U1d is dominated, often overwhelmingly, by *Festuca rubra* ssp. *rubra* with constant relatively low cover *Agrostis capillaris* and near-constant *Luzula campestris*. *Anthoxanthum odoratum* and *Vulpia bromoides* are frequent with scattered but, by contrast to MG6b, usually very low cover *Holcus lanatus*. *Holcus mollis* is very locally abundant but typically absent. *Avenella flexuosus* is very locally abundant north of Quadrat MG6b-5 (Map 3) in swards that are close in composition to U2a but otherwise wholly absent. Other graminoids include scattered *Poa pratensis*, and mostly very infrequent *Agrostis stolonifera, Festuca ovina* ssp. *ovina, Dactylis glomerata, Carex muricata* ssp. *pairae, Aira praecox, Festuca rubra* ssp. *commutata, Poa humilis* and, usually close to mapped MG1 or on firing butts, *Arrhenatherum elatius*[21]. *Lolium perenne* is confined to trampled paths, although these usually support MG6a/b (too small/narrow to map separately).

[21] Most firing butts within the fenced range support U1d, much of which is ceding to MG1a; although *Arrhenatherum elatius* cover is currently always <10%. Quadrat U1d-4 was recorded from one such butt.

Figure 8 – Moderately species-rich U1d (Quadrat U1d-7) within hay cut grassland to the north-west of Survey Area 1

Rumex acetosella ssp. *pyrenaicus* and *Hypochaeris radicata* are the most common forbs with *Ranunculus bulbosus* and *Achillea millefolium* (including patchy *A.millefolium* spp. *sudetica*). *Plantago lanceolata, Pilosella officinarum* and *Vicia sativa* ssp. *segetalis* are frequent and locally abundant. Scattered associates include *Trifolium dubium, Jacobaea vulgaris, Crepis capillaris* and, by contrast to MG6b where it is near-constant, *Rumex acetosa* ssp. *acetosa*. Mostly infrequent, but each locally common, taxa include *Centaurea nigra, Lotus corniculatus, Ornithopus perpusillus, Trifolium pratense* and *Linaria vulgaris*. *Galium saxatile* is very locally common in the stands approaching U2a but otherwise absent. Other forbs include *Trifolium micranthum, Knautia arvensis, Plantago coronopus, Cerastium fontanum* ssp. *vulgare, Geranium molle, Hieracium sabaudum, Taraxacum* agg., *Veronica arvensis, Ervilla hirsuta* and, on the margins of the 'Surfaced Track' (Section 3.2.6) *Cerastium semidecandrum* and the only *Stellaria pallida* recorded anywhere during fieldwork.

The ground layer of U1d is for the most part dominated by *Pseudoscleropodium purum* with scattered *Brachythecium albicans* and, in now unmown grassland within the fenced range, *Kindbergia praelonga*. A number of other bryophytes are scattered across the community but the acrocarpous mosses of U1b are largely absent. Similarly there are almost no macro-lichens. The fungus *Clavaria fragilis* was recorded in Quadrat U1d-9 but no other waxcaps were seen anywhere during the course of fieldwork.

Woody species seedlings, saplings and post-cut regeneration are scattered across U1d. As with other grassland communities, *Quercus robur* and *Ulex europaeus* are the most common species; the latter especially within stands that have not been recently mown and where there has been past soil stripping (notably within the region of Quadrat U1d-10, Map 3, which was formerly a range floor). Juvenile *Cytisus scoparius* is very locally common but typically absent.

Based on the ten quadrats recorded during fieldwork, a floristic table for mapped U1d within Survey Area 1 is given below.

U1d Quadrats	1	2	3	4	5	6	7	8	9	10	Frequency
Date	21/05/2024	21/05/2024	21/05/2024	23/05/2024	23/05/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024	
Grid Ref (GPS)	TM 00573 22954	TM 00921 23041	TM 01058 22888	TM 00683 22679	TM 01015 22666	TM 00502 23173	TM 0068 23320	TM 01102 23103	TM 01338 23864	TM 01294 22651	
GPS Error (+/-m)	4	3	3	3	3	3	4	5	4	4	
Slope (°)	3	1	3	17	2	+/-flat	+/-flat	+/-flat	4	+/-flat	
Aspect (°)	233	164	105	157	63	n/a	n/a	n/a	345	n/a	
Sward Height (cm)	19	14	25	39	12	15	18	23	19	20	
Festuca rubra ssp. *rubra*	9	5	10	5	6	8	8	9	8	5	V
Agrostis capillaris	4	4	4	8	8	4	4	3	3	4	V
Hypochaeris radicata	5	5		1	5	2	4	4	4	4	V
Rumex acetosella ssp. *pyrenaicus*	3	3	2	4	5	4	1	5		4	V
Luzula campestris	4		4	2	3	3	2		3	2	IV
Pseudoscleropodium purum		4	3		3	8	5	4	4	3	IV
Achillea millefolium	3	4		6			4	3	3	3	IV
Ranunculus bulbosus	4	3		2			3	3	2	3	IV
Vicia sativa ssp. *segetalis*		2		2	1		3		3	1	III
Anthoxanthum odoratum		5				3	5		3	5	III
Vulpia bromoides		4	1	3	1					3	III
Pilosella officinarum	2	4		4					5	5	III
Plantago lanceolata	4	4		2			3			5	III
Holcus lanatus						2	2	2	2		II
Trifolium dubium		4		3					2	1	II
Brachythecium albicans		2			3	4		3			II
Kindbergia praelonga	1	1	1	4							II
Poa pratensis	3	3							1		II
Rumex acetosa ssp. *acetosa*							2	1	2		II
Festuca ovina ssp. *ovina*					4					1	I
Jacobaea vulgaris		2		1							I
Ornithopus perpusillus					3					1	I
Veronica arvensis				1						1	I
Quercus robur seedling/sapling								1		1	I
Hypnum lacunosum					1					1	I
Lophocolea semiteres				4						4	I
Rhytidiadelphus squarrosus	1		2								I
Aira praecox					3						I
Dactylis glomerata				1							I
Bellis perennis		2									I
Centaurea nigra									1		I
Cerastium glomeratum				1							I
Crepis capillaris									1		I
Ervilla hirsuta									1		I
Linaria vulgaris								3			I

U1d Quadrats	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Frequency**
Date	21/05/2024	21/05/2024	21/05/2024	23/05/2024	23/05/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024	
Grid Ref (GPS)	TM 00573 22954	TM 00921 23041	TM 01058 22888	TM 00683 22679	TM 01015 22666	TM 00502 23173	TM 0068 23320	TM 01102 23103	TM 01338 23864	TM 01294 22651	
GPS Error (+/-m)	4	3	3	3	3	3	4	5	4	4	
Slope (°)	3	1	3	17	2	+/-flat	+/-flat	+/-flat	4	+/-flat	
Aspect (°)	233	164	105	157	63	n/a	n/a	n/a	345	n/a	
Sward Height (cm)	19	14	25	39	12	15	18	23	19	20	
Lotus corniculatus	1										I
Lotus pedunculatus	3										I
Plantago coronopus										2	I
Taraxacum agg.									1		I
Trifolium campestre		1									I
Trifolium pratense									4		I
Trifolium repens		1									I
Ulex europaeus seedling/sapling										1	I
Brachythecium rutabulum									1		I
Ceratodon purpureus								2			I
Hypnum jutlandicum									1		I
Plagiomnium affine				1							I
Pleuridium acuminatum										2	I
Polytrichum juniperinum										1	I
Syntrichia ruraliformis								2			I
Cetraria aculeata										1	I
Species Per Quadrat	14	20	8	19	13	9	13	14	21	25	15.6

Running the floristic table through the key to calcifugous grasslands and montane communities, taking into account that *Festuca rubra* largely replaces *Festuca ovina* agg. at Middlewick Ranges, given by Rodwell (1992b) again places sampled swards squarely within U1. However, unlike U1b, sub-community classification is relatively straightforward given that all listed preferentials for U1d, other than *Galium verum*, are present.

MATCH analysis (Appendix IX) supports this classification, awarding U1d the highest match co-efficient, albeit only a little higher than U1b. Were *Galium verum* present (which it is in one of the fields within Survey Area 2) and *Lotus corniculatus* more frequent, it would doubtlessly score U1d considerably higher.

3.2.2 Scrub

Eight scrub classifications were mapped during fieldwork (Maps 4-8).

W21a (*Crataegus monogyna-Hedera helix* scrub*, Hedera helix-Urtica dioica* sub-community)

W21a is, bar two stands of scrub on the margins of woodland, confined to boundary hedgerows. Most hedges were presumably originally planted. The other two stands comprise natural regeneration scrub over former grassland. Typical of the community nationally, stands are for the most part species-poor.

Stands are variably dominated by *Ulmus procera* (especially along the western Survey Area boundary), *Crataegus monogyna* (the northern boundary), *Prunus spinosa* (the south-eastern boundary and the two stands to the west of Quadrat MG6a-2, Map 3) or a mixture of one or more of these (although one is usually wholly dominant). *Quercus robur*, in the form of over-hanging mature trees (to the north of the western pill box) and juvenile regeneration (in the far eastern corner of Survey Area 1), is locally common. All other species, including *Ilex aquifolium, Malus domestica, Fraxinus excelsior, Sambucus nigra* and *Acer pseudoplatanus*, are uncommon.

All stands support a field layer that includes at least locally dominant *Hedera helix* ssp. *helix*. *Galium aparine* is frequent with locally common *Rubus fruticosus* agg., *Stellaria holostea, Anthriscus sylvestris* and *Geranium robertianum*. Most margins include abundant grasses, especially *Holcus lanatus*, *Arrhenatherum elatius* and, more locally, *Poa trivialis*. All other species, including *Urtica dioica* ssp. *dioica, Arum maculatum, Ficaria verna, Cirsium vulgare, Silene latifolia* ssp. *alba, Alliaria petiolata, Hyacinthoides* x *massartiana* and *Veronica chamaedrys*, are infrequent and/or extremely local. *Geranium sanguineum* and *Arum italicum* ssp. *italicum* are present on the northern boundary, both probably having been originally garden-dumped.

No attempt was made to record ground layer bryophytes. Terricolous macro-lichens are absent.

W22a (*Prunus spinosa-Rubus fruticosus* scrub, *Hedera helix-Silene dioica* sub-community)

With the exception of two outlying stands to the centre-north and centre-south-west, W22a is confined to blackthorn dominated scrub to the south-east of Survey Area 1. As with W21a, stands are for the most part characteristically species-poor.

All stands of W22a are dominated by, usually dense, often impenetrable, *Prunus spinosa* with frequent and locally abundant climbing *Rubus fruticosus* agg. Mature *Quercus robur* trees run along a former field boundary bank within the centre of the largest stand[22], which was presumably once a hedge with trees and from which scrub has spread outwards. *Ilex aquifolium* is occasional here. *Cytisus scoparius* is locally common in stands to the south and south-west. *Ulex europaeus* is very infrequent.

Given the dense canopy of *Prunus*, the field layer is largely inaccessible but, as is typical of W22a where access can be gained, mostly very species-poor, supporting patchy shade tolerant *Hedera helix* ssp. *helix* and little else. However, stand margins commonly support *Rubus fruticosus* agg. and *Galium aparine* with locally common *Pteridium aquilinum, Urtica dioica* ssp. *dioica, Holcus lanatus* and/or *Holcus mollis*. Other species include sparse *Arum maculatum, Anthriscus sylvestris, Stellaria holostea, Poa trivialis* and *Arrhenatherum elatius*.

Little attempt was made to record ground layer bryophytes; although *Kindbergia praelonga* was noted to be at least locally common. Terricolous macro-lichens are absent.

[22] A boundary was shown here on the 1839 Tithe map.

Nightingale was heard singing from the largest mapped stand of W22a during April fieldwork and the dense scrub present here provides potentially valuable nesting and foraging habitat for a number of other bird species.

W23a (*Ulex europaeus-Rubus fruticosus* scrub, *Anthoxanthum odoratum* sub-community)

Over 70% of the scrub mapped across Survey Area 1 falls within W23a. Almost without exception stands have developed in areas of past soil disturbance associated with former range groundworks. Prior to c.2017 most southern areas appear to have been managed by periodic cutting (Section 1.1.2). However, there is little or no evidence of any management since this time. A small area to the south of the stop butts was burnt, either as a result of arson or unintentional wildfire, between 24th and 31st July 2024. Other small patches of W23a have evidently been burnt in the past. Typical of W23a that is not livestock grazed, most vegetation is species- or very species-poor; although the stands at Middlewick are considerably more diverse in terms of woody species than is normally the case.

Ulex europaeus is readily the most common species of W23a and dominates large expanses of the community, commonly in the form of a more-or-less continuous thicket interspersed with trees or small groups of trees rising above the canopy of scrub. However, *Cytisus scoparius* is also very common and in places comprises the overwhelming dominant; very locally in the absence of *Ulex*. In the largest stands, parts of which could not be accessed and which may therefore contain patches of vegetation other than W23a, juvenile *Quercus robur* (rarely mature trees), *Crataegus monogyna* and *Prunus spinosa* can be very common with patches of dense *Rubus fruticosus* agg. *Betula pendula* is scattered and very locally abundant, with occasional *Malus domestica, Sambucus nigra, Salix caprea* ssp. *caprea, Acer pseudoplatanus, Ilex aquifolium* and *Quercus ilex*. *Corylus avellana, Taxus baccata, Sorbus aria, Prunus domestica* and *Sorbus aucuparia* appear to be rare.

Amongst the densest stands, W23a supports little or no field or ground later vegetation. However, more open patches, mostly on margins, usually support abundant grasses, typically *Holcus lanatus, Agrostis capillaris, Festuca rubra* ssp. *rubra, Holcus mollis, Dactylis glomerata* and/or *Arrhenatherum elatius* (*Anthoxanthum odoratum* is mostly very infrequent) with scattered *Rubus fruticosus* agg. and sparse *Rubus idaeus*. *Pteridium aquilinum* is very locally common but usually absent. Other species include very local *Hedera helix* ssp. *helix*, and scattered *Galium aparine, Achillea millefolium, Taraxacum* agg. and *Digitalis purpurea*. *Teucrium scorodonia* is rare.

The ground layer was not surveyed but upon casual observation appears to be very poor. Terricolous macro-lichens are largely if not wholly absent.

Numerous Nightingales were heard singing from within mapped W23a to the south of the fenced range during April and May fieldwork. At least one Nightingale was also heard singing within W23a to the north of the fenced range (east of Quadrat MG1a-2, Map 3).

W23b (*Ulex europaeus-Rubus fruticosus* scrub, *Rumex acetosella* sub-community)

W23b is confined to southern and central-southern parts of Survey Area 1, again almost exclusively where there has been past soil stripping; rarely re-deposition. It comprises mostly very recently established (or, post cutting, re-established) stands of gorse scrub that are of a markedly lower stature than W23a with which it commonly merges. In places it is so recently established that it can be of a near identical floristic composition to stands of the U1b (rarely U1d) over which it has encroached. It is thus commonly much richer than W23a, although all stands are, in the absence of intervention, likely to rapidly cede to the latter.

Almost all stands of W23b are dominated by *Ulex europaeus* in the near absence of other woody species other than locally frequent *Cytisus scoparius, Rubus fruticosus* agg. and juvenile *Quercus robur*. Juvenile *Betula pendula* and *Sorbus aucuparia* are rare.

As with W23a, the field layer is poor or very poor in the densest stands, although these are rarely accessible. In more open stands, especially on their margins however, *Agrostis capillaris* and *Festuca rubra* ssp. *rubra* (*F. rubra* ssp. *commutata* is also present) are commonly abundant with rather more local*, Holcus lanatus, Holcus mollis, Anthoxanthum odoratum, Vulpia bromoides, Bromus hordeaceus* ssp. *hordeaceus, Luzula campestris* and/or *Aira praecox*. Where stands have recently encroached upon the open pioneer form of U1b, *Rumex acetosella* ssp. *pyrenaicus* and *Hypochaeris radicata* can be quite frequent with scattered *Achillea millefolium, Crepis capillaris, Digitalis purpurea* and *Jacobaea vulgaris*. Elsewhere, *Plantago lanceolata* and *Pilosella officinarum* are present with mostly very sparse *Veronica chamaedrys, Taraxacum* agg.*, Erigeron canadensis, Lepidium campestre* and *Plantago coronopus*.

Although not surveyed in any detail, the ground layer in more open stands includes locally common *Polytrichum juniperinum, Pseudoscleropodium purum, Hypnum jutlandicum, Rhytidiadelphus squarrosus* and *Campylopus introflexus*. *Cladonia* spp., including *C.fimbriata, C.coniocraea, C.furcata* ssp. *furcata* and *C.macilenta*, are very locally common on the margins of pioneer U1b but otherwise wholly absent.

W24a (*Rubus fruticosus-Holcus lanatus* underscrub, *Cirsium arvense-Cirsium vulgare* sub-community)

W24a is present in mostly small or very stands, usually within or on the margins of other stands of scrub and woodland but also on the margins of open grassland. On the whole, stands are species- or, more commonly, very species-poor.

All support abundant, usually singly dominant and very dense, 1-3m (rarely >4m) *Rubus fruticosus* agg.. *Urtica dioica* ssp. *dioica* is common in a number of stands and can be co-dominant (e.g. in the far west of the site close to Mersea Road). *Chamaenerion angustifolium* is co-dominant in one stand to the north (west of Quadrat MG1a-1, Map 3). Climbing *Fallopia baldschuanica* is abundant in boundary stands abutting properties along Speedwell Road in the far south-east, evidently having spread from adjacent gardens. *Vinca major*, similarly in the form of a garden escape, is very locally common here.

Trees and shrubs, especially juvenile *Quercus robur, Cytisus scoparius* and *Betula pendula*, are present in many stands of W24a but are never cover abundant. Other species include rare *Ulex europaeus, Prunus cerasifera, Sambucus nigra, Crataegus monogyna, Ilex aquifolium* and *Robinia pseudoacacia*.

The field layer beneath the dense canopies of *Rubus* or *Rubus-Urtica*/*-Chamaenerion*/*-Fallopia* is extremely poor with the majority of species confined to stand margins that, in isolation, usually belong within W24b but which were far too small to map separately. Thus species here include frequent and/or locally abundant *Arrhenatherum elatius, Holcus lanatus, Poa trivialis, Agrostis capillaris, Festuca rubra* ssp. *rubra, Dactylis glomerata, Galium aparine* and *Cirsium arvense*.

No attempt was made to record ground layer bryophytes. Terricolous macro-lichens are absent.

W24b (*Rubus fruticosus-Holcus lanatus* underscrub, *Arrhenatherum elatius-Heracleum sphondylium* sub-community)

Only two small stands of W24b were mapped during fieldwork: one on the western site boundary south of Quadrat MG1a-2; the other to the east of Quadrat MG1a-1 (Map 3). Both support species-poor recently bramble encroached grassland that, without intervention, will rapidly cede to W24a.

Both stands are overwhelmingly dominated by *Rubus fruticosus* agg. with scattered and locally abundant *Holcus lanatus* and *Arrhenatherum elatius*. The stand to the west supports occasional *Cytisus scoparius* with field layer *Agrostis capillaris*, locally frequent *Hypericum perforatum* and very locally abundant *Clinopodium nepeta*. The stand to the east supports locally abundant *Urtica dioica* ssp. *dioica* (extending from adjacent OV24a) with *Dactylis glomerata*.

No attempt was made to record ground layer bryophytes. Terricolous macro-lichens are absent.

W25a (*Pteridium aquilinum-Rubus fruticosus* underscrub, *Hyacinthoides non-scripta* sub-community)

W25a is restricted to four stands of open canopy glade in the far south-west of Survey Area 1. They range from species-poor to moderately species-rich.

Stands are dominated by *Pteridium aquilinum* with mostly very sparse *Rubus fruticosus* agg. *Lonicera periclymenum* is common and locally very abundant in the most north-easterly mapped stand with scattered *Hyacinthoides non-scripta*. A mature *Quercus robur* tree is present in the centre. The stand on the north-eastern margins of the Redoubt supports abundant and locally dominant (beneath the canopy of *Pteridium*) *Hyacinthoides non-scripta*. A single mature *Betula pendula* is present here. The other two stands are markedly grassy; although *Hyacinthoides non-scripta* is locally very common here too. They are variably dominated by *Pteridium aquilinum* with abundant/co-dominant *Arrhenatherum elatius, Agrostis capillaris* and *Holcus lanatus* with rather less *Poa pratensis* and *Holcus mollis*.

Stellaria holostea is present in all stands with locally common *Urtica dioica* ssp. *dioica*. Other species include occasional *Digitalis purpurea, Galium aparine* and *Teucrium scorodonia*.

No attempt was made to recorded ground layer bryophytes. Terricolous macro-lichens are absent.

W25b (*Pteridium aquilinum-Rubus fruticosus* underscrub, *Teucrium scorodonia* sub-community)

The single stand of mapped W25b is poorly referable to the NVC being wholly dominated by exceptionally species-poor *Pteridium aquilinum* with scattered and locally abundant/co-dominant *Holcus mollis*. It is thus close in composition to U20c but wholly lacks *Galium saxatile*. The only other species noted here during fieldwork, all recorded as rare, were *Urtica dioica* ssp. *dioica, Hyacinthoides non-scripta, Ulex europaeus, Teucrium scorodonia, Galium aparine, Agrostis capillaris* and, on a small patch of recently disturbed ground, *Myosotis ramosissima*.

Ground layer bryophytes appear from brief inspection to be largely absent; terricolous macro-lichens wholly absent.

3.2.3 Woodland

Four woodland communities were mapped during fieldwork (Maps 4-8).

W6b (*Alnus glutinosa-Urtica dioica* woodland, *Salix fragilis* sub-community)

W6b is confined to a strip of wet woodland flanking Birch Brook toward the far south-west of Survey Area 1. Whilst much of it is extremely difficult to access due to the quantity of fallen dead wood and the dense vegetation that has regenerated around this, the stand appears to comprise both floodplain and seepage wet woodland. Several derelict ditches are present on the southern side of Birch Brook that bring seepage waters arising from springs within adjacent W10c down to the stream; although many are dysfunctional and inflowing waters are now dispersed across the floodplain rather than outflowing directly into the stream channel.

The stand is dominated by a rather open canopy of *Salix* x *fragilis* with *Quercus robur*, mostly but not always on drier levees that appear to be both natural and artificial in origin, and sparsely scattered *Salix alba* and *Betula* x *aurata*. Understorey regeneration *Salix* x *fragilis* is very common, especially close to Birch Brook with occasional *Sambucus nigra, Ulmus procera* and *Crataegus monogyna*, and rare *Ilex aquifolium, Corylus avellana* and *Euonymus europaeus*. *Salix cinerea* ssp. *oleifolia* is very locally dominant in one very small impenetrable stand overlying the stream. In isolation this falls within W1 but was too small to map separately. Elsewhere *Salix cinerea* ssp. *cinerea* is rare.

The field layer of W6b is largely dominated by *Urtica dioica* ssp. *dioica*, although cover diminishes significantly on most margins of the mapped stand, with *Cardamine flexuosa, Galium aparine, Poa trivialis, Circaea lutetiana* and *Carex remota*. The presence of the latter, in addition to several other indicator species, marks a shift from floodplain W6b toward seepage W7b; although the latter is not present in its own right at anything other than the exceptionally small scale. Other common species include *Impatiens parviflora, Ribes rubrum* and *Stachys sylvatica*. *Phalaris arundinacea* and *Ficaria verna* (both sub-species are present) are locally abundant with very locally abundant *Carex acutiformis*. Scattered associates include *Carex pendula, Dryopteris dilatata, Rubus fruticosus* agg., *Veronica hederifolia* ssp. *lucorum, Lonicera periclymenum, Agrostis stolonifera, Athyrium filix-femina, Juncus effusus* and *Angelica sylvestris*. *Ajuga reptans* and *Scutellaria galericulata* are very locally frequent but otherwise largely absent. *Lycopus europaeus* is abundant in one flooded section of lateral ditch. *Callitriche stagnalis* is also present in flooded ditch sections, as well as the channel of Birch Brook itself. *Helosciadium nodiflorum, Veronica beccabunga, Sparganium erectum* and *Mentha aquatica* are present in the very small dog-disturbed section of Birch Brook beside the bridge on the southern boundary of Survey Area 1. All other species, including *Solanum dulcamara, Juncus acutiflorus, Polystichum setiferum, Dryopteris carthusiana, Agrostis canina, Galium palustre* ssp. *elongatum, Iris pseudacorus* and *Dryopteris affinis* ssp. *borreri*, are very uncommon.

No attempt was made to record ground layer bryophytes, although the leafy liverwort *Chiloscyphus polyanthos* was noted to be locally abundant in and on the banks of at least one derelict ditch. Terricolous macro-lichens are absent.

A slow-worm was seen beside the stream during fieldwork on 29th April 2024.

W10a (*Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, typical sub-community)

All stands of mapped W10a have developed from sections of out-grown former field boundary hedgerows. In the case of the two most westerly stands old boundaries are almost impossible to see on the ground but LiDAR imagery (Figure 12, Wessex Archaeology 2020) shows there were field boundaries here that correspond to those depicted on historical maps. Core parts of stands therefore likely date back to at least 1839 when the Tithe map showed field boundaries here that presumably supported hedgerows.

The canopy of all W10a stands is dominated by monocultures of canopy *Quercus robur*; although in the far western stand of scrub-woodland overtopping trees are largely confined to the former hedge-with-trees.

The understorey of the three northerly stands is dominated by *Ulmus procera* with variably frequent and/or locally abundant/dominant *Prunus spinosa, Crataegus monogyna*, recruitment *Quercus robur, Ilex aquifolium*, and climbing *Rubus fruticosus* agg. and *Hedera helix* ssp. *helix*. The most southerly stand is dominated solely by *Prunus spinosa* and *Rubus fruticosus* agg. Other species include occasional *Quercus ilex* and mostly sparse or very sparse *Sambucus nigra, Acer campestre* and *Taxus baccata*.

The field layer of mapped W10a is somewhat variable: although *Rubus fruticosus* agg. is more-or-less constant with frequent *Galium aparine, Stellaria holostea* and *Arum maculatum*. *Hyacinthoides non-scripta* is locally abundant-dominant in the most north-westerly and north-easterly stands with very locally abundant *Hyacinthoides* x *massartiana* in the north-east. Common associates include *Anthriscus sylvestris, Hedera helix* ssp. *helix, Holcus lanatus* and *Urtica dioica* ssp. *dioica*. Rather less widespread but very locally common species include *Pteridium aquilinum, Arrhenatherum elatius, Ficara verna*, *Geum urbanum, Glechoma hederacea, Veronica hederifolia* ssp. *lucorum* and, in the north-eastern stand, the garden escapes *Oxalis debilis* and *Claytonia perfoliata*. The only *Ruscus aculeatus* recorded anywhere during Survey Area 1 fieldwork is also present here.

No attempt was made to record ground layer bryophytes or macro-lichens.

W10c (*Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Hedera helix* sub-community)

Occupying approximately 10% of Survey Area 1, W10c is the single most common woodland community mapped during fieldwork. Almost all is of a recent secondary origin, having developed within the last 50-100 years (Section 1.1.2); although a number of over-mature and near-veteran trees long pre-date this (see below). However, the stand mapped between Quadrats MG1a-1 and MG6a-2 (Map 3) is oriented along an old field boundary bank that was depicted on the 1839 Tithe map and core parts may therefore date back at least this far. Similarly the stand north-east of Quadrat MG6b-3 (Map 3) also appears to be associated with a former field boundary and has almost certainly developed from an outgrown hedge. In the far south-east the very narrow strip of W10c (the majority of which lies beyond the Survey Area 1 boundary) lies on the northern margins of the trackway that accessed the former Middlewick Farm and which was depicted on the 1777 Chapman & Andre Map of Essex (Wessex Archaeology 2020).

The majority of W10c stands are dominated by canopy *Quercus robur* with locally abundant *Betula pendula* and locally frequent *Prunus avium*. A number of evidently originally open-grown oak trees in western stands are over-mature, a handful near-veteran, and not only long pre-date the development of woodland but the establishment of Middlewick Ranges itself. All other canopy trees, including *Fraxinus excelsior, Acer pseudoplatanus* and *Betula pubescens*, are rare. The stand of scrub-woodland to the north-east of Quadrat MG6b-3 (Map 3) is dominated by dense *Ulmus procera* and supports no canopy trees at all. Similarly stands to the west of Survey Area 1 that border Mersea Road are overwhelmingly dominated by *Ulmus procera* and thus form scrub-woodland.

The understorey is somewhat variable, although *Ilex aquifolium* is present in almost all stands and is usually cover abundant; locally dominant. *Crataegus monogyna, Prunus spinosa, Ulmus procera, Corylus avellana* and *Quercus ilex* are scattered and locally very common with climbing *Hedera helix* ssp. *helix* and, more locally, *Lonicera periclymenum*. Other species include mostly infrequent *Ulex europaeus, Salix caprea* ssp. *caprea, Sambucus nigra, Malus domestica, Cytisus scoparius* and *Euonymus europaeus*. Juvenile *Ulmus* x *vegeta, Taxus baccata, Sorbus aucuparia Prunus serotina, Salix cinerea* ssp. *oleifolia, Sorbus aria* and *Salix* x *reichardtii* are rare. Semi-open canopy stands in the west usually support very dense *Rubus fruticosus* agg.

The field layer of all W10c stands is largely dominated by *Hedera helix* ssp. *helix* and *Rubus fruticosus* agg., albeit often in a mosaic form where one of the other is sole dominant, with one or more: *Impatiens parviflora* (abundant in most western stands), *Anthriscus sylvestris* (especially in northern stands), *Galium aparine*

(scattered throughout most stands), *Urtica dioica* ssp. *dioica* (locally abundant in damper stands), *Circaea lutetiana* (especially to the south), *Hyacinthoides non-scripta* (to the north and south of the western woodland), *Arum maculatum* (widely scattered), *Veronica hederifolia* ssp. *lucorum* (especially to the south-west), *Holcus lanatus* (especially to the west), *Geranium robertianum* (ditto), *Stellaria holostea* (ditto), *Ribes rubrum* (confined to western stands), *Alliaria petiolata* (widely scattered), *Agrostis capillaris* (ditto), *Lonicera periclymenum* (mostly west and south-west), *Holcus mollis* (ditto), *Stachys sylvatica* (widely scattered), *Arrhenatherum elatius* (widely scattered in more open stands), *Dactylis glomerata* (ditto) and *Pteridium aquilinum* (mostly toward the south-west). Other species include mostly sparsely scattered and/or locally frequent *Moehringia trinervia, Ficaria verna, Rosa arvensis, Digitalis purpurea, Glechoma hederacea, Dryopteris dilatata, Brachypodium sylvaticum, Scrophularia nodosa, Deschampsia cespitosa* ssp. *cespitosa, Rumex obtusifolius* and *Ribes uva-crispa*. *Hyacinthoides* x *massartiana* is locally common in the stand between Quadrats MG1a-1 and MG6a-2 (Map 3). Within hill slope seepages to the south of mapped W6b the only *Carex demissa, C.laevigata* and *C.leporina* recorded anywhere within Survey Area 1 are present. *Athyrium filix-femina* is also present in a seepage here with *Carex remota*, very locally abundant/dominant *Gylceria fluitans* and very locally frequent *Scutellaria galericulata*. *Polystichum setiferum* is scattered along the banks of the Birch Brook with a little *Asplenium scolopendrium*.

No attempt was made to record ground layer bryophytes or macro-lichens.

W10d (*Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Holcus lanatus* sub-community)

W10d is the second most common woodland community across Survey Area 1, comprising stands that are even more recently established than those of W10c; although woodland on the eastern boundary overlies a former field boundary that was present on the 1839 Tithe map. Similarly, mapped stands to the north-east of Quadrat MG6b-2/south-east of Quadrat MG6a-2 (Map 3), both within and outside the fenced range, overlie a former field boundary that was depicted on the 1839 Tithe map. Field evidence suggests that without intervention all stands will gradually cede to W10c (or W10a)[23].

Quercus robur is the sole canopy dominant in all mapped stands, bar one, with very locally frequent but otherwise largely absent *Betula pendula*. Whilst individual trees in many stands pre-date woodland development, most notably along the former field boundaries noted above, only a handful of oaks can be described as over-mature/near-veteran. The very small stand, situated in the far north-east of Survey Area 1, not solely dominated by *Quercus robur* also supports *Fraxinus excelsior* and *Salix* x *fragilis*. A single *Quercus* x *petraea* was recorded in the central-southern stand south of Quadrat U1b-7 (Map 3).

The understorey is composed of mostly scattered, although overall frequent, *Ulex europaeus* (most stands support at least some *Ulex*), *Ilex aquifolium* (especially common in the centre south) and *Crataegus monogyna* (most notably in the centre-north). *Cytisus scoparius* and *Quercus ilex* are rather more sparsely scattered but each very locally frequent. *Prunus spinosa* is very locally abundant (to the south-east of Quadrat MG6a-2, north of the fenced range) but otherwise largely absent. *Hedera helix* ssp. *helix* is a locally common climber. In places, most notably in the stand to the north-east of Quadrat MG6b-2, within the fenced range, there is little by way of any understorey. Elsewhere *Sambucus nigra* and *Sorbus aucuparia* are very uncommon.

The field layer is near universally dominated by grasses. Species vary between stands; although *Holcus lanatus* is more-or-less constant with locally abundant/dominant *Agrostis capillaris, Festuca rubra* ssp. *rubra, Holcus mollis, Arrhenatherum elatius* and *Dactylis glomerata*. *Poa trivialis* is very locally abundant. *Rubus fruticosus* agg. is frequent in most stands with scattered *Hedera helix* ssp. *helix* (especially around the bases of trees) and *Lonicera periclymenum*. By contrast to W10d nationally *Pteridium aquilinum* is usually absent other than toward the far south-west of the Survey Area. *Anthriscus sylvestris, Galium aparine, Urtica dioica* spp. *dioica, Impatiens parviflora* and, especially toward the far south-west, *Hyacinthoides non-scripta* are locally common. Most other species, including *Stellaria holostea, Rumex acetosa* ssp. *acetosa, Geranium robertianum, Luzula multiflora* and *Ranunculus repens*, are far the most part very uncommon.

Little attempt was made to record bryophytes although *Pseudoscleropodium purum* and *Brachythecium rutabulum* were noted to be scattered within the largest block of W10d to the north of Survey Area 1 with a little *Polytrichastrum formosum* and *Kindbergia praelonga*. Terricolous macro-lichens are largely if not wholly absent.

[23] This is especially true of the northerly stands between Quadrats MG1a-1 and MG1a-2 (Map 3), parts of which are already very close to W10c.

3.2.4 Ruderal

One ruderal classification was mapped during fieldwork (Map 4).

OV24a (*Urtica dioica-Galium aparine* community, typical sub-community)

Only two stands of OV24a were mapped during fieldwork, both overlying former firing butts that have largely been removed toward the centre-north of Survey Area 1. Both are dominated by *Urtica dioica* ssp. *dioica* with *Galium aparine*. In the larger stand much of this is overtopped in early summer by *Anthriscus sylvestris*. The other stand supports frequent *Cirsium arvense*.

Few other species were recorded from the community during fieldwork other than a little *Poa trivialis, Arrhenatherum elatius, Rubus fruticosus* agg. *Cirsium vulgare* and *Artemisa vulgaris.*

No attempt was made to record ground layer bryophytes. Terricolous macro-lichens are absent.

3.2.5 Bare Ground

One non-referable Bare Ground classification was mapped during fieldwork (Maps 6 and 7).

'Bare Ground'

Largely unvegetated 'Bare Ground' is confined to disturbed ground in front of range targets, along the most south-easterly section of the 'Surfaced Track' where bare ground is more prevalent than surface dressings (hence classification), within bullet traps and along the trampled paths that lie behind stop butts.

Whilst bare sandy soil dominates the classification, particularly within the two most westerly bullet traps, all stands include at least some vegetation. In places, most notably the most easterly bullet trap, plant cover can be relatively high supporting frequent and locally abundant *Anisantha sterilis* (*A.diandra* is also present here), with scattered *Bromus hordeaceus* ssp. *hordeaceus, Vulpia myuros, Achillea millefolium, Erigeron canadensis* and *Papaver rhoeas*. *Melilotus altissimus*, with a little *M.albus* and *M.officinalis*, is very locally frequent. Other species recorded here include *Silene latifolia* ssp. *alba, Reseda luteola, Hypericum perforatum, Tussilago farfara, Agrostis gigantea, Silene vulgaris* ssp. *vulgaris, Epilobium tetragonum* ssp. *tetragonum, Trifolium arvense, Equisetum arvense, Polypogon monspeliensis, Sonchus asper, Filago germanica, Arrhenatherum elatius, Rumex acetosella* ssp. *pyrenaicus, Tripleurospermum inodorum, Epilobium parviflorum, Senecio vulgaris* ssp. *vulgaris, Hirschfeldia incana, Sonchus arvensis, Brassica napus, Triticum aestivum, Foeniculum vulgare* and *Polypogon viridis*. Unsurveyed bryophytes (especially acrocarpous mosses) are very locally frequent.

Agrostis capillaris is typically the most common species of all other stands of mapped 'Bare Ground', many of which are ceding to pioneer U1b grassland, with scattered and/or locally frequent *Rumex acetosella* ssp. *pyrenaicus, Aira praecox, Cerastium semidecandrum, Hypochaeris radicata, Vulpia bromoides, Myosotis ramosissima*, and the acrocarpous mosses *Polytrichum juniperinum, P.piliferum* and *Ceratodon purpureus*.

The centres of most trampled paths are more-or-less entirely bare although in one small stretch to the south of Quadrat U1d-10 (Map 3) seasonally wet depressions support frequent *Gnaphalium uliginosum, Persicaria hydropiper* and *Juncus bufonius* with marginal *Polygonum aviculare*.

3.2.6 Hardstanding and Buildings

Four non-referable Hardstanding and Buildings classifications were mapped during fieldwork (Maps 4-8).

'Building'

This classification covers the two WWII pill boxes, the two buildings within the fenced compound to the north-west of the fenced range, the two small control buildings with the centre of the fenced range and, most notably, the two target marker galleries. For safety reasons, only the latter were subject to botanical survey.

Following closure of the Middlewick Ranges the concrete marker galleries have become widely colonised by pioneer plants. Of particular note are the tops of galleries and the semi-sheltered concrete concourses, from which targets were raised and lowered during firing times, that lie beneath. These both support frequent *Rubus fruticosus* agg., albeit almost exclusively between concrete blocks, in surface cracks or at the bases of brick

walls, with scattered and/or locally common *Vulpia myuros, Erigeron canadensis, Lactuca serriola, Pilosella officinarum, Plantago lanceolata, Achillea millefolium, Hypochaeris radicata, Epilobium brachycarpum, Papaver rhoeas, Arrhenatherum elatius, Festuca rubra* ssp. *rubra, Papaver setiferum, Bromus hordeaceus* ssp. *hordeaceus, Poa annua, Arenaria serpyllifolia* ssp. *serpyllifolia, Sonchus asper, Senecio vulgaris* ssp. *vulgaris, Agrostis capillaris, Taraxacum* agg., *Dactylis glomerata, Crepis capillaris* and *Arabidopsis thaliana*. Other species include the poppies *Papaver cambricum, P.somniferum* ssp. *setigerum, P.lecoqii* and *P.somniferum* ssp. *somniferum, Sherardia arvensis, Polygonum depressum, Petrosedum rupestre, Erigeron sumatrensis, Spergula arvensis* var. *arvensis, Plantago coronopus, Hirschfeldia incana, Geranium rotundifolium, Lepidium campestre, Artemisia vulgaris, Geranium molle, Lamium purpureum, Epilobium ciliatum, Oxybasis rubra* and *Sagina procumbens*.

No attempt was made to record bryophytes or macro-lichens; although the former are at least locally common between concrete blocks, in surface cracks and at the bases of brick walls. A number of calcicolous taxa can be expected to be present here and in other Hardstanding and Buildings classifications that will be absent from non-artificial substrates elsewhere.

'Concrete Hardstanding'

This classification covers a single small area of unvegetated concrete hardstanding within the fenced compound to the north-west of the fenced range.

'Pea Shingle'

Other than a stretch of pea shingle surfaced hardstanding within the fenced compound to the north of the fenced range (which during the course of fieldwork supported a shipping container used for storage), mapped 'Pea Shingle' is confined to the tops of firing butts within the fenced range.

Most of classification by area is unvegetated, presumably having been periodically herbicide sprayed prior to range closure, although *Pilosella officinarum* and *Vulpia bromoides* are (now) frequent on most butts with variably scattered, sometimes locally very common, *Rumex acetosella* ssp. *pyrenaicus, Plantago lanceolata, Agrostis capillaris* and *Achillea millefolium*. Amongst many other species observed growing amongst mapped 'Pea Shingle' during fieldwork, are *Ervilla hirsuta, Amsinckia micrantha, Echinochloa crus-galli, Anthriscus caucalis, Spergula arvensis* var. *arvensis, Chenopodium album, Trifolium arvense, Arabidopsis thaliana, Medicago lupulina, Cerastium semidecandrum* and *Ballota nigra*. *Eschscholzia californica* and *Oenothera glazioviana* were noted within the fenced compound during the two very brief visits that were undertaken here.

No attempt was made to record bryophytes or macro-lichens.

'Surfaced Track'

The mapped 'Surfaced Track' covers the vehicular service track that runs from the Middlewick Ranges entrance off Mersea Road around the northern perimeter of the fenced range and southwards along the western side of the ranges before turning eastwards behind range targets and target galleries. Substrates range from mixed gravel and shingle, with very local limestone scalpings, to much small patches of tarmac and concrete.

Most of the classification is unvegetated other than on track margins where compaction tolerant and/or pioneer species such as *Lolium perenne, Poa annua, Matricaria discoidea* ssp. *discoidea, Polygonum aviculare, Dactylis glomerata, Achillea millefolium, Taraxacum* agg., *Trifolium repens* and *Jacobaea vulgaris*. However, to the south of the targets, where the track appears to have been little used since range closure, parts can be reasonably well-vegetated. Here, in addition to species already noted, *Achillea millefolium, Festuca rubra* (both ssp. *rubra* and ssp. *commutata* are present), *Geranium molle, Trifolium arvense, Vicia sativa* ssp. *segetalis, Plantago lanceolata, Hypochaeris radicata, Trifolium dubium, Pilosella officinarum, Bellis perennis, Veronica arvensis, Cerastium glomeratum, Plantago coronopus, Agrostis capillaris* and *Bromus hordeaceus* ssp. *hordeaceus* can all be very locally frequent. Elsewhere a little *Cerastium semidecandrum, Myosotis ramosissima, Filago germanica* and *Poa infirma* are present where adjacent grassland is spilling out onto track margins.

No attempt was made to record bryophytes or macro-lichens; although the former are at least locally common. The latter are largely, if not wholly, absent.

3.3 Survey Area 1: Species Recording

354 species of vascular plant, including sub-species and varieties, were recorded across Survey Area 1 during fieldwork. The full list is given in Appendix II. A summary is given in Table 3. The locations of rare/scarce/threatened species mapped during fieldwork are shown on Maps 4-8. Due to an oversight, *Galium palustre* ssp. *elongatum* was not mapped at the time it was recorded. Once the oversight had been recognised, the species could not be re-found.

Table 3 – Summary of species recorded from Survey Area 1

Functional group	Number of species (%)
Trees and shrubs	45 (12.7)
Other woody species (low-growth shrubs and climbers)	18 (5.1)
Graminoids (grasses, sedges and rushes)	63 (17.8)
Non-gramineaceous herbaceous species (forbs/herbs)	219 (61.9)
Ferns and horsetails	9 (2.5)
Rare/Scarce/Threatened species (Section 4.3)	26 (7.3)

3.4 Survey Area 2: Species Recording

361 species of vascular plant, assuming *Centaurea debeauxii*/*nigra, Galeopsis bifid*/*tetrahit* and *Rosa canina*/*canina* agg. each represent only a single taxon, were recorded across Survey Area 2 during fieldwork. The full set of results are given in Appendix III. A summary is given in Table 4.

Table 4 – Summary of species recorded from Survey Area 2

Component Survey Area	No. Species	No. Rare/Scarce/Threatened Species
1 Enclosed Grassland (North)	130	7
2 Butts (North)	152	9
3 Wet Woodland (North)	115	7
4 Woodland Edge and Hedgerows (North)	138	4
5 Public Grassland (North)	90	4
6 Wet Woodland (Centre)	117	7
7 Woodland Edge and Hedgerows (Centre)	145	2
8 Grassland (Centre)	70	2
9 Special (South)	132	8
10 Wet Woodland (South)	135	12
11 Woodland Edge and Hedgerows (South)	165	7
12 Grassland (South)	88	2

Although the only requirement of surveys across Survey Area 2 was species recording, notes were made on the NVC communities present within the three Component Survey Areas dominated by grassland beyond Survey Area 1. These are given in Table 5.

Table 5 – NVC communities present within the three grassland dominated Component Survey Areas of Survey Area 2 beyond Survey Area 1

Component Survey Area	Notes on NVC composition
8 Grassland (Centre)	Mostly MG6b with small patches of U1d in the three southernmost fields. Uncut western stands within the south-westernmost field are dominated by a mosaic of MG1a and W24a/b with a relatively large stand of W23a. The two easternmost field sections, separated by fencing and beyond MOD ownership, are dominated by MG1a with pockets of MG6a/b and a little residual U1d
9 Special (North)	Mostly a mosaic of MG1a/W24a with patches of MG1e and small stands of MG10a/b to the north and, largely inaccessible, S26 to the south-east [most S26 here lies within Component Survey Area 11]
12 Grassland (South)	Mostly MG1a with local MG6a and patches of MG1b, MG6b, W24a and W24b. However, MG6b is dominant across much of the most south-westerly field

3.5 Survey Site: Species Recording

418 species of vascular plant, including sub-species and varieties, were recorded from across the Survey Site as a whole during fieldwork. The full list is given in Appendix IV. A summary is given in Table 6.

Table 6 – Summary of species recorded from the Survey Site

Functional group	Number of species (%)
Trees and shrubs	56 (13.4)
Other woody species (low-growth shrubs and climbers)	22 (5.3)
Graminoids (grasses, sedges and rushes)	73 (17.5)
Non-gramineaceous herbaceous species (forbs/herbs)	254 (60.8)
Ferns and horsetails	13 (3.1)
Rare/Scarce/Threatened species (Section 4.3)	36 (8.6)

4 EVALUATION

4.1 Habitats

Six broad habitat-types were mapped across Survey Area 1 during fieldwork (Map 2). Of these, four fall within or partly within one of five priority Biodiversity Acton Plan (BAP) habitats that are included in the JNCC register of Priority Habitats for which local authorities have a 'biodiversity duty' under the Natural Environment and Rural Communities Act (2006). Map 9 and Table 7 (based on Maddock 2008, updated 2011) provide a summary.

Table 7 – Summary of broad and Priority Habitats

Broad Habitat	Priority Habitat (composite NVC communities)	Area (ha)
Bare Ground		
Grassland	Lowland Dry Acid Grassland (U1b and U1d)	32.35
	Lowland Meadows (MG1e)	0.02
Hardstanding and Buildings		
Ruderal		
Scrub	Hedgerows (some W21a)	0.22
Woodland	Lowland Mixed Deciduous Woodland (W10a, W10c and W10d)	16.45
	Wet Woodland (W6e)	0.40

4.2 Vegetation Communities

22 NVC communities were mapped during fieldwork. Table 8 gives a guide to the distribution and therefore conservation status of these based on distribution notes given by Rodwell (1991 *et seq*), SSSI guidelines for lowland grasslands by Jefferson *et al* (2019), and over 30 years of surveyor experience.

Table 8 – Guide to the national and regional distributions of recorded NVC communities
National = Great Britain excluding Northern Ireland
Regional = Eastern England (Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk and Suffolk)

NVC community	National Distribution	Regional Distribution
MG1a	Widespread and very common	Very Common
MG1b	Widespread and very common	Very Common
MG1e	Widespread but local in south-eastern England	Local
MG6a	Widespread and very common	Very Common
MG6b	Widespread and very common	Very Common
MG7b	Widespread and very common	Very Common
MG10a	Widespread and common in suitably wet grasslands	Local
U1b	Widespread but local	Very Local
U1d	Confined to south-eastern England	Very Local
OV24a	Widespread and very common	Very Common
W6b	Widespread but local	Local
W10a	Widespread and common	Common
W10c	Widespread and common	Common
W10d	Widespread and common	Common
W21a	Widespread and very common	Very Common
W22a	Widespread and common	Common
W23a	Widespread and common	Common
W23b	Widespread but local	Local

Table 8 – Guide to the national and regional distributions of recorded NVC communities
National = Great Britain excluding Northern Ireland
Regional = Eastern England (Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk and Suffolk)

NVC community	National Distribution	Regional Distribution
W24a	Widespread and very common	Very Common
W24b	Widespread and common	Common
W25a	Widespread and common	Common
W25b	Widespread and common	Common

4.3 Species

Of the 417 species of vascular plant recorded from across the Survey Site during fieldwork, 36 species are, or have been (Section 5.1.7), regarded as nationally and/or county rare, scarce and/or threatened. Table 9 provides a summary. Maps 4-8 show the locations of those species recorded during fieldwork within Survey Area 1 with the exception of *Galium palustre* ssp. *elongatum* (not known to be regarded as 'Essex Rare' until after it was recorded), and the garden escapes *Arum italicum* ssp. *italicum* and *Geranium sanguineum*.

Table 9 – Rare, scarce and/or threatened species
ER = Listed as 'Essex Rare' in the Essex Red Data List (Essex Field Club 2002, updated 2009)
ES-NS = included in the Essex Red Data List (Essex Field Club 2002, updated 2009) as Nationally Scarce (Stewart *et al* 1994) but which no longer qualifies as such (JNCC 2023)
NS = Nationally Scarce (Stewart *et al* 1994, as updated JNCC 2023)
RDB = UK Red Data Book (Cheffings & Farrell 2005, as updated JNCC 2023):
VU = Vulnerable (species facing a high threat of extinction in the wild in the near future)
NT = Near Threatened (species facing a high threat of extinction in the wild in the medium-term future)
ERL = England Red List (Stroh et al 2014, as updated JNCC 2023): VU and NT as per RDB
1 Only recorded in Survey Area 1 and the Component Survey Areas of Survey Area 2 that lie within Survey Area 1
2 Only recorded in Survey Area 2, beyond Survey Area 1

	ER	ES-NS	NS	RDB	ERL
Agrostis canina	+				
Agrostis vinealis[1]	+				
Anacamptis pyramidalis[2]	+				
Arum italicum ssp. *italicum*[1]		+			
Athyrium filix-femina	+				
Blechnum spicant[2]	+				
Calluna vulgaris[1]					NT
Carex demissa[1]	+				
Carex laevigata	+				
Cerastium semidecandrum[1]	+				
Clinopodium nepeta[1]			+		
Dryopteris affinis ssp. *affinis*[2]	+				
Dryopteris affinis ssp. *borreri*	+				
Dryopteris carthusiana	+				
Equisetum sylvaticum[2]	+				
Filago germanica				NT	NT
Galium palustre ssp. *elongatum*	+				
Geranium rotundifolium	+				
Geranium sanguineum[1]	+				NT
Hypericum x *desetangsii*[1]	+				
Knautia arvensis					NT
Lepidium campestre					NT
Lepidium latifolium[2]			+		
Logfia minima[1]					NT
Myosotis discolor	+				

Table 9 – Rare, scarce and/or threatened species
ER = Listed as 'Essex Rare' in the Essex Red Data List (Essex Field Club 2002, updated 2009)
ES-NS = included in the Essex Red Data List (Essex Field Club 2002, updated 2009) as Nationally Scarce (Stewart *et al* 1994) but which no longer qualifies as such (JNCC 2023)
NS = Nationally Scarce (Stewart *et al* 1994, as updated JNCC 2023)
RDB = UK Red Data Book (Cheffings & Farrell 2005, as updated JNCC 2023):
VU = Vulnerable (species facing a high threat of extinction in the wild in the near future)
NT = Near Threatened (species facing a high threat of extinction in the wild in the medium-term future)
ERL = England Red List (Stroh et al 2014, as updated JNCC 2023): VU and NT as per RDB
1 Only recorded in Survey Area 1 and the Component Survey Areas of Survey Area 2 that lie within Survey Area 1
2 Only recorded in Survey Area 2, beyond Survey Area 1

	ER	ES-NS	NS	RDB	ERL
Myosotis ramosissima[1]	+				
Poa infirma[1]		+			
Polypodium vulgare[2]	+				
Polypogon monspeliensis[1]			+		
Polystichum setiferum	+				
Potentilla argentea[2]		+			NT
Ribes nigrum[2]	+				
Spergula arvensis var. *arvensis*[1]				VU	VU
Stellaria pallida[1]	+				
Trifolium ornithopodioides[2]		+			
Veronica officinalis[2]					NT
No. Species	22	4	3	2	9

5 DISCUSSION

5.1 Assessment of Botanical Value

As previous sections have revealed, Survey Area 1 is of significant botanical value, supporting five Priority Habitats, along with several local or very locally distributed community-types and numerous rare, scarce and/or threatened species.

5.1.1 Lowland Dry Acid Grassland

32.35ha of Lowland Dry Acid Grassland (LDAG), a rare habitat in Essex (Essex Wildlife Trust 2023, Natural England 2024), were mapped across Survey Area 1 during fieldwork (Map 9). Composed solely of U1b and U1d, the extant Priority Habitat is also of 'high botanical nature conservation value' and therefore eligible for selection as a Site of Special Scientific Interest (SSSI) (Jefferson *et al* 2019).

Whilst both U1b and U1d at Middlewick are atypical of their respective communities nationally, quadrat sampling across Survey Area 1 has revealed swards to be species-rich. U1b especially also supports a number of rare, scarce and/or threatened species. Evidence of post-Medieval plough lines suggest many areas have remained as grassland for up to five centuries; although the richest extant swards, some of which are also lichen-rich, are associated with areas that were surface stripped between the late 1800's and early 1900's.

Only small patches of LDAG remain extant within Survey Area 2, beyond Survey Area 1. Although further survey is required to be certain, it is likely that no patches cover >0.5ha (the standard threshold to be eligible for selection as an SSSI).

5.1.2 Lowland Meadows

Only the 0.02ha of mapped MG1e falls within the Priority Habitat of Lowland Meadows (LM). Whilst also a classification of 'high botanical nature conservation value', mapped stands are far below the area threshold to be considered eligible for SSSI selection on the basis of grassland classification alone (Jefferson *et al* 2019).

The small patches of MG1e noted during botanical recording across Survey Area 2, beyond Survey Area 1, are also likely to be considerably <0.5ha in area.

5.1.3 Hedgerows

Only selected parts of mapped W21a across Survey Area 1 fall within the Priority Habitat of Hedgerows. In northern boundary stands these are both species- and structurally-poor.

By contrast, numerous hedgerows across Survey Area 2, beyond Survey Area 1, are likely to fall within the Priority Habitat; although most former hedges here are outgrown and may no longer qualify as Hedgerows but rather Lowland Mixed Deciduous Woodland.

5.1.4 Lowland Mixed Deciduous Woodland

16.45ha of Lowland Mixed Deciduous Woodland (LMDW), defined solely on the basis of NVC classification, are present within Survey Area 1 (Map 9). However, given that scrub within woodland glades and outgrown hedges no longer meeting the criteria for qualification as Hedgerows are included within the LMDW Priority Habitat definition, the actual area is closer to 18ha. All, bar relict stretches of outgrown hedgerow, is composed of recent secondary woodland within a county where woodland is for the most part widely distributed. Commonly supporting low species- and structural-diversity, it is therefore highly unlikely that any qualifies for consideration as an SSSI on the basis of habitat alone (Latham *et al* 2018). However, it includes spring seepages of value both in their own right and in the hydrological functioning of the contiguous Wet Woodland that they feed into.

A slightly larger extent of LMDW is present within Survey Area 2, beyond Survey Area 1[24]. This has not been surveyed in sufficient detail to determine its true nature conservation value; although it includes the only woodland, Birch Grove, that is known to date back prior to 1881.

[24] No attempt has been made to calculate the precise area of LMDW here as the woodland flanking Birch Brook also includes Wet Woodland. However, the combined area of both is at least 23ha.

5.1.5 Wet Woodland

0.4ha of Wet Woodland (WW) were mapped within Survey Area 1. Whilst stands are again of a recent secondary origin, they are both compositionally and structurally more diverse than most of the surrounding LMDW. The Wet Woodland habitat as a whole is also considerably less common than LMDW, both regionally and nationally, and most rare/scarce/threatened species recorded from woodland were within WW and/or the spring seepages within LMDW that feed into it.

There appears to be a considerably greater extent of WW within Survey Area 2, beyond Survey Area 1. Most of this appears to be much longer established than that of Survey Area 1 and some stands likely fall within the regionally rare community of W7b. In addition, rare/scarce/threatened species, including *Dryopteris affinis* ssp. *affinis* and *Equisetum sylvaticum*, are present here that were not recorded in Survey Area 1.

5.1.6 Other Habitats

Most grassland across the Survey Site, other than LDAG and LM, is relatively species-poor. However, there are no signs that swards across Survey Area 1 have been the subject of any form of agricultural improvement and almost all stands of MG6b here are likely to be derived from former U1 (mostly U1d) grassland[25]. More appropriate grassland management, especially within the fenced range, would undoubtedly see much of it revert to U1. If this were the case, the total area of acid grassland across Survey Area 1 would reach c.51ha.

Stands of mapped scrub and ruderal vegetation within Survey Area 1 have limited botanical value; although scrub in particular can be very important for fauna. By contrast some areas of bare ground and mapped hardstanding support species that are present (at least now that the fenced ranges are no longer in use and the grassland is neither mown nor disturbed) nowhere else. Whilst a number of these are non-native taxa, they include rare/scare/threatened species.

5.1.7 Notable Species

Table 9 (Section 4.3) lists the 36 species recorded during fieldwork that are, or have been, regarded as nationally and/or county rare, scarce and/or threatened. Together these comprise 8.6% of all vascular plant species recorded during 2024.

Other than wet woodland taxa, the majority are confined to areas of open sandy habitat within or beside paths and tracks where there is periodic disturbance and competition is low.

Whilst the status of Nationally Scarce (NS), RDB and ERL taxa are based on recent data, the status of species within Essex (which is divided for national recording purposes into the BSBI vice-counties of South Essex, VC18 and North Essex, VC19 within which the Survey Site lies) are based on records that are now at least 22 years old[26].

As Table 9 shows, four species included in the *Essex Red Data List* as Nationally Scarce, no longer warrant this status. It is not known whether any of these would have qualified as Essex Rare had Nationally Scarce status not been attributed to them; although a review of species distributions given in the *BSBI Online Plant Atlas 2020* (https://plantatlas2020.org/atlas accessed 22nd October 2024) suggests the following would apply if the list were revised to follow standard Rare Plant Register guidelines (BSBI 2024):

- *Arum italicum* ssp. *italicum* – only present as a neophyte in Britain, thus not Rare/Scarce in either VC18 or VC19
- *Poa infirma* – could be Rare/Scarce in both VC18 and VC19
- *Potentilla argentea* – could be Rare/Scarce in both VC18 and VC19 (many records given by the *BSBI Online Plant Atlas 2020* are pre-2000)
- *Trifolium ornithopodioides* – could be Rare/Scarce in both VC18 and VC19, at least in inland parts of the County

A review of species distributions given in the *BSBI Online Plant Atlas 2020* to determine the current status of species listed as Essex Rare by Essex Field Club (2002, updated 2009) suggests the following:

[25] Some stands of MG6b also overlie post-Medieval plough lines and may therefore date back several centuries.
[26] It is understood from the Essex Field Club website that the 2009 update related solely to updating the nomenclature of listed taxa.

- *Agrostis canina* – unlikely to be Rare/Scarce in either VC18 or VC19 (although many records across both vice-counties pre-date 2000)
- *Agrostis vinealis* – could be Rare/Scarce in VC19 (most records in the west of the VC are pre-1930) but unlikely to be so in VC18
- *Anacamptis pyramidalis* – very unlikely to be Rare/Scarce in either VC18 or VC19
- *Athyrium filix-femina* – very unlikely to be Rare/Scarce in either VC18 or VC19
- *Blechnum spicant* – could be Rare/Scarce in both VC18 and VC19
- *Carex demissa* – could be Rare/Scarce in both VC18 and VC19
- *Carex laevigata* – very likely to be Rare/Scarce in VC18 (where it has been recorded in only one hectad post-2000); could also be Rare/Scarce in VC19
- *Cerastium semidecandrum* – unlikely to be Rare/Scarce in VC19; very unlikely to be Rare/Scarce in VC18
- *Dryopteris affinis* ssp. *affinis* – very likely to be Rare/Scarce in VC19 (where it has been recorded in only one hectad post-2000[27]); could also be Rare/Scarce in VC18
- *Dryopteris affinis* ssp. *borreri* – unlikely to be Rare/Scarce in either VC18 or VC19
- *Dryopteris carthusiana* – unlikely to be Rare/Scarce in either VC18 or VC19 (although around half of all county records pre-date 2000)
- *Equisetum sylvaticum* – could be Rare/Scarce in both VC18 and VC19
- *Galium palustre* ssp. *elongatum* – very unlikely to be Rare/Scarce in either VC18 or VC19 (note the two ssp. are not mapped separately in the *Online Plant Atlas*)
- *Geranium rotundifolium* – very unlikely to be Rare/Scarce in either VC18 or VC19 (this species has considerably expanded its range since 2002)
- *Geranium sanguineum* – only present as a neophyte in Essex, thus not Rare/Scarce in either VC18 or VC19
- *Hypericum* x *desetangsii* – likely to be Rare/Scarce in VC18 but probably not in VC19
- *Myosotis discolor* – very unlikely to be Rare/Scarce in either VC18 or VC19
- *Myosotis ramosissima* – unlikely to be Rare/Scarce in either VC18 or VC19
- *Polypodium vulgare* – could be Rare/Scarce in both VC18 and VC19
- *Polystichum setiferum* – very unlikely to be Rare/Scarce in either VC18 or VC19
- *Ribes nigrum* – very unlikely to be Rare/Scarce in either VC18 or VC19
- *Stellaria pallida* – unlikely to be Rare/Scarce in either VC18 or VC19

Not listed as Essex Rare by Essex Field Club (2002, updated 2009) but mapped during fieldwork because it has been rarely seen by the surveyor in Eastern England:

- *Erophila glabrecens* – could be Rare/Scarce in both VC18 and VC19

With regard to the other NS, RDB and ERL species not listed as Essex Rare or Nationally Scarce by Essex Field Club (2002, updated 2009), species distributions given in the *BSBI Online Plant Atlas 2020* suggests the following:

- *Calluna vulgaris* – could be Rare/Scarce in VC19 but not in VC18
- *Clinopodium nepeta* – very unlikely to be Rare/Scarce in either VC18 or VC19 (VC19 is the stronghold for this species in Britain)
- *Filago germanica* – very unlikely to be Rare/Scarce in either VC18 or VC19
- *Knautia arvensis* – very unlikely to be Rare/Scarce in either VC18 or VC19
- *Lepidium campestre* – could be Rare/Scarce in VC19 (where most records pre-date 2000) but not in VC18
- *Logfia minima* – could be Rare/Scarce in both VC18 and VC19 (most records in the latter pre-date 2000)
- *Polypogon monspeliensis* – could be Rare/Scarce in both VC18 and VC19 if non-native records are excluded (it appears from survey that the species was most likely originally introduced to Middlewick via imported substrates)
- *Spergula arvensis* var. *arvensis* – unlikely to be Rare/Scarce in either VC18 or VC19 (although many records in both vice-counties pre-date 2000)
- *Veronica officinalis* – very unlikely to be Rare/Scarce in either VC18 or VC19

[27] The *Dryopteris affinis* ssp. *affinis* recorded from Component Survey Area 10 during fieldwork is in a different hectad to the one presented in the *Online Plant Atlas*.

Due to the lack of available data, it has not been possible to determine the Essex status of any bryophytes or lichens, although many of the latter are undoubtedly at least very local in the county and the overall assemblage in parts of mapped U1b is likely to be of county significance.

5.2 Recommendations

5.2.1 Consultation with Natural England

Whilst most of Survey Area 1, along with all the woodland within Survey Area 2, are included within the Middlewick Ranges and Birch Brook Local Wildlife Sites (LWS) (EECOS 2017), there is a strong case for much of the Survey Site to be selected as a Site of Special Scientific Interest (SSSI).

This survey has revealed that c.32ha of Survey Area 1 supports extant species-rich Lowland Dry Acid Grassland (LDAG), automatically making it eligible for consideration as an SSSI (Jefferson *et al* 2019). With appropriate management (Section 5.2.2), this could extend to as much as 52ha; although how much of the latter would revert to species-rich grassland and over what timescale is unknown.

It has been calculated that Essex supports in the region of 500ha of acid grassland within designated SSSI and LWS (Essex Wildlife Trust 2023), although it is not known whether all of this qualifies as Lowland Dry Acid Grassland nor whether it includes stands of scrub that during this survey were excluded from the total area of LDAG. Nevertheless, data presented by Essex Wildlife Trust (2023) suggests that the LDAG within Survey Area 1 is the single largest expanse of the habitat in Essex outside Epping Forest.

Recent surveys of Nightingales across the Survey Site and from MOD land to the south of Weir Lane, beyond the southern limits of Survey Area 2, recorded 59 singing males in Spring 2024 (Friends of Middlewick Ranges 2024). Based on data presented by Hewson *et al* (2018), this represents 1% of the total UK population of the species, making the area surveyed in 2024 eligible for SSSI selection (Drewitt *et al* 2020). Across Middlewick Ranges (as defined above) and Colchester Barracks as a whole, 125 singing males were recorded (Friends of Middlewick Ranges 2024). This is >2% of the UK population and likely the single largest in the country (Hewson *et al* 2018).

Surveys of invertebrates are on-going (Dodd *et al* in prep). However, past records suggest that at least part of Middlewick Ranges is/was eligible for selection as an SSSI due to the presence of Endangered and Vulnerable species, and perhaps also the invertebrate assemblage as a whole (Curson *et al* 2019).

As a consequence of the above it is highly recommended that priority be given to consultation with Natural England regarding the possible future designation of Middlewick Ranges as an SSSI and the implications that this may have for all interested parties.

5.2.2 Management for Wildlife

Much of the conservation interest of Middlewick Ranges is related to plagioclimax habitats that require management to maintain their wildlife value. Of particular note are the areas of grassland across the now unmown fenced range, stands of scrub that are currently suitable for Nightingale and other scrub-associated fauna and areas of bare ground, particularly those in and around range stop butts. The nature conservation interest of all these areas will rapidly deteriorate unless management intervention is undertaken soon.

It is therefore recommended that unmown stands be recut as soon as possible until such a time that livestock grazing (within the already extant fence) can be introduced. Beyond the fenced range areas should continue to be annually hay cut. Stands of W23a should be cut on rotation, starting as soon as possible, to prevent them becoming outgrown and, as a consequence, of little value to scrub-associated birds, including Nightingale. These two methods of intervention will enhance bare ground; although more may be needed to provide the sort of bare sandy south-facing banks that many specialist invertebrates depend. Whether this is required immediately will depend on the results of ongoing invertebrate surveys (Dodd *et al* in prep.)

Once a decision is made on the future of Middlewick Ranges, management options going forward should be drawn up appropriate to the outcomes of consultation with Natural England and other interested parties.

6 SITE MAPS

6.1 List of Maps

Map 1 – Survey Site and Survey Areas
Map 2 – Survey Area 1: Broad Habitats
Map 3 – Survey Area 1: Overview of NVC Communities and the Locations of Quadrats
Map 4 – Survey Area 1: NVC Communities and Rare/Scarce/Threatened Species - NW
Map 5 – Survey Area 1: NVC Communities and Rare/Scarce/Threatened Species - NE
Map 6 – Survey Area 1: NVC Communities and Rare/Scarce/Threatened Species - SE
Map 7 – Survey Area 1: NVC Communities and Rare/Scarce/Threatened Species – SW
Map 8 – Survey Area 1: NVC Communities and Rare/Scarce/Threatened Species - W
Map 9 – Survey Area 1: Priority Habitats *sensu stricto*
Map 10 – Survey Area 1: Priority Habitats

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

Map 1 - Survey Site and Survey Areas

Scale @ A3 = 1 : 7400

Survey Area 1

Survey Area 2

N

W E

S

Dr Giles Groome CEcol CEnv MCIEEM 2024

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

Map 2 - Survey Area 1: Broad Habitats

Scale @ A3 = 1 : 5000

Broad Habitat

- Bare Ground
- Grassland
- Hardstanding and Buildings
- Ruderal
- Scrub
- Woodland

N

W E

S

Dr Giles Groome CEcol CEnv MCIEEM 2024

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

MG6b - 6
U1d - 7
MG1a - 1
U1d - 6
MG6b - 7
MG6a - 2
MG6a - 3
U1d - 8
MG1a - 2
U1d - 2
MG6b - 8
MG6a - 1
MG6b - 1
MG1a - 3
MG6b - 2
U1d - 1
MG6a - 4
MG6b - 3
U1d - 3
U1d - 9
U1b - 4
MG6b - 9
MG6b - 4
MG6b - 10
U1d - 4
U1d - 5
U1d - 10
MG6a - 5
MG1a - 4
U1b - 1
MG1a - 5
U1b - 5
U1b - 2
U1b - 6
MG6b - 5
U1b - 7
U1b - 3
U1b - 8

© Crown copyright and database rights 2024 Ordnance Survey 0100031673

Map 3 - Survey Area 1: Overview of NVC Communities and the Locations of Quadrats

Scale @ A3 = 1 : 5000

NVC Classification

- 'Bare Ground'
- 'Building'
- 'Concrete Hardstanding'
- MG10a
- MG1a
- MG1b
- MG1e
- MG6a
- MG6b
- MG7b
- OV24a
- 'Pea Shingle'
- 'Surfaced Track'
- U1b
- U1d
- W10a
- W10c
- W10d
- W21a
- W22a
- W23a
- W23b
- W24a
- W24b
- W25a
- W25b
- W6b

N
W E
S

Dr Giles Groome CEcol CEnv MCIEEM 2024

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

Map 4 - Survey Area 1: NVC Classifcations and Rare/ Scarce/Threatened Species - NW

Scale @ A3 = 1 : 2000

Rare/Scarce/Threatened Species

- Agrostis canina
- Agrostis vinealis
- Athyrium filix-femina
- Calluna vulgaris
- Carex demissa
- Carex laevigata
- Cerastium semidecandrum
- Clinopodium nepeta
- Dryopteris affinis ssp. borreri
- Dryopteris carthusiana
- Erophila glabrescens
- Filago germanica
- Geranium rotundifolium
- Hypericum x desetangsii
- Knautia arvensis
- Lepidium campestre
- Logfia minima
- Myosotis discolor
- Myosotis ramosissima
- Poa infirma
- Polypogon monspeliensis
- Polystichum setiferum
- Spergula arvensis var. arvensis
- Stellaria pallida

NVC Classification

- 'Bare Ground'
- 'Building'
- 'Concrete Hardstanding'
- MG10a
- MG1a
- MG1b
- MG1e
- MG6a
- MG6b
- MG7b
- OV24a
- 'Pea Shingle'
- 'Surfaced Track'
- U1b
- U1d
- W10a
- W10c
- W10d
- W21a
- W22a
- W23a
- W23b
- W24a
- W24b
- W25a
- W25b
- W6b

N
W E
S

Dr Giles Groome CEcol CEnv MCIEEM 2024

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

Rare/Scarce/Threatened Species

- Agrostis canina
- Agrostis vinealis
- Athyrium filix-femina
- Calluna vulgaris
- Carex demissa
- Carex laevigata
- Cerastium semidecandrum
- Clinopodium nepeta
- Dryopteris affinis ssp. borreri
- Dryopteris carthusiana
- Erophila glabrescens
- Filago germanica
- Geranium rotundifolium
- Hypericum x desetangsii
- Knautia arvensis
- Lepidium campestre
- Logfia minima
- Myosotis discolor
- Myosotis ramosissima
- Poa infirma
- Polypogon monspeliensis
- Polystichum setiferum
- Spergula arvensis var. arvensis
- Stellaria pallida

Map 5 - Survey Area 1: NVC Classifcations and Rare/ Scarce/Threatened Species - NE

Scale @ A3 = 1 : 2000

NVC Classification

- 'Bare Ground'
- 'Building'
- 'Concrete Hardstanding'
- MG10a
- MG1a
- MG1b
- MG1e
- MG6a
- MG6b
- MG7b
- OV24a
- 'Pea Shingle'
- 'Surfaced Track'
- U1b
- U1d
- W10a
- W10c
- W10d
- W21a
- W22a
- W23a
- W23b
- W24a
- W24b
- W25a
- W25b
- W6b

N W E S

Dr Giles Groome CEcol CEnv MCIEEM 2024

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

Map 6 - Survey Area 1: NVC Classifcations and Rare/ Scarce/Threatened Species - SE

Scale @ A3 = 1 : 2000

NVC Classification

- 'Bare Ground'
- 'Building'
- 'Concrete Hardstanding'
- MG10a
- MG1a
- MG1b
- MG1e
- MG6a
- MG6b
- MG7b
- OV24a
- 'Pea Shingle'
- 'Surfaced Track'
- U1b
- U1d
- W10a
- W10c
- W10d
- W21a
- W22a
- W23a
- W23b
- W24a
- W24b
- W25a
- W25b
- W6b

Rare/Scarce/Threatened Species

- Agrostis canina
- Agrostis vinealis
- Athyrium filix-femina
- Calluna vulgaris
- Carex demissa
- Carex laevigata
- Cerastium semidecandrum
- Clinopodium nepeta
- Dryopteris affinis ssp. borreri
- Dryopteris carthusiana
- Erophila glabrescens
- Filago germanica
- Geranium rotundifolium
- Hypericum x desetangsii
- Knautia arvensis
- Lepidium campestre
- Logfia minima
- Myosotis discolor
- Myosotis ramosissima
- Poa infirma
- Polypogon monspeliensis
- Polystichum setiferum
- Spergula arvensis var. arvensis
- Stellaria pallida

N
W E
S

Dr Giles Groome CEcol CEnv MCIEEM 2024

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

Map 7 - Survey Area 1: NVC Classifcations and Rare/ Scarce/Threatened Species - SW

Scale @ A3 = 1 : 2000

NVC Classification

- 'Bare Ground'
- 'Building'
- 'Concrete Hardstanding'
- MG10a
- MG1a
- MG1b
- MG1e
- MG6a
- MG6b
- MG7b
- OV24a
- 'Pea Shingle'
- 'Surfaced Track'
- U1b
- U1d
- W10a
- W10c
- W10d
- W21a
- W22a
- W23a
- W23b
- W24a
- W24b
- W25a
- W25b
- W6b

Rare/Scarce/Threatened Species

- Agrostis canina
- Agrostis vinealis
- Athyrium filix-femina
- Calluna vulgaris
- Carex demissa
- Carex laevigata
- Cerastium semidecandrum
- Clinopodium nepeta
- Dryopteris affinis ssp. borreri
- Dryopteris carthusiana
- Erophila glabrescens
- Filago germanica
- Geranium rotundifolium
- Hypericum x desetangsii
- Knautia arvensis
- Lepidium campestre
- Logfia minima
- Myosotis discolor
- Myosotis ramosissima
- Poa infirma
- Polypogon monspeliensis
- Polystichum setiferum
- Spergula arvensis var. arvensis
- Stellaria pallida

N
W E
S

Dr Giles Groome CEcol CEnv MCIEEM 2024

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

Map 8 - Survey Area 1: NVC Classifcations and Rare/ Scarce/Threatened Species - W

Scale @ A3 = 1 : 2000

Rare/Scarce/Threatened Species

- Agrostis canina
- Agrostis vinealis
- Athyrium filix-femina
- Calluna vulgaris
- Carex demissa
- Carex laevigata
- Cerastium semidecandrum
- Clinopodium nepeta
- Dryopteris affinis ssp. borreri
- Dryopteris carthusiana
- Erophila glabrescens
- Filago germanica
- Geranium rotundifolium
- Hypericum x desetangsii
- Knautia arvensis
- Lepidium campestre
- Logfia minima
- Myosotis discolor
- Myosotis ramosissima
- Poa infirma
- Polypogon monspeliensis
- Polystichum setiferum
- Spergula arvensis var. arvensis
- Stellaria pallida

NVC Classification

- 'Bare Ground'
- 'Building'
- 'Concrete Hardstanding'
- MG10a
- MG1a
- MG1b
- MG1e
- MG6a
- MG6b
- MG7b
- OV24a
- 'Pea Shingle'
- 'Surfaced Track'
- U1b
- U1d
- W10a
- W10c
- W10d
- W21a
- W22a
- W23a
- W23b
- W24a
- W24b
- W25a
- W25b
- W6b

N
W E
S

Dr Giles Groome CEcol CEnv MCIEEM 2024

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

Map 9 - Survey Area 1: Priority Habitats

Scale @ A3 = 1 : 5000

Priority Habitat

- Hedgerows
- Lowland Dry Acid Grassland
- Lowland Meadows
- Lowland Mixed Deciduous Woodland
- Wet Woodland

N

W E

S

Dr Giles Groome CEcol CEnv MCIEEM 2024

Botanical and National Vegetation Classification Surveys of Middlewick Ranges 2024

Map 10 - Survey Area 2: Component Survey Areas

Scale @ A3 = 1 : 7400

Component Survey Area

- 1 Enclosed Grassland (North)
- 2 Butts (North)
- 3 Wet Woodland (North)
- 4 Woodland Edge and Hedgerows (North)
- 5 Public Grassland (North)
- 6 Wet Woodland (Centre)
- 7 Woodland Edge and Hedgerows (Centre)
- 8 Grassland (Centre)
- 9 Special (South)
- 10 Wet Woodland (South)
- 11 Woodland Edge and Hedgerows (South)
- 12 Grassland (South)

N
W E
S

Dr Giles Groome CEcol CEnv MCIEEM 2024

7 REFERENCES

BBS (2021) *BBS Census Catalogue Names 2021 V4.* (https://www.britishbryologicalsociety.org.uk/publications/census-catalogue/)

BLS (2019). *2019 BLS Checklist.* (https://www.britishlichensociety.org.uk/sites/www.britishlichensociety.org.uk/files/recording-mapping-downloads/BLS_General_v6f_2019.xlsx)

British Geological Survey (2024) *Geology of Britain*. http://mapapps.bgs.ac.uk/geologyofbritain/home.html (accessed 30th September 2024).

BSBI (2024) *County Rare Plant Register Guidelines – an update (2017)*. https://bsbi.org/rare-plant-registers (accessed 22nd October 2024).

Cheffings C M & Farrell L (2005) *Species Status No. 7. The Vascular Plant Red Data List for Great Britain*. JNCC, Peterborough.

Curson J, Howe M, Webb J, Heaver D & Tonhasca A (2019) *Guidelines for the Selection of Biological SSSIs Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 20 Invertebrates*. Joint Nature Conservation Committee, Peterborough

Dahl E & Hadač E (1941) Strandgesellschafen der Insel Ostoy in Oslofjord. Eine pflanzensoziologische Studie. *Nytt Magasin for Naturvidenskapene* B, 82, 251-312.

Dodd S, Edwards E & Groome G (in prep.) *Invertebrate Survey and Assessment of Middlewick Ranges, 2024-5*. Report to Colchester City Council.

Drewitt A L, Whitehead S & Cohen S (2020) *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 17 Birds (version 1.1)*. Joint Nature Conservation Committee, Peterborough.

Edwards M (2024) *Middlewick Ranges, Colchester; Entomological Survey Protocol, 2024*. Unpublished report by Edwards Ecological and Data Services, West Sussex.

EECOS (2017) *Colchester Borough Local Wildlife Site Review 2015. Final Report*. Essex Ecology Services Ltd., Colchester.

Essex Field Club (2002, updated 2009) *Essex Red Data List Species by Taxonomic Group: Vascular Plants*. https://www.essexfieldclub.org.uk/portal.php (accessed 20th April 2024).

Essex Field Club and Colchester Natural History Society (2024) *The Case for Middlewick*. Letter to Colchester City Council. http://bit.ly/middlewickranges (accessed 6th February 2024).

Essex Wildlife Trust (2023) *Acid Grassland in Essex Review*. Excel workbook. http://bit.ly/middlewickranges (accessed 22nd October 2024).

Friends of Middlewick Ranges (2024) *Middlewick Nightingale Project 2024. Headline Results and Implications (as of 24th May 2024)*. Unpublished report by the Friends of Middlewick Ranges.

Groome G (2014) *National Vegetation Classification Surveys of Langdon Meadows*. Unpublished report to Natural England, Cambridge.

Hewson C M, Miller M, Johnston A, Conway G J, Saunders R, Marchant J H & Fuller R J (2018) Estimating national population sizes: Methodological challenges and applications illustrated in the common nightingale, a declining songbird in the UK. *Journal of Applied Ecology*, 55. https://doi.org/10.1111/1365-2664.13120

Jefferson R G, Smith S L N & MacKintosh E J (2019) *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 3 Lowland Grasslands*. Joint Nature Conservation Committee, Peterborough.

JNCC (2011) *A Compilation of Proposed Additions and Revisions to Vegetation Types in the National Vegetation Classification*. Joint Nature Conservation Committee, Peterborough.

JNCC (2023) *Taxon Designations Spreadsheet (updated 6th December 2023),* http://jncc.defra.gov.uk/page-3428.

Maddock A (ed) (2008, updated 2011) *UK Biodiversity Action Plan. Priority Habitat Descriptions*. Biodiversity Reporting and Information Group, Peterborough.

Malloch A J C (1999) *MATCH Version 2 for Windows NT/95/98/2000*. Unit of Vegetation Science, University of Lancaster.

Natural England (2024) *Priority Habitats Inventory, 25th September 2024*. https://environment.data.gov.uk (accessed 22nd October 2024).

Rodwell J S (ed) (1991) *British Plant Communities, Volume 1: Woodlands and Scrub*. Cambridge University Press, Cambridge.

Rodwell J S (ed) (1992a) *British Plant Communities, Volume 2: Mires and Heaths*. Cambridge University Press, Cambridge.

Rodwell J S (ed) (1992b) *British Plant Communities, Volume 3: Grasslands and Montane Communities*. Cambridge University Press, Cambridge.

Rodwell J S (ed) (1995) *British Plant Communities, Volume 4: Aquatic Communities, Swamps and Tall-herb Fens*. Cambridge University Press, Cambridge.

Rodwell J S (ed) (2000) *British Plant Communities, Volume 5: Maritime Communities and Vegetation of Open Habitats*. Cambridge University Press, Cambridge.

Rodwell J S (2006) *National Vegetation Classification: Users' Handbook*. JNCC, Peterborough.

Soil Survey of England and Wales (1983) *Soils of England and Wales. Sheet 6. South East England*. Soil Survey of England and Wales, Harpenden.

Stace C (2019) *New Flora of the British Isles (Fourth Edition)*. Cambridge University Press, Cambridge.

Stantec (2020) *Middlewick Ranges. Local Plan Housing Allocation: Ecological Evidence Base Report*. Stantec, High Wycombe, Buckinghamshire.

Stewart A, Pearman D A & Preston C D (1994) *Scarce Plants in Britain*. JNCC, Peterborough.

Stroh P H, Leach S J, August T A, Walker K J, Pearman D A, Rumsey F J, Harrower C A, Fay M F, Martin J P, Pankhurst T, Preston C D, Taylor I (2014) *A Vascular Plant Red List for England*. Botanical Society of Britain and Ireland, Bristol.

WA Heritage (2008) *Fingringhoe and Middlewick Ranges and Friday Wood DTA Colchester Training Area DTE East, Essex. Archaeological Desk-based Assessment and Monument Condition Survey*. Wessex Archaeology, Salisbury.

Wessex Archaeology (2020) *Middlewick Ranges, Colchester, Essex. Archaeological Desk-Based Assessment*. Wessex Archaeology Ltd, Maidstone.

APPENDIX I – CHECKLIST OF NVC COMMUNITIES

The following list of NVC communities covers all community-types referred to in this report (nomenclature updated as per Section 1.4). Communities in **bold** were mapped during fieldwork; those in normal type are referred to in the text and were not mapped.

Woodland and Scrub Communities

W1 *Salix cinerea-Galium palustre* woodland
W6b *Alnus glutinosa-Urtica dioica* woodland, *Salix* x *fragilis* sub-community
W7b *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland, *Carex remota-Cirsium palustre* sub-community
W10a *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, typical sub-community
W10c *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Hedera helix* sub-community
W10d *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Holcus lanatus* sub-community
W21a *Crataegus monogyna-Hedera helix* scrub*, Hedera helix-Urtica dioica* sub-community
W22a *Prunus spinosa-Rubus fruticosus* scrub, *Hedera helix-Silene dioica* sub-community
W23a *Ulex europaeus-Rubus fruticosus* scrub, *Anthoxanthum odoratum* sub-community
W23b *Ulex europaeus-Rubus fruticosus* scrub, *Rumex acetosella* sub-community
W24a *Rubus fruticosus-Holcus lanatus* underscrub; *Cirsium arvense-Cirsium vulgare* sub-community
W24b *Rubus fruticosus-Holcus lanatus* underscrub; *Arrhenatherum elatius-Heracleum sphondylium* sub-community
W25a *Pteridium aquilinum-Rubus fruticosus* underscrub, *Hyacinthoides non-scripta* sub-community
W25b *Pteridium aquilinum-Rubus fruticosus* underscrub, *Teucrium scorodonia* sub-community

Grassland Communities

MG1a *Arrhenatherum elatius* grassland*, Festuca rubra* sub-community
MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community
MG1e *Arrhenatherum elatius* grassland*, Centaurea nigra* agg. sub-community
MG6a *Lolium perenne-Cynosurus cristatus* grassland, typical sub-community
MG6b *Lolium perenne-Cynosurus cristatus* grassland, *Anthoxanthum odoratum* sub-community
MG7b *Lolium perenne* leys and related grasslands, *Lolium perenne-Poa trivialis* leys
MG7e *Lolium perenne* leys and related grasslands, *Lolium perenne-Plantago lanceolata* grassland
MG10a *Holcus lanatus-Juncus effusus* rush-pasture, typical sub-community
MG10b *Holcus lanatus-Juncus effusus* rush-pasture, *Juncus inflexus* sub-community

U1b *Festuca ovina* agg.-*Agrostis capillaris-Rumex acetosella* grassland, typical sub-community
U1c *Festuca ovina* agg.-*Agrostis capillaris-Rumex acetosella* grassland, *Erodium cicutarium-Teesdalia nudicaulis* sub-community
U1d *Festuca ovina* agg.-*Agrostis capillaris-Rumex acetosella* grassland, *Anthoxanthum odoratum-Lotus corniculatus* sub-community
U1f *Festuca ovina* agg.-*Agrostis capillaris-Rumex acetosella* grassland, *Hypochaeris radicata* sub-community
U2a *Avenella flexuosa* grassland, *Festuca ovina* agg.-*Agrostis capillaris* sub-community
U20c *Pteridium aquilinum-Galium saxatile* community, species-poor sub-community

Swamp Communities

S26 *Phragmites australis-Urtica dioica* tall-herb fen

Vegetation of Open Habitats

OV18b *Polygonum aviculare-Matricaria discoidea* community, *Plantago major* sub-community
OV21b *Poa annua-Plantago major* community, *Lolium perenne* sub-community
OV21c *Poa annua-Plantago major* community, *Polygonum aviculare-Ranunculus repens* sub-community
OV23c *Lolium perenne-Dactylis glomerata* community, *Plantago major-Trifolium repens* sub-community
OV24a *Urtica dioica-Galium aparine* community, typical sub-community

APPENDIX II – SPECIES LIST FOR SURVEY AREA 1

Recorded 17th April to 11th September 2024 by Giles Groome. Nomenclature follows Stace (2019).

Taxon	Common Name	DAFOR
Acer campestre	Field Maple	R
Acer platanoides	Norway Maple	R
Acer pseudoplatanus	Sycamore	O
Achillea millefolium	Yarrow	F
Achillea millefolium ssp. *sudetica*	Yarrow	O
Aesculus hippocastanum	Horse-chestnut	R
Agrimonia eupatoria	Agrimony	R
Agrostis canina	Velvet Bet	R
Agrostis capillaris	Common Bent	A
Agrostis gigantea	Black Bent	R
Agrostis stolonifera	Creeping Bent	O
Agrostis vinealis	Brown Bent	R
Aira praecox	Early Hair-grass	LF
Ajuga reptans	Bugle	R
Alliaria petiolata	Garlic Mustard	LF
Allium vineale	Wild Onion	R
Alopecurus pratensis	Meadow Foxtail	R
Amsinckia micrantha	Common Fiddleneck	R
Angelica sylvestris	Wild Angelica	R
Anisantha diandra	Great Brome	R
Anisantha sterilis	Barren Brome	LF
Anthoxanthum odoratum	Sweet Vernal-grass	LA
Anthriscus caucalis	Bur Chervil	R
Anthriscus sylvestris	Cow Parsley	LA
Aphanes australis	Slender Parsley-piert	LF
Arabidopsis thaliana	Thale-cress	R
Arenaria leptoclados	Slender Sandwort	R
Arenaria serpyllifolia ssp. *serpyllifolia*	Thyme-leaved Sandwort	R
Armoracia rusticana	Horse-radish	R
Arrhenatherum elatius	False Oat-grass	LD
Artemisia absinthium	Wormwood	R
Artemisia vulgaris	Common Mugwort	O
Arum italicum ssp. *italicum*	Italian Lord's-and-ladies	R
Arum maculatum	Lord's-and-ladies	LF
Asplenium scolopendrium	Hart's-tongue	R
Athyrium filix-femina	Lady-fern	R
Avenella flexuosa	Wavy Hair-grass	R
Ballota nigra	Black Horehound	R
Bellis perennis	Daisy	LA
Betula pendula	Silver Birch	LF
Betula pubescens	Downy Birch	R
Betula x aurata	Hybrid Birch	R
Brachypodium sylvaticum	False-brome	R
Brassica napus	Rape	R
Bromus hordeaceus ssp. *hordeaceus*	Soft-brome	LA
Bryonia dioica	White Bryony	R
Buddleja davidii	Butterfly-bush	R
Callitriche stagnalis	Common Water-starwort	R
Calluna vulgaris	Heather	R
Calystegia silvatica	Large Bindweed	R
Capsella bursa-pastoris	Shepherd's-purse	R
Cardamine flexuosus	Wavy Bittercress	R
Carduus nutans	Musk Thistle	R
Carex acutiformis	Lesser Pond-sedge	R
Carex demissa	Common Yellow-sedge	R
Carex laevigata	Smooth-stalked Sedge	R
Carex leporina	Oval Sedge	R
Carex muricata ssp. *pairae*	Prickly Sedge	O
Carex pendula	Pendulous Sedge	R
Carex pseudocyperus	Cypress Sedge	R

Taxon	Common Name	DAFOR
Carex remota	Remote Sedge	LF
Carpinus betulus	Hornbeam	R
Centaurea nigra	Common Knapweed	O
Centaurium erythraea	Common Centaury	LF
Cerastium fontanum ssp. *vulgare*	Common Mouse-ear	O
Cerastium glomeratum	Sticky Mouse-ear	LF
Cerastium semidecandrum	Little Mouse-ear	LF
Cerastium tomentosum	Snow-in-summer	R
Chamaenerion angustifolium	Rosebay Willowherb	LA
Chenopodium album	Fat-hen	R
Circaea lutetiana	Enchanter's-nightshade	LF
Cirsium arvense	Creeping Thistle	R
Cirsium palustre	Marsh Thistle	R
Cirsium vulgare	Spear Thistle	O
Claytonia perfoliata	Springbeauty	R
Clinopodium nepeta	Lesser Calamint	R
Conium maculatum	Hemlock	R
Conopodium majus	Pignut	R
Convolvulus arvensis	Field Bindweed	O
Corylus avellana	Hazel	LF
Cotoneaster rehderi	Bullate Cotoneaster	R
Cotoneaster sternianus	Stern's Cotoneaster	R
Crataegus monogyna	Hawthorn	LD
Crepis capillaris	Smooth Hawk's-beard	O
Crepis vesicaria ssp. *taraxacifolia*	Beaked Hawk's-beard	O
Cytisus scoparius	Broom	LD
Dactylis glomerata	Cock's-foot	LA
Danthonia decumbens	Heath-grass	R
Daucus carota ssp. *carota*	Wild Carrot	R
Deschampsia cespitosa ssp. *cespitosa*	Tufted Hair-grass	O
Digitalis purpurea	Foxglove	O
Dryopteris affinis ssp. *borreri*	Borrer's Male-fern	R
Dryopteris carthusiana	Narrow Buckler-fern	R
Dryopteris dilatata	Broad Buckler-fern	O
Dryopteris filix-mas	Common Male-fern	R
Echinochloa crus-galli	Cockspur	R
Elymus repens	Common Couch	R
Epilobium brachycarpum	Panicled Willowherb	R
Epilobium ciliatum	American Willowherb	R
Epilobium hirsutum	Great Willowherb	R
Epilobium montanum	Broad-leaved Willowherb	R
Epilobium parviflorum	Hoary Willowherb	R
Epilobium tetragonum ssp. *tetragonum*	Square-stemmed Willowherb	O
Equisetum arvense	Field Horsetail	O
Erigeron canadensis	Canadian Fleabane	O
Erigeron sumatrensis	Guernsey Fleabane	R
Erodium cicutarium	Common Stork's-bill	LF
Erophila glabrescens	Glabrous Whitlowgrass	R
Erophila verna	Common Whitlowgrass	LF
Ervilla hirsuta	Hairy Tare	F
Eschscholzia californica	Mexican Poppy	R
Euonymus europaeus	Spindle	R
Euphorbia peplus	Petty Spurge	R
Fallopia baldschuanica	Russian-vine	R
Fallopia convolvulus	Black-bindweed	R
Festuca filiformis	Fine-leaved Sheep's-fescue	R
Festuca ovina ssp. *hirtula*	Sheep's-fescue	R
Festuca ovina ssp. *ovina*	Sheep's-fescue	R
Festuca rubra ssp. *commutata*	Chewing's Fescue	O
Festuca rubra ssp. *rubra*	Red Fescue	A
Ficaria verna	Lesser Celandine	O
Ficaria verna ssp. *fertilis*		+
Ficaria verna ssp. *verna*		+
Filago germanica	Common Cudweed	R

Taxon	Common Name	DAFOR
Foeniculum vulgare	Fennel	R
Fraxinus excelsior	Ash	R
Galeopsis bifida/tetrahit	Bifid/Common hemp-nettle	R
Galium album	Hedge Bedstraw	O
Galium aparine	Cleavers	LA
Galium palustre ssp*. elongatum*	Common Marsh-bedstraw	R
Galium saxatile	Heath Bedstraw	R
Geranium dissectum	Cut-leaved Crane's-bill	R
Geranium molle	Dove's-foot Crane's-bill	O
Geranium pusillum	Small-flowered Crane's-bill	LF
Geranium robertianum	Herb-Robert	LA
Geranium rotundifolium	Round-leaved Crane's-bill	R
Geranium sanguineum	Bloody Crane's-bill	R
Geum urbanum	Wood Avens	R
Glechoma hederacea	Ground-ivy	LF
Glyceria declinata	Small Sweet-grass	R
Glyceria fluitans	Floating Sweet-grass	R
Gnaphalium uliginosum	Marsh Cudweed	R
Hedera helix ssp. helix	Common Ivy	LA
Helminthotheca echioides	Bristly Oxtongue	R
Helosciadium nodiflorum	Fool's-water-cress	R
Heracleum sphondylium ssp*. sphondylium*	Hogweed	R
Hieracium sabaudum	Autumn Hawkweed	R
Hirschfeldia incana	Hoary Mustard	R
Holcus lanatus	Yorkshire-fog	LA
Holcus mollis	Creeping Soft-grass	LA
Hordeum murinum	Wall Barley	R
Humulus lupulus	Hop	R
Hyacinthoides non-scripta	Hybrid Bluebell	LA
Hyacinthoides x *massartiana*	Bluebell	LA
Hypericum perforatum	Perforate St John's-wort	O
Hypericum x *desetangsii*	Des Etangs' St John's-wort	R
Hypochaeris radicata	Common Cat's-ear	A
Ilex aquifolium	Holly	LA
Impatiens parviflora	Small Balsam	LD
Inula conyzae	Ploughman's-spikenard	R
Iris foetidissima	Stinking Iris	R
Iris pseudacorus	Yellow Iris	R
Jacobaea erucifolia	Hoary Ragwort	R
Jacobaea vulgaris	Common Ragwort	F
Juglans regia	Walnut	R
Juncus acutiflorus	Sharp-flowered Rush	R
Juncus bufonius	Toad Rush	R
Juncus effusus	Soft-rush	R
Juncus effusus var*. subglomeratus*	Soft-rush	R
Juncus tenuis	Slender Rush	R
Knautia arvensis	Field Scabious	O
Lactuca serriola	Prickly Lettuce	R
Lactuca virosa	Great Lettuce	O
Lamium album	White Dead-nettle	R
Lamium amplexicaule	Henbit Dead-nettle	R
Lamium hybridum	Cut-leaved Dead-nettle	R
Lamium purpureum	Red Dead-nettle	O
Lapsana communis	Nipplewort	R
Lathyrus latifolius	Broad-leaved Everlasting-pea	R
Leontodon saxatilis	Lesser Hawkbit	R
Lepidium campestre	Field Pepperwort	R
Lepidium didymum	Lesser Swine-cress	R
Leucanthemum vulgare	Oxeye Daisy	R
Linaria purpurea	Purple Toadflax	R
Linaria vulgaris	Common Toadflax	O
Logfia minima	Small Cudweed	R
Lolium perenne	Perennial Rye-grass	LA
Lonicera periclymenum	Honeysuckle	LA

Taxon	Common Name	DAFOR
Lotus corniculatus	Common Bird's-foot-trefoil	R
Lotus pedunculatus	Greater Bird's-foot-trefoil	R
Lunularia annua	Honesty	R
Luzula campestris	Field Wood-rush	A
Luzula multiflora	Heath Wood-rush	R
Lycopus europaeus	Gipsywort	R
Lysimachia arvensis	Scarlet Pimpernel	R
Mahonia aquifolium	Oregon-grape	R
Malus domestica	Apple	O
Malva multiflora	Smaller Tree-mallow	R
Malva sylvestris	Common Mallow	O
Matricaria discoidea ssp. *discoidea*	Pineappleweed	O
Medicago lupulina	Black Medick	R
Melilotus albus	White Melilot	R
Melilotus altissimus	Tall Melilot	R
Melilotus officinalis	Ribbed Melilot	R
Mentha aquatica	Water Mint	R
Moehringia trinervia	Three-nerved Sandwort	LF
Muscari armeniacum	Garden Grape-hyacinth	R
Myosotis arvensis	Field Forget-me-not	R
Myosotis discolor	Changing Forget-me-not	R
Myosotis ramosissima	Early Forget-me-not	R
Myosotis sylvatica	Wood Forget-me-not	R
Nardus stricta	Mat-grass	LF
Oenothera glazioviana	Large-flowered Evening-primrose	R
Ononis repens	Common Restharrow	R
Ornithogalum umbellatum ssp. *umbellatum*	Star-of-Bethlehem	R
Ornithopus perpusillus	Bird's-foot	LF
Oxalis debilis	Large-flowered Pink-sorrel	R
Oxybasis rubra	Red Goosefoot	R
Papaver cambricum	Welsh Poppy	R
Papaver lecoqii	Yellow-juiced Poppy	R
Papaver rhoeas	Common Poppy	R
Papaver setiferum	Oriental Poppy	R
Papaver somniferum ssp. *setigerum*	Opium Poppy	R
Papaver somniferum ssp. *somniferum*	Opium Poppy	R
Pastinaca sativa ssp. *sylvestris*	Wild Parsnip	R
Pentaglottis sempervirens	Green Alkanet	R
Persicaria hydropiper	Water-pepper	R
Persicaria maculosa	Redshank	R
Petrosedum rupestre	Reflexed Stonecrop	R
Phalaris arundinacea	Reed Canary-grass	R
Phleum bertolonii	Smaller Cat's-tail	R
Phleum pratense	Timothy	R
Pilosella officinarum	Mouse-ear-hawkweed	LA
Plantago coronopus	Buck's-horn Plantain	LF
Plantago lanceolata	Ribwort Plantain	F
Plantago major ssp. *major*	Greater Plantain	LF
Poa annua	Annual Meadow-grass	LA
Poa humilis	Spreading Meadow-grass	R
Poa infirma	Early Meadow-grass	R
Poa nemoralis	Wood Meadow-grass	R
Poa pratensis	Smooth Meadow-grass	LA
Poa trivialis	Rough Meadow-grass	LA
Polygonum aviculare	Knotgrass	O
Polygonum depressum	Equal-leaved Knotgrass	R
Polypogon monspeliensis	Annual Bear-grass	R
Polypogon viridis	Water Bent	R
Polystichum setiferum	Soft Shield-fern	R
Potentilla reptans	Creeping Cinquefoil	R
Primula veris	Cowslip	R
Prunella vulgaris	Selfheal	O
Prunus avium	Wild Cherry	LF
Prunus cerasifera	Cherry Plum	R

Taxon	Common Name	DAFOR
Prunus domestica	Wild Plum	R
Prunus laurocerasus	Cherry Laurel	R
Prunus serotina	Rum Cherry	R
Prunus spinosa	Blackthorn	LD
Prunus x *fruticans*	Hybrid Blackthorn	R
Pteridium aquilinum	Bracken	LD
Quercus cerris	Turkey Oak	R
Quercus ilex	Holm Oak	O
Quercus robur	Pedunculate Oak	LD
Quercus x *rosacea*	a hybrid Oak	R
Ranunculus acris ssp. *acris*	Meadow Buttercup	R
Ranunculus auricormis	Goldilocks Buttercup	R
Ranunculus bulbosus	Bulbous Buttercup	A
Ranunculus repens	Creeping Buttercup	O
Reseda lutea	Wild Mignonette	R
Reseda luteola	Weld	O
Ribes rubrum	Red Currant	LF
Ribes uva-crispa	Gooseberry	R
Robinia pseudoacacia	False-acacia	R
Rosa arvensis	Field Rose	R
Rosa canina	Dog Rose	R
Rosa squarrosa	Glandular Dog-rose	R
Rubus fruticosus agg.	Brambles	LD
Rubus idaeus	Raspberry	R
Rumex acetosa ssp. *acetosa*	Common Sorrel	A
Rumex acetosella ssp. *pyrenaicus*	Sheep's Sorrel	LA
Rumex conglomeratus	Clustered Dock	R
Rumex crispus ssp. *crispus*	Curled Dock	R
Rumex obtusifolius	Broad-leaved Dock	R
Rumex sanguineus	Wood Dock	R
Ruscus aculeatus	Butcher's-broom	R
Sagina filicaulis	Slender Pearlwort	R
Sagina procumbens	Procumbent Pearlwort	R
Salix alba	White Willow	R
Salix caprea ssp. *caprea*	Goat Willow	O
Salix cinerea ssp. *cinerea*	Grey Willow	R
Salix cinerea ssp. *oleifolia*	Grey Willow	R
Salix x *fragilis*	Crack Willow	LF
Salix x *reichardtii*	a hybrid Willow	R
Sambucus nigra	Elder	O
Schedonorus arundinaceus	Tall Fescue	LD
Schedonorus giganteus	Giant Fescue	R
Scorzoneroides autumnalis	Autumn Hawkbit	R
Scrophularia nodosa	Common Figwort	O
Scutellaria galericulata	Skullcap	R
Sedum acre	Biting Stonecrop	R
Senecio sylvaticus	Heath Ragwort	R
Senecio vulgaris ssp. *vulgaris*	Groundsel	O
Sherardia arvensis	Field Madder	R
Silene dioica	Red Campion	R
Silene latifolia ssp. *alba*	White Campion	O
Silene vulgaris ssp. *vulgaris*	Bladder Campion	R
Silene x *hampeana*	a hybrid Campion	R
Sisymbrium officinale	Hedge Mustard	R
Smyrnium olusatrum	Alexanders	O
Solanum dulcamara	Bittersweet	R
Sonchus arvensis	Perennial Sow-thistle	R
Sonchus asper	Prickly Sow-thistle	R
Sonchus oleraceus	Smooth Sow-thistle	R
Sorbus aria	Whitebeam	R
Sorbus aucuparia	Rowan	R
Sorbus intermedia	Swedish Whitebeam	R
Sparganium erectum	Branched Bur-reed	R
Spergula arvensis var. *arvensis*	Corn Spurrey	R

Taxon	Common Name	DAFOR
Spergularia rubra	Sand Spurrey	O
Stachys sylvatica	Hedge Woundwort	R
Stellaria graminea	Lesser Stitchwort	LA
Stellaria holostea	Greater Stitchwort	LA
Stellaria media	Common Chickweed	R
Stellaria pallida	Lesser Chickweed	R
Taraxacum agg.	Dandelion	O
Taxus baccata	Yew	R
Teucrium scorodonia	Wood Sage	R
Tragopogon pratensis ssp. *minor*	Goat's-beard	O
Trifolium arvense	Hare's-foot Clover	LA
Trifolium campestre	Hop Trefoil	O
Trifolium dubium	Lesser Trefoil	LA
Trifolium hybridum	Alsike Clover	R
Trifolium micranthum	Slender Trefoil	R
Trifolium pratense	Red Clover	O
Trifolium pratense var. *sativum*	Red Clover	R
Trifolium repens	White Clover	O
Trifolium striatum	Knotted Clover	R
Tripleurospermum inodorum	Scentless Mayweed	R
Trisetum flavescens	Yellow Oat-grass	R
Triticum aestivum	Bread Wheat	R
Tussilago farfara	Colt's-foot	R
Ulex europaeus	Gorse	LD
Ulmus procera	English Elm	LD
Ulmus x *vegeta*	Huntingdon Elm	R
Urtica dioica ssp. *dioica*	Common Nettle	LA
Verbascum thapsus	Great Mullein	R
Veronica arvensis	Wall Speedwell	LF
Veronica beccabunga	Brooklime	R
Veronica chamaedrys	Germander Speedwell	O
Veronica hederifolia ssp. *lucorum*	Ivy-leaved Speedwell	LA
Vicia sativa ssp. *nigra*	Narrow-leaved Vetch	R
Vicia sativa ssp. *segetalis*	Common Vetch	O
Vinca major	Greater Periwinkle	R
Viola arvensis	Field Pansy	R
Viola odorata	Sweet Violet	R
Vulpia bromoides	Squirreltail Fescue	LA
Vulpia myuros	Rat's-tail Fescue	O

APPENDIX III – SPECIES LISTS FOR SURVEY AREA 2

Recorded 10th to 14th June 2024 by Giles Groome. Nomenclature follows Stace (2019).

Taxon	Component Survey Area (Table 1, Map 10)											
	1	2	3	4	5	6	7	8	9	10	11	12
Acer platanoides					x						x	x
Acer pseudoplatanus			x	x						x	x	
Achillea millefolium	x	x		x	x		x	x	x		x	x
Achillea millefolium var. *sudetica*	x											
Aesculus hippocastanum							x		x		x	
Agrimonia eupatoria	x								x			
Agrostis canina						x						
Agrostis capillaris	x	x	x	x	x	x	x	x	x	x	x	x
Agrostis stolonifera		x				x			x		x	
Aira praecox	x	x		x	x							
Ajuga reptans			x			x				x		
Alliaria petiolata			x	x		x	x			x	x	
Allium vineale				x								
Alnus glutinosa										x	x	
Alopecurus pratensis				x	x		x	x	x			
Amsinckia micrantha	x											
Anacamptis pyramidalis									x			
Anemone nemorosa										x		
Angelica sylvestris			x			x	x			x		
Anisantha sterilis	x	x		x							x	
Anthoxanthum odoratum	x	x	x	x	x	x	x	x	x	x	x	x
Anthriscus caucalis		x										
Anthriscus sylvestris	x	x	x	x	x		x		x		x	x
Aphanes australis	x	x										
Arabidopsis thaliana	x	x										
Arenaria leptoclados		x										
Arenaria serpyllifolia	x	x										
Armoracia rusticana				x					x			
Arrhenatherum elatius	x	x	x	x	x	x	x	x	x	x	x	x
Artemisia vulgaris	x	x			x				x		x	x
Arum maculatum			x			x	x		x	x		
Asplenium scolopendrium			x			x				x		
Athyrium filix-femina			x			x				x		
Avenella flexuosa		x		x								
Ballota nigra		x		x	x		x					
Bellis perennis	x	x		x	x		x	x	x	x	x	x
Berberis thunbergii											x	
Betula pendula	x	x	x	x		x	x			x	x	x
Betula pubescens		x	x			x	x			x	x	
Betula x *aurata*			x			x					x	
Blechnum spicant										x		
Brachypodium sylvaticum		x	x			x	x					
Brassica napus		x										
Bromus hordeaceus ssp. *hordeaceus*	x	x	x	x	x	x	x	x	x		x	x
Bryonia dioica				x			x				x	
Buddleja davidii	x	x										x
Callitriche stagnalis			x			x						
Calluna vulgaris	x	x										
Calystegia silvatica						x	x		x		x	
Capsella bursa-pastoris	x	x										
Cardamine flexuosus			x			x				x	x	
Cardamine pratensis						x						
Carex acutiformis			x		x			x				
Carex demissa			x									
Carex divulsa ssp. *divulsa*										x		
Carex hirta									x		x	
Carex laevigata			x							x		
Carex leporina			x			x						
Carex muricata ssp. *pairae*	x	x	x	x	x	x	x	x	x	x	x	x

Taxon	Component Survey Area (Table 1, Map 10)											
	1	2	3	4	5	6	7	8	9	10	11	12
Carex otrubae											x	
Carex pendula			x			x				x		
Carex pseudocyperus			x									
Carex remota			x			x	x			x	x	
Carex spicata							x		x			
Carpinus betulus			x									
Castanea sativa										x	x	
Centaurea nigra/debeauxii	x	x		x	x		x	x	x		x	x
Centaurium erythraea		x							x		x	
Cerastium fontanum	x	x		x	x			x	x	x	x	x
Cerastium glomeratum	x	x		x								
Cerastium semidecandrum	x	x		x								
Chaerophyllum temulum							x					
Chamaenerion angustifolium	x			x	x		x			x	x	x
Circaea lutetiana			x			x	x			x	x	
Cirsium arvense	x	x	x	x	x		x	x	x	x	x	x
Cirsium palustre				x		x						
Cirsium vulgare	x	x	x	x	x		x		x	x	x	x
Clinopodium nepeta				x	x							
Conium maculatum		x		x	x		x		x		x	
Convolvulus arvensis	x	x		x	x		x	x	x			x
Corylus avellana			x	x		x	x			x		
Cotoneaster rehderi			x									
Cotoneaster salicifolius										x		
Cotoneaster sternianus			x									
Crataegus monogyna	x	x	x	x	x	x	x	x	x	x	x	x
Crepis capillaris	x	x		x	x		x	x	x		x	x
Crepis vesicaria		x			x							
Cupressus lawsoniana										x		
Cynosurus cristatus									x			
Cytisus scoparius	x	x	x	x		x	x		x	x	x	x
Dactylis glomerata	x	x	x	x	x	x	x	x	x	x	x	x
Daucus carota ssp. *carota*							x					x
Deschampsia cespitosa				x			x			x		
Digitalis purpurea	x	x	x	x	x	x	x			x	x	
Diplotaxis tenufolia											x	
Dipsacus fullonum									x		x	
Dryopteris affinis ssp. *affinis*										x		
Dryopteris affinis ssp. *borreri*			x			x				x	x	
Dryopteris carthusiana			x			x						
Dryopteris dilatata			x			x				x		
Dryopteris filix-mas	x		x			x	x			x	x	
Eleocharis palustris ssp. *waltersii*									x			
Elymus repens					x		x					
Epilobium ciliatum	x					x			x		x	
Epilobium hirsutum				x		x		x	x		x	x
Epilobium montanum			x									
Epilobium parviflorum	x	x					x					
Epilobium tetragonum	x	x	x					x	x	x	x	
Equisetum arvense		x										
Equisetum sylvaticum										x		
Erigeron acris											x	
Erigeron canadensis	x	x		x								
Erodium cicutarium	x	x					x		x			
Erophila verna		x										
Ervilla hirsuta	x	x		x	x		x	x	x	x	x	x
Ervum tetraspermum									x	x	x	
Euonymus europaeus			x									
Euphorbia oblongata											x	
Fagus sylvatica										x		
Fallopia baldschuanica							x					
Festuca filiformis	x	x										
Festuca ovina ssp. *hirtula*	x											
Festuca ovina ssp. *ovina*	x	x										

Taxon	Component Survey Area (Table 1, Map 10)											
	1	2	3	4	5	6	7	8	9	10	11	12
Festuca rubra ssp. *commutata*	x	x						x				
Festuca rubra ssp. *rubra*	x	x	x	x	x	x	x	x	x	x	x	x
Ficaria verna			x			x						
Filago germanica		x									x	
Foeniculum vulgare		x										
Fraxinus excelsior			x	x	x	x	x		x	x	x	
Galeopsis bifida/tetrahit						x				x		
Galium album										x		
Galium aparine	x	x	x	x	x	x	x	x	x	x	x	x
Galium palustre ssp. *elongatum*					x					x		
Galium saxatile				x								
Galium verum								x				
Geranium dissectum	x	x	x	x	x		x	x	x	x	x	x
Geranium molle	x	x		x			x	x	x	x	x	x
Geranium pusillum	x	x										
Geranium pyrenaicum									x		x	
Geranium robertianum			x	x		x	x		x	x	x	
Geranium rotundifolium		x							x			
Geranium sanguineum				x								
Geum urbanum			x	x		x	x			x	x	
Glechoma hederacea			x			x	x		x	x	x	
Glyceria fluitans			x			x	x					
Gnaphalium uliginosum		x										
Hedera helix	x	x	x	x		x	x		x	x	x	
Helminthotheca echioides	x	x		x					x		x	x
Helosciadium nodiflorum			x			x						
Heracleum sphondylium	x		x				x	x		x	x	x
Hieracium agg.		x										
Holcus lanatus	x	x	x	x	x	x	x	x	x	x	x	x
Holcus mollis	x	x	x	x	x	x	x	x	x	x	x	x
Hordeum murinum		x		x			x				x	
Humulus lupulus			x			x						
Hyacinthoides spp.			x	x		x	x			x	x	
Hypericum perforatum	x	x		x	x		x	x	x	x	x	x
Hypericum tetrapterum										x		
Hypochaeris radicata	x	x	x	x	x		x	x	x	x	x	x
Ilex aquifolium	x	x	x	x		x	x			x	x	
Impatiens parviflora			x	x		x				x		
Iris pseudacorus			x			x				x		
Jacobaea erucifolia		x		x					x			
Jacobaea vulgaris	x	x	x	x	x	x	x	x	x	x	x	x
Juglans regia	x											
Juncus acutiflorus									x			
Juncus articulatus									x			
Juncus bufonius		x										
Juncus conglomeratus						x			x	x		
Juncus effusus			x	x		x	x		x	x	x	
Juncus inflexus									x			
Knautia arvensis	x				x		x	x			x	x
Lactuca serriola		x										x
Lactuca virosa	x	x		x	x		x	x			x	x
Lamium amplexicaule	x											
Lapsana communis		x		x			x			x	x	
Lathyrus odoratus							x					
Lathyrus pratensis							x		x			
Lemna minor						x						
Leontodon saxatilis		x							x			
Lepidium campestre	x	x							x			
Lepidium didymum	x	x										
Lepidium draba									x			
Lepidium heterophyllum								x				
Lepidium latifolium									x			
Leucanthemum vulgare	x	x			x		x	x	x		x	x
Linaria vulgaris		x		x			x				x	x

Taxon	Component Survey Area (Table 1, Map 10)											
	1	2	3	4	5	6	7	8	9	10	11	12
Logfia minima		x										
Lolium perenne	x	x	x	x	x	x	x	x	x		x	x
Lonicera periclymenum		x	x	x		x	x		x	x	x	
Lonicera tatarica							x					
Lotus corniculatus	x	x			x		x				x	x
Lotus pedunculatus	x	x		x	x		x		x			x
Lunularia annua							x					
Luzula campestris	x	x		x	x		x	x				x
Lycopus europaeus			x			x				x		
Lysimachia arvensis										x	x	
Lysimachia nemorum									x			
Mahonia aquifolium				x								
Malus domestica		x		x	x	x	x		x	x	x	
Malva neglecta									x			
Malva sylvestris	x	x			x		x				x	
Matricaria discoidea	x			x	x		x				x	
Medicago arabica									x		x	
Medicago lupulina	x	x		x					x		x	
Melilotus albus		x										
Melilotus altissimus		x										
Mentha aquatica			x						x			
Moehringia trinervia			x			x	x			x		
Myosotis arvensis									x	x	x	x
Myosotis discolor									x	x	x	
Myosotis ramosissima	x											
Nardus stricta	x											
Odontites vernus ssp*. serotinus*									x			
Ononis repens		x										
Ophrys apifera									x			
Ornithopus perpusillus	x	x		x			x					
Oxalis acetosella										x		
Oxalis debilis				x	x						x	
Papaver lecoqii		x										
Papaver rhoeas	x	x									x	
Papaver setiferum		x										
Papaver somniferum ssp*. setiferum*		x										
Papaver somniferum ssp*. somniferum*		x										
Pastinaca sativa ssp*. sylvestris*				x					x	x	x	x
Pentaglottis sempervirens	x	x		x			x					
Persicaria hydropiper		x	x			x						
Petrosedum rupestre				x								
Phalaris arundinacea			x			x				x		
Phleum bertolonii		x		x			x	x	x		x	x
Phleum pratense				x					x		x	
Phragmites australis									x		x	
Pilosella officinarum	x	x		x	x		x	x		x	x	x
Pinus sylvestris										x		
Plantago coronopus	x	x		x	x		x		x		x	
Plantago lanceolata	x	x		x	x	x	x	x	x	x	x	x
Plantago major	x	x		x	x	x	x	x	x	x	x	x
Poa annua	x	x	x	x	x		x	x	x		x	x
Poa humilis		x										
Poa nemoralis			x							x	x	
Poa pratensis	x	x	x	x	x	x	x	x	x		x	x
Poa trivialis	x	x	x	x	x	x	x	x	x	x	x	x
Polygonum aviculare	x	x		x			x				x	x
Polygonum depressum		x		x			x				x	
Polypodium vulgare						x						
Polypogon monspeliensis		x										
Polystichum setiferum			x			x				x		
Populus tremula						x	x				x	
Populus x canadensis										x		
Potentilla argentea									x		x	
Potentilla reptans				x					x	x	x	x

Taxon	Component Survey Area (Table 1, Map 10)											
	1	2	3	4	5	6	7	8	9	10	11	12
Potentilla x *mixta*									x			
Prunella vulgaris			x			x			x	x		
Prunus avium	x		x	x		x	x			x	x	x
Prunus cerasifera						x					x	
Prunus domestica				x		x	x	x	x	x	x	
Prunus laurocerasus			x			x						
Prunus lusitanica						x					x	
Prunus spinosa	x	x	x	x	x	x	x	x	x	x	x	x
Prunus x *fruticans*			x	x		x	x				x	
Pteridium aquilinum			x	x		x	x			x	x	
Pulicaria dysenterica									x			
Quercus cerris	x						x					
Quercus ilex		x	x	x		x	x			x	x	
Quercus robur	x	x	x	x	x	x	x	x	x	x	x	x
Quercus x *rosacea*		x									x	
Ranunculus acris				x	x		x	x	x	x	x	x
Ranunculus bulbosus	x	x		x	x		x	x				x
Ranunculus repens	x	x	x	x	x	x	x	x	x	x	x	x
Reseda luteola	x	x		x	x							
Reynoutria japonica									x			
Ribes nigrum										x		
Ribes rubrum			x			x	x			x		
Ribes uva-crispa						x				x		
Robinia pseudoacacia							x					
Rosa arvensis			x			x				x		
Rosa canina	x			x		x	x		x	x	x	
Rosa canina agg.												x
Rosa corymbifera							x		x			
Rosa squarrosa				x			x		x		x	
Rubus fruticosus agg.	x	x	x	x	x	x	x	x	x	x	x	x
Rubus idaeus	x					x						
Rumex acetosa	x	x	x	x	x		x	x	x	x	x	x
Rumex acetosella	x	x	x	x	x		x	x		x	x	x
Rumex conglomeratus			x			x				x	x	
Rumex crispus	x	x		x	x		x	x	x		x	x
Rumex obtusifolius	x			x	x	x			x	x	x	x
Rumex sanguineus			x	x		x	x		x	x	x	
Rumex x pratensis											x	x
Ruscus aculeatus				x			x					
Sagina procumbens	x											
Salix alba				x					x	x	x	
Salix caprea ssp. *caprea*			x			x	x			x	x	
Salix cinerea ssp. *cinerea*			x			x	x	x		x	x	
Salix cinerea ssp. *oleifolia*			x						x	x		
Salix x *fragilis*			x	x	x	x				x	x	
Salix x *reichardtii*	x		x			x					x	
Sambucus nigra		x	x	x		x	x	x	x	x	x	x
Schedonorus arundinaceus					x							x
Scrophularia nodosa							x			x	x	
Scutellaria galericulata			x			x						
Senecio sylvaticus	x	x										
Senecio vulgaris	x	x									x	
Sherardia arvensis	x	x										
Silene dioica				x								x
Silene latifolia ssp. *alba*	x	x			x		x		x	x	x	x
Silene vulgaris		x										
Silene x *hampeana*				x								
Sison amomum									x		x	
Sisymbrium officinale	x	x					x				x	
Smyrnium olusatrum				x								
Solanum dulcamara			x	x		x	x	x	x		x	
Sonchus arvensis	x										x	
Sonchus asper	x	x		x	x			x	x		x	x
Sonchus oleraceus	x	x					x					

Taxon	Component Survey Area (Table 1, Map 10)											
	1	2	3	4	5	6	7	8	9	10	11	12
Sorbus aria				x								
Sorbus aucuparia			x			x				x	x	
Sorbus intermedia					x							
Sparganium erectum			x			x						
Spergula arvensis var. arvensis	x	x										
Spergularia rubra	x	x										
Stachys sylvatica			x			x	x			x		
Stellaria graminea	x	x		x	x		x	x	x		x	x
Stellaria holostea		x	x	x		x	x			x	x	x
Stellaria media	x	x		x								
Symphytum orientale							x					
Symphytum x *uplandicum*									x		x	
Tamus communis						x						
Taraxacum agg.	x	x	x	x	x	x	x	x	x	x	x	x
Taxus baccata	x						x					
Teucrium scorodonia			x	x		x						
Torilis japonica									x			
Tragopogon pratensis	x	x		x				x	x		x	x
Trifolium arvense	x	x		x			x					
Trifolium campestre	x	x			x		x		x	x	x	x
Trifolium dubium	x	x		x	x		x	x	x	x	x	x
Trifolium hybridum					x							
Trifolium micranthum	x	x		x	x		x	x	x		x	
Trifolium ornithopodioides									x		x	
Trifolium pratense		x		x	x						x	x
Trifolium pratense var. *sativum*					x							
Trifolium repens	x	x		x	x		x	x	x	x	x	x
Trifolium striatum	x						x		x			
Trisetum flavescens				x				x				
Typha latifolia						x						
Ulex europaeus	x	x	x	x	x	x				x	x	
Ulmus procera			x	x	x	x	x	x			x	
Ulmus x *vegeta*			x			x	x			x	x	
Urtica dioica ssp. *dioica*	x	x	x	x	x	x	x	x	x	x	x	x
Veronica arvensis	x	x			x		x		x	x	x	x
Veronica beccabunga			x			x						
Veronica chamaedrys	x		x	x	x	x	x		x	x	x	x
Veronica montana						x				x	x	
Veronica officinalis										x		
Vicia sativa ssp. *nigra*								x				.
Vicia sativa ssp. *segetalis*	x	x		x	x		x	x	x	x	x	x
Vinca major							x					
Viola arvensis		x										
Viola odorata					x		x					
Viola riviniana						x				x		
Vulpia bromoides	x	x	x	x	x		x	x	x	x	x	x
Vulpia myuros	x	x		x								

APPENDIX IV – SPECIES LIST FOR THE SURVEY SITE

Taxon	Common Name
Acer campestre	Field Maple
Acer platanoides	Norway Maple
Acer pseudoplatanus	Sycamore
Achillea millefolium	Yarrow
Achillea millefolium ssp. *sudetica*	Yarrow
Aesculus hippocastanum	Horse-chestnut
Agrimonia eupatoria	Agrimony
Agrostis canina	Velvet Bent
Agrostis capillaris	Common Bent
Agrostis gigantea	Black Bent
Agrostis stolonifera	Creeping Bent
Agrostis vinealis	Brown Bent
Aira praecox	Early Hair-grass
Ajuga reptans	Bugle
Alliaria petiolata	Garlic Mustard
Allium vineale	Wild Onion
Alnus glutinosa	Alder
Alopecurus pratensis	Meadow Foxtail
Amsinckia micrantha	Common Fiddleneck
Anacamptis pyramidalis	Pyramidal Orchid
Anemone nemorosa	Wood Anemone
Angelica sylvestris	Wild Angelica
Anisantha diandra	Great Brome
Anisantha sterilis	Barren Brome
Anthoxanthum odoratum	Sweet Vernal-grass
Anthriscus caucalis	Bur Chervil
Anthriscus sylvestris	Cow Parsley
Aphanes australis	Slender Parsley-piert
Arabidopsis thaliana	Thale-cress
Arenaria leptoclados	Slender Sandwort
Arenaria serpyllifolia ssp. *serpyllifolia*	Thyme-leaved Sandwort
Armoracia rusticana	Horse-radish
Arrhenatherum elatius	False Oat-grass
Artemisia absinthium	Wormwood
Artemisia vulgaris	Common Mugwort
Arum italicum ssp. *italicum*	Italian Lord's-and-ladies
Arum maculatum	Lord's-and-ladies
Asplenium scolopendrium	Hart's-tongue
Athyrium filix-femina	Lady-fern
Avenella flexuosa	Wavy Hair-grass
Ballota nigra	Black Horehound
Bellis perennis	Daisy
Berberis thunbergii	Thunberg's Barberry
Betula pendula	Silver Birch
Betula pubescens	Downy Birch
Betula x aurata	Hybrid Birch
Blechnum spicant	Hard-fern
Brachypodium sylvaticum	False-brome
Brassica napus	Rape
Bromus hordeaceus ssp. *hordeaceus*	Soft-brome
Bryonia dioica	White Bryony
Buddleja davidii	Butterfly-bush
Callitriche stagnalis	Common Water-starwort
Calluna vulgaris	Heather
Calystegia silvatica	Large Bindweed
Capsella bursa-pastoris	Shepherd's-purse
Cardamine flexuosus	Wavy Bittercress
Cardamine pratensis	Cuckooflower
Carduus nutans	Musk Thistle
Carex acutiformis	Lesser Pond-sedge
Carex demissa	Common Yellow-sedge
Carex divulsa ssp. *divulsa*	Grey Sedge

Taxon	Common Name
Carex hirta	Hairy Sedge
Carex laevigata	Smooth-stalked Sedge
Carex leporina	Oval Sedge
Carex muricata ssp. *pairae*	Prickly Sedge
Carex otrubae	False Fox-sedge
Carex pendula	Pendulous Sedge
Carex pseudocyperus	Cypress Sedge
Carex remota	Remote Sedge
Carex spicata	Spiked Sedge
Carpinus betulus	Hornbeam
Castanea sativa	Sweet Chestnut
Centaurea nigra	Common Knapweed
Centaurium erythraea	Common Centaury
Cerastium fontanum ssp. *vulgare*	Common Mouse-ear
Cerastium glomeratum	Sticky Mouse-ear
Cerastium semidecandrum	Little Mouse-ear
Cerastium tomentosum	Snow-in-summer
Chaerophyllum temulum	Rough Chervil
Chamaenerion angustifolium	Rosebay Willowherb
Chenopodium album	Fat-hen
Circaea lutetiana	Enchanter's-nightshade
Cirsium arvense	Creeping Thistle
Cirsium palustre	Marsh Thistle
Cirsium vulgare	Spear Thistle
Claytonia perfoliata	Springbeauty
Clinopodium nepeta	Lesser Calamint
Conium maculatum	Hemlock
Conopodium majus	Pignut
Convolvulus arvensis	Field Bindweed
Corylus avellana	Hazel
Cotoneaster rehderi	Bullate Cotoneaster
Cotoneaster salicifolius	Willow-leaved Cotoneaster
Cotoneaster sternianus	Stern's Cotoneaster
Crataegus monogyna	Hawthorn
Crepis capillaris	Smooth Hawk's-beard
Crepis vesicaria ssp. *taraxacifolia*	Beaked Hawk's-beard
Cupressus lawsoniana	Lawson's Cypress
Cynosurus cristatus	Crested Dog's-tail
Cytisus scoparius	Broom
Dactylis glomerata	Cock's-foot
Danthonia decumbens	Heath-grass
Daucus carota ssp. *carota*	Wild Carrot
Deschampsia cespitosa ssp. *cespitosa*	Tufted Hair-grass
Digitalis purpurea	Foxglove
Diplotaxis tenufolia	Perennial Wall-rocket
Dipsacus fullonum	Wild Teasel
Dryopteris affinis ssp. *affinis*	Scaly Male-fern
Dryopteris affinis ssp. *borreri*	Borrer's Male-fern
Dryopteris carthusiana	Narrow Buckler-fern
Dryopteris dilatata	Broad Buckler-fern
Dryopteris filix-mas	Common Male-fern
Echinochloa crus-galli	Cockspur
Eleocharis palustris ssp. *waltersii*	Common Spike-rush
Elymus repens	Common Couch
Epilobium brachycarpum	Panicled Willowherb
Epilobium ciliatum	American Willowherb
Epilobium hirsutum	Great Willowherb
Epilobium montanum	Broad-leaved Willowherb
Epilobium parviflorum	Hoary Willowherb
Epilobium tetragonum ssp. *tetragonum*	Square-stemmed Willowherb
Equisetum arvense	Field Horsetail
Equisetum sylvaticum	Wood Horsetail
Erigeron acris	Blue Fleabane
Erigeron canadensis	Canadian Fleabane

Taxon	Common Name
Erigeron sumatrensis	Guernsey Fleabane
Erodium cicutarium	Common Stork's-bill
Erophila glabrescens	Glabrous Whitlowgrass
Erophila verna	Common Whitlowgrass
Ervilla hirsuta	Hairy Tare
Ervum tetraspermum	Smooth Tare
Eschscholzia californica	Mexican Poppy
Euonymus europaeus	Spindle
Euphorbia oblongata	Balkan Spurge
Euphorbia peplus	Petty Spurge
Fagus sylvatica	Beech
Fallopia baldschuanica	Russian-vine
Fallopia convolvulus	Black-bindweed
Festuca filiformis	Fine-leaved Sheep's-fescue
Festuca ovina ssp. *hirtula*	Sheep's-fescue
Festuca ovina ssp. *ovina*	Sheep's-fescue
Festuca rubra ssp. *commutata*	Chewing's Fescue
Festuca rubra ssp. *rubra*	Red Fescue
Ficaria verna ssp. *fertilis*	Lesser Celandine
Ficaria verna ssp. *verna*	Lesser Celandine
Filago germanica	Common Cudweed
Foeniculum vulgare	Fennel
Fraxinus excelsior	Ash
Galeopsis bifida/tetrahit	Bifid/Common hemp-nettle
Galium album	Hedge Bedstraw
Galium aparine	Cleavers
Galium palustre ssp. *elongatum*	Common Marsh-bedstraw
Galium saxatile	Heath Bedstraw
Galium verum	Lady's Bedstraw
Geranium dissectum	Cut-leaved Crane's-bill
Geranium molle	Dove's-foot Crane's-bill
Geranium pusillum	Small-flowered Crane's-bill
Geranium pyrenaicum	Hedgerow Crane's-bill
Geranium robertianum	Herb-Robert
Geranium rotundifolium	Round-leaved Crane's-bill
Geranium sanguineum	Bloody Crane's-bill
Geum urbanum	Wood Avens
Glechoma hederacea	Ground-ivy
Glyceria declinata	Small Sweet-grass
Glyceria fluitans	Floating Sweet-grass
Gnaphalium uliginosum	Marsh Cudweed
Hedera helix ssp. helix	Common Ivy
Helminthotheca echioides	Bristly Oxtongue
Helosciadium nodiflorum	Fool's-water-cress
Heracleum sphondylium ssp. *sphondylium*	Hogweed
Hieracium sabaudum	Autumn Hawkweed
Hirschfeldia incana	Hoary Mustard
Holcus lanatus	Yorkshire-fog
Holcus mollis	Creeping Soft-grass
Hordeum murinum	Wall Barley
Humulus lupulus	Hop
Hyacinthoides non-scripta	Hybrid Bluebell
Hyacinthoides x massartiana	Bluebell
Hypericum perforatum	Perforate St John's-wort
Hypericum tetrapterum	Square-stemmed St John's-wort
Hypericum x *desetangsii*	Des Etangs' St John's-wort
Hypochaeris radicata	Common Cat's-ear
Ilex aquifolium	Holly
Impatiens parviflora	Small Balsam
Inula conyzae	Ploughman's-spikenard
Iris foetidissima	Stinking Iris
Iris pseudacorus	Yellow Iris
Jacobaea erucifolia	Hoary Ragwort
Jacobaea vulgaris	Common Ragwort

Taxon	Common Name
Juglans regia	Walnut
Juncus acutiflorus	Sharp-flowered Rush
Juncus articulatus	Jointed Rush
Juncus bufonius	Toad Rush
Juncus conglomeratus	Compact Rush
Juncus effusus	Soft-rush
Juncus effusus var. *subglomeratus*	Soft-rush
Juncus inflexus	Hard Rush
Juncus tenuis	Slender Rush
Knautia arvensis	Field Scabious
Lactuca serriola	Prickly Lettuce
Lactuca virosa	Great Lettuce
Lamium album	White Dead-nettle
Lamium amplexicaule	Henbit Dead-nettle
Lamium hybridum	Cut-leaved Dead-nettle
Lamium purpureum	Red Dead-nettle
Lapsana communis	Nipplewort
Lathyrus latifolius	Broad-leaved Everlasting-pea
Lathyrus pratensis	Meadow Vetchling
Lemna minor	Common Duckweed
Leontodon saxatilis	Lesser Hawkbit
Lepidium campestre	Field Pepperwort
Lepidium didymum	Lesser Swine-cress
Lepidium draba	Hoary Cress
Lepidium heterophyllum	Smith's Pepperwort
Lepidium latifolium	Dittander
Leucanthemum vulgare	Oxeye Daisy
Linaria purpurea	Purple Toadflax
Linaria vulgaris	Common Toadflax
Logfia minima	Small Cudweed
Lolium perenne	Perennial Rye-grass
Lonicera periclymenum	Honeysuckle
Lonicera tatarica	Tartarian Honeysuckle
Lotus corniculatus	Common Bird's-foot-trefoil
Lotus pedunculatus	Greater Bird's-foot-trefoil
Lunularia annua	Honesty
Luzula campestris	Field Wood-rush
Luzula multiflora	Heath Wood-rush
Lycopus europaeus	Gipsywort
Lysimachia arvensis	Scarlet Pimpernel
Lysimachia nemorum	Yellow Pimpernel
Mahonia aquifolium	Oregon-grape
Malus domestica	Apple
Malva multiflora	Smaller Tree-mallow
Malva neglecta	Dwarf Mallow
Malva sylvestris	Common Mallow
Matricaria discoidea ssp. *discoidea*	Pineappleweed
Medicago arabica	Spotted Medick
Medicago lupulina	Black Medick
Melilotus albus	White Melilot
Melilotus altissimus	Tall Melilot
Melilotus officinalis	Ribbed Melilot
Mentha aquatica	Water Mint
Moehringia trinervia	Three-nerved Sandwort
Muscari armeniacum	Garden Grape-hyacinth
Myosotis arvensis	Field Forget-me-not
Myosotis discolor	Changing Forget-me-not
Myosotis ramosissima	Early Forget-me-not
Myosotis sylvatica	Wood Forget-me-not
Nardus stricta	Mat-grass
Odontites vernus ssp. *serotinus*	Red Bartsia
Oenothera glazioviana	Large-flowered Evening-primrose
Ononis repens	Common Restharrow
Ophrys apifera	Bee Orchid

Taxon	Common Name
Ornithogalum umbellatum ssp. *umbellatum*	Star-of-Bethlehem
Ornithopus perpusillus	Bird's-foot
Oxalis acetosella	Wood-sorrel
Oxalis debilis	Large-flowered Pink-sorrel
Oxybasis rubra	Red Goosefoot
Papaver cambricum	Welsh Poppy
Papaver lecoqii	Yellow-juiced Poppy
Papaver rhoeas	Common Poppy
Papaver setiferum	Oriental Poppy
Papaver somniferum ssp. *setigerum*	Opium Poppy
Papaver somniferum ssp. *somniferum*	Opium Poppy
Pastinaca sativa ssp. *sylvestris*	Wild Parsnip
Pentaglottis sempervirens	Green Alkanet
Persicaria hydropiper	Water-pepper
Persicaria maculosa	Redshank
Petrosedum rupestre	Reflexed Stonecrop
Phalaris arundinacea	Reed Canary-grass
Phleum bertolonii	Smaller Cat's-tail
Phleum pratense	Timothy
Phragmites australis	Common Reed
Pilosella officinarum	Mouse-ear-hawkweed
Pinus sylvestris	Scots Pine
Plantago coronopus	Buck's-horn Plantain
Plantago lanceolata	Ribwort Plantain
Plantago major ssp. *major*	Greater Plantain
Poa annua	Annual Meadow-grass
Poa humilis	Spreading Meadow-grass
Poa infirma	Early Meadow-grass
Poa nemoralis	Wood Meadow-grass
Poa pratensis	Smooth Meadow-grass
Poa trivialis	Rough Meadow-grass
Polygonum aviculare	Knotgrass
Polygonum depressum	Equal-leaved Knotgrass
Polypodium vulgare	Common Polypody
Polypogon monspeliensis	Annual Bear-grass
Polypogon viridis	Water Bent
Polystichum setiferum	Soft Shield-fern
Populus tremula	Aspen
Populus x *canadensis*	Hybrid Black-poplar
Potentilla argentea	Hoary Cinquefoil
Potentilla reptans	Creeping Cinquefoil
Potentilla x mixta	Hybrid Cinquefoil
Primula veris	Cowslip
Prunella vulgaris	Selfheal
Prunus avium	Wild Cherry
Prunus cerasifera	Cherry Plum
Prunus domestica	Wild Plum
Prunus laurocerasus	Cherry Laurel
Prunus lusitanica	Portugal Laurel
Prunus serotina	Rum Cherry
Prunus spinosa	Blackthorn
Prunus x *fruticans*	Hybrid Blackthorn
Pteridium aquilinum	Bracken
Pulicaria dysenterica	Common Fleabane
Quercus cerris	Turkey Oak
Quercus ilex	Holm Oak
Quercus robur	Pedunculate Oak
Quercus x rosacea	a hybrid Oak
Ranunculus acris ssp. *acris*	Meadow Buttercup
Ranunculus auricormis	Goldilocks Buttercup
Ranunculus bulbosus	Bulbous Buttercup
Ranunculus repens	Creeping Buttercup
Reseda lutea	Wild Mignonette
Reseda luteola	Weld

Taxon	Common Name
Reynoutria japonica	Japanese Knotweed
Ribes nigrum	Black Currant
Ribes rubrum	Red Currant
Ribes uva-crispa	Gooseberry
Robinia pseudoacacia	False-acacia
Rosa arvensis	Field Rose
Rosa canina	Dog Rose
Rosa corymbifera	Hairy Dog-rose
Rosa squarrosa	Glandular Dog-rose
Rubus fruticosus agg.	Brambles
Rubus idaeus	Raspberry
Rumex acetosa ssp. *acetosa*	Common Sorrel
Rumex acetosella ssp. *pyrenaicus*	Sheep's Sorrel
Rumex conglomeratus	Clustered Dock
Rumex crispus ssp. *crispus*	Curled Dock
Rumex obtusifolius	Broad-leaved Dock
Rumex sanguineus	Wood Dock
Rumex x pratensis	a hybrid Dock
Ruscus aculeatus	Butcher's-broom
Sagina filicaulis	Slender Pearlwort
Sagina procumbens	Procumbent Pearlwort
Salix alba	White Willow
Salix caprea ssp. *caprea*	Goat Willow
Salix cinerea ssp. *cinerea*	Grey Willow
Salix cinerea ssp. *oleifolia*	Grey Willow
Salix x *fragilis*	Crack Willow
Salix x *reichardtii*	a hybrid Willow
Sambucus nigra	Elder
Schedonorus arundinaceus	Tall Fescue
Schedonorus giganteus	Giant Fescue
Scorzoneroides autumnalis	Autumn Hawkbit
Scrophularia nodosa	Common Figwort
Scutellaria galericulata	Skullcap
Sedum acre	Biting Stonecrop
Senecio sylvaticus	Heath Ragwort
Senecio vulgaris ssp. vulgaris	Groundsel
Sherardia arvensis	Field Madder
Silene dioica	Red Campion
Silene latifolia ssp. *alba*	White Campion
Silene vulgaris ssp. *vulgaris*	Bladder Campion
Silene x *hampeana*	a hybrid Campion
Sison amomum	Stone Parsley
Sisymbrium officinale	Hedge Mustard
Smyrnium olusatrum	Alexanders
Solanum dulcamara	Bittersweet
Sonchus arvensis	Perennial Sow-thistle
Sonchus asper	Prickly Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Sorbus aria	Whitebeam
Sorbus aucuparia	Rowan
Sorbus intermedia	Swedish Whitebeam
Sparganium erectum	Branched Bur-reed
Spergula arvensis var. *arvensis*	Corn Spurrey
Spergularia rubra	Sand Spurrey
Stachys sylvatica	Hedge Woundwort
Stellaria graminea	Lesser Stitchwort
Stellaria holostea	Greater Stitchwort
Stellaria media	Common Chickweed
Stellaria pallida	Lesser Chickweed
Symphytum orientale	White Comfrey
Symphytum x *uplandicum*	Russian Comfrey
Tamus communis	Black Bryony
Taraxacum agg.	Dandelion
Taxus baccata	Yew

Taxon	Common Name
Teucrium scorodonia	Wood Sage
Tragopogon pratensis ssp*. minor*	Goat's-beard
Trifolium arvense	Hare's-foot Clover
Trifolium campestre	Hop Trefoil
Trifolium dubium	Lesser Trefoil
Trifolium hybridum	Alsike Clover
Trifolium micranthum	Slender Trefoil
Trifolium ornithopodioides	Bird's-foot Clover
Trifolium pratense	Red Clover
Trifolium pratense var sativum	Red Clover (horticultural)
Trifolium repens	White Clover
Trifolium striatum	Knotted Clover
Tripleurospermum inodorum	Scentless Mayweed
Trisetum flavescens	Yellow Oat-grass
Triticum aestivum	Bread Wheat
Tussilago farfara	Colt's-foot
Typha latifolia	Bulrush
Ulex europaeus	Gorse
Ulmus procera	English Elm
Ulmus x *vegeta*	Huntingdon Elm
Urtica dioica ssp*. dioica*	Common Nettle
Verbascum thapsus	Great Mullein
Veronica arvensis	Wall Speedwell
Veronica beccabunga	Brooklime
Veronica chamaedrys	Germander Speedwell
Veronica hederifolia ssp*. lucorum*	Ivy-leaved Speedwell
Veronica montana	Wood Speedwell
Veronica officinalis	Heath Speedwell
Vicia sativa ssp*. nigra*	Narrow-leaved Vetch
Vicia sativa ssp*. segetalis*	Common Vetch
Vinca major	Greater Periwinkle
Viola arvensis	Field Pansy
Viola odorata	Sweet Violet
Viola riviniana	Common Dog-violet
Vulpia bromoides	Squirreltail Fescue
Vulpia myuros	Rat's-tail Fescue

APPENDIX V – RESULTS OF MATCH ANALYSIS FOR MG1a QUADRATS

The matching procedures have produced the following results for sample 1

Community code	co-efficient	
MG 7C	24.7	0 subcommunities.
MG 7B	21.7	0 subcommunities.
MG 1	21.5	5 subcommunities.
W25	21.0	2 subcommunities.
MG 7E	20.8	0 subcommunities.
MG 7D	20.4	0 subcommunities.
W23	20.0	3 subcommunities.
OV27	19.7	5 subcommunities.
MG 6	18.9	3 subcommunities.
MG 5	18.8	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 1c	25.7
MG 1b	25.1
MG 7C	24.7
OV27b	24.6
MG 1a	24.0
W25a	22.6
MG 6b	22.1
MG 7B	21.7
MG 1	21.5
W25	21.0

The matching procedures have produced the following results for sample 2

Community code	co-efficient	
MG 1	33.3	5 subcommunities.
MG 7E	31.3	0 subcommunities.
W23	29.7	3 subcommunities.
MG 9	28.9	2 subcommunities.
MG 5	28.7	3 subcommunities.
MC 9	28.1	5 subcommunities.
W24	27.4	2 subcommunities.
MG 6	27.3	3 subcommunities.
MC12	26.8	2 subcommunities.
MG 7D	26.4	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 1e	36.0
MG 1a	34.5
W23b	34.2
MG 9b	33.7
MG 1	33.3
MG 1c	32.7
MC 9b	32.6
MG 7E	31.3
MG 1d	30.6
W23	29.7

The matching procedures have produced the following results for sample 3

Community code	co-efficient	
MG 7E	41.3	0 subcommunities.
MG 1	39.2	5 subcommunities.
MG 7D	38.7	0 subcommunities.
MG 9	38.5	2 subcommunities.
MG 7B	38.2	0 subcommunities.
MC12	38.1	2 subcommunities.
MG 6	36.7	3 subcommunities.
MG 7C	36.6	0 subcommunities.
MC 9	36.3	5 subcommunities.
SD 9	34.5	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 9b	46.1
SD 9a	42.5
MC 9b	41.3
MG 7E	41.3
MC 9c	40.6
MG 1e	40.3
MG 1a	40.3
MG 1c	40.2
MG 1	39.2
MG 6b	39.0

The matching procedures have produced the following results for sample 4

Community code	co-efficient	
OV27	24.9	5 subcommunities.
MG 1	18.7	5 subcommunities.
W24	18.0	2 subcommunities.
S 7	17.6	0 subcommunities.
MC12	17.0	2 subcommunities.
OV24	16.9	2 subcommunities.
MG 9	16.7	2 subcommunities.
SD18	16.2	2 subcommunities.
MG10	15.4	3 subcommunities.
SD 9	15.2	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 9b	27.0
MG 1b	26.4
OV27	24.9
OV27a	24.7
MG 1c	23.5
SD 9a	22.3
MG 1a	21.3
MG10a	20.4
SD18b	20.2
MC12b	19.3

The matching procedures have produced the following results for sample 5

Community code	co-efficient	
MG 1	29.8	5 subcommunities.
OV24	29.8	2 subcommunities.
MG 7E	28.7	0 subcommunities.
W24	28.4	2 subcommunities.
MG 7D	27.0	0 subcommunities.
MG 7B	25.7	0 subcommunities.
OV27	25.5	5 subcommunities.
MG 9	24.0	2 subcommunities.
W23	23.8	3 subcommunities.
OV23	22.6	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 1b	40.1
MG 9b	36.9
MG 1c	36.5
MG 1a	31.7
OV23d	30.3
MG 1	29.8
OV24	29.8
W24b	29.1
OV24b	28.8
MG 7E	28.7

The matching procedures have produced the following results for Combined data

The N.V.C. communities most closely matching the test data are:

1.	MG 1	coefficient =	49.2,	5 subcommunities.
2.	MG 9	coefficient =	44.3,	2 subcommunities.
3.	OV27	coefficient =	44.2,	5 subcommunities.
4.	MG 7C	coefficient =	40.4,	0 subcommunities.
5.	MG 7D	coefficient =	40.3,	0 subcommunities.
6.	MG 7E	coefficient =	39.8,	0 subcommunities.
7.	SD18	coefficient =	39.8,	2 subcommunities.
8.	W23	coefficient =	39.4,	3 subcommunities.
9.	W24	coefficient =	38.5,	2 subcommunities.
10.	MG 6	coefficient =	38.3,	3 subcommunities.

The N.V.C subcommunities most closely matching the test data are:

1.	MG 1a	coefficient =	51.5
2.	MG 1	coefficient =	49.2
3.	MG 1c	coefficient =	49.2
4.	MG 9b	coefficient =	49.0
5.	MG 1b	coefficient =	48.3
6.	OV27b	coefficient =	44.6
7.	MG 9	coefficient =	44.3
8.	OV27	coefficient =	44.2
9.	MG 1e	coefficient =	42.6
10.	MG 9a	coefficient =	42.2

APPENDIX VI – RESULTS OF MATCH ANALYSIS FOR MG6a QUADRATS

The matching procedures have produced the following results for sample 1

Community code	co-efficient	
MG 7E	57.5	0 subcommunities.
MG 7D	48.8	0 subcommunities.
OV23	47.5	4 subcommunities.
MG 6	44.7	3 subcommunities.
MG 7F	44.2	0 subcommunities.
MG 7B	42.2	0 subcommunities.
MG 7C	38.3	0 subcommunities.
MC 9	36.9	5 subcommunities.
MG 5	36.6	3 subcommunities.
MG 7A	36.5	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 7E	57.5
MG 6c	53.0
OV23c	52.2
MG 7D	48.8
OV23	47.5
MG 6b	46.4
MG 6	44.7
MG 7F	44.2
MG 6a	43.8
MC 9b	43.8

The matching procedures have produced the following results for sample 2

Community code	co-efficient	
MC12	41.2	2 subcommunities.
MC 3	41.1	0 subcommunities.
MC 9	35.8	5 subcommunities.
MC 7	32.7	0 subcommunities.
MG 7D	30.7	0 subcommunities.
MC 8	30.5	7 subcommunities.
MG 7E	30.2	0 subcommunities.
MG 6	29.5	3 subcommunities.
OV27	27.3	5 subcommunities.
W23	27.0	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MC12b	45.9
MC 9e	43.7
MC 8d	42.6
MC12	41.2
MC 3	41.1
MC 9b	40.2
MC 8g	37.8
MC 9	35.8
MC 9a	35.7
MC 9d	35.1

The matching procedures have produced the following results for sample 3

Community code	co-efficient	
MG 7E	53.8	0 subcommunities.
MG 6	43.9	3 subcommunities.
MG 5	43.2	3 subcommunities.
MG 7D	42.2	0 subcommunities.
MG 7F	41.7	0 subcommunities.
MG 7B	41.6	0 subcommunities.
MG 7C	41.3	0 subcommunities.
OV23	39.9	4 subcommunities.
MC 9	38.6	5 subcommunities.
MG 3	37.8	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 7E	53.8
MG 6c	52.0
MG 6b	45.5
MC 9c	45.0
MG 6	43.9
MG 5	43.2
MG 6a	43.1
MG 5a	42.3
MG 7D	42.2
OV23c	41.9

The matching procedures have produced the following results for sample 4

Community code	co-efficient	
MG 7C	30.5	0 subcommunities.
MG 7D	30.3	0 subcommunities.
MG 9	27.3	2 subcommunities.
MG 7B	27.1	0 subcommunities.
MG 1	26.8	5 subcommunities.
OV27	24.4	5 subcommunities.
MG 7E	23.5	0 subcommunities.
W23	21.3	3 subcommunities.
MG10	20.7	3 subcommunities.
W24	20.1	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 9b	32.8
MG 1c	32.6
MG 7C	30.5
MG 7D	30.3
MG 1a	30.2
MG 1b	30.0
MG 9	27.3
OV27b	27.2
MG 7B	27.1
MG 1	26.8

The matching procedures have produced the following results for sample 5

Community code	co-efficient	
OV27	26.3	5 subcommunities.
W23	23.2	3 subcommunities.
MG 7E	21.2	0 subcommunities.
MG 9	20.9	2 subcommunities.
MG 1	19.7	5 subcommunities.
W24	19.1	2 subcommunities.
MG 7B	19.1	0 subcommunities.
MG 6	19.0	3 subcommunities.
SD10	18.3	2 subcommunities.
MG 7D	18.0	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 9b	30.7
OV27a	29.9
MG 1b	27.1
OV27	26.3
W23b	25.4
MG 1c	24.2
W23a	23.4
W23	23.2
MG 6b	22.5
OV27b	22.4

The matching procedures have produced the following results for Combined data

The N.V.C. communities most closely matching the test data are:

1.	MG 7E	coefficient =	58.3,	0 subcommunities.
2.	MG 7D	coefficient =	53.6,	0 subcommunities.
3.	MG 6	coefficient =	53.3,	3 subcommunities.
4.	MG 9	coefficient =	52.8,	2 subcommunities.
5.	MG 7C	coefficient =	52.6,	0 subcommunities.
6.	MG 1	coefficient =	48.0,	5 subcommunities.
7.	MG 7F	coefficient =	46.3,	0 subcommunities.
8.	MG 7B	coefficient =	44.7,	0 subcommunities.
9.	OV23	coefficient =	44.4,	4 subcommunities.
10.	OV27	coefficient =	42.9,	5 subcommunities.

The N.V.C subcommunities most closely matching the test data are:

1.	MG 7E	coefficient =	58.3
2.	MG 6a	coefficient =	54.8
3.	MG 1a	coefficient =	54.5
4.	MG 9b	coefficient =	53.9
5.	MG 7D	coefficient =	53.6
6.	MG 6	coefficient =	53.3
7.	MG 9	coefficient =	52.8
8.	MG 6b	coefficient =	52.8
9.	MG 7C	coefficient =	52.6
10.	MG 6c	coefficient =	49.9

APPENDIX VII – RESULTS OF MATCH ANALYSIS FOR MG6b QUADRATS

The matching procedures have produced the following results for sample 1

Community code	co-efficient	
MC 9	41.1	5 subcommunities.
MG 5	40.0	3 subcommunities.
SD 8	39.0	5 subcommunities.
SD 7	37.4	4 subcommunities.
MG 7F	37.2	0 subcommunities.
SD 9	35.9	2 subcommunities.
MG 7E	35.9	0 subcommunities.
MG 3	35.5	2 subcommunities.
MG 6	35.3	3 subcommunities.
SD12	31.6	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MC 9c	44.4
MC 9b	41.1
MC 9	41.1
MG 6b	40.7
SD 8a	40.2
MG 5	40.0
MC 9e	39.9
MC 9a	39.3
SD 7a	39.0
SD 8	39.0

The matching procedures have produced the following results for sample 2

Community code	co-efficient	
SD12	33.7	2 subcommunities.
U 4	29.2	5 subcommunities.
W23	28.9	3 subcommunities.
U 1	26.1	6 subcommunities.
U20	25.8	3 subcommunities.
SD 8	25.7	5 subcommunities.
MC 9	25.6	5 subcommunities.
MC 3	24.5	0 subcommunities.
MC12	24.1	2 subcommunities.
MG 5	22.5	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
SD12a	36.0
W23b	34.5
SD12	33.7
U 4a	33.2
W23a	32.7
U 4b	32.3
MC 9e	30.9
SD12b	30.5
U20a	29.8
U 4	29.2

The matching procedures have produced the following results for Sample 3

Community code	co-efficient	
MG 7F	33.7	0 subcommunities.
SD 8	33.4	5 subcommunities.
SD12	32.9	2 subcommunities.
W23	32.7	3 subcommunities.
SD 9	32.7	2 subcommunities.
MG 5	32.2	3 subcommunities.
MG 6	31.4	3 subcommunities.
MC 9	29.2	5 subcommunities.
U 4	29.0	5 subcommunities.
SD 7	28.0	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 4b	38.8
W23a	37.2
MG 6b	36.2
SD 9a	36.1
SD12b	35.0
SD 8d	34.5
SD 8b	34.0
MG 7F	33.7
SD12a	33.6
SD 8	33.4

The matching procedures have produced the following results for sample 4

Community code	co-efficient	
U 1	30.2	6 subcommunities.
SD12	29.7	2 subcommunities.
W23	26.5	3 subcommunities.
U 4	23.7	5 subcommunities.
SD 8	23.2	5 subcommunities.
SD11	22.7	2 subcommunities.
SD 7	22.1	4 subcommunities.
U20	19.0	3 subcommunities.
MC 9	18.8	5 subcommunities.
U 5	18.8	5 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 1b	33.5
SD12a	32.5
SD12b	30.3
U 1	30.2
W23b	30.2
SD12	29.7
U 1e	28.8
U 1f	27.6
SD 8b	27.2
W23	26.5

The matching procedures have produced the following results for sample 5

Community code	co-efficient	
W23	27.8	3 subcommunities.
SD12	23.6	2 subcommunities.
U 1	23.0	6 subcommunities.
CG 6	20.3	2 subcommunities.
U 4	19.3	5 subcommunities.
U 2	18.6	2 subcommunities.
SD10	18.3	2 subcommunities.
MC 9	17.8	5 subcommunities.
MC 8	17.7	7 subcommunities.
U20	17.6	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
W23b	34.2
W23a	29.6
W23	27.8
U 1f	27.1
U 1e	25.8
U 1b	25.1
SD12	23.6
SD12a	23.4
U 1	23.0
U20a	22.6

The matching procedures have produced the following results for sample 6

Community code	co-efficient	
MG 5	40.9	3 subcommunities.
MC 9	39.2	5 subcommunities.
MG 3	38.6	2 subcommunities.
MC12	36.2	2 subcommunities.
MG 7D	35.3	0 subcommunities.
MG 7E	34.6	0 subcommunities.
SD12	34.4	2 subcommunities.
W23	34.3	3 subcommunities.
SD 9	34.0	2 subcommunities.
MG 6	33.8	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MC 9c	44.3
MG 6b	43.8
MG 5c	43.2
MC 9b	42.8
MC 9e	41.7
MG 5	40.9
W23b	39.9
MG 5b	39.7
MC 9	39.2
MG 5a	39.0

The matching procedures have produced the following results for sample 7

Community code	co-efficient	
MG 5	43.2	3 subcommunities.
MG 7E	36.1	0 subcommunities.
SD 8	35.4	5 subcommunities.
SD 9	33.9	2 subcommunities.
MG 3	33.6	2 subcommunities.
U 4	32.6	5 subcommunities.
MG 6	32.6	3 subcommunities.
MC 9	32.1	5 subcommunities.
MG 4	30.4	0 subcommunities.
SD 7	30.0	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 4b	43.4
MG 5	43.2
MG 5b	42.0
MG 5a	40.8
MG 5c	40.7
MG 6b	40.3
SD 8b	37.6
MC 9e	36.6
U 4a	36.2
MG 7E	36.1

The matching procedures have produced the following results for sample 8

Community code	co-efficient	
MG 3	34.9	2 subcommunities.
MG 5	34.9	3 subcommunities.
MC 9	32.2	5 subcommunities.
MC12	31.7	2 subcommunities.
MG 7D	31.0	0 subcommunities.
SD12	31.0	2 subcommunities.
U 4	28.9	5 subcommunities.
MG 7E	28.9	0 subcommunities.
W23	28.8	3 subcommunities.
MG 6	28.6	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 5c	38.2
MG 6b	38.2
MC 9e	37.5
MC 9b	37.0
U 4b	36.5
SD12a	35.4
MG 3	34.9
MG 5	34.9
MC 9c	33.5
MG 5a	33.2

The matching procedures have produced the following results for sample 9

Community code	co-efficient	
MG 5	38.9	3 subcommunities.
MG 3	38.1	2 subcommunities.
MC 9	38.0	5 subcommunities.
MG 7E	33.9	0 subcommunities.
SD12	32.6	2 subcommunities.
W23	32.2	3 subcommunities.
MC12	31.9	2 subcommunities.
MG 7D	31.7	0 subcommunities.
MG 6	30.7	3 subcommunities.
U 1	30.1	6 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MC 9b	41.5
W23b	41.5
MC 9e	40.3
MG 5c	40.1
MG 6b	39.6
SD12a	39.5
MG 5	38.9
MC 9c	38.8
MG 3	38.1
MC 9	38.0

The matching procedures have produced the following results for sample 10

Community code	co-efficient	
MC 9	35.1	5 subcommunities.
MG 3	34.3	2 subcommunities.
MG 5	33.5	3 subcommunities.
MG 7E	32.6	0 subcommunities.
MC12	32.2	2 subcommunities.
MC 3	32.1	0 subcommunities.
MG 6	30.6	3 subcommunities.
MG 7D	29.8	0 subcommunities.
MG 1	29.6	5 subcommunities.
MG 9	29.1	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MC 9e	45.9
MG 6b	37.8
MC 9b	36.6
MC 9	35.1
MC 9a	35.0
MG 1e	34.7
MC 9d	34.6
MG 3a	34.5
MC12b	34.4
MG 3	34.3

The matching procedures have produced the following results for Combined data

The N.V.C. communities most closely matching the test data are:

1.	W23	coefficient =	48.0,	3 subcommunities.
2.	MG 5	coefficient =	46.0,	3 subcommunities.
3.	MG 6	coefficient =	43.2,	3 subcommunities.
4.	SD12	coefficient =	42.3,	2 subcommunities.
5.	SD 8	coefficient =	42.3,	5 subcommunities.
6.	SD 7	coefficient =	41.9,	4 subcommunities.
7.	MC 9	coefficient =	41.7,	5 subcommunities.
8.	MG 1	coefficient =	40.9,	5 subcommunities.
9.	SD 9	coefficient =	40.6,	2 subcommunities.
10.	U 1	coefficient =	40.1,	6 subcommunities.

The N.V.C subcommunities most closely matching the test data are:

1.	W23b	coefficient =	49.6
2.	MG 6b	coefficient =	49.3
3.	W23	coefficient =	48.0
4.	MG 5	coefficient =	46.0
5.	MG 1e	coefficient =	45.9
6.	SD 8b	coefficient =	44.9
7.	SD 9a	coefficient =	44.7
8.	MG 5a	coefficient =	44.1
9.	MG 5b	coefficient =	43.5
10.	MG 6	coefficient =	43.2

APPENDIX VIII – RESULTS OF MATCH ANALYSIS FOR U1b QUADRATS

The matching procedures have produced the following results for sample 1

Community code	co-efficient	
U 1	32.6	6 subcommunities.
SD11	27.3	2 subcommunities.
SD12	25.3	2 subcommunities.
H11	23.7	3 subcommunities.
H 1	22.1	5 subcommunities.
CG10	21.6	3 subcommunities.
U 3	20.6	0 subcommunities.
SD 7	19.6	4 subcommunities.
CG 7	19.4	4 subcommunities.
U 5	19.2	5 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 1	32.6
U 1a	32.6
H11a	30.0
U 1f	29.7
U 1b	29.6
SD11a	29.5
U 1c	28.4
SD12a	28.4
SD11	27.3
U 1d	26.0

The matching procedures have produced the following results for sample 2

Community code	co-efficient	
U 1	28.0	6 subcommunities.
SD 7	27.5	4 subcommunities.
OV23	26.2	4 subcommunities.
MG 7E	25.1	0 subcommunities.
SD 8	22.0	5 subcommunities.
MG 6	20.4	3 subcommunities.
SD19	20.0	0 subcommunities.
MG 5	20.0	3 subcommunities.
MG 7F	19.6	0 subcommunities.
MC 5	18.6	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 1c	30.1
U 1	28.0
SD 7	27.5
U 1b	27.4
SD 7a	26.7
OV23c	26.4
OV23	26.2
U 1d	26.1
SD 7b	25.8
SD 7d	25.4

The matching procedures have produced the following results for sample 3

Community code	co-efficient	
U 1	33.1	6 subcommunities.
SD 7	31.7	4 subcommunities.
SD 8	26.2	5 subcommunities.
MC10	23.8	3 subcommunities.
MC 9	23.1	5 subcommunities.
MC11	21.0	3 subcommunities.
SD11	20.9	2 subcommunities.
SD 9	20.8	2 subcommunities.
SD12	20.8	2 subcommunities.
MG 5	19.5	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 1b	35.6
U 1d	33.9
U 1	33.1
SD 7a	32.9
U 1f	32.7
SD 7	31.7
U 1c	30.2
SD 7d	28.7
SD 8a	27.8
MC 9c	27.3

The matching procedures have produced the following results for sample 4

Community code	co-efficient	
SD12	34.2	2 subcommunities.
U 1	31.3	6 subcommunities.
W23	28.3	3 subcommunities.
SD 7	28.2	4 subcommunities.
U 4	24.0	5 subcommunities.
U20	23.7	3 subcommunities.
SD 8	21.9	5 subcommunities.
U 3	21.8	0 subcommunities.
SD11	21.0	2 subcommunities.
H 1	20.9	5 subcommunities.

Matches against sub-communities.

Community code	co-efficient
W23b	37.1
SD12a	34.8
SD12	34.2
U 1f	33.5
SD12b	32.9
U 1b	31.7
U 1	31.3
SD 7d	28.4
W23	28.3
SD 7	28.2

The matching procedures have produced the following results for sample 5

Community code	co-efficient	
SD 7	30.4	4 subcommunities.
U 1	30.1	6 subcommunities.
W23	24.2	3 subcommunities.
SD12	23.9	2 subcommunities.
SD11	23.1	2 subcommunities.
SD 8	18.1	5 subcommunities.
SD16	18.0	4 subcommunities.
SD18	17.7	2 subcommunities.
MC 9	17.6	5 subcommunities.
H 1	17.6	5 subcommunities.

Matches against sub-communities.

Community code	co-efficient
W23b	33.2
SD 7a	31.8
SD 7	30.4
U 1b	30.4
U 1	30.1
SD 7b	29.4
SD 7d	28.7
U 1d	26.8
U 1f	26.6
SD12a	26.4

The matching procedures have produced the following results for sample 6

Community code	co-efficient	
U 1	30.5	6 subcommunities.
SD11	21.1	2 subcommunities.
SD12	19.0	2 subcommunities.
H11	17.6	3 subcommunities.
OV37	15.1	3 subcommunities.
H 7	14.2	5 subcommunities.
OV 2	14.0	0 subcommunities.
H 1	14.0	5 subcommunities.
SD 7	13.9	4 subcommunities.
H 8	13.6	5 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 1b	33.7
U 1	30.5
U 1c	30.1
U 1f	29.0
U 1d	25.8
U 1a	23.4
U 1e	22.7
SD11a	22.6
SD12b	21.4
SD11	21.1

The matching procedures have produced the following results for sample 7

Community code	co-efficient	
U 1	26.0	6 subcommunities.
SD11	23.8	2 subcommunities.
H11	17.2	3 subcommunities.
SD12	14.8	2 subcommunities.
U 2	14.5	2 subcommunities.
W23	14.1	3 subcommunities.
SD10	12.2	2 subcommunities.
OV 1	10.6	0 subcommunities.
H 8	10.4	5 subcommunities.
OV 2	9.9	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 1f	32.0
U 1b	30.2
U 1	26.0
U 1e	26.0
SD11	23.8
SD11a	21.7
U 1c	21.5
U 2a	20.3
U 1d	20.1
U 1a	19.0

The matching procedures have produced the following results for sample 8

Community code	co-efficient	
SD11	21.5	2 subcommunities.
U 1	20.9	6 subcommunities.
H11	16.9	3 subcommunities.
H 9	13.8	5 subcommunities.
W23	13.4	3 subcommunities.
SD12	12.7	2 subcommunities.
H 8	12.1	5 subcommunities.
H 2	11.5	3 subcommunities.
OV 2	10.3	0 subcommunities.
U 2	10.2	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 1f	29.5
SD11a	23.2
U 1b	21.9
SD11	21.5
U 1	20.9
W23b	19.5
H11a	19.0
U 1a	18.7
U 1c	17.4
U 1e	17.4

The matching procedures have produced the following results for Combined data

The N.V.C. communities most closely matching the test data are:

1.	U 1	coefficient =	48.0,	6 subcommunities.
2.	SD 7	coefficient =	37.9,	4 subcommunities.
3.	SD11	coefficient =	32.3,	2 subcommunities.
4.	SD12	coefficient =	27.9,	2 subcommunities.
5.	SD 8	coefficient =	27.5,	5 subcommunities.
6.	H11	coefficient =	25.7,	3 subcommunities.
7.	MC 5	coefficient =	25.5,	4 subcommunities.
8.	CG 7	coefficient =	24.7,	4 subcommunities.
9.	SD19	coefficient =	23.0,	0 subcommunities.
10.	OV 2	coefficient =	22.3,	0 subcommunities.

The N.V.C subcommunities most closely matching the test data are:

1.	U 1	coefficient =	48.0
2.	U 1b	coefficient =	47.4
3.	U 1c	coefficient =	45.2
4.	U 1f	coefficient =	41.9
5.	U 1d	coefficient =	40.7
6.	SD 7	coefficient =	37.9
7.	SD 7a	coefficient =	37.2
8.	SD 7d	coefficient =	36.5
9.	SD 7b	coefficient =	36.1
10.	SD11a	coefficient =	33.9

APPENDIX IX – RESULTS OF MATCH ANALYSIS FOR U1d QUADRATS

The matching procedures have produced the following results for sample 1

Community code	co-efficient	
SD 8	41.4	5 subcommunities.
MG 5	38.1	3 subcommunities.
SD 7	37.5	4 subcommunities.
SD12	36.1	2 subcommunities.
SD 9	34.7	2 subcommunities.
MC 9	33.5	5 subcommunities.
W23	30.4	3 subcommunities.
U 1	29.7	6 subcommunities.
MG 7F	29.7	0 subcommunities.
SD16	28.4	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
SD 8b	44.8
SD12a	42.0
SD 8a	41.9
SD 8	41.4
MC 9c	40.0
SD 8d	39.7
MG 5	38.1
SD 7a	37.6
SD 7	37.5
W23b	37.2

The matching procedures have produced the following results for sample 2

Community code	co-efficient	
SD 8	40.6	5 subcommunities.
MG 5	36.3	3 subcommunities.
SD 7	35.3	4 subcommunities.
MG 7F	33.0	0 subcommunities.
U 1	32.5	6 subcommunities.
SD 9	32.0	2 subcommunities.
MG 6	31.6	3 subcommunities.
SD12	30.9	2 subcommunities.
MG 3	30.0	2 subcommunities.
MC 9	29.6	5 subcommunities.

Matches against sub-communities.

Community code	co-efficient
SD 8a	40.9
SD 8b	40.8
SD 8	40.6
SD 8d	38.2
U 1d	36.9
SD 7a	36.6
MG 5a	36.6
MG 5b	36.3
MG 5	36.3
SD12a	36.0

The matching procedures have produced the following results for sample 3

Community code	co-efficient	
SD12	30.8	2 subcommunities.
W23	29.8	3 subcommunities.
U 4	25.0	5 subcommunities.
SD 8	24.6	5 subcommunities.
U 1	23.2	6 subcommunities.
U20	22.9	3 subcommunities.
MG 5	20.6	3 subcommunities.
MC 9	20.5	5 subcommunities.
CG10	20.3	3 subcommunities.
SD 7	19.6	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
W23b	35.1
SD12a	33.3
W23a	31.1
SD12	30.8
W23	29.8
U 4a	28.9
SD 8b	28.0
SD12b	27.7
U 4e	26.4
U 4b	26.4

The matching procedures have produced the following results for sample 4

Community code	co-efficient	
MG 5	31.8	3 subcommunities.
MG 7E	30.3	0 subcommunities.
SD 7	28.9	4 subcommunities.
SD 8	28.7	5 subcommunities.
MG 7F	27.3	0 subcommunities.
U 1	27.3	6 subcommunities.
MC 9	27.1	5 subcommunities.
OV23	26.7	4 subcommunities.
MC11	25.6	3 subcommunities.
SD 9	24.8	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MC 9c	32.0
MG 5	31.8
MG 5b	31.0
MG 5a	30.4
SD 7a	30.4
MG 7E	30.3
U 1b	30.3
SD 8b	29.9
U 1d	29.5
SD 8a	29.4

The matching procedures have produced the following results for sample 5

Community code	co-efficient	
U 1	37.1	6 subcommunities.
SD12	30.8	2 subcommunities.
SD 7	23.7	4 subcommunities.
SD11	22.4	2 subcommunities.
U 4	22.2	5 subcommunities.
CG10	21.6	3 subcommunities.
H 7	21.2	5 subcommunities.
H 8	20.7	5 subcommunities.
SD 8	20.1	5 subcommunities.
U20	20.0	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 1b	38.4
U 1	37.1
U 1f	34.9
SD12a	34.2
SD12	30.8
U 1e	30.2
U 1c	30.2
SD12b	29.7
U 1d	28.9
SD 8b	27.4

The matching procedures have produced the following results for sample 6

Community code	co-efficient	
SD12	39.1	2 subcommunities.
W23	34.3	3 subcommunities.
U 1	32.9	6 subcommunities.
MC 9	30.5	5 subcommunities.
U 4	30.1	5 subcommunities.
MG 5	28.2	3 subcommunities.
SD 7	28.2	4 subcommunities.
MG 6	26.1	3 subcommunities.
MG 3	25.9	2 subcommunities.
SD16	25.8	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
SD12a	43.9
W23b	40.5
SD12	39.1
MC 9e	38.7
MG 6b	36.3
SD12b	36.2
U 1f	35.9
U 4b	35.8
W23a	35.3
W23	34.3

The matching procedures have produced the following results for sample 7

Community code	co-efficient	
MC 9	41.1	5 subcommunities.
MG 5	40.0	3 subcommunities.
MG 3	37.8	2 subcommunities.
SD12	36.0	2 subcommunities.
U 4	34.0	5 subcommunities.
SD 8	33.4	5 subcommunities.
MG 7E	33.2	0 subcommunities.
W23	32.9	3 subcommunities.
MG 6	32.6	3 subcommunities.
SD 9	31.6	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MC 9e	46.1
MC 9c	44.4
U 4b	44.2
MG 6b	42.3
SD12a	41.8
W23b	41.4
MG 5c	41.1
MC 9	41.1
MG 5	40.0
MC 9b	39.8

The matching procedures have produced the following results for sample 8

Community code	co-efficient	
MC 9	29.7	5 subcommunities.
SD12	29.4	2 subcommunities.
U 1	29.0	6 subcommunities.
SD 7	28.5	4 subcommunities.
MC12	26.7	2 subcommunities.
MG 5	26.7	3 subcommunities.
W23	25.4	3 subcommunities.
SD 9	25.1	2 subcommunities.
SD 8	24.4	5 subcommunities.
MG 7E	24.4	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
W23b	34.2
MC 9c	33.9
SD12b	32.6
U 1d	32.1
MC 9b	30.7
U 1f	30.3
MC 9e	30.3
U 1b	29.9
MC 9	29.7
SD12	29.4

The matching procedures have produced the following results for sample 9

Community code	co-efficient	
MG 5	45.0	3 subcommunities.
MG 3	34.7	2 subcommunities.
MG 6	33.9	3 subcommunities.
MG 7E	33.5	0 subcommunities.
MG 4	33.5	0 subcommunities.
MG 7F	33.0	0 subcommunities.
SD 9	32.8	2 subcommunities.
SD 7	31.6	4 subcommunities.
SD12	30.4	2 subcommunities.
MG 7D	30.1	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 5	45.0
MG 5c	43.2
MG 5b	43.0
MG 5a	42.6
MG 6b	41.4
SD12a	35.2
MG 3b	34.9
MG 3	34.7
MG 6	33.9
MG 7E	33.5

The matching procedures have produced the following results for sample 10

Community code	co-efficient	
U 1	33.5	6 subcommunities.
SD12	27.9	2 subcommunities.
MG 5	27.7	3 subcommunities.
SD 8	25.1	5 subcommunities.
U 4	25.0	5 subcommunities.
OV 2	24.4	0 subcommunities.
CG10	24.1	3 subcommunities.
CG 7	22.9	4 subcommunities.
MC10	22.8	3 subcommunities.
MC 9	22.3	5 subcommunities.

Matches against sub-communities.

Community code	co-efficient
U 1d	37.7
SD12a	35.7
U 1b	34.3
U 1	33.5
U 1c	31.4
U 1f	31.3
SD 8b	30.2
U 4a	28.4
U 1e	28.2
SD12	27.9

The matching procedures have produced the following results for Combined data

The N.V.C. communities most closely matching the test data are:

1.	U 1	coefficient =	48.8,	6 subcommunities.
2.	SD 7	coefficient =	46.4,	4 subcommunities.
3.	SD 8	coefficient =	46.0,	5 subcommunities.
4.	MG 5	coefficient =	45.1,	3 subcommunities.
5.	SD 9	coefficient =	41.0,	2 subcommunities.
6.	SD12	coefficient =	40.7,	2 subcommunities.
7.	MG 6	coefficient =	39.2,	3 subcommunities.
8.	MC 9	coefficient =	38.2,	5 subcommunities.
9.	OV23	coefficient =	36.7,	4 subcommunities.
10.	U 4	coefficient =	36.6,	5 subcommunities.

The N.V.C subcommunities most closely matching the test data are:

1.	U 1d	coefficient =	50.7
2.	SD 8b	coefficient =	49.5
3.	U 1b	coefficient =	49.0
4.	U 1	coefficient =	48.8
5.	SD 7	coefficient =	46.4
6.	SD 8	coefficient =	46.0
7.	SD 7a	coefficient =	45.8
8.	MG 5	coefficient =	45.1
9.	SD 8a	coefficient =	44.8
10.	SD12a	coefficient =	44.4

Area 2 Species by Family

Family No.	Family Name	Species	1	2	3	4	5	6	7	8	9	10	11	12
5	Equisetaceae	Equisetum arvense		x										
5	Equisetaceae	Equisetum sylvaticum										x		
14	Aspleniaceae	Asplenium scolopendrium			x			x				x		
17	Athyriaceae	Athyrium filix-femina			x			x				x		
18	Blechnaceae	Blechnum spicant										x		
20	Dryopteridaceae	Dryopteris affinis ssp. affinis										x		
20	Dryopteridaceae	Dryopteris affinis ssp. borreri			x			x				x	x	
20	Dryopteridaceae	Dryopteris carthusiana			x			x						
20	Dryopteridaceae	Dryopteris dilatata			x			x				x		
20	Dryopteridaceae	Dryopteris filix-mas	x		x			x	x			x	x	
20	Dryopteridaceae	Polystichum setiferum			x			x				x		
20	Dryopteridaceae	Pteridium aquilinum			x	x		x	x			x	x	
21	Polypodiaceae	Polypodium vulgare						x						
23	Pinacea	Pinus sylvestris										x		
25	Cupressaceae	Cupressus lawsoniana										x		
26	Taxaceae	Taxus baccata	x						x					
34	Papaveracea	Papaver lecoqii		x										
34	Papaveracea	Papaver rhoeas	x	x									x	
34	Papaveracea	Papaver setiferum		x										
34	Papaveracea	Papaver somniferum ssp. setiferum		x										
34	Papaveracea	Papaver somniferum ssp. somniferum		x										
35	Berberidaceae	Berberis thunbergii											x	
35	Berberidaceae	Mahonia aquifolium				x								
36	Ranunculaceae	Anemone nemorosa										x		
36	Ranunculaceae	Ficaria verna			x			x						
36	Ranunculaceae	Ranunculus acris				x	x		x	x	x	x	x	x
36	Ranunculaceae	Ranunculus bulbosus	x	x		x	x		x	x				x
36	Ranunculaceae	Ranunculus repens	x	x	x	x	x	x	x	x	x	x	x	x
41	Grossulariaceae	Ribes nigrum										x		
41	Grossulariaceae	Ribes rubrum			x			x	x			x		
41	Grossulariaceae	Ribes uva-crispa						x				x		
43	Crassulaceae	Petrosedum rupestre				x								
46	Fabaceae	Cytisus scoparius	x	x	x	x		x	x		x	x	x	x
46	Fabaceae	Ervilla hirsuta	x	x		x	x		x	x	x	x	x	x
46	Fabaceae	Ervum tetraspermum									x	x	x	
46	Fabaceae	Lathyrus odoratus							x					
46	Fabaceae	Lathyrus pratensis							x		x			
46	Fabaceae	Lotus corniculatus	x	x			x		x				x	x
46	Fabaceae	Lotus pedunculatus	x	x		x	x		x		x			x
46	Fabaceae	Medicago arabica									x		x	
46	Fabaceae	Medicago lupulina	x	x		x					x		x	
46	Fabaceae	Melilotus albus		x										
46	Fabaceae	Melilotus altissimus		x										
46	Fabaceae	Ononis repens		x										

46	Fabaceae	Ornithopus perpusillus	x	x		x			x							
46	Fabaceae	Robinia pseudoacacia							x							
46	Fabaceae	Trifolium arvense	x	x		x			x							
46	Fabaceae	Trifolium campestre	x	x			x		x		x	x	x	x		
46	Fabaceae	Trifolium dubium	x	x		x	x		x	x	x	x	x	x		
46	Fabaceae	Trifolium hybridum					x									
46	Fabaceae	Trifolium micranthum	x	x		x	x		x	x	x		x			
46	Fabaceae	Trifolium ornithopodioides									x		x			
46	Fabaceae	Trifolium pratense		x		x	x						x	x		
46	Fabaceae	Trifolium pratense var. sativum					x									
46	Fabaceae	Trifolium repens	x	x		x	x		x	x	x	x	x	x		
46	Fabaceae	Trifolium striatum	x						x		x					
46	Fabaceae	Ulex europaeus	x	x	x	x	x	x				x	x			
46	Fabaceae	Vicia sativa ssp. nigra								x				.		
46	Fabaceae	Vicia sativa ssp. segetalis	x	x		x	x		x	x	x	x	x	x		
48	Rosaceae	Agrimonia eupatoria	x								x					
48	Rosaceae	Aphanes australis	x	x												
48	Rosaceae	Cotoneaster rehderi			x											
48	Rosaceae	Cotoneaster salicifolius										x				
48	Rosaceae	Cotoneaster sternianus			x											
48	Rosaceae	Crataegus monogyna	x	x	x	x	x	x	x	x	x	x	x	x		
48	Rosaceae	Geum urbanum			x	x		x	x			x	x			
48	Rosaceae	Malus domestica		x		x	x	x	x		x	x	x			
48	Rosaceae	Potentilla argentea									x		x			
48	Rosaceae	Potentilla reptans				x					x	x	x	x		
48	Rosaceae	Potentilla x mixta									x					
48	Rosaceae	Prunus avium	x		x	x		x	x			x	x	x		
48	Rosaceae	Prunus cerasifera						x					x			
48	Rosaceae	Prunus domestica				x		x	x	x	x	x	x			
48	Rosaceae	Prunus laurocerasus			x			x								
48	Rosaceae	Prunus lusitanica						x					x			
48	Rosaceae	Prunus spinosa	x	x	x	x	x	x	x	x	x	x	x	x		
48	Rosaceae	Prunus x fruticans			x	x		x	x				x			
48	Rosaceae	Rosa arvensis			x			x				x				
48	Rosaceae	Rosa canina	x			x		x	x		x	x	x			
48	Rosaceae	Rosa canina agg.												x		
48	Rosaceae	Rosa corymbifera							x		x					
48	Rosaceae	Rosa squarrosa				x			x		x		x			
48	Rosaceae	Rubus fruticosus agg.	x	x	x	x	x	x	x	x	x	x	x	x		
48	Rosaceae	Rubus idaeus	x					x								
48	Rosaceae	Sorbus aria				x										
48	Rosaceae	Sorbus aucuparia			x			x				x	x			
48	Rosaceae	Sorbus intermedia					x									
51	Ulmaceae	Ulmus procera			x	x	x	x	x	x			x			
51	Ulmaceae	Ulmus x vegeta			x			x	x			x	x			

52	Cannabaceae	Humulus lupulus			x			x							
54	Urticaceae	Urtica dioica ssp. dioica	x	x	x	x	x	x	x	x	x	x	x	x	
56	Fagaceae	Castanea sativa										x	x		
56	Fagaceae	Fagus sylvatica										x			
56	Fagaceae	Quercus cerris	x						x						
56	Fagaceae	Quercus ilex		x	x	x		x	x			x	x		
56	Fagaceae	Quercus robur	x	x	x	x	x	x	x	x	x	x	x	x	
56	Fagaceae	Quercus x rosacea		x									x		
58	Juglandaceae	Juglans regia	x												
59	Betulaceae	Alnus glutinosa										x	x		
59	Betulaceae	Betula pendula	x	x	x	x		x	x			x	x	x	
59	Betulaceae	Betula pubescens		x	x			x	x			x	x		
59	Betulaceae	Betula x aurata			x			x					x		
59	Betulaceae	Carpinus betulus			x										
59	Betulaceae	Corylus avellana			x	x		x	x			x			
60	Cucurbitaceae	Bryonia dioica				x			x				x		
61	Celastraceae	Euonymus europaeus			x										
63	Oxalidaceae	Oxalis acetosella										x			
63	Oxalidaceae	Oxalis debilis				x	x						x		
64	Hypericaceae	Hypericum perforatum	x	x		x	x		x	x	x	x	x	x	
64	Hypericaceae	Hypericum tetrapterum										x			
66	Violaceae	Viola arvensis		x											
66	Violaceae	Viola odorata					x		x						
66	Violaceae	Viola riviniana						x				x			
68	Salicaceae	Populus tremula						x	x				x		
68	Salicaceae	Populus x canadensis										x			
68	Salicaceae	Salix alba				x					x	x	x		
68	Salicaceae	Salix caprea ssp. caprea			x			x	x			x	x		
68	Salicaceae	Salix cinerea ssp. cinerea			x			x	x	x		x	x		
68	Salicaceae	Salix cinerea ssp. oleifolia			x						x	x			
68	Salicaceae	Salix x fragilis			x	x	x	x				x	x		
68	Salicaceae	Salix x reichardtii	x		x			x					x		
69	Euphorbiaceae	Euphorbia oblongata											x		
71	Geraniaceae	Erodium cicutarium	x	x					x		x				
71	Geraniaceae	Geranium dissectum	x	x	x	x	x		x	x	x	x	x	x	
71	Geraniaceae	Geranium molle	x	x		x			x	x	x	x	x	x	
71	Geraniaceae	Geranium pusillum	x	x											
71	Geraniaceae	Geranium pyrenaicum									x		x		
71	Geraniaceae	Geranium robertianum			x	x		x	x		x	x	x		
71	Geraniaceae	Geranium rotundifolium		x							x				
71	Geraniaceae	Geranium sanguineum				x									
73	Onagraceae	Chamaenerion angustifolium	x			x	x		x			x	x	x	
73	Onagraceae	Circaea lutetiana			x			x	x			x	x		
73	Onagraceae	Epilobium ciliatum	x					x			x		x		
73	Onagraceae	Epilobium hirsutum				x		x		x	x		x	x	

73	Onagraceae	Epilobium montanum			x											
73	Onagraceae	Epilobium parviflorum	x	x					x							
73	Onagraceae	Epilobium tetragonum	x	x	x					x	x	x	x			
77	Sapindaceae	Acer platanoides					x						x	x		
77	Sapindaceae	Acer pseudoplatanus			x	x						x	x			
77	Sapindaceae	Aesculus hippocastanum							x		x		x			
80	Malvaceae	Malva neglecta									x					
80	Malvaceae	Malva sylvestris	x	x			x		x				x			
85	Resedaceae	Reseda luteola	x	x		x	x									
87	Brassicaceae	Alliaria petiolata			x	x		x	x			x	x			
87	Brassicaceae	Arabidopsis thaliana	x	x												
87	Brassicaceae	Armoracia rusticana				x					x					
87	Brassicaceae	Brassica napus		x												
87	Brassicaceae	Capsella bursa-pastoris	x	x												
87	Brassicaceae	Cardamine flexuosus			x			x				x	x			
87	Brassicaceae	Cardamine pratensis						x								
87	Brassicaceae	Diplotaxis tenufolia											x			
87	Brassicaceae	Erophila verna		x												
87	Brassicaceae	Lepidium campestre	x	x							x					
87	Brassicaceae	Lepidium didymum	x	x												
87	Brassicaceae	Lepidium draba									x					
87	Brassicaceae	Lepidium heterophyllum								x						
87	Brassicaceae	Lepidium latifolium									x					
87	Brassicaceae	Lunularia annua							x							
87	Brassicaceae	Sisymbrium officinale	x	x					x				x			
92	Polygonaceae	Fallopia baldschuanica							x							
92	Polygonaceae	Persicaria hydropiper		x	x			x								
92	Polygonaceae	Polygonum aviculare	x	x		x			x				x	x		
92	Polygonaceae	Polygonum depressum		x		x			x				x			
92	Polygonaceae	Reynoutria japonica									x					
92	Polygonaceae	Rumex acetosa	x	x	x	x	x		x	x	x	x	x	x		
92	Polygonaceae	Rumex acetosella	x	x	x	x	x		x	x		x	x	x		
92	Polygonaceae	Rumex conglomeratus			x			x				x	x			
92	Polygonaceae	Rumex crispus	x	x		x	x		x	x	x		x	x		
92	Polygonaceae	Rumex obtusifolius	x			x	x	x			x	x	x	x		
92	Polygonaceae	Rumex sanguineus			x	x		x	x		x	x	x			
92	Polygonaceae	Rumex x pratensis											x	x		
94	Caryophyllaceae	Arenaria leptoclados		x												
94	Caryophyllaceae	Arenaria serpyllifolia	x	x												
94	Caryophyllaceae	Cerastium fontanum	x	x		x	x			x	x	x	x	x		
94	Caryophyllaceae	Cerastium glomeratum	x	x		x										
94	Caryophyllaceae	Cerastium semidecandrum	x	x		x										
94	Caryophyllaceae	Moehringia trinervia			x			x	x			x				
94	Caryophyllaceae	Sagina procumbens	x													
94	Caryophyllaceae	Silene dioica				x								x		

94	Caryophyllaceae	Silene latifolia ssp. alba	x	x			x		x		x	x	x	x	
94	Caryophyllaceae	Silene vulgaris		x											
94	Caryophyllaceae	Silene x hampeana				x									
94	Caryophyllaceae	Spergula arvensis var. arvensis	x	x											
94	Caryophyllaceae	Spergularia rubra	x	x											
94	Caryophyllaceae	Stellaria graminea	x	x		x	x		x	x	x		x	x	
94	Caryophyllaceae	Stellaria holostea		x	x	x		x	x			x	x	x	
94	Caryophyllaceae	Stellaria media	x	x		x									
103	Balsaminaceae	Impatiens parviflora			x	x		x				x			
105	Primulaceae	Lysimachia arvensis										x	x		
105	Primulaceae	Lysimachia nemorum									x				
108	Ericaceae	Calluna vulgaris	x	x											
110	Rubiaceae	Galium album										x			
110	Rubiaceae	Galium aparine	x	x	x	x	x	x	x	x	x	x	x	x	
110	Rubiaceae	Galium palustre ssp. elongatum					x					x			
110	Rubiaceae	Galium saxatile				x									
110	Rubiaceae	Galium verum								x					
110	Rubiaceae	Sherardia arvensis	x	x											
111	Gentianaceae	Centaurium erythraea		x							x		x		
112	Apocynaceae	Vinca major							x						
114	Boraginaceae	Amsinckia micrantha	x												
114	Boraginaceae	Myosotis arvensis									x	x	x	x	
114	Boraginaceae	Myosotis discolor									x	x	x		
114	Boraginaceae	Myosotis ramosissima	x												
114	Boraginaceae	Pentaglottis sempervirens	x	x		x			x						
114	Boraginaceae	Symphytum orientale							x						
114	Boraginaceae	Symphytum x uplandicum									x		x		
115	Convolvulaceae	Calystegia silvatica						x	x		x		x		
115	Convolvulaceae	Convolvulus arvensis	x	x		x	x		x	x	x			x	
116	Solanaceae	Solanum dulcamara			x	x		x	x	x	x		x		
117	Oleaceae	Fraxinus excelsior			x	x	x	x	x		x	x	x		
120	Veronicaceae	Digitalis purpurea	x	x	x	x	x	x	x			x	x		
120	Veronicaceae	Linaria vulgaris		x		x			x				x	x	
120	Veronicaceae	Veronica arvensis	x	x			x		x		x	x	x	x	
120	Veronicaceae	Veronica beccabunga			x			x							
120	Veronicaceae	Veronica chamaedrys	x		x	x	x	x	x		x	x	x	x	
120	Veronicaceae	Veronica montana						x				x	x		
120	Veronicaceae	Veronica officinalis										x			
121	Plantaginaceae	Plantago coronopus	x	x		x	x		x		x		x		
121	Plantaginaceae	Plantago lanceolata	x	x		x	x	x	x	x	x	x	x	x	
121	Plantaginaceae	Plantago major	x	x		x	x	x	x	x	x	x	x	x	
123	Callitrichaceae	Callitriche stagnalis			x			x							
124	Scrophulariaceae	Buddleja davidii	x	x										x	
124	Scrophulariaceae	Scrophularia nodosa							x			x	x		
128	Lamiaceae	Ajuga reptans			x			x				x			

128	Lamiaceae	Ballota nigra		x		x	x		x						
128	Lamiaceae	Clinopodium nepeta				x	x								
128	Lamiaceae	Galeopsis bifida/tetrahit						x				x			
128	Lamiaceae	Glechoma hederacea			x			x	x		x	x	x		
128	Lamiaceae	Lamium amplexicaule	x												
128	Lamiaceae	Lycopus europaeus			x			x				x			
128	Lamiaceae	Mentha aquatica			x						x				
128	Lamiaceae	Prunella vulgaris			x			x			x	x			
128	Lamiaceae	Scutellaria galericulata			x			x							
128	Lamiaceae	Stachys sylvatica			x			x	x			x			
128	Lamiaceae	Teucrium scorodonia			x	x		x							
131	Orobanchaceae	Odontites vernus ssp. serotinus									x				
132	Aquifoliaceae	Ilex aquifolium	x	x	x	x		x	x			x	x		
135	Asteraceae	Achillea millefolium	x	x		x	x		x	x	x		x	x	
135	Asteraceae	Achillea millefolium var. sudetica	x												
135	Asteraceae	Artemisia vulgaris	x	x			x				x		x	x	
135	Asteraceae	Bellis perennis	x	x		x	x		x	x	x	x	x	x	
135	Asteraceae	Centaurea nigra/debeauxii	x	x		x	x		x	x	x		x	x	
135	Asteraceae	Cirsium arvense	x	x	x	x	x		x	x	x	x	x	x	
135	Asteraceae	Cirsium palustre				x		x							
135	Asteraceae	Cirsium vulgare	x	x	x	x	x		x		x	x	x	x	
135	Asteraceae	Crepis capillaris	x	x		x	x		x	x	x		x	x	
135	Asteraceae	Crepis vesicaria		x			x								
135	Asteraceae	Erigeron acris											x		
135	Asteraceae	Erigeron canadensis	x	x		x									
135	Asteraceae	Filago germanica		x									x		
135	Asteraceae	Gnaphalium uliginosum		x											
135	Asteraceae	Helminthotheca echioides	x	x		x					x		x	x	
135	Asteraceae	Hieracium agg.		x											
135	Asteraceae	Hypochaeris radicata	x	x	x	x	x		x	x	x	x	x	x	
135	Asteraceae	Jacobaea erucifolia		x		x					x				
135	Asteraceae	Jacobaea vulgaris	x	x	x	x	x	x	x	x	x	x	x	x	
135	Asteraceae	Lactuca serriola		x										x	
135	Asteraceae	Lactuca virosa	x	x		x	x		x	x			x	x	
135	Asteraceae	Lapsana communis		x		x			x			x	x		
135	Asteraceae	Leontodon saxatilis		x							x				
135	Asteraceae	Leucanthemum vulgare	x	x			x		x	x	x		x	x	
135	Asteraceae	Logfia minima		x											
135	Asteraceae	Matricaria discoidea	x			x	x		x				x		
135	Asteraceae	Pilosella officinarum	x	x		x	x		x	x		x	x	x	
135	Asteraceae	Pulicaria dysenterica									x				
135	Asteraceae	Senecio sylvaticus	x	x											
135	Asteraceae	Senecio vulgaris	x	x									x		
135	Asteraceae	Sonchus arvensis	x										x		
135	Asteraceae	Sonchus asper	x	x		x	x			x	x		x	x	

135	Asteraceae	Sonchus oleraceus	x	x					x						
135	Asteraceae	Taraxacum agg.	x	x	x	x	x	x	x	x	x	x	x	x	x
135	Asteraceae	Tragopogon pratensis	x	x		x				x	x		x	x	x
137	Adoxaceae	Sambucus nigra		x	x	x		x	x	x	x	x	x	x	x
138	Caprifoliaceae	Lonicera periclymenum		x	x	x		x	x		x	x	x		
138	Caprifoliaceae	Lonicera tatarica							x						
140	Dipsacaceae	Dipsacus fullonum									x		x		
140	Dipsacaceae	Knautia arvensis	x				x		x	x			x	x	
143	Araliaceae	Hedera helix	x	x	x	x		x	x		x	x	x		
145	Apiaceae	Angelica sylvestris			x			x	x			x			
145	Apiaceae	Anthriscus caucalis		x											
145	Apiaceae	Anthriscus sylvestris	x	x	x	x	x		x		x		x	x	
145	Apiaceae	Chaerophyllum temulum							x						
145	Apiaceae	Conium maculatum		x		x	x		x		x		x		
145	Apiaceae	Daucus carota ssp. carota							x					x	
145	Apiaceae	Foeniculum vulgare		x											
145	Apiaceae	Helosciadium nodiflorum			x			x							
145	Apiaceae	Heracleum sphondylium	x		x				x	x		x	x	x	
145	Apiaceae	Pastinaca sativa ssp. sylvestris				x					x	x	x	x	
145	Apiaceae	Sison amomum									x		x		
145	Apiaceae	Smyrnium olusatrum				x									
145	Apiaceae	Torilis japonica									x				
147	Araceae	Arum maculatum			x			x	x		x	x			
147	Araceae	Lemna minor						x							
159	Dioscoreaceae	Tamus communis						x							
164	Orchidaceae	Anacamptis pyramidalis									x				
164	Orchidaceae	Ophrys apifera									x				
165	Iridaceae	Iris pseudacorus			x			x				x			
167	Amaryllidaceae	Allium vineale				x									
168	Asparagaceae	Hyacinthoides spp.			x	x		x	x			x	x		
168	Asparagaceae	Ruscus aculeatus				x			x						
172	Typhaceae	Sparganium erectum			x			x							
172	Typhaceae	Typha latifolia						x							
175	Juncaceae	Juncus acutiflorus									x				
175	Juncaceae	Juncus articulatus									x				
175	Juncaceae	Juncus bufonius		x											
175	Juncaceae	Juncus conglomeratus						x			x	x			
175	Juncaceae	Juncus effusus			x	x		x	x		x	x	x		
175	Juncaceae	Juncus inflexus									x				
175	Juncaceae	Luzula campestris	x	x		x	x		x	x					x
176	Cyperaceae	Carex acutiformis			x		x			x					
176	Cyperaceae	Carex demissa			x										
176	Cyperaceae	Carex divulsa ssp. divulsa										x			
176	Cyperaceae	Carex hirta									x		x		
176	Cyperaceae	Carex laevigata			x							x			

176	Cyperaceae	Carex leporina			x			x																
176	Cyperaceae	Carex muricata ssp. pairae	x	x	x	x	x	x	x	x	x	x	x	x										
176	Cyperaceae	Carex otrubae											x											
176	Cyperaceae	Carex pendula			x			x				x												
176	Cyperaceae	Carex pseudocyperus			x																			
176	Cyperaceae	Carex remota			x			x	x			x	x											
176	Cyperaceae	Carex spicata							x		x													
176	Cyperaceae	Eleocharis palustris ssp. waltersii									x													
177	Poaceae	Agrostis canina						x																
177	Poaceae	Agrostis capillaris	x	x	x	x	x	x	x	x	x	x	x	x										
177	Poaceae	Agrostis stolonifera		x				x			x		x											
177	Poaceae	Aira praecox	x	x		x	x																	
177	Poaceae	Alopecurus pratensis				x	x		x	x	x													
177	Poaceae	Anisantha sterilis	x	x		x							x											
177	Poaceae	Anthoxanthum odoratum	x	x	x	x	x	x	x	x	x	x	x	x										
177	Poaceae	Arrhenatherum elatius	x	x	x	x	x	x	x	x	x	x	x	x										
177	Poaceae	Avenella flexuosa		x		x																		
177	Poaceae	Brachypodium sylvaticum		x	x			x	x															
177	Poaceae	Bromus hordeaceus ssp. hordeaceus	x	x	x	x	x	x	x	x	x		x	x										
177	Poaceae	Cynosurus cristatus									x													
177	Poaceae	Dactylis glomerata	x	x	x	x	x	x	x	x	x	x	x	x										
177	Poaceae	Deschampsia cespitosa				x			x			x												
177	Poaceae	Elymus repens					x		x															
177	Poaceae	Festuca filiformis	x	x																				
177	Poaceae	Festuca ovina ssp. hirtula	x																					
177	Poaceae	Festuca ovina ssp. ovina	x	x																				
177	Poaceae	Festuca rubra ssp. commutata	x	x						x														
177	Poaceae	Festuca rubra ssp. rubra	x	x	x	x	x	x	x	x	x	x	x	x										
177	Poaceae	Glyceria fluitans			x			x	x															
177	Poaceae	Holcus lanatus	x	x	x	x	x	x	x	x	x	x	x	x										
177	Poaceae	Holcus mollis	x	x	x	x	x	x	x	x	x	x	x	x										
177	Poaceae	Hordeum murinum		x		x			x				x											
177	Poaceae	Lolium perenne	x	x	x	x	x	x	x	x	x		x	x										
177	Poaceae	Nardus stricta	x																					
177	Poaceae	Phalaris arundinacea			x			x				x												
177	Poaceae	Phleum bertolonii		x		x			x	x	x		x	x										
177	Poaceae	Phleum pratense				x					x		x											
177	Poaceae	Phragmites australis									x		x											
177	Poaceae	Poa annua	x	x	x	x	x		x	x	x		x	x										
177	Poaceae	Poa humilis		x																				
177	Poaceae	Poa nemoralis			x							x	x											
177	Poaceae	Poa pratensis	x	x	x	x	x	x	x	x	x		x	x										
177	Poaceae	Poa trivialis	x	x	x	x	x	x	x	x	x	x	x	x										
177	Poaceae	Polypogon monspeliensis		x																				
177	Poaceae	Schedonorus arundinaceus					x							x										

177	Poaceae	Trisetum flavescens				x			x							
177	Poaceae	Vulpia bromoides	x	x	x	x	x	x	x	x	x	x	x	x	x	x
177	Poaceae	Vulpia myuros	x	x		x										