Pixton Park Grassland NVC Survey 2018 and 2019

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Pixton Park Grassland NVC Survey 2018 & 2019

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Summary:

In 2018 and 2019 grassland surveys were carried out by staff from the Natural England Field Unit of land within and adjoining Pixton Park, Dulverton Somerset in order to identify any communities with potential to be notified features of a proposed Site of Special Scientific Interest.

The surveys revealed a total of ~8.8 hectares of grassland referable to the National Vegetation Classification calcifugous grassland community U4b *Festuca ovina - Agrostis capillaris – Galium saxatile* grassland, *Holcus lanatus – Trifolium repens* subcommunity of which almost 7 hectares lie within the area now recognised as Pixton Park.

This community falls within the definition of the Priority Habitat Lowland Dry Acid Grassland, however the examples here also have notable affinity with the mesotrophic community MG5 *Cynosurus cristatus – Centaurea nigra* grassland which forms part of the Priority Habitat Lowland Meadows.

Data collected in all the areas mapped as this community were compared with Natural England's published guidelines for assessing condition of SSSI habitat features and were judged as being in unfavourable condition by reason of an insufficient frequency of positive indicator species being present.

Overview:

Figure 1 Surveyors recording vegetation in Area C (© E. Pawley, 2018)

Pixton Park, which lies within the Exmoor National Park to the east of Dulverton, Somerset, is an 18th Century landscaped park, referred to as a 'deer park' on the Ordnance Survey map of 1891, but containing remnants of earlier features.

The park occupies a low hill (rising to around 230m), underlain by sedimentary bedrock of the Baggy Sandstones formation, laid down around 360 million years ago in the Devonian period. The predominant hard geology is Old Red Sandstone, giving rise to neutral-acidic soils although the site is also traversed east-west by a narrow belt of limestone of similar age. The hill is bounded to the west and south by alluvial floodplains in the valley of the River Barle and to the east by the River Exe, while to the north the land rises in a series of hills to the uplands of Exmoor.

Today the site is a mixture of open grassland (some of which is still grazed by deer) and woodland, parts of which are thought to have developed relatively recently on formerly open wood-pasture. There remain many ancient and veteran trees throughout

The site is divided into a number of ownerships and includes a series of enclosures for deer, while other grassland areas are grazed by horses and sheep.

Pixton Park has been proposed for notification as a SSSI and Natural England have commissioned and compiled a series of surveys to examine the range of interest features present. The trees have been identified as important for their lichen, fungal and saproxylic invertebrate communities.

Habitats across most of the modern extent of the park were mapped in a survey by Hewins Ecology in 2014, but in 2018 the Natural England Field Unit was asked to carry out a confirmatory survey of some of the grassland recorded by Hewins, to ensure data currency.

In 2019 NEFU undertook additional survey of grassland in other areas around the periphery of the park where ancient and veteran trees had been identified. For the most part these were alluvial pastures, grazed by cattle, or meadows cut for hay/haylage.

Methodology:

2018 survey **(NEFU2018-155)** took place on 22nd May, led by Katherine Birch and Esther Pawley, accompanied by Rob Large, Alex Prendergast, Ruth Crundwell (all NEFU) and Flemming Ulf-Hansen (NE Area Team 12). A second visit took place on 25th May attended by members of Natural England's Specialist Services team including Dr Richard Jefferson (Senior Specialist – Grassland).

The team walked over areas mapped as grassland in 2014, confirming that the majority of the site supports species-poor semi-improved grassland, which Hewins assigned to the National Vegetation Classification (NVC, Rodwell, 1992) community MG6 *Lolium perenne – Cynosurus cristatus* grassland. This determination was accepted in 2018 and no samples were recorded in these areas.

The main focus of the survey was on areas previously mapped as including MG5 *Cynosurus cristatus – Centaurea nigra* grassland, since this community forms part of the Priority Habitat *Lowland Meadows* and would qualify to be a notified feature for SSSI designation purposes. The extent of distinct grassland stand types was compared with the 2014 map and any discrepancies noted.

In each of the four areas identified, five sample quadrats were recorded. One further sample was recorded in a glade within open wood-pasture habitat.

Each sample was a two metre square area in which all vascular plant and bryophyte species were noted, along with an estimate of their percentage cover within the quadrat. Estimates were also made of sward height and percentage cover of bare ground and photographs taken. Data were collected on iPads using bespoke Excel spreadsheets and ten-figure grid references for each sample were obtained using the Viewranger iPad app and/or handheld GPS devices.

For each stand an assessment of the grassland type was made in the field using Rodwell's (1992) keys to both

mesotrophic and calcifugous grassland types. Additional species, including any scarce or threatened taxa, not occurring in the samples, were noted, as were comments on condition and evidence of management.

A second survey **(NEFU2019-018)** took place on the 23rd and 25th July 2019, led by Rob Large and assisted by Andy McLay, Simon Tame (all NEFU) and Justin Gillet (NE Area Team 12). This assessed further areas, not covered by the 2014 survey, which had been identified as having ancient/veteran trees either in-field, or in adjoining hedgerows or woodland, but which could not be visited in 2018 due to difficulties securing access permission.

Altogether thirteen fields were visited and a total of 45 quadrats sampled, in groups of five, in similar stand types.

The sampling methodology used in 2019 was the same as that in 2018, except that cover of species was estimated using the DOMIN scale (see Table 1, below) rather than as percentage cover.

Table 1: The DOMIN scale

1	<4% Few individuals
2	<4% Several individuals
3	<4% Many individuals
4	4-10%
5	11-25%
6	26-33%
7	34-50%
8	51-75%
9	76-90%
_	91-100%

Data collected in both surveys were subsequently compiled and compared with Rodwell's floristic tables (see Appendix 2) to arrive at an assessment of the likely NVC communities. Cleaned data was later processed and run through the analysis programme TABLEFIT (v4, Marrs et. al., 2019) for further confirmation.

Results:

Habitat mapping and quadrat locations are shown in Appendix 1. Floristic tables in Appendix 2 and raw quadrat data in Appendix 3.

2018 survey:

In 2018 it was observed that the extent of grassland in the main area of the park had not changed significantly, although the managed condition of particular areas differed somewhat. Evidence of bracken clearance was noted in several places and areas which had been un-grazed in 2014 now appeared to be included in a grazing rotation, most likely by horses and/or sheep using temporary electric fencing. Field margins and other incidental grassland areas showed evidence of topping, presumably for weed-control.

Figure 2: From Area C looking southwest (© E. Pawley, 2018)

Field observations noted that, although the grassland in all four areas targeted had some similarities with MG5 communities, overall the grassland 'felt' rather more like the calcifugous community U4b *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland, *Holcus lanatus – Trifolium repens* subcommunity, which is fairly widespread on the fringes of Exmoor.

No soil samples were taken, but Rodwell's (1992) field keys readily confirmed that MG5 and U4 were both valid endpoints, depending on the user's assumption about likely soil pH and thus which key was used. The underlying geology predominant across the survey area is of a type which gives rise to mildly acidic soils, adding weight to the determination of U4b.

Survey results are presented as a series of areas denoted by the letters A-L (see map in Appendix 1). Some areas

comprise a single field, while others are clusters of fields of broadly similar character. Areas A-D are those previously surveyed by Hewins in 2014.

Area A

A moderate, north facing slope in the north of the park, this area (approx. 2.3 ha) was described by Hewins (2014) as MG5, un-grazed at the time of survey and having a "fairly lush structure (around 15cm)".

In 2018, the field had been grazed recently by horses and a white-tape, temporary electric fence remained in situ around the perimeter, positioned presumably to prevent stock from entering the strip of broadleaved woodland at the bottom of the slope (some of which was evidently planted only a few years ago). The sward was short (~6cm) and the ground somewhat poached, with up to 10% bare soil in some areas.

Constant species included Common Bent (*Agrostis capillaris*), Sweet Vernal Grass (*Anthoxanthum odoratum*), Yorkshire Fog (*Holcus lanatus*), Ribwort Plantain (*Plantago lanceolata*) and Common Cat's-ear (*Hypochaeris radicata*) at fairly high cover, with Field Woodrush (*Luzula campestris*), Self-heal (*Prunella vulgaris*), Meadow Buttercup (*Ranunculus acris*), Germander Speedwell (*Veronica chamaedrys*), Dandelion (*Taraxacum* agg.) and the moss *Rhytidiadelphus squarrosus* providing lower cover throughout.

MG5 constant species were noticeably infrequent with the exception *of* Ribwort Plantain, Common Bird's-foot Trefoil (*Lotus corniculatus*), Common Cat's-ear and Red Fescue (*Festuca rubra* agg.). In particular Black Knapweed (*Centaurea nigra s.l.*) was scarce and highly localised in only a few small areas and Crested Dog's-tail (*Cynosurus cristatus*), scattered only thinly throughout, these being the nominative species of the MG5 community.

Interestingly, Pignut (*Conopodium majus*) was frequent throughout the sward and Heath Spotted Orchid (*Dactylorhiza maculata*) and possibly both Greater and Lesser Butterfly Orchid (*Platanthera chlorantha* and *P. bifolia*) were noted within more species-rich areas. The Butterfly Orchids were still in tight bud or not flowering and the presence of both species could not be confirmed, however it was the opinion of experienced botanists present that there appeared to be two distinct types. *P. bifolia* is listed as Vulnerable in the England Vascular Plant Red List (Stroh *et. al.*, 2014).

Grassland outside the electric fence had been topped, with the arisings left in place. False Oat-grass (*Arrhenatherum elatius*) and Cock's-foot (*Dactylis glomerata*) were both more frequent in these areas, suggesting a transition to MG1 *Arrhenatherum elatius* grassland in these less intensively managed fringes.

The mean number of species recorded per sample in this area was 22.6, which is a little higher than Rodwell's stated mean for U4b but well within the range he gives.

Figure 3: Dactylorhiza maculata in Area A (© E. Pawley, 2018)

Area B

This rather steeper, west-facing slope (approx. 1.9 ha) to the west of Pixton Park House was grazed by horses in 2014 (sward height around 8cm), but described as having similar composition to Area A.

In 2018 the field was largely un-grazed (although recorded sward heights were still under 10cm, perhaps as a result of being favoured by a large, wild herd of Red Deer, *Cervus elaphus* (which were seen on a number of occasions), since it is sheltered and almost surrounded by woodland and the lower edge was described as transitional to MG1. However a small area in the south was over-grazed by stock from the adjoining MG6 area, with up to 15% bare soil.

Constant species at high cover were similar to Area A, with the addition of Red Fescue, while Lesser Stitchwort (*Stellaria graminea*), Lesser Celandine (*Ficaria verna*), Rough- and Smooth Meadow-grass (*Poa trivialis* and *P. pratensis* s.l.) were also frequent, though at lower cover.

Mean species per sample was lower than in Area A at 18.8, but again well within range for either MG5 or U4b.

Figure 4: Area B from the north (© E. Pawley, 2018)

Area C

Situated to the east and north of the old stables, this area (approx. 2.5 ha) occupies flatter ground, sloping gently towards the south and comprises a series of pastures and other grassland outside the fenced deer park. Internal fencing is derelict and there is no fence between these grasslands and adjoining woodland.

In 2014 these marginal areas were apparently un-grazed and mapped variously as MG1, MG1/MG5 transition or MG1/MG5 transition/disturbed. Hewins recorded no sample quadrats here, but described the sward as varying between "dense and tussocky" and "much finer and herb-rich".

In 2018 some areas had been topped and some showed evidence of having been grazed (with some poaching by cattle noted). The only tussocky MG1-type grassland being in unmanaged areas around in-field trees. Field notes describe areas variously as "semi-improved", "eutrophic through mowing U4/MG1", "U4 transition to MG1" and "U4/OV something".

The distribution of disturbed areas remained much as mapped in 2014, with most in the northern part around agricultural buildings. The small northernmost parcel was unmanaged and highly disturbed with abundant ruderal vegetation. Further south the grassland was topped and apparently more eutrophic as a result.

The confused nature of the management history here made selection of uniform stand types difficult, but five samples were recorded in broadly U4-type grassland. Constancy was unsurprisingly rather lower than in the preceding areas, but the bulk of the cover still comes from constant Common Bent, Sweet Vernal-grass and Yorkshire Fog, with frequent Ribwort Plantain, Common Bird's-foot Trefoil and Common Sorrel (*Rumex acetosa*) at lower cover.

Mean species per sample was lower here at 16.8 than in the other areas. A single tussock of Small-fruited Prickly Sedge (*Carex muricata* subsp. *pairae*) was noted close to one of the samples, but there were no other species of note.

One further sample was taken within a grassy woodland glade to the west of this area, which had been mapped similarly in 2014. This was described by 2018 surveyors as closer to U4a (the Typical subcommunity), but included a number of woodland species in the sward. This sample has been excluded from further analysis, but data are shown in Appendix 3.

Figure 5: Typical of Area C, looking north (© K. Birch, 2018)

Figure 6: Grassland in the woodland glade (© E. Pawley, 2018)

Area D

A small area of MG5 was mapped in 2014, some distance away from the preceding areas, within the wider MG6 matrix. This was described as showing, "some affinity to an acid grassland, possibly U4".

When the mapped area was inspected in 2018, it was found to be mostly indistinguishable from the surrounding semi-improved grassland. There was, however a noticeably different and more species-rich area of approximately the same size, situated slightly to the northeast and lower down the slope of a steep, north-facing bank.

The sampled area corresponds with a narrow strip of limestone geology visible on British Geological Survey mapping (viewed using the iGeology iPad app), which appears to extend along the whole of the bank below a small area of plantation woodland.

Subsequent inspection of Hewins's original plot photograph and target notes (describing an area of Bracken, *Pteridium aquilinum* clearance) suggests that there may have been a mapping error in the 2014 report and that the sample and target notes taken in that survey were not exactly as mapped in the report, but instead lay around 50m to the northeast.

Once again, the high-cover constants here are Common Bent and Sweet Vernal Grass with Ribwort Plantain also exceeding 30% cover in one sample. Other species present in all samples include; Cock's-foot, Field Woodrush, Self-heal, Dandelion and Germander Speedwell as well as Pignut and Common Dog-violet (*Viola riviniana*).

Yorkshire Fog is less frequent here, but was present in two of the three samples, along with Common Cat's-ear, Common Bird's-foot Trefoil and Smooth Meadow-grass. Most other species were recorded in only one sample.

To the north-west, close to the estimated actual location of Hewins's plot a number of plants of Moonwort (*Botrichium lunaria*, at SS92833 26813, see figure 8) were found during the later visit by NE Specialists This species is listed as Vulnerable in the England Red List, (Stroh et. al., 2014). In addition, lower down the slope a small area of Lady's Mantle (*Alchemilla filicaulis* subsp. *vestita* – Somerset County Notable) was noted.

Other species noted on this slope, outside of samples included; Bluebell (*Hyacinthoides non-scripta*), Creeping Soft-grass (*Holcus mollis*), Heath Bedstraw (*Galium saxatile*), Glaucous Sedge (*Carex flacca*) and Spring Sedge (*Carex caryophyllea*).

During a NEFU fungi survey in late September 2018 Snowy Waxcap (*Cuphopyllus virgineus*) was found further east along the same bank. Although fairly common, this species is indicative of unimproved neutral-acidic grassland. This was the only Waxcap species found on that visit.

Figure 7: From Pixton Hill, Area D, looking north across the deer park (© R. Large, 2018)

Figure 8: Botrichium lunaria in Area D (© E. Pawley, 2018)

2018 survey:

The second survey considered two blocks of enclosed land outside the main area of parkland: To the east a series of pastures/meadows run down the hillside into the Exe valley (between plantation woodlands which are known to contain some ancient/veteran trees), while to the west and north several pastures occupy flatter land towards Dulverton and the Barle valley (with ancient/veteran trees either in-field or within adjoining hedgerows). The aim of the survey was to identify any further areas of Priority grassland habitat to inform the SSSI notification.

In most cases the fields were readily grouped into clusters with similar community composition and management

regimes, although, where necessary, some fields were subdivided to separate obviously different plant communities. In total nine "stands" were identified, with five sample quadrats recorded in each.

Area E

Comprising two fields (numbered 1306 & 2685, totalling 8.3 ha) on moderate to steeply sloping, generally east facing land to the east of the park, the predominant vegetation type here was rather herb-poor and evidently fertile *Agrostis/Holcus* grassland.

The flatter, upper part of field 1306 had recently been cut and baled and inspection of the remaining sward gave no indication of being anything other than poor semi-improved grassland (no samples taken). Above the cut area a wide fringe of unmanaged MG1-type grassland contained a large patch of Nettle (*Urtica dioica*), Common Dock (*Rumex obtusifolius*), Thistles (*Cirsium* spp.) and other tall ruderal vegetation in an area which had clearly been used as a temporary store for farmyard manure, possibly routinely.

Below the cut area, to the east, somewhat steeper land was uncut, rank, species-poor and grass dominated. The same was the case (albeit somewhat less rank) across most of the upper, moderately sloping areas of field 2685. Widespread broadleaved herbs were limited to Clovers (*Trifolium* spp.), Dandelion, Creeping Thistle (*Cirsium arvense*) and Greater Bird's-foot Trefoil (*Lotus pedunculatus*, which completely replaces *L. corniculatus* in all fields surveyed in 2019), with Common Mouse-ear (*Cerastium fontanum*) and Lesser Stitchwort more sparsely distributed.

Steeper areas of both fields (the southern edge of 1306 and the eastern end of 2685) were more species-rich, with Meadow-, Creeping- and Bulbous Buttercups (*Ranunculus acris, R. repens* and *R. bulbosus*), Self-heal, Yarrow (*Achillea millefolium*). Common Vetch (*Vicia sativa*) and Betony (*Betonica officinalis*) all occurring locally, although not all were in areas sampled.

The south-facing bank in the south of 1306 was the richest area and the only location where Betony and Black Knapweed were noted and this area perhaps has more affinity to MG5. It has been observed that this bank appears to be a continuation of the geology underlying the north-facing slope described in Area D above and the greater diversity here may reflect that.

The lowest parts of field 2685, in the east, are Bracken – dominated.

Overall the floristics of Area E are probably best described by U4/U4b, but tending towards MG6 across much of the area possibly as a result of agricultural improvement. The total area of more species-rich grassland mapped is around 1.6 ha.

Area F

This small, isolated field (4858, ~2 ha) is located at the foot of the eastern hillside. More than half of the area is very steep, while the remainder is flat and perhaps formerly part of the Exe floodplain. This field is evidently managed mainly by topping (where possible) and boundaries are not stock-proof. Conifer plantation above includes large Pheasant release pens and the primary use of the field is as a driven shoot.

Despite there being two distinctly different landforms in the field, the grass-species composition is remarkably uniform. The constant, high-cover Common Bent, Sweet Vernal Grass and Yorkshire Fog found in most of the survey areas are joined by Cock's-foot, reflecting a lack of grazing management along with constant, low-cover Perennial Rye-grass, which was not seen elsewhere.

The flat land and lower slopes show signs of disturbance and perhaps soil-compaction from vehicle use with Greater Plantain (*Plantago major*) and Docks (*Rumex* spp.) frequent.

The upper slopes are significantly more herb-rich, with constants including Bugle (*Ajuga reptans*), Yarrow, Greater Bird's-foot Trefoil, Ribwort Plantain, Common Cat's-ear, Common Sorrel and Clovers. Black Knapweed, Meadowsweet (*Filipendula ulmaria*) and Devil's-bit Scabious (*Succisa pratensis*) are all frequent and obvious and Lady's Mantle occurs in a number of places.

Once again the overall fit of the samples here is very good for U4b, but the affinity to MG5 is more obvious here than in any other area surveyed. The lower area however also shows similarities with MG7e *Lolium perenne – Plantago lanceolata* grassland and perhaps with OV23 *Lolium perenne – Dactylis glomerata* grassland, more typical of disturbed, weedy roadsides.

Area G

This area comprises two small, fields (3058 & 4762, combined area ~2.4 ha), sloping gently and draining to the west, managed as a single unit and separated by a derelict bank and ditch with a line of mature trees on it. Although no stock was present, there was evidence of recent grazing by cattle.

The smaller field (4762) has a seepage/spring line on its northern edge and is poorly drained, with around a third of the area at the western end waterlogged and heavily poached. Higher ground to the east is drier but also significantly poached and Bramble and scrub is encroaching from the edges. Where there is open grassland however, this is species-rich, with one sample having 24 species present in a $4m^2$ quadrat.

Black Knapweed, Greater Bird's-foot Trefoil, Creeping Buttercup, Tormentil (*Potentilla erecta*) and Ribwort Plantain are all locally frequent here, while damper areas have Marsh Thistle (*Cirsium palustre*), Meadowsweet an a low cover of Sharp-flowered Rush (*Juncus acutiflorus*).

Field notes describe 4762 as "U4b/MG5 with scrub transitional to poor M23/M27?", but the area of dry-ish grassland here is not much more than 0.5 Ha and the wetter area is highly disturbed by cattle poaching.

Waterlogging continues into the south-eastern part of 3058, but otherwise this field is rather drier being bisected by a damp, east-west ditch, towards which both halves of the field slope. A few plants of Black Knapweed were noted in the southeast, along with a single occurrence of Greater Burnet (*Sanguisorba officinalis* – Somerset County Notable).

The sward becomes progressively shorter and more poached toward the northwest and the area north of the ditch has a significant amount of Ragwort (*Jacobaea vulgaris*) as well as Creeping Thistle and Greater Plantain, typical of overgrazed sites.

Overall, this area's species composition is broadly referable to U4b, although in the east it includes elements of MG5 and M27-type vegetation and in the northwest it approaches MG6.

Area H

Two further small, flat fields (2467 and the half of 1561 to the north of the access track to the cottage called Allendale, combined area ~1.7 ha) were being grazed by a small herd of beef cattle. The sward was uniformly short, with a fair amount of bare soil (up to 15% was recorded).

Broadleaved herb species were limited to Yarrow, Common Mouse-ear, Creeping Thistle, Ribwort Plantain, Tormentil, Creeping Buttercup, Common Sorrel, Ragwort, White Clover (*Trifolium repens*) and a little Greater Bird's-foot Trefoil. No sample had more than 12 species present.

Floristically, this area was a poor match for U4b with some samples perhaps closer to U1f, but again it is probably better to regard it as poor semi-improved/MG6.

Area I

The southern half of field 1561 and the adjoining 1352 (combined area ~1.1 ha) showed no sign of any recent management, though the edges appear to be well used by dog-walkers from the adjacent housing estate.

1352 is unmistakeably M27 *Filipendula ulmaria – Angelica sylvestris* mire, although not an especially species-rich example. Meadowsweet 60-70 cm high dominates, with Wild Angelica, Sharp-flowered Rush and Soft Rush (*Juncus effusus*) distributed throughout. However the presence of Common Bent, Yorkshire Fog and Meadow Foxtail (*Alopecurus pratensis*) at low cover suggests that this was formerly pasture now abandoned, perhaps due to failure of drainage. A wet ditch in the middle looks to be an attempt to reinstate drainage, which has not been successful.

The southern part of field 1561 appears, from the track to be a typical MG1 grassland, with False Oat-grass (*Arrhenatherum elatius*) and Common Hogweed (*Heracleum sphondylium*) the most obvious components. Closer inspection however reveals lower areas, particularly along the southern edge, having Meadowsweet, Marsh Bedstraw (*Galium palustre*), Greater Bird's-foot Trefoil, Wild Angelica and Rushes (*Juncus* spp.), suggesting MG1c the *Filipendula ulmaria* subcommunity, forming a transition to the adjacent M27. Some small patches are dominated by Tufted Hair Grass (*Deschampsia cespitosa*) which may be referable to the MG9 *Holcus lanatus – Deschampsia cespitosa* community.

Two other small fields to the west of 1352 were not surveyed, due to a lack of clarity about ownership and no obvious access point. One field was evidently unmanaged and wet while the other seems to be being developed for housing.

Area J

A single small field (1847, area ~0.8 ha), managed as cattle pasture, but not grazed recently at the time of survey is rather similar to field 4762 (see Area G, above).

The eastern end of the field has about 0.5 ha of dry, fairly species-rich U4b/MG5 grassland, grazed to a short sward and showing signs of recent bramble clearance, particularly on a raised bank along the southern boundary. Self-heal, Lady's Mantle, Greater Bird's-foot Trefoil and Lesser Stitchwort are all fairly frequent here, although not making much cover in

any of the samples and the bank also supports woodland species such as Primrose (*Primula vulgaris*), Bluebell (*Hyacinthoides non-scripta*) and Common Dog-violet.

The remainder of the field, in the western end is shaded by trees on all sides and again is damper, with a seep on the northern edge giving rise to a small patch of short-grazed flush more closely resembling the composition of the M27 mire in the adjoining fields. The rest of the area, although drier at the time of survey, was heavily poached with frequent Bramble, Nettle and Rushes and may have been favoured by grazing cattle for shade in the recent hot weather. There is some suggestion of affinity with MG8b *Cynosurus cristatus – Caltha palustris* grassland typical subcommunity (Wallace & Prosser, 2017) in this damper corner, though the area is small and heavily disturbed.

Area J was analysed using TABLEFIT initially with five quadrats, but this gave unconvincing results. A second run using only the three quadrats in the drier eastern part of the field confirmed a much better fit to U4b again with similarities to MG5.

Area K

This is a larger field (0933, ~2.3 ha), clearly formed from two smaller ones by the removal of a hedge, leaving a row of three or four mature, open-grown Oaks in place.

The sward was noticeably lusher and more fertile than elsewhere, with constant grasses including Common- and Creeping Bent (*Agrostis stolonifera*), Sweet Vernal Grass, Yorkshire Fog, Cock's-foot and Red Fescue, in a rather variable mixture with Meadow Foxtail (*Alopecurus pratensis*), Perennial Rye-grass and Timothy (*Phleum pratense*), suggesting that some re-seeding may have taken place.

Broadleaved herbs were patchily distributed, with Meadowsweet constant at low cover and both Clustered Dock (*Rumex conglomeratus*) and Greater Bird's-foot Trefoil locally frequent hinting at a history of dampness, but otherwise, species such as Creeping Buttercup, Creeping Thistle, Silverweed (*Potentilla anserina*), Ragwort, Ribwort Plantain, Common Mouse-ear, White Clover and Dandelion were fairly typical of agricultural improvement.

Five samples were recorded, but fit to any of the TABLEFIT suggested communities was not convincing, beyond suggesting that the community may be U4-derived and semi-improved. For this reason it has been mapped as MG6.

Figure 9: Semi-improved grassland and remnant hedgerow trees in Area G (© R. Large, 2018)

Area L

The final area walked is a complex of fields, covering about 23 ha of the former floodplain of the river Barle. The river itself has been straightened and constrained to a channel along the western edge of the plain, but there is some indication that it once ran in part closer to the eastern edge alongside the Pixton Park woodlands.

There are a few surviving mature and ancient trees along the woodland edge, in hedges and within some of the fields in this area, but previous walkovers suggested that there was likely to be little interest in most of the grassland here. A few internal hedge banks survive, but others appear to have been removed and there are few completely stock-proof boundaries at present.

Four numbered fields were not sampled in this survey: 9721 is a large, apparently unmanaged area of rank grassland with a significant proportion of Rye-grass evident within a tall, rank sward in which Yorkshire Fog, Cock's-foot and False Oat-grass are abundant. As in Area I above, lower-lying patches have Meadowsweet, Angelica and Rushes, but the overall impression is of abandoned semi-improved pasture.

Figure 10: From Area G, looking west into field 9721 (© R. Large, 2018)

1095, 2475 and 3946 are completely flat and had recently been cut, presumably for hay/haylage and subsequently spread with farmyard manure. The only broadleaved herbs which were identifiable in the remaining sward were abundant Greater Plantain, White Clover and Docks. Inspection of uncut areas around the edges revealed Rye-grass, Yorkshire Fog, False Oat-grass and Meadow Foxtail, along with single plants of Red Clover and interestingly, Yellow Rattle. The eastern edge of 2475 had a wide, unmanaged margin with a few large Oaks and smaller scrub in a rank, unmanaged sward in which Rye-grass, White Clover and Docks were evident.

Figure 11: Rank margin and hay-cut area in field 2475 (© R. Large, 2018)

The remaining two fields 1409 & 3483, separated only by a remnant ditch, are not fenced off from the adjoining 1095 and 2475, but lie lower and are clearly much wetter. A total of ten samples were recorded here. Five were in scattered stands of M23a (*Juncus effusus/acutiflorus-*

Galium palustre rush-pasture, *Juncus acutiflorus* sub-community) running the whole length of the two fields. Sharp-flowered Rush, Greater Bird's-foot Trefoil, Marsh Bedstraw, Marsh Thistle and Marsh Willowherb (*Epilobium palustre*), Rough Meadow-grass, Tufted Hair-grass and Clustered Dock are all constant and Velvet Bent (*Agrostis canina*) is frequent, with Ragged Robin (*Silene flos-cuculi*) and Lesser Stitchwort scattered throughout. In some patches Grey Willow (*Salix cinerea* subsp. *oleifolia*) are becoming established.

The other five samples were taken in the surrounding drier matrix which was mostly rank and unmanaged. Samples in this area produced a rather less convincing fit for U4b, with TABLEFIT analysis suggesting U1f (which it is clearly not). This area is again probably best described as under-managed, semi-improved pasture. Fringing the areas of M23a there are areas close to MG9 and drier, ranker spots resemble MG1. Toward the northern edge of the field Rye-grass becomes more abundant.

Grassland condition:

Hewins's survey in 2014 included a condition assessment of areas mapped as MG5 (Areas A and B in this report) following the methodology described by Jefferson and Robertson (2000), with ten sample stops in each of the areas, finding the grassland to be in unfavourable condition by reason of insufficient herb cover and frequency of positive indicator species. All other attributes assessed (e.g. scrub cover, negative indicators, sward height etc.) were found to be favourable.

Figure 12: Mature Oak on a former field boundary within Area G (© R. Large, 2018)

Condition assessment did not form part of the survey brief in either 2018 or 2019, however the larger number of NVC samples recorded, along with field notes offer the opportunity to assess most condition attributes retrospectively. In light of the nature of the grassland communities at Pixton Park being somewhat intermediate between U4b and MG5, consideration has been given to thresholds for both types. Following advice from NE grassland specialists (R. Jefferson, *pers. com*.), a further comparison was made including indicator species from lists for both communities, with the addition of Pignut and Lesser Stitchwort, which are present throughout some of the areas surveyed (see Appendix 4 for details of this analysis).

To summarise; when indicator lists are combined and augmented with the above species, U4b/MG5 grassland across both surveys has insufficient frequency of positive indicator species to meet even a reduced threshold value for favourable condition, however areas A, F & G do pass the threshold if considered individually.

In addition all areas were observed to have relatively low ratio of herbs to grasses, though this was not recorded systematically in either survey. Although this attribute (herb % cover in samples often known as herb/grass ratio) would apply if one was assessing using the CSM MG5 protocol, it is not an attribute that is used for acid grasslands in Robertson & Jefferson 2000. This is because acid grasslands are generally naturally more 'grassy'. Thus the grassland areas only fail on number/frequency of positive indicator species (R. Jefferson, *pers. com.*)

On balance of the rather limited evidence presented here and given the rather fragmented nature of the U4b/MG5 areas, we conclude that the priority grassland here is not currently in favourable condition.

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Conclusion:

The 2018 survey has broadly confirmed the extent of grassland interest recorded in 2014. However more detailed sampling and analysis has determined that it is more appropriate to consider Areas A to D as the calcifugous community U4b, with elements resembling MG5, rather than the other way around as Hewins's suggested. This is to some extent an expert judgment call, although supported by the nature of soils and geology locally, since the grassland here is clearly towards the more mesotrophic and species-rich end of the U4 community spectrum.

Either community is a qualifying SSSI feature, although the site threshold for notification of U4b, at 5 ha is much higher than the 0.5 ha MG5 threshold. In total this grassland community (along with transitions to MG1 in less intensively managed areas) was found, in both 2014 and 2018 to extend across almost 7 ha. 2019 survey has identified at least a further 4 ha of similarly species-rich U4b/MG5, in fragments 0.5 to 1.2 ha in area across the landscape.

The 2019 survey also identified just over 0.5 ha of M27 mire vegetation in the north of the survey area and 1.2 ha of M23a rush-pasture, as well as smaller areas somewhat transitional between these two communities. All gave the impression of having developed in wetter areas of a broader semi-improved grassland matrix which has been mapped as MG6, but is similar in composition to an impoverished version of the U4b grassland.

The boundary and extent of a future SSSI at Pixton Park is likely to be determined mainly by the identified veteran tree interest and its associated fungal, lichen and invertebrate communities. However our findings demonstrate that there is qualifying grassland interest within the likely area as well.

Future management of the site should ideally aim to enhance and extend the species-rich areas which represent now-scarce examples of this community and to support the threatened and notable species present, including the Butterfly Orchids, Moonwort, Greater Burnet and others.

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Appendix 1: Maps

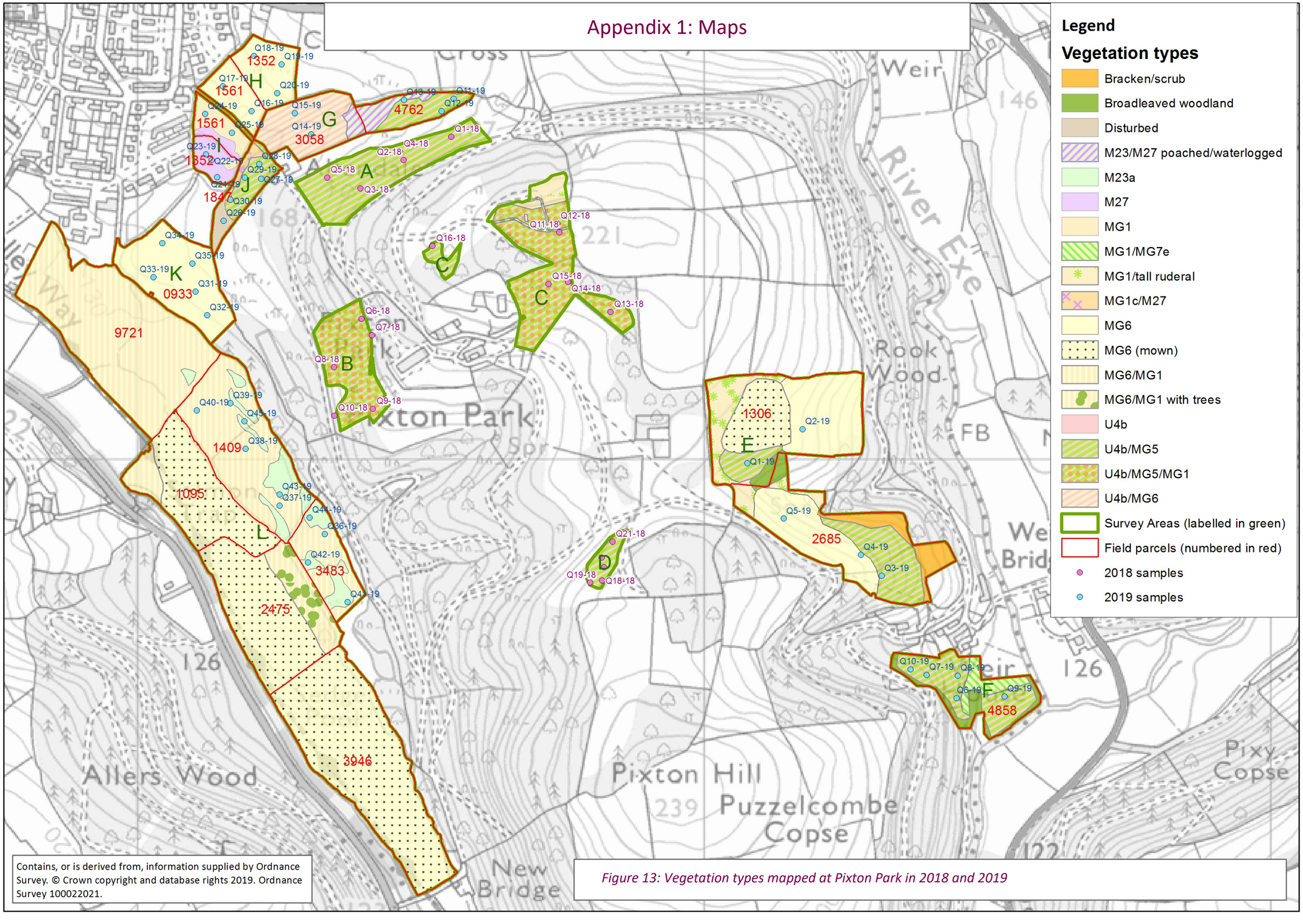

Figure 13: Vegetation types mapped at Pixton Park in 2018 and 2019

Appendix 2: Floristic tables

Table 2: Comparison of floristics of 2018 survey areas with Rodwell (1992) communities

	Community/surveyed stand					
Taxon	**MG**	**Area**	**Area**	**Area**	**Area**	**U4b**
Achillea millefolium	III				I (1)	IV
Agrostis capillaris	IV	V (7-	V (8-	V (7-	V (4-	V (1-
Ajuga reptans			I (5)		II (1)	
Anthoxanthum odoratum	IV	V (5-	V (7-	IV	V (4-	V (1-
Bellis perennis	II (1-			II (1)		II (1-
Brachythecium rutabulum	III		III	I (1)		
Calliergonella cuspidata	I (1-	IV	I (1)		II (1)	
Cardamine pratensis	I (1-				II (1)	
Cerastium fontanum	II (1-	I (1)		III		IV
Cirsium arvense	II (1-			I (1)		I (1-
Cirsium palustre				I (1)	II (1)	
Conopodium majus	I (1-	IV	I (4)	I (4)	V (1-	
Cynosurus cristatus	V (1-	II (1)				II (1-
Dactylorhiza fuchsii		I (1)				
Dactylis glomerata	IV	II (1)	III	III	V (4-	II (1-
Festuca rubra	V (1-	III	V (4-	III	IV	IV
Ficaria verna		IV	V (1-	III	II (1-	
Fraxinus excelsior seedling		II (1)	II (1)			
Holcus lanatus	IV	V (4-	V (4-	V (4-	IV	V(1-
Hyacinthoides non-scripta					I (1)	
Hypochaeris radicata	III	IV	II (1)	II (1-	III	
Jacobaea vulgaris	I (1-		II (1)	II (1-		
Juncus effusus	I (1-	I (1)		I (1)		I (1-
Leucanthemum vulgare	II (1-			I (1)		
Lolium perenne	III	I (4)	I (4)	I (1)		II (1-
Lotus corniculatus	V (1-	IV	IV	IV	II (1)	II (1-
Luzula campestris	III	V (1-	IV	II (5)	V (1-	III
Lysimachia nemorum					I (1-	
Plagiomnium undulatum		II (1)				
Plantago lanceolata	V (1-	V (5-	V (4-	V (1-	V (1-	III
Platanthera sp. (cf. bifolia)		I (1)				
Poa annua		II (1)				I (1-
Poa humilis			IV	III	IV	III
Poa trivialis	II (1-	I (1)	IV	II (4)	III	
Potentilla anserina				I (4)		
Potentilla erecta	I 1-	II (1-			II (1)	III
Potentilla reptans	I (1-				I (4)	
Potentilla sterilis			II (4-		V (1-	
Primula vulgaris					I (1)	
Prunella vulgaris	III	V (1-		I (1)	I (1)	II (1-
Pseudoscleropodium purum	I (1-	I (4)	II (1)		I (1)	II (1-
Pteridium aquilinum			III		III	I (1-
Ranunculus acris	III	V (1-				II (1-
Ranunculus bulbosus	III	I (1)				
Ranunculus repens	I (1-	II (1-	I (1)	I (1)	I (1)	I (1-
Rhinanthus minor	II(1-	IV	I (1)			
Rhytidiadelphus squarrosus	II (1-	V (4-	IV	II (1-	II (1)	III
Rubus fruticosus agg			I (4)	I (1)	I (1)	
Rumex acetosa	III	IV	III	IV	II (1)	III
Rumex acetosella					I (1)	

…cont.			Community/surveyed stand			
Taxon	**MG5**	**Area A**	**Area B**	**Area C**	**Area D**	**U4b**
Rumex sanguineus				I (4)	I (1)	
Scorzonerioides autumnalis	III (1-	II (1-4)				
Stellaria graminea			V (1-4)	I (1)		
Taraxacum agg.	III (1-	V (1-5)	I (1)	IV (1)	V (1-4)	II (1-4)
Thuidium tamariscinum		I	II (1-4)		II (1)	I (1-3)
Trifolium dubium	II (1-8)			I (1)		
Trifolium pratense	IV (1-5)	III (1)	III	II (4-5)		II (2-5)
Trifolium repens	IV (1-9)	III (1-8)		II	I (1)	IV (1-6)
Veronica arvensis			II			
Veronica chamaedrys	II (1-4)	V (1-4)		II (1-4)	V (1-4)	II (1-4)
Veronica serpyllifolia		I		I (1)		
Vicia sativa			II	II		
Viola riviniana					V (1)	II (1-4)
Vulpia bromoides				I (1)		
Number of samples		5	5	5	5	
Number of species/sample	22 (13-	22.6(21-	18.8(13-	16.4(8-23)	21(15-	20 (11-
Mean sward height (cm)		5.6 (3-7)	4.2 (2-7)	6.4 (5-7)	9 (7-15)	13 (2-50)
Vegetation cover (%)		93 (90-	93 (85-	99 (97-100)	100	94 (60-

Table 3: Comparison of floristics of 2019 survey areas E and F with Rodwell (1992) communities

	Community/surveyed stand				
	MG6	**Area**	**U4b**	**Area**	**MG5**
Achillea millefolium	II (1-	II (4-	VI	IV	III (1-6)
Agrostis capillaris	III (1-	V (6-	V (1-	V (5-	IV (1-8)
Ajuga reptans				IV	
Alchemilla filicaulis vestita				II (1-	I (1-3)
Anthoxanthum odoratum	II (1-	IV	V (1-	V (3-	IV (1-8)
Calliergonella cuspidata		I (3)		II (1-	
Cardamine pratensis				II (1)	
Centaurea nigra agg.	I (1-			IV	IV (1-5)
Cerastium fontanum	IV (1-	III	IV	IV	II (1-4)
Cirsium arvense	III (1-	V (1-	I (1-	I (2)	II (1-3)
Cynosurus cristatus	V (2-	I (3)	II (1-		V (1-8)
Dactylis glomerata	III (1-	I (2)	II (1-	V (3-	IV (1-7)
Festuca rubra agg.	IV(1-	III	IV	IV	V (1-8)
Holcus lanatus	IV	V (4-	V (1-	V (5-	IV (1-6)
Hypochaeris radicata	I (2-			IV	III (1-5)
Lolium perenne	V (1-	I (1)	II (1-	V (2-	III (1-8)
Lotus pedunculatus		IV		V (1-	
Luzula campestris	I (1-		III	I (1)	III (1-6)
Phleum pratense	I (1-	II (1-			I (1-6)
Plantago lanceolata	III (1-	II (2-	III	V (3-	V (1-7)
Poa trivialis	II (1-			II (2-	II (1-8)
Primula veris			II (1-	I (1)	
Ranunculus acris	III (1-	I (1)			III (1-4)
Ranunculus bulbosus		I (1)			III (1-7)
Ranunculus repens	I (1-	II (3)	I (1-	V (2-	I (1-7)
Rubus fruticosus agg.				I (1)	
Rumex acetosa	II (1-	I (2)	III	V (2-	III (1-4)
Rumex conglomeratus		I (1)			
Rumex obtusifolius	I (1-	II (1)			

…cont.		Community/surveyed stand			
	MG6	Area E	U4b	Area F	MG5
Stellaria graminea		III (2-3)			
Stellaria media agg.		II (2)			
Succisa pratensis			II (1-3)	III (3-4)	I (1-5)
Taraxacum agg.	II (1-	IV (1)	II (1-4)	III (2-4)	III (1-4)
Trifolium pratense	II (1-	IV (2-4)	II (2-5)	V (1-2)	IV (1-5)
Trifolium repens	V (1-	V (2-3)	VI (1-6)	V (2-3)	IV (1-9)
Veronica chamaedrys	I (1-2)	II (2)	II (1-4)	III (1-2)	II (1-4)
Number of samples		3		3	
Number of species/sample	13(9-	13(9-17)	20(11-	20(18-	23(12-
Mean sward height (cm)		17(15-	13(2-50)	19(15-	
Vegetation cover (%)		99(95-	94(60-	99(97-	

Table 4: Comparison of floristics of 2019 survey areas G and J with Rodwell (1992) communities

	Community/surveyed stand					
Taxon	**M27**	**Area**	**Area**	**Area**	**U4b**	**MG**
Achillea millefolium		IV	III (2)	V (2)	VI (1-	III
Agrostis capillaris		V (5-	V (5-	V (7-	V (1-	IV
Agrostis stolonifera	I (3-	II (4)	II (3-	I (3)		I (1-
Ajuga reptans	I (1-	I (6)	II (1)			
Alchemilla filicaulis			II (1-	III (1-		I (1-
Anthoxanthum odoratum	I (1-	I (4)	IV (2-	V (3-	V (1-	IV
Atrichum undulatum	I (3-		I (1)			
Calliergonella cuspidata	I (1-		IV (1-	III (1)		I (1-
Carex hirta		II (1-				
Carex leporina		I (3)	II (1-			
Carex remota			I (1-3)			
Centaurea nigra agg.	I (1-	III (1-				IV
Cerastium fontanum		II (1)	II (1)	I (1)	IV (1-	II (1-
Cirsium arvense	II (1-	II (2-	II (1-	III (1-	I (1-	II (1-
Cirsium palustre	II (1-	III (2-	III (1)	III (1)		
Cynosurus cristatus		III (3)			II (1-	V (1-
Dactylis glomerata	I (1-	III (2-			II (1-	IV
Festuca rubra agg.	I (1-	V (3-	V (3)	V (3)	IV (1-	V (1-
Filipendula ulmaria	V (8-	II (1-	V (3-	V (3-		I (1-
Galium palustre sens.lat.	II (1-	I (2)	II (1-			
Holcus lanatus	II (1-	V (4-	V (3-	V (3-	V (1-	IV
Hylocomium splendens		II (2)	I (2)	I (2)	I (1-	
Hypochaeris radicata		II (1)				III
Jacobaea vulgaris		III (1-	IV (1)	V (1)		I (1-
Juncus acutiflorus	I (1-	I (4)	III (1-	I (1)		
Juncus bufonius			I (1)			
Juncus conglomeratus	I (3-		II (1)	I (1)		
Juncus effusus	III (1-	I (1)	III (1-	I (1)	I (1-	I (1-
Kindbergia praelonga	I (1-	I (1)				
Lathyrus pratensis	I (1-	I (1)				II (1-
Lotus pedunculatus	II (1-	V (2-	III (3-	III (3-		
Luzula campestris		III (1-	I (1)	I (1)	III (1-	III
Plantago lanceolata		IV	IV (3-	V (3-	III (1-	V (1-
Poa trivialis	II (1-	II (1-	I (2)			II (1-
Potentilla anserina	I (1-	II (2-				
Potentilla erecta		IV	I (1)		III	I (1-
Prunella vulgaris	I (3-	I (3)	III (2)	V (2)	II (1-	III

…cont.			Community/surveyed stand			
Taxon	**M**	**Area G**	**Area**	**Area**	**U4b**	**MG5**
Quercus robur		I (1)				
Ranunculus acris	I (1-5)	II (2)	II (1-2)	III (1-2)		III (1-4)
Ranunculus repens	II (1-7)	V (2-4)	V (2-7)	V (2-5)	I (1-4)	I (1-7)
Rubus fruticosus agg.	I (2-5)		II (1)	I (1)		
Rumex acetosa	II (1-4)	IV (2-3)	V (2)	V (2)	III (1-4)	III (1-4)
Rumex conglomeratus			I (1)			
Sagina apetala			I (1)			
Salix cinerea			I (1)			
Schedonorus arundinaceus		I (1)				
Scorzoneroides autumnalis		II (1-2)				III (1-5)
Stellaria graminea	I (1-3)		III (1)	V (1)		
Taraxacum agg.		III (1-2)	II (1)	III (1)	II (1-4)	III (1-4)
Trifolium repens		III (1-3)	I (3)		VI (1-6)	IV (1-9)
Veronica chamaedrys		III (1-2)			II (1-4)	II (1-4)
Veronica serpyllifolia			I (1)			
Number of samples		5	5	3		
Number of species/sample	15(6-33)	20(10-	20(17-	19(17-	20 (11-	23(12-
Mean sward height (cm)	102(20-	16(8-20)	10(8-13)	8(8-9)	13 (2-50)	
Vegetation cover (%)	99(80-	99(99-	94(80-	95(85-	94 (60-	

Table 5: Comparison of floristics of 2019 survey area I with Rodwell (1992) communities

		Community/surveyed stand	
Taxon	M27	Area I	M
Agrostis capillaris		IV (2-5)	I
Alopecurus pratensis		IV (3-5)	I
Angelica sylvestris	IV (1-4)	I (1)	
Arrhenatherum elatius	II (1-5)	II (5)	V
Carex hirta		II (2-5)	
Dactylis glomerata	I (1-6)	II (2)	IV
Deschampsia cespitosa		III (3-4)	
Epilobium obscurum	I (1)	II (1-2)	
Filipendula ulmaria	V (4-10)	V (2-10)	V-
Galium aparine	I (1-5)	II (1-5)	III
Galium palustre sens.lat.	II (1-4)	III (1)	
Heracleum sphondylium	I (1-4)	II (1)	III
Holcus lanatus	II (1-6)	III (1-3)	IV
Jacobaea vulgaris		I (1)	
Juncus acutiflorus	I (1-7)	III (1-2)	
Juncus effusus	III (1-6)	II (2-3)	
Kindbergia praelonga	I (1-6)	I (1)	
Lathyrus pratensis	I (1-4)	III (2-3)	III
Lotus pedunculatus	II (1-5)	II (1-2)	I
Plantago lanceolata		I (2)	II
Poa trivialis	II (1-5)	II (3)	III
Rumex acetosa	II (1-4)	III (1-2)	III
Rumex conglomeratus		III (1-4)	
Sanguisorba officinalis	I (1-3)	III (1-2)	
Veronica chamaedrys		III (1-2)	I
Number of samples		5	
Number of species/sample	15(6-33)	18(15-22)	15
Mean sward height (cm)	102(20-	45(40-50)	
Vegetation cover (%)	99(80-	100(100)	

Table 6: Comparison of floristics of 2019 survey areas H, K and L (grassland) with Rodwell (1992) communities

	Community/surveyed stand				
	U4	Area H	Area K	Area L (grasslan	MG6
Achillea millefolium	IV (1-6)	III (1)		II (2)	
Agrostis capillaris	V (1-8)	V (5-7)	V (6-8)	V (9-10)	III (1-
Agrostis stolonifera			V (6-8)		I (1-9)
Ajuga reptans			I		
Alopecurus pratensis	I		III (1-2)		I (1-7)
Anthoxanthum odoratum	V (1-6)	II (2-3)	I	II (3)	II (1-
Arrhenatherum elatius				I (1)	I (1-3)
Brachythecium rutabulum				IV (1)	
Carex leporina				I (1)	
Cerastium fontanum	IV (1-4)	II (1)	IV (1-2)		IV (1-
Cirsium arvense		II (1-2)	II (1)	II (1)	III (1-
Cirsium palustre				II (1)	
Dactylis glomerata	II (1-4)	I (3)	V (1-3)		III (1-
Epilobium obscurum				I (1)	
Festuca rubra agg.	IV (1-8)	IV (2-6)	V (3-4)		IV (1-
Holcus lanatus	V (1-6)	V (6-7)	V (5-6)	V (3)	IV (1-
Holcus mollis	I			I (2)	
Jacobaea vulgaris		III (1)	III (1-3)		
Juncus acutiflorus				II (1-2)	
Scorzoneroides autumnalis		I (1)			II (1-
Lotus pedunculatus			IV (3-8)	V (1-5)	
Luzula campestris	III (1-3)	II (1)		II (1)	I (1-5)
Plantago lanceolata	III (1-4)	III (1-3)	V (1-3)		III (1-
Poa trivialis		I (1)	III (2-4)	IV (1)	II (1-
Potentilla anserina				I (8)	I (1-3)
Potentilla erecta	III (1-4)	III (2)		I (7)	
Ranunculus repens	I	IV (1-2)	IV (1-4)	III (2-4)	I (1-7)
Rhytidiadelphus squarrosus	III (1-8)			III (1)	I (1-6)
Rumex acetosa	III (1-4)	II (2)	IV (1-2)	IV (1-3)	II (1-
Rumex obtusifolius			II (1)		I (1-4)
Stellaria graminea			III (1)		
Taraxacum agg.	II (1-4)	III (1)	IV (1)		II (1-
Trifolium repens	IV (1-6)	II (3)	II (2-3)		V (1-
Veronica chamaedrys	II (1-4)			II (1-5)	I (1-2)
Number of samples		5	5	5	
Number of species/sample	20(11-39)	10(8-	14(12-17)	11(7-15)	13(4-
Mean sward height (cm)	13(2-66)	8(5-12)	16(10-19)	32(30-35)	
Vegetation cover (%)	96(70-100)	92(85-	99(97-	100(99-	

Table 7: Comparison of floristics of 2019 survey area L (rush pasture) with Rodwell (1992) M23a community

	Community/surveyed stand	
Taxon	**Area L**	**M23a**
Agrostis canina sens.lat.	III (2-5)	II (1-6)
Agrostis capillaris	IV (4-5)	I (2-6)
Angelica sylvestris	II (1-3)	II (1-5)
Brachythecium rutabulum	IV (1)	I (1-6)
Calliergonella cuspidata	II (1)	II (1-5)
Cardamine pratensis	I (1)	
Cirsium palustre	V (1-2)	III (1-5)
Deschampsia cespitosa	V (3-4)	I (1-4)
Epilobium palustre	V (1-3)	II (1-3)

…cont.	Community/surveyed stand	
Taxon	**Area L**	**M23a**
Filipendula ulmaria	III (4-7)	II (2-7)
Galium aparine	II (1-5)	
Galium palustre sens.lat.	V (2-4)	IV (1-4)
Holcus lanatus	V (1-4)	IV(1-8)
Holcus mollis	I (1)	
Jacobaea vulgaris	II (1)	
Juncus acutiflorus	V (7-9)	V(2-9)
Juncus effusus	III (2-5)	IV(1-6)
Lotus pedunculatus	V (4-5)	IV (1-6)
Poa trivialis	V (1-2)	II (3-5)
Ranunculus repens	IV (2-4)	II (2-5)
Rumex acetosa	IV (1-3)	II (1-5)
Rumex conglomeratus	V (4-5)	
Rumex obtusifolius	I (1)	
Silene flos-cuculi	II (1-2)	
Stellaria graminea	IV (1-2)	I (1-2)
Succisa pratensis	I (2)	I (1-5)
Valeriana officinalis	I (3)	
Number of samples	5	
Number of species/sample	18(15-22)	21(6-39)
Mean sward height (cm)	45(40-50)	47(30-
Vegetation cover (%)	100(100)	96(60-

Appendix 3: Quadrat data

Table 8: Pixton Park core area, quadrat data, survey NEFU 2018-155, 22nd May 2018

Survey Area	Area					Area					Area					Glad	Area				
Quadrat	**Q1-**	**Q2-**	**Q3-**	**Q4-**	**Q5-**	**Q6-**	**Q7-**	**Q8-**	**Q9-**	**Q10-**	**Q11-**	**Q12-**	**Q13-**	**Q14-**	**Q15-**	**Q16-**	**Q17-**	**Q18-**	**Q19-**	**Q20-**	**Q21-**
Grid Ref	SS92 553	SS92 469	SS92 393	SS92 463	SS92 334	SS92 395	SS92 413	SS92 346	SS92 415	SS92 347	SS92 744	SS92 740	SS92 834	SS92 759	SS92 725	SS92 520	SS92 823	SS92 819	SS92 798	SS92 818	SS92 837
Sward Height	6	7	3	5	7	3	5	7	2	4	7	7	6	5	7	10	15	9	7	7	7
Bare Ground %	10	2	7	10	7	2	8	15	5	7	1	0	3	1	0	1	1	0	0	0	0
	%					%					%					%	%				
Achillea millefolium																	2				
Agrostis capillaris	90	90	40	90	90	90	90	80	80	60	50	80	85	90	80	70	30	60	10	20	10
Ajuga reptans								20												2	3
Anthoxanthum odoratum	80	80	20	90	90	75	70	40	70	80	30	70	80	85		80	70	40	40	10	20
Bellis perennis											1	1									
Brachythecium rutabulum							1	1	5			1									
Bromus hordeaceus																					
Calliergonella cuspidata	1	10	15	15				1												2	2
Cardamine pratensis																				2	1
Carex remota																5					
Carex sylvatica																5					
Cerastium fontanum			1								2	2	1								
Cirsium arvense											1										
Cirsium palustre											1					1		1		1	
Conopodium majus	5	2		5	5					5				4			4	3	2	3	2
Crataegus monogyna																					1
Cynosurus cristatus	1	2														1					
Dactylorhiza fuchsii				1																	
Dactylis glomerata		3		1				10	10	8			10	3	20	1	25	5	5	15	12
Festuca rubra		2	1		5	90	70	20	10	50		1	5		2	2	5	10		15	5
Ficaria verna	1	2	1	1		5	5	5	3	1			5	3	1	10				2	5
Fraxinus excelsior seedling	1			1				1		1											
Holcus lanatus	5	5	15	5	5	20	30	5	10	5	20	20	15	10	50	20	5		50	1	2
Hyacinthoides non-scripta																			1		
Hypochaeris radicata	20	35		20	10				1	1	10	3					1	2		2	
Jacobaea vulgaris									1	1	5	3									
Juncus effusus			2								1										
Leucanthemum vulgare												2									
Lolium perenne			4						5		1										
Lotus corniculatus	3	5		5	5	20	20	1		8	3	2	4	1		4	2	1			
Luzula campestris	15	5	1	20	20	20		7	10	15		15		25		20	5	3	15	2	2
Lysimachia nemorum																2				15	
Plagiomnium undulatum		1			1																
Plantago lanceolata	15	30	40	15	20	15	5	5	20	5	20	5	7	10	3	20	10	5	50	5	3
Platanthera bifolia					1																
Poa annua	1		1																		
Poa humilis						5	5	1		2		5	5	3		2	15	10		1	1
Poa trivialis			1				1	5	5	5	10		5			20	3			5	2
Potentilla anserina											5										
Potentilla erecta	7				1															1	1
Potentilla reptans																			10		
Potentilla sterilis								10		20							1	1	2	2	5
Primula vulgaris																				2	
Prunella vulgaris	3	5	25	5	1							3									2
Pseudoscleropodium purum	5							1		1										2	
Pteridium aquilinum							1	1		5									1	2	4
Ranunculus acris	3	10	25	5	1																
Ranunculus bulbosus				1																	
Ranunculus repens		1	5						1			1				1	1				
Rhinanthus minor	3	10		5	25					2											
Survey Area	**Area**					**Area**					**Area**					**Glad**	**Area**				

Quadrat	Q1-	Q2-	Q3-	Q4-	Q5-	Q6-	Q7-	Q8-	Q9-	Q10-	Q11-	Q12-	Q13-	Q14-	Q15-	Q16-	Q17-	Q18-	Q19-	Q20-	Q21-
			%					%					%			%			%		
Rhytidiadelphus squarosus	5	15	5	15	20	1	1	1		5		70			1	40	2			2	
Rubus fruticosus agg							6				1								1		
Rumex acetosa	1		1	1	1		1		1	1	4		2	5	3					1	2
Rumex acetosella																	1				
Rumex sanguineous													8								1
Salix cinerea																2					
Scorzonerioides autumnalis				5	1																
Stellaria graminea						5	5	1	2	2				2							
Taraxacum agg.	15	5	1	15	10				1		3	1	1	1		1	2	5	1	5	4
Thuidium tamariscinum				1		10			1											2	2
Trifolium dubium												1									
Trifolium pratense		2		1	1	1			2	2	10	15				10					
Trifolium repens		3	60		1						5	5				4	2				
Veronica arvensis							2	3													
Veronica chamaedrys	5	3	5	5	5								1	7		2	3	3	10	4	1
Veronica serpyllifolia				1							1										
Vicia sativa							1	1			1	3									
Viola riviniana																2	1	1	1	1	1
Vulpia bromoides											1										
Species	22	23	21	25	22	13	17	22	19	23	23	22	15	14	8	24	20	16	15	28	25

Table 9: Pixton Park surrounds, Areas E, F & G, quadrat data, survey NEFU 2019-018, 23rd-25th July 2019

Area	Area E					Area F					Area G				
Quadrat	Q1-	Q2-	Q3-	Q4-	Q5-	Q6-	Q7-	Q8-	Q9-	Q10-	Q11-	Q12-	Q13-	Q14-	Q15-
Grid reference	SS 93076	SS 93173	SS 93313	SS 93276	SS 93140	SS 93445	SS 93392	SS 93447	SS 93530	SS 93364	SS 92557	SS 92536	SS 92470	SS 92306	SS 92277
Sward height (cm)	15	15	15	20	20	20	20	20	20	15	15	8	20	18	19
Bare ground (%)	0	0	5	0	0	0	0	0	0	3	1	5	15	1	3
		Cover (DOMIN)					Cover (DOMIN)					Cover (DOMIN)			
Achillea millefolium	5		4				1	3	3	5	2	2		2	2
Agrostis capillaris	6	7	7	8	8	6	6	5	5	5	7	6	5	7	7
Ajuga reptans							2	2	3	2		6			
Alchemilla filicaulis						2				1					
Anthoxanthum odoratum		6	5	6	5	4	4	3	4	3	4				
Calliergonella cuspidata	3					3			1						
Cardamine pratensis							1	1							
Carex hirta												1		4	
Carex leporina												3			
Centaurea nigra agg.						4	6	4		3	4			5	1
Cerastium fontanum			1	1	1	1	1	1	1			1			1
Cirsium arvense	2	1	4	2	1				2			2			4
Cirsium palustre											4	3		2	
Cynosurus cristatus	3										3	3			3
Dactylis glomerata			2			7	6	3	5	4		3	7		2
Festuca rubra agg.	6		3	3			6	3	3	5	3	3	3	5	3
Filipendula ulmaria												1	7		
Galium palustre sens.lat.													2		
Holcus lanatus	6	7	5	5	4	6	6	6	5	5	4	4	7	7	6
Hylocomium splendens											2	2			
Hypochaeris radicata							3	2	1	3		1			1

Area	Area E					Area F					Area G				
Quadrat	Q1-	Q2-	Q3-	Q4-	Q5-	Q6-	Q7-	Q8-	Q9-	Q10-	Q11-	Q12-	Q13-	Q14-	Q15-

	Cover					Cover					Cover (DOMIN)				
Jacobaea vulgaris											1	1			3
Juncus acutiflorus												4			
Juncus effusus												1			
Kindbergia praelonga											1				
Lathyrus pratensis												1			
Lolium perenne	1					4	2	2	2	2					
Lotus pedunculatus		3	3	2	4	1	3	3	3	2	3	2	3	3	2
Luzula campestris										1	3	2			1
Phleum pratense	1			3											
Plantago lanceolata	4		2			4	4	5	3	3	4	5		4	4
Poa trivialis						3			2					2	1
Potentilla anserina														3	2
Potentilla erecta											2	1	1		1
Primula veris										1					
Prunella vulgaris												3			
Quercus robur												1			
Ranunculus acris	1										2	2			
Ranunculus bulbosus	1														
Ranunculus repens	3	3				2	3	3	3	2	2	3	2	4	3
Rubus fruticosus agg.						1									
Rumex acetosa					2	3	3	3	3	2	3	2		2	2
Rumex conglomeratus				1											
Rumex obtusifolius				1	1										
Schedonorus arundinaceus											1				
Scorzoneroides autumnalis											2				1
Stellaria graminea	2	2	3												
Stellaria media agg.				2	2										
Succisa pratensis							4	3		4					
Taraxacum agg.	1		1	1	1	2			4	2	1	2			1
Trifolium pratense	4	3	2		2	1	2	2	2	2					
Trifolium repens	2	2	2	3	2	3	3	2	2	2	3			3	1
Veronica chamaedrys			2	2			1	1		2	2		2		1
Species	17	9	15	14	12	18	20	20	20	22	24	30	10	14	23

Table 10: Pixton Park surrounds, Areas H, I & J, quadrat data, survey NEFU 2019-018, 23rd-25th July 2019

Area	**Area H**					**Area I**					**Area J**				
Quadrat	**Q16-**	**Q17-**	**Q18-**	**Q19-**	**Q20-**	**Q21-**	**Q22-**	**Q23-**	**Q24-**	**Q25-**	**Q26-**	**Q27-**	**Q28-**	**Q29-**	**Q30-**
Grid reference	SS 92201	SS 92150	SS 92205	SS 92254	SS 92246	SS 92140	SS 92130	SS 92120	SS 92119	SS 92166	SS 92151	SS 92218	SS 92214	SS 92189	SS 92163
Sward height (cm)	6	7	8	5	12	60	70	70	50	35	12	8	8	9	13
Bare ground (%)	4	15	15	5	3	0	0	0	0	0	20	1	1	0	0
	Cover					Cover					Cover (DOMIN)				
Achillea millefolium	1		1		1							2	2	2	
Agrostis capillaris	7	6	7	5	7	3	2		5	5	7	7	7	8	5
Agrostis stolonifera											7	3			
Ajuga reptans											1				1
Alchemilla filicaulis												4		1	
Alopecurus pratensis						3	3		4	5					
Angelica sylvestris									1						
Anthoxanthum odoratum		2		3							2	4	4	3	
Arrhenatherum elatius									5	5					
Atrichum undulatum															1
Area	**Area H**					**Area I**					**Area J**				
Quadrat	**Q16-**	**Q17-**	**Q18-**	**Q19-**	**Q20-**	**Q21-**	**Q22-**	**Q23-**	**Q24-**	**Q25-**	**Q26-**	**Q27-**	**Q28-**	**Q29-**	**Q30-**

	Cover					Cover					Cover (DOMIN)				
Brachythecium rutabulum															
Calliergonella cuspidata											2		1	1	2
Carex hirta						5			2						
Carex leporina											1				2
Carex remota															3
Centaurea nigra agg.															
Cerastium fontanum		1		1							1		1		
Cirsium arvense		2	1									1		3	
Cirsium palustre												1	1		1
Dactylis glomerata					3				2	2					
Deschampsia cespitosa						4			3	4					
Epilobium obscurum							2			1					
Festuca rubra agg.	3	3		2	6						3	3	3	3	3
Filipendula ulmaria						9	9	10	5	2	6	5	4	3	6
Galium aparine								5		1					
Galium palustre sens.lat.							1	1		1	2				1
Heracleum sphondylium									1	1					
Holcus lanatus	6	7	7	7	7	1			3	2	4	4	5	3	3
Hylocomium splendens												2			
Jacobaea vulgaris		1		1	1					1	1	1	1	1	
Juncus acutiflorus							1	1	2		4		1		5
Juncus bufonius sens.lat.											1				
Juncus conglomeratus											1			1	
Juncus effusus						3				2	3			1	2
Kindbergia praelonga						1									
Lathyrus pratensis							3		2	3					
Lotus pedunculatus						1				2		4	3		5
Luzula campestris		1		1										1	
Phleum pratense															
Plantago lanceolata	2		3		1				2		3	3	3	4	
Poa trivialis		1							3	3	2				
Potentilla erecta	2	2	2								1				
Prunella vulgaris												2	2	2	
Ranunculus acris												2		1	
Ranunculus repens	1	2	2		1						4	3	2	5	7
Rubus fruticosus agg.											1	1			
Rumex acetosa			2	2		1			2	2	2	2	2	2	2
Rumex conglomeratus							4	1	2						1
Sagina apetala											1				
Salix cinerea											1				
Sanguisorba officinalis								1	1	2					
Scorzoneroides autumnalis					1										
Stellaria graminea												1	1	1	
Taraxacum agg.		1	1		1							1		1	
Trifolium repens	3			3											3
Veronica chamaedrys						2	1			2					
Veronica serpyllifolia											1				
Species	8	12	9	9	10	11	9	6	17	19	25	21	17	20	18

Table 11: Pixton Park surrounds, Areas K & L, quadrat data, survey NEFU 2019-018, 23rd-25th July 2019

Area	Area K					Area L					Area L rush				
Quadrat	**Q31-**	**Q32-**	**Q33-**	**Q34-**	**Q35-**	**Q36-**	**Q37-**	**Q38-**	**Q39-**	**Q40-**	**Q41-**	**Q42-**	**Q43-**	**Q44-**	**Q45-**
Grid reference	SS 92102	SS 92122	SS 92028	SS 92043	SS 92096	SS 92330	SS 92250	SS 92190	SS 92163	SS 92104	SS 92370	SS 92300	SS 92250	SS 92303	SS 92188
Sward height (cm)	17	15	17	10	19	30	35	35	30	30	40	50	50	45	40
Bare ground (%)	0	0	0	3	3	1	0	0	0	0	0	0	0	0	0
	Cover					Cover					Cover (DOMIN)				
Achillea millefolium						2			2						
Agrostis canina sens.lat.											5	5		2	
Agrostis capillaris	7	6	8	7	7	9	9	10	9	9		5	4	5	5
Agrostis stolonifera	7	8	6	7	6										
Ajuga reptans			1												
Alopecurus pratensis	2		1		2										
Angelica sylvestris											3			1	
Anthoxanthum odoratum		1					3			3					
Arrhenatherum elatius						1									
Brachythecium rutabulum							1	1	1	1	1		1	1	1
Calliergonella cuspidata											1				1
Cardamine pratensis													1		
Carex leporina						1									
Cerastium fontanum	2	1	1	2											
Cirsium arvense	1		1				1		1						
Cirsium palustre						1			1		1	2	2	2	1
Dactylis glomerata	3	3	3	1	2										
Deschampsia cespitosa											4	3	4	3	4
Epilobium obscurum								1							
Epilobium palustre											1	3	3	1	2
Festuca rubra agg.	4	4	3	3	3										
Filipendula ulmaria											7	6			4
Galium aparine													5	1	
Galium palustre sens.lat.											2	2	4	3	3
Holcus lanatus	5	6	5	5	6	3	3	3	3	3	1	4	3	3	4
Holcus mollis						2					1				
Jacobaea vulgaris	3		1	2									1		1
Juncus acutiflorus						2				1	7	9	8	8	9
Juncus conglomeratus															
Juncus effusus											4		5		2
Lotus pedunculatus	8	5	3		4	1	3	5	4	3	4	4	5	5	4
Luzula campestris						1				1					
Plantago lanceolata	3	3	3	3	1										
Poa trivialis	3	2		4			1	1	1	1	2	1	2	1	2
Potentilla anserina							8								
Potentilla erecta						7									
Ranunculus repens	4	1	3		4	4		4		2	2	3	4	3	
Rhytidiadelphus squarrosus						1			1	1					
Rumex acetosa	2	1		2	1	3	1		2	1	3	3		2	1
Rumex conglomeratus											5	4	4	4	4
Rumex obtusifolius	1		1										1		
Silene flos-cuculi											2			1	
Stellaria graminea	1		1		1						2	1		2	1
Succisa pratensis											2				
Taraxacum agg.	1	1		1	1										
Trifolium pratense															
Trifolium repens			2	3											
Valeriana officinalis											3				

Area	Area K					Area L					Area L rush				
Quadrat	Q31-	Q32-	Q33-	Q34-	Q35-	Q36-	Q37-	Q38-	Q39-	Q40-	Q41-	Q42-	Q43-	Q44-	Q45-
	Cover					Cover					Cover (DOMIN)				
Veronica chamaedrys						5				1					
Species count	17	13	16	12	12	15	9	7	10	12	22	15	17	18	17

Appendix 4 Condition Assessment

Table 12: Consideration of sample data across all areas mapped as U4b/MG5 against condition attribute thresholds combined for the two communities and adjusted for local conditions)

Attribute	Estimated value	Thresholds	Outcome	Comment
Frequency of positive indicator species	Across areas A-G and J (40 samples) indicators recorded were; *Alchemilla* sp. (R), *Centaurea nigra* (R), *Conopodium majus* (O), *Filipendula ulmaria* (R), *Lathyrus pratensis* (O), *Leucanthemum vulgare* (R), *Lotus* spp. (F), *Potentilla erecta* (O), *Primula veris* (R), *Rhinanthus minor* (R), *Sanguisorba officinalis* (R), *Stellaria graminea* (O), *Succisa pratensis* (R).	At least 2 species/taxa frequent (F) and 2 occasional (O) throughout the sward.	FAIL	Areas A, F & G might be considered to pass individually if more samples were taken
Proportion of grasses /herbs	Not recorded in 2018 or 2019	U4 - No threshold set. MG5 - 40-90%	PASS/FAIL	All areas likely to fail MG5 threshold.
Frequency/cover of negative indicator species (all)	All those present are rare	No species/taxa more than occasional throughout the sward or singly or together more than 5% cover	PASS	
Cover of trees and scrub (all)	<1% throughout	No more than 5% cover	PASS	
Cover of coarse graminoids (e.g. *Dactylis, Holcus*)	All areas exceed 10% on average for these two species. Area F exceeds on Dactylis alone	U4 - No more than 10% cover	FAIL	If treated as U4
Cover of Juncus spp./ large graminoids/ Carex spp. with leaves >5mm wide	No significant areas found	MG5 - No species or taxa together or singly more than 10%	PASS	
Average sward height	Areas A-D & J: all average 15cm or less. Areas E-G: all average >15cm	U4 - 3-10cm. MG5 5-15cm or above	?	All areas are managed annually, so this attribute may just reflect management timing.
Cover of litter	Not recorded in 2018 or 2019	U4 - no more than 25%	PASS	No significant litter noted in areas sampled apart from parts of Area C
Cover of bare ground	All Areas average less than 10%, most are less than 5%	U4 - no more than 10%. MG5 no more than 5%	PASS	If treated as U4

Natural England is here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

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