

Fieldwork to Support Habitat Restoration Work at The Lows, Blo’Norton



NVC survey and initiation of Vegetation Monitoring Programme July 2017

Undertaken on behalf of the Little Ouse Headwaters project

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SUMMARY

1. The core of the Little Ouse Headwaters Project (LOHP) area lies within the Blo' Norton and Thelnetham Fens SSSI, which forms part of the Waveney and Ouse Valley Fens Special Area of Conservation (SAC). The Lows, Blo'Norton is situated on the northern bank of the River Little Ouse beside Little Fen; with The Frith, these sites lie beside or near to the margin of Redgrave and Lopham Fen National Nature Reserve, which is part of the SAC.
2. LOHP has requested that a National Vegetation Classification survey is carried out following a period of site restoration treatments, and that three permanent monitoring plots are established on the key areas of the site as part of the Vegetation Monitoring Programme. The initial survey of the plots will provide a baseline for assessing the changes that may occur in the structure and composition of the swards during site restoration.
3. On the drier, valley slopes to the north, two grassland NVC communities were identified, corresponding to Ordinary Dry Grassland (MG7e *Lolio-Plantaginion* Sissingh 1969 p.p., *Lolium perenne-Plantago lanceolata* sub-community) and Ordinary Damp Grassland (MG7b *Lolio-Plantaginion* Sissingh 1969 p.p., *Lolium perenne – Poa trivialis* grassland). In conservation management since 2002, both of these improved grasslands have developed an improved sward structure with a reduction in Creeping Thistle and Common Nettle.
4. The southern part of The Lows extends on to the valley floodplain. Here, four NVC communities are recognised, grading from rush pasture, through fen meadow to swamp and tall-herb reed-fen. The most extensive is a stand of Hard Rush Rush-pasture – MG10b *Holco-Juncetum effusi* rush-pasture, *Juncus inflexus* sub-community, which supports a scattered suite of fen species, including Early Marsh-orchid. The smaller Blunt-flowered Rush Fen-meadow stand M22a *Juncus subnodulosus-Cirsium palustre* fen-meadow, Typical sub-community occurs nearer the river, and these two sites appear to be groundwater-dependent and correspond most closely to the Lowland Fen Habitat of Principal Importance (priority habitats) listed in Section 41 of The Natural Environment and Rural Communities (NERC) Act 2006. This is believed to be the conservation feature for which The Lows is designated as a County Wildlife Site.
5. The fenland habitat also supports stands of Lesser Pond-sedge Swamp S7 *Caricetum acutiformis* swamp (which supports several plants of Tawny Sedge) and a Tall Herb Reed-mire M27c *Filipendula ulmaria-Angelica sylvestris* mire, *Juncus effusus-Holcus lanatus* sub-community. Both stands appear to have developed as Lesser Pond-sedge and Common Reed have colonized from the waterbodies that surround and edge the fenland area.
6. The three monitoring plots were established in situations intended to represent vegetation units that have many of the distinguishing features of the habitat-type in which they are located, but are also likely to be sensitive to changes in management and hydrological influence.
7. **L01 Ordinary Dry Grassland.** The sward represented by this plot has been in stable management since at least 2005, and can be regarded as a stable form of rather dry mesotrophic sward with, as yet, little bias towards either acidic or calcareous species composition. A favourable target would be achieved by the removal of residual Creeping Thistle, a reduction in species indicating fertile conditions, and further definition of the sward as 'dry grassland' with the occurrence of additional indicator species of either acidic or calcareous ground conditions.

8. **L02 Hard Rush Rush-pasture.** This plot lies on the margin of the area of rush-pasture and is partly colonised by Common Reed. Ideal levels of management and hydrological regime would encourage the whole stand to shift further towards fen meadow, and provide favourable conditions for the expansion of fen species tolerant of grazing and high groundwater levels.
9. **L03 Blunt-flowered Rush Fen-meadow.** This plot lies on the margin of the area of fen-meadow and is partly colonised by Common Reed. Ideal levels of management and hydrological regime would encourage the whole stand represented by the monitoring plot to remain as fen meadow, without significant shading by Common Reed, continuing to provide favourable conditions for the expansion of fen species tolerant of grazing and high groundwater levels.
10. The Fieldwork Report makes three recommendations, that:
 - a) The Vegetation Monitoring Programme is adopted at The Lows, Blo’Norton as an aid to management decision-making;
 - b) Target conditions for each sward should be devised, based on the initial descriptions of grassland and fen vegetation types and character given in the Fieldwork Report;
 - c) Monitoring surveys should be repeated regularly, and the results incorporated into management decision-making.

CONTENTS

1. INTRODUCTION	1
1.1 Background	1
1.2 Survey requirements and objectives	1
1.3 Survey reporting	2
2. SURVEY METHODOLOGIES	3
2.1 NVC survey methodology	3
2.2 Vegetation monitoring survey methodology	3
2.3 Limitations to the surveys	5
3. VEGETATION SURVEY RESULTS	6
3.1 Character of the survey area	6
3.2 NVC survey results	6
3.2.1 Synopsis of grassland communities	8
3.2.2 Synopsis of fen communities	12
4. EVALUATION OF HABITATS AND SPECIES	14
4.1 Habitat evaluation	17
4.2 Notable plant species	18
5. MANAGEMENT CONSIDERATIONS	19
5.1 As part of the landscape unit	19
5.2 At the site-scale	19
6. VEGETATION MONITORING PROGRAMME – FIELDWORK REPORT	20
6.1 Locating the Monitoring Plots	20
6.2 Monitoring Plot Report – L01 Ordinary Dry Grassland 2017	23
6.3 Monitoring Plot Report – L02 Hard Rush Rush-pasture 2017	27
6.4 Monitoring Plot Report – L03 Blunt-flowered Rush Fen-meadow 2017	32
6.5 Interpretation of the Monitoring Plot surveys	36
6.6 Recommendations of the Vegetation Monitoring Programme	38
7. REFERENCES	39

Figure 1. The location of The Lows, Blo’Norton and surrounding land

Figure 2. Location of NVC survey plots

Figure 3. Location of NVC plant communities.

Figure 4. Location of permanent marker posts

Appendix 1. NVC sample plot National Grid References

Appendix 2. Species recorded in NVC and monitoring plots

Appendix 3. NVC communities of the valley slope

Appendix 4. NVC communities of the valley floor

Appendix 5. Field record for L01 Ordinary Dry Grassland Monitoring Plot

Appendix 6. Field record for L02 Hard Rush Rush-pasture Monitoring Plot

Appendix 7. Field record for L03 Blunt-flowered Rush Fen-meadow Monitoring Plot

1. INTRODUCTION

1.1 Background

The Little Ouse Headwaters Project (LOHP) was formally constituted as a Charitable Company in 2002 to restore and link fenland remnants along the upper Little Ouse Valley, and to promote access and enjoyment of the wildlife and landscape of the valley. The core of the project area lies within the Blo' Norton and Thelnetham Fens SSSI, which forms part of the Waveney and Ouse Valley Fens Special Area of Conservation (SAC). These valley fens are remnants of what was formerly a more extensive habitat, for which East Anglia had one of the most important concentrations in Western Europe.

The Lows, Blo'Norton is a 4.5 ha site owned by the Blo'Norton Church Land Charity, and leased by LOHP since 2002. The Lows comprises a block of floodplain fen extending to the Little Ouse River, and also contiguous valleside grassland. As shown in Figure 1, The Lows abuts the wooded Little Fen and forms part of a group of sites – including The Frith – situated immediately to the west of Redgrave and Lopham Fen National Nature Reserve. Both The Lows and Little Fen lie on or on the margin of the peats that support the fen habitats for which the SAC is designated.

Figure 1. The location of The Lows, Blo'Norton and surrounding land



1.2 Survey requirements and objectives

Since The Lows was leased in 2002, a programme of habitat restoration has been carried out, guided by a 'condition assessment' protocol (Stone 2006), which placed the site's vegetation within the context of the National Vegetation Classification (NVC) and provided a mechanism for assessing the

effectiveness of grassland and fen management. From 2011, funding for the ongoing restoration work on The Lows has come from Natural England through a Higher Level Stewardship Scheme agreement¹.

The LOHP has requested that two vegetation surveys are carried out, a full NVC survey of the main habitats, and the establishment of three permanent monitoring plots.

The first requirement is for a National Vegetation Classification (NVC) survey (Rodwell 1991-2000), with the objective of establishing the character of grassland and fen vegetation making up the survey area. The NVC is now the common standard for defining types of vegetation and describing them within a British and European context. The classification is widely used by Natural England and has been employed to describe the vegetation of much of the nature conservation interest in the Waveney-Little Ouse valley corridor.

The second requirement is to extend the vegetation monitoring programme established on other LOHP sites with the objective of providing a baseline for the grassland and fen swards of The Lows in order to assess the changes that may occur in the structure and composition of the swards during site restoration.

1.3 Survey reporting

Jonny Stone has been commissioned by LOHP to undertake these vegetation surveys on The Lows, Blo’Norton. The NVC and vegetation monitoring methodologies are summarised in Section 2. The NVC survey results and their evaluation are given in Sections 3 and 4. Section 5 gives management considerations.

The results of the initial survey for the new vegetation monitoring plots are given in the 2017 Fieldwork Report in section 6.

¹ HLS Agreement No. AG00357439 Date commenced: 01 October 2011

2. SURVEY METHODOLOGIES

2.1 NVC survey methodology

The National Vegetation Classification (NVC) is the common standard for defining types of vegetation and describing them within a British and European context (Rodwell et al. 2007). The classification is widely used by Natural England and has been employed to describe the vegetation of many semi-natural sites in Suffolk and over the rest of the United Kingdom. Although not designed as a scientific or strict monitoring tool, it is particularly useful for placing the current character of the habitats within a national spectrum of grassland or woodland types, and for interpreting the natural and management-induced changes over time.

Fieldwork followed the methodology set out in the JNCC NVC Users' Handbook (Rodwell 2006). General habitat characters were assessed by an initial walkover to establish the location and extent of distinctive community types. Sample plot locations were selected to represent typical vegetation characters within each type of community. Five or more sample plots were selected for each vegetation-type where possible, and are shown in **Figure 2. Location of NVC survey plots**. Each plot was geo-referenced and listed in Appendix 1.

The valleyside grassland swards were sampled using 2 x 2m plots, and the 'coarser' fen vegetation by 4 x 4m plots, following Rodwell (2006). The general character of each plot was recorded by taking photographs of the vegetation at oblique and vertical angles. All plots were assessed for their floristic composition and species cover/abundance and for the range of variables characterising their structure including vegetation height and the relative coverage of the constituent plant groups. Definitions for each attribute are given in Table 1.

All vascular plants are named following Stace (2010); the bryophyte flora follows Hill et al. (2008). Species recorded in NVC sample plots are listed in Appendix 2.

Field data were tabulated in Microsoft Excel then grouped by floristic similarity to show the common and typical characters; each type was then compared with the published NVC accounts (Rodwell 1992-2000). This comparison was refined using the European phytosociological framework recently adopted by the International Association for Vegetation Science (Mucina et al. 2016). Field data are presented in Appendices 3 and 4.

2.2 Vegetation monitoring survey methodology

Documentation for a Vegetation Monitoring Programme was initially developed for LOHP to aid the ecological restoration of Bleyswyck's Bank and Parkers Piece in 2010. The development, methodology and functions of the programme were described in detail in the Monitoring Plan (ELP 2010) for those sites and is not repeated here.

The methodology was applied at The Lows to establish three permanent plots, with the following objectives:

1. To establish permanent monitoring plots in specified habitat types and general locations, using the protocols developed in the Monitoring Plan.
2. To undertake the initial monitoring survey, using the 'full' Fieldwork Protocols.

- To interpret the fieldwork results, and provide guidance on the establishment of initial target conditions.

Table 1. Definitions of the attributes used to assess plot character

Sward height (cm)	This variable is defined as the average height of the top of the main leaf canopy of the sward. Sward height is therefore not the height of the tallest stem, nor is it the average height of flowering stems, unless these form that canopy layer.
% Total veg. cover	This is the average of values given in each plot for the proportion of the plot, when viewed from overhead, which is covered by the foliage and flowering stems of vascular plants, rather than by bryophytes or lichens. The combined values for these three groups of plants may exceed 100 per cent as, frequently, lichens and mosses may grow beneath the other plants.
% Bryophyte cover	This is the average of the estimated cover values for all mosses and liverworts recorded in the plot.
% Lichen cover	This is the average of the estimated cover values for all ground-dwelling lichens recorded in the plot.
% Plant litter	Litter is defined as dead plant material, and the cover value is that proportion of the <u>ground surface</u> of the plot that is covered either by dead stems retained in the growing position, or by materials lying prostrate on or near the ground surface. Plant litter cover is difficult to estimate, particularly in swards where tussock-forming species are prevalent, and here only refers to dead material lying prostrate on or above the ground surface. The values given are not, therefore, identical to those required by the current condition assessment protocols used by Natural England, which assess only thick, continuous thatches.
% Bare ground	This variable is defined as an estimate of the proportion of the ground surface that is not directly mantled by plant litter or bryophytes, and not occupied by shoots and other living aerial plant matter as they pass through that surface. The estimate therefore includes bare ground covered by prostrate stems or other living plant material lying on or near the ground surface. It is always a greater figure than that required for Natural England's condition assessment, which only refers to non-vegetated areas.
Species No.	This metric is simply an average of the numbers of listed species occurring in each plot.

This initial fieldwork report followed the prescriptions of the Monitoring Plan (ELP 2010) and records the 'full' survey protocol, using the four Fieldwork Elements summarised in Table 2.

Table 2. Summary of survey techniques

Survey intensity	Fieldwork Element		Function within the Survey
Rapid	1	Locating Monitoring Plots	To establish locations for the Monitoring Plots
	2	Photographic Record	To produce a record of surveillance images showing the condition of the developing vegetation
Full	3	Vegetation structural characters	To record features of the vegetation structure against which management requirements can be established.
	4	Floristic sub-sampling	To record the floristic composition of the plot in order to judge to success of the restoration measures against target floristic conditions.

In addition to the photographic record, the structural characters of the vegetation were assessed from each quarter of the two 10 x 10 m plots. Floristic composition was tabulated by stratified sub-

sampling of the monitoring plots using twenty 1 x 1 metre sub-samples. The field records for floristic sampling are given in Appendices 5-7.

2.3 Limitations to the surveys

Both surveys were carried out in June 2017 at an optimal time of year for both grassland and fenland vegetation. No access issues were encountered. Although it is possible that some plant species were not recorded by the sampled plots, this is not considered to have significantly affected the conclusions of this report. There were no limitations affecting the location of the NVC sample plots.

The general locations of each permanent monitoring plot were established during on-site discussions with LOHP. The subsequent emplacement of permanent marker posts matched the locations of the temporary posts used to carry out the baseline survey.

3. VEGETATION SURVEY RESULTS

3.1 Character of the survey area

The Lows at Blo’Norton straddles thinning peat near the edge of the Blo’Norton-Thelnetham Lake Basin (Tallentire 1969; Mulholland 2001, West 2009) and ascends over sloping terrace sands and gravels onto the clayey hillwash on the valley side (British Geological Survey 1989). The site is therefore composed of two landscape units, the valley floor peats and the valleyside grasslands.

Although indistinct on Faden’s 1979 Map of Norfolk (Barringer 1989), the modern field layout is clearly shown on the Ordnance Survey Six-inch England and Wales series, 1842-1952², following the 1885 survey. A digital version³ of the Land Utilisation Survey 1933-1949 provides an idea of the broad habitats present before the Second World War, with much of the site being shown as ‘Rough Grazing’ except a thin strip along the northern boundary beside Fen Road, which is shown as managed ‘Grassland’. However, as the boundary of these different land-uses corresponds to the break of slope which runs east-west along the middle of the northern field, it is not clear whether an actual change in land use was being recorded mid-field.

The Lows is designated as a County Wildlife Site (No. 595) and the modern habitats were briefly described in Stone (2006) and LOHP (2012). The valleysides were found to support a weedy, mesotrophic grassland with dry and moist facets, descending to the valley floor with circum-neutral to calcareous rush pasture, grading to areas of fen meadow and swamp. The upper part of the dry grassland was recognised as being slightly calcareous, and the lower part – over free-draining terrace sands – as being potentially slightly acidic, though both sources recognise the current fertility imparted by the topsoils, as indicated by abundant Creeping Thistle and Common Nettle. As noted by LOHP (2012), reduced river maintenance and the closure of the Redgrave borehole have caused the lower fields to become much wetter in recent decades.

At the time of survey, the ground surface of the earthy peats on the valley floor was found to be slightly damp to saturated, following several months of normal rainfall levels⁴.

3.2 NVC survey results

As shown in **Figure 2. Location of NVC sample plots**, 33 plots were selected from representative locations within distinct slope and floodplain stands of vegetation. Floristic and physiognomic data were recorded from each plot, and the raw data is provided separately as an electronic spreadsheet. Appendix 1 lists the National Grid references taken by GPS; Appendix 2 gives the species recorded. Common names are given in the description of the NVC communities, but scientific names are retained for the plant community titles.

² The Ordnance Survey historic maps are not reproduced here as no copyright was sought; they can be viewed on the National Library of Scotland website [<http://maps.nls.uk> (accessed 24th December 2017)]

³ <http://magic.defra.gov.uk/MagicMap.aspx>

⁴ Final NCIC (National Climate Information Centre) data based on the Met Office 5km gridded rainfall dataset derived from rain gauges (Source: Met Office © Crown Copyright, 2017).

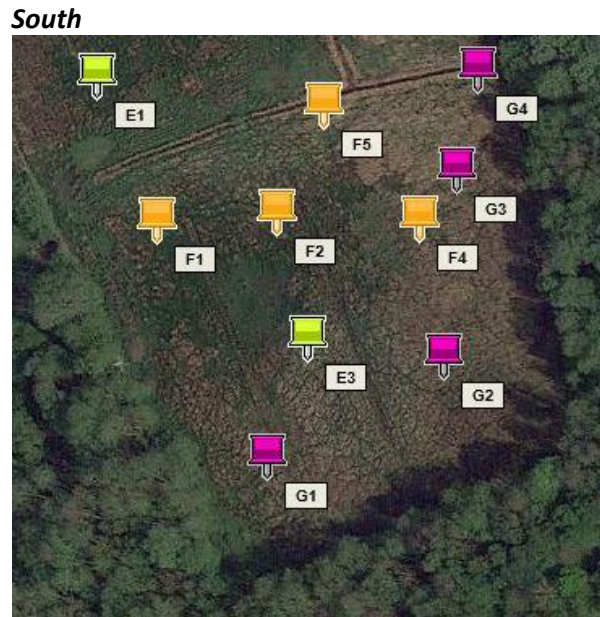
Figure 2. Location of NVC survey plots [plots are coded to the stand each one represents]

North



Central





Seven NVC communities were identified and are listed in Table 3 and shown in **Figure 3. Location of NVC plant communities.**

Table 3. NVC communities recorded from The Lows, Blo’Norton

Stand	NVC code	Community title	Area (ha)
A	MG7e	<i>Lolio-Plantaginion</i> Sissingh 1969 p.p., <i>Lolium perenne-Plantago lanceolata</i> grassland	0.96
B	OV25c	<i>Urtica dioica-Cirsium arvense</i> community, <i>Lolium perenne-Papaver rhoeas</i> sub-community	0.05
C	MG7b	<i>Lolio-Plantaginion</i> Sissingh 1969 p.p., <i>Lolium perenne – Poa trivialis</i> leys	0.28
D	MG10b	<i>Holco-Juncetum effusi</i> rush-pasture, <i>Juncus inflexus</i> sub-community	1.32
E	S7	<i>Caricetum acutiformis</i> swamp	0.65
F	M22a	<i>Juncus subnodulosus-Cirsium palustre</i> fen-meadow, Typical sub-community	0.49
G	M27c	<i>Filipendula ulmaria-Angelica sylvestris</i> mire, <i>Juncus effusus-Holcus lanatus</i> sub-community	0.65

Full floristic and physiognomic data tables are given in Appendix 3 for each community.

3.2.1 Synopsis of grassland communities

A summary of the floristic characters of each valley-side grassland type is given in Table 4. The relative frequency of occurrence of each species in the sample plots is given using Roman numerals according to the following scale:

- V = 81-100 per cent
- IV = 61-80 per cent
- III = 41-60 per cent
- II = 21-40 per cent

Species occurring in 20 per cent or fewer sample plots are excluded from this table. They are listed in the community tables in Appendix 3.

Table 4. Synopsis of surveyed grasslands

	A	B	C
<i>Cirsium arvense</i>	V	V	V
<i>Poa trivialis</i>	V	V	V
<i>Holcus lanatus</i>	V	V	V
<i>Lolium perenne</i>	V	V	IV
<i>Dactylis glomerata</i>	V	V	IV
<i>Trifolium repens</i>	V	V	IV
<i>Cerastium fontanum</i>	V	IV	IV
<i>Agrostis stolonifera</i>	II	V	V
<i>Ranunculus repens</i>	II	II	IV
<i>Agrostis capillaris</i>	V	V	
<i>Taraxacum</i> agg.	V	V	
<i>Geranium dissectum</i>	III	IV	
<i>Bromus hordeaceus</i>	III	IV	
<i>Festuca rubra</i>	II		II
<i>Plantago lanceolata</i>	III		
<i>Trifolium dubium</i>	II		
<i>Veronica chamaedrys</i>		IV	
<i>Hordeum murinum</i>		IV	
<i>Rumex crispus</i>		II	
<i>Elytrigia repens</i>		II	
<i>Urtica dioica</i>		V	IV
<i>Juncus effusus</i>			III
<i>Alopecurus pratensis</i>			II
<i>Deschampsia cespitosa</i>			II
<i>Juncus inflexus</i>			II

Figure 3. Location of NVC plant communities.





As shown in Table 4, Stands A-C share 9 common grasses and herbs. The key species used to classify the grassland types is Perennial Ryegrass *Lolium perenne*, placing both Stands A and C amongst the *Lolio-Plantagion* community (MG7).

Stand A can be assigned to the *Lolium perenne-Plantago lanceolata* sub-community (MG7e), where the cover of Perennial Ryegrass is at least matched by Common Bent, Yorkshire Fog and White Clover. This corresponds closely with the sub-community description given in Rodwell (1992, p.75). The floristic composition of this stand gives little indication of soil chemistry, though the predominance of Common Bent through much of the sward is suggestive of a slightly acidic soil reaction. Notwithstanding, a scatter of established Spiked Sedge tussocks towards the eastern end of the field may indicate more base-rich conditions in this area. The average number of species per plot was recorded as 15.0 species, with the sward height ranging from 4-7 cm.

The formerly ubiquitous Creeping Thistle (Stone 2006) is still thinly spread through the grassland as an associate species, typically found with a low cover of Domin 1-3 (<4 per cent cover). The persistence of the species is likely to reflect the significant fertility present in the topsoil, and this rhizomatous species is tolerant of all but prolonged droughts.

Stand A Ordinary Dry Grassland – representative oblique view [6th June 2017]



Stand B Weedy Grassland – representative oblique view [6th June 2017]



Discrete areas of more disturbed ground occur within and along the northern margin of Stand A⁵. These are mapped as an overlay in Figure 3, as the balance of species – rather than species

⁵ The latter is likely to coincide with the location of a stockade used when rounding up livestock

composition – is shifted towards a weedier Stand B. Here, competitive ruderals are significant, with Nettle and Wall Barley sharing dominance with Creeping Thistle. Two large patches are distinguished as the **OV25c *Urtica dioica-Cirsium arvense* community, *Lolium perenne-Papaver rhoeas* sub-community**, which is often recorded in disturbed areas of grassland, sometimes following a period of dereliction (Rodwell 2000, p.411).

Stand C distinguishes the southern part of the field at the foot of the valley slope where the soil surface is noticeably damper. The boundary between the two grasslands (Stands A and C) is typically abrupt and is marked partly by a change in sward colour but also the appearance of scattered tussocks of Soft and Hard Rush, with occasional Tufted Hair-grass. Perennial Ryegrass and Yorkshire Fog remain constants in this stand, but Common Bent is almost absent. Rough Meadow-grass replaces this species as the typical sward dominant, in association with Creeping Bent and Creeping Buttercup. The stand can therefore be placed within the ***Lolium perenne-Poa trivialis* sub-community (MG7b)** of the *Lolio-Plantaginion* community. Floristically, it is transitional to the rush pastures of the valley floor.

Stand C Ordinary Damp Grassland – representative oblique view [6th June 2017]



3.2.2 Synopsis of fen communities

A summary of the floristic characters of each fen vegetation type is given in Table 5. The relative frequency of occurrence of each species in the sample plots is given using Roman numerals according to the following scale:

- V = 81-100 per cent
- IV = 61-80 per cent
- III = 41-60 per cent
- II = 21-40 per cent

Species occurring in 20 per cent or fewer sample plots are excluded from this table. They are listed in the community tables in Appendix 3.

Table 5 illustrates the marked differences between the 4 distinct stands mapped in Figure 3.

Table 5. Synopsis of surveyed fen stands

Stand	D	E	F	G
<i>Poa trivialis</i>	IV	IV	V	V
<i>Juncus effusus</i>	V	III	IV	V
<i>Galium uliginosum</i>	IV	III	V	II
<i>Equisetum arvense</i>	III	II	V	II
<i>Galium aparine</i>	II	II		IV
<i>Urtica dioica</i>	IV		V	V
<i>Cirsium palustre</i>	III		III	V
<i>Brachythecium rutabulum</i>	V		IV	IV
<i>Cardamine pratensis</i>	II		III	IV
<i>Carex hirta</i>	V			
<i>Ranunculus repens</i>	V			
<i>Taraxacum</i> agg.	V			
<i>Schedonorus pratensis</i>	IV			
<i>Cirsium arvense</i>	III			
<i>Agrostis canina</i>	III			
<i>Deschampsia cespitosa</i>	III			
<i>Trifolium repens</i>	III			
<i>Calliergonella cuspidatum</i>	II			
<i>Hypericum tetrapterum</i>	II			
<i>Juncus articulatus</i>	II			
<i>Juncus subnodulosus</i>	II		V	
<i>Cerastium fontanum</i>	V		IV	
<i>Agrostis stolonifera</i>	V		IV	
<i>Festuca rubra</i>	III		III	
<i>Epilobium parviflorum</i>	III		II	
<i>Lathyrus pratensis</i>	II		II	
<i>Juncus inflexus</i>	V	II	IV	
<i>Holcus lanatus</i>	IV	II	II	
<i>Phalaris arundinacea</i>	II	II	II	
<i>Carex acutiformis</i>		V	III	
<i>Phragmites australis</i>		III	IV	V
<i>Thalictrum flavum</i>		II	III	III
<i>Glechoma hederacea</i>			II	
<i>Carex disticha</i>			II	
<i>Calystegia sepium</i>			II	
<i>Epilobium palustre</i>			II	
<i>Filipendula ulmaria</i>			II	V
<i>Mentha aquatica</i>			III	III
<i>Epilobium obscurum</i>				IV
<i>Angelica sylvestris</i>				III
<i>Lotus pedunculatus</i>				III

A large part of the floodplain margin is occupied by Stand D, informally called Hard Rush Rush-pasture. It is much more species-rich than many examples of this habitat (average species per sample is 23.2) and includes a scatter of reedfen and fen-meadow species, as listed in Appendix 2 and summarised in Table 6. When these species are excluded from consideration, the stand falls comfortably within the span of mildly calcareous rush-pasture represented by the ***Holco-Juncetum effusi* Page 1980, *Juncus inflexus* sub-community**. The species groups more commonly associated

with fens – which are scattered throughout large parts of this stand – are also intermingled with a smaller group of ruderal species, notably Creeping Thistle, Hairy Sedge and Common Nettle. This floristic assemblage may indicate that the stand is recovering from a period of management and/or hydrological perturbations, as suggested by LOHP (2012). The classification of this stand should therefore be regarded as a statement of its current condition, while the presence of typical fenland species in the stand may be indicative of its potential to shift – at least in part – towards a type of M22 *Juncus subnodulosus-Cirsium palustre* fen meadow (See Stand F).

One notable species present as a few individuals is the Early Marsh-orchid *Dactylorhiza incarnata*. The species was found in the vicinity of NGR 603282 279175.

Table 6. Summary of species by habitat preference (see Appendix 2)

Stand	D	E	F	G
Fen species	6	2	11	6
Fen-meadow species	12	4	9	6
Wet grassland species	18	9	12	7
Ruderal species	8	6	7	5
Generalist moss	1	1	1	1
Total species	45	22	40	25

Stand D Hard Rush Rush-pasture – representative oblique view [7th June 2017]



Stand E is a Lesser Pond-sedge Swamp dominated by the eponymous sedge. As shown in Figure 3, areas of this stand appear to have developed largely from loci along the network of floodplain ditches, though in the southern field the original source may have been the river itself. As shown in Tables 5 and 6, this is a relatively species-poor type of fen vegetation (average number of species in samples is 8.2), with most associate species derived from the rush-pasture. Notwithstanding, Tawny Sedge *Carex hostiana* was found alongside the east-west ditch (NGR 603243 279066). The stands can be distinguished as **S7 *Caricetum acutiformis* swamp**, which often form swampy patches in calcareous floodplains (Rodwell 1995, p.160).

Stand E Lesser Pond-sedge Swamp – representative oblique view [7th June 2017]



Stand F is a form of Blunt-flowered Rush Fen-meadow that is restricted to the centre of the floodplain fields, and largely occurs in the southern field. A large patch of Brown Sedge occupies the centre of the stand, which was inundated at the time of survey. It is also notable for the relatively short sward – compared to surrounding stands – and for the sparsity of Common Reed over large areas of the stand. It is also quite species-rich (average number of species in samples is 18.8) and supports a relatively high proportion of fen species (Table 6).

As shown in Table 5, the floristic composition of Stand F overlaps with Stand D (rush-pasture) but lacks a number of the ‘wet grassland’ and ‘ruderal’ species. Although frequently dominated by the calcicolous Blunt-flowered Rush and the fen-meadow specialist Brown Sedge, a suite of species associated with fertile and drier conditions is also widespread, notably Rough Meadow-grass, Common Nettle and Field Horsetail. Like Stand D, this Blunt-flowered Rush Fen-meadow may also be recovering from a period of management and/or hydrological perturbations. The Stand is, however, unequivocally a fen-meadow and is placed within M22a *Juncus subnodulosus-Cirsium palustre* fen-meadow, Typical sub-community.

Stand G Tall Herb Reed-mire occupies a broad strip beside the Little Ouse river and extends in a thin strip up the eastern boundary ditch. The expansion of Common Reed through much of this stand suggests that it is transitional to reed-dominated vegetation, but the proliferation of rushes and tall herbs maintains its connection to a sort of fen-meadow, where Meadowsweet, Marsh Thistle and, occasionally, Common Sorrel all dominate patches. Even where reed is thickest, Soft Rush and a group of tall fen species separate the stand from the less species-rich reed-fen communities, such as S26 *Phragmites australis-Urtica dioica* tall-herb fen.

In addition to Common Reed and Soft Rush, Stand G supports fen species, such as Meadowsweet, Common Meadow-rue and Wild Angelica and fen-meadow species including Marsh Thistle and Marsh Bird’s-foot Trefoil. There are also frequent wet grassland species, notably Rough Meadow-grass and Cuckooflower, and several common ruderals, such as Common Nettle and Short-fruited Willowherb – the latter being a frequent colonist of periodically flooded ground in marshland. This diverse assemblage is less species-rich than Stands D and F (average number of species in samples is 18.8), but similarly supports groups of species tolerant of regular management alongside those indicative of a period of management and/or hydrological perturbations.

In its current condition, Stand G is placed within the M27c *Filipendula ulmaria*-*Angelica sylvestris* mire, *Juncus effusus*-*Holcus lanatus* sub-community. Nonetheless, it should be borne in mind that the vegetation may be transitional between a form of fen-meadow and a simple reed-fen.

Stand F Blunt-flowered Rush Fen-meadow – representative oblique view [7th June 2017]



Stand G Tall Herb Reed-mire – representative oblique view [7th June 2017]



4. EVALUATION OF HABITATS AND SPECIES

Following discussion of the character of the survey area in terms of its constituent habitat and species in section 3.2, an indication of the ecological value of features present can be given (IEEM 2006; CIEEM 2016).

4.1 Habitat evaluation

The habitats recorded from the survey area are evaluated against the guidelines given in Table 7 (IEEM, 2006).

Table 7. Levels of Value of Ecological Resource

Level of Value	Examples
International	Internationally designated or proposed sites such as Ramsar Sites, Special Protection Areas, Biosphere Reserves and Special Areas of Conservation, or otherwise meeting criteria for international designation. Sites supporting populations of internationally important species in internationally important numbers, numbers i.e. Annex 1 of Birds Directive, migratory species on migration routes, or in breeding, moulting, wintering or staging areas.
National	SSSI or NNR designated or qualifying sites holding species or assemblage of national importance. Sites supporting viable breeding populations of Wildlife and Countryside Act Schedule 1 Species and supplying critical elements of their habitat requirements. Sites supporting nationally important numbers of a single species (>1% UK population). Species contributing to the integrity of an SPA or SSSI but which are not cited as species for which the site is designated.
Regional	Sites not meeting SSSI criteria but comfortably exceeding SINC criteria. Species subject to special conservation measures in UK BAP or sites holding viable breeding populations or supplying critical elements of their habitat requirements. Sites containing regionally important numbers of a single species (>1% regional population).
High Local	Sites meeting the criteria for a county area designation (SINC), Designated Local Nature Reserves holding viable populations of any key species identified in the Local BAP. Sites supporting viable breeding populations of substantial number of species known to be Red or Amber List Species of Conservation Concern and supplying critical elements of their habitat requirements.
Moderate Local	Undesignated sites, or features considered to appreciably enrich the habitat resource within approximately 10 km radius from the site. Sites supporting viable breeding populations of a small number of species listed as Red list or Amber list Species of Conservation Concern or supplying critical elements of their habitat requirements.
Low Local	Undesignated sites, species or areas considered to enrich the species richness within the immediate environs of the site.
Negligible	Areas with a poor species richness and none of the above. Any other species.

Evaluated against the criteria given in Table 7, the ecological value of the habitats in the surveyed area is indicated in Table 8.

The key habitat is the floodplain fen, represented by the two core communities on the site, the Hard Rush Rush-pasture and the Blunt-flowered Rush Fen-meadow. The floristics indicate that both stands are influenced by calcareous groundwaters and can be regarded as groundwater-dependent wetlands (Krause et al. 2007; Brooks et al. 2014). The other stands on the floodplain do not support as many fenland species and are not in such favourable condition.

The Lows, Blo’Norton includes a gradation across the footslope onto the valleyside slopes, where immature mesotrophic grasslands provide both a buffer for the floodplain grasslands and ancillary habitat.

Table 8. Level of ecological value (geographic scale of importance)

	Ecological feature
High Local	1. Floodplain fen MG10b <i>Holco-Juncetum effusi</i> rush-pasture, <i>Juncus inflexus</i> sub-community M22a <i>Juncus subnodulosus-Cirsium palustre</i> fen-meadow, Typical sub-community
Moderate Local	2. Floodplain other vegetation S7 <i>Caricetum acutiformis</i> swamp M27c <i>Filipendula ulmaria-Angelica sylvestris</i> mire, <i>Juncus effusus-Holcus lanatus</i> sub-community
Low Local	3. Valleyside grasslands MG7e <i>Lolio-Plantaginion</i> Sissingh 1969 p.p., <i>Lolium perenne-Plantago lanceolata</i> grassland MG7b <i>Lolio-Plantaginion</i> Sissingh 1969 p.p., <i>Lolium perenne – Poa trivialis</i> grassland
Negligible	4. Valleyside vegetation OV25c <i>Urtica dioica-Cirsium arvense</i> community, <i>Lolium perenne-Papaver rhoeas</i> sub-community

4.2 Notable plant species

No notable plant species were recorded during the survey (Norfolk Flora Group 2017), though it should be noted that three species are on the Rare Plant Register for Suffolk (Suffolk Biological Records Centre 2005): Tawny Sedge *Carex hostiana*, Early Marsh-orchid *Dactylorhiza incarnata* and Marsh Willowherb *Epilobium palustre*. In Suffolk, they are classified as Locally Scarce (formerly as Suffolk Rarities). For the calcicolous Tawny Sedge, Sanford and Fisk (2010) list 7 recent records at nearby sites in Suffolk, including Market Weston Fen and the Thelnetham Fens.

Table 9. Summary of notable species status

	Tawny Sedge	Early Marsh-orchid	Marsh Willowherb
Status ¹	None	None	None
GB Red List ²	Threat Status: Least Concern	Threat Status: Least Concern	Threat Status: Least Concern
England Red List ³	Threat Status: Least Concern	Threat Status: Least Concern	Threat Status: Least Concern

¹ Stewart et al. (1994); ² Cheffings et al. (2005); ³ Stroh et al. (2014)

5. MANAGEMENT CONSIDERATIONS

5.1 As part of the landscape unit

The Lows, Blo’Norton is a County Wildlife Site, presumably designated for the presence of the Lowland Fen area on the valley floor. This type of vegetation is listed under the Section 41 habitats of principal importance (priority habitats) requirement published by Natural England in August 2010⁶. Section 41 (S41) of The Natural Environment and Rural Communities (NERC) Act 2006 requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

Supplementary considerations include:

1. The transition encompassed by the site from the River Little Ouse, through the peat fill of the valley floor and the valleyside footslopes to the main valley slope. This sequence is composed of semi-natural habitats of various ages and conditions, managed as a single entity.
2. The proximity of the site to other examples of the primary habitat – Lowland Fen – and other related habitats on the valley floor and valleyside. These include Blo’Norton Little Fen, The Frith and Redgrave and Lopham Fen National Nature Reserve.

5.2 At the site-scale

The Lows, Blo’Norton consists of two conjoined habitats: the valley slope grassland and the Lowland Fen of the Valley Floor.

1. The valley slope unit consists of dry and moist grasslands. The floristic composition of the dry grassland, following continuous management since 2002, is beginning to separate into mildly acidic and mildly calcareous elements. Although fertility appears to remain elevated above the level typical for semi-natural habitats, the intensity and duration of management has shifted species composition in a favourable direction, compared with the sward condition assessed in 2005 (Stone 2006). The moist grassland of the footslope is now distinct and is gaining a number of species present on the fringes of the neighbouring rush-pasture.
2. The valley floor supports a body of apparently recovering Lowland Fen, where four distinct plant communities are distinguished. Two communities (recorded as Stands D and F) closely resemble forms of fen-meadow in quite favourable condition and contain species indicative of groundwater influence. Stands with abundant Lesser Pond-sedge and Common Reed appear to have assembled through colonisation from the ditch in increasingly wet conditions (LOHP 2012) and currently have lower species-richness and fewer species that are typical of Lowland Fen in favourable condition. The widespread occurrence of Soft Rush – which is favoured by mildly acidic conditions – is indicative of standing water, which may be an issue affecting vegetation condition, particularly along the southern and eastern boundaries of the site.

⁶ <http://webarchive.nationalarchives.gov.uk/20140605093420/http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx>

6. VEGETATION MONITORING PROGRAMME – FIELDWORK REPORT

Fieldwork to establish the permanent plots and undertake the initial vegetation survey was undertaken on 9th June 2017.

6.1 Locating the Monitoring Plots

Monitoring plots were established in three of the stands delimited in section 3.2.

Valleyslope – Stand A. Ordinary Dry Grassland

Valleyfloor – Stand D. Hard Rush Rush-pasture

Valleyfloor – Stand F. Blunt-flowered Rush Fen-meadow

The plots were readily established using the method given in the Monitoring Plan; each plot is 10 m x 10 m in size and lies between two permanent marker posts. The post locations were established using temporary marker posts placed near the edge of each grassland unit. These posts were subsequently replaced by permanent posts by LOHP. The location of the permanent marker posts is given in Figure 4. The precise location of the monitoring plot is re-established by stretching a 50 metre tape between the posts. From known lengths along this baseline, the plot is reconstructed at right angles to it, as indicated in Table 7.

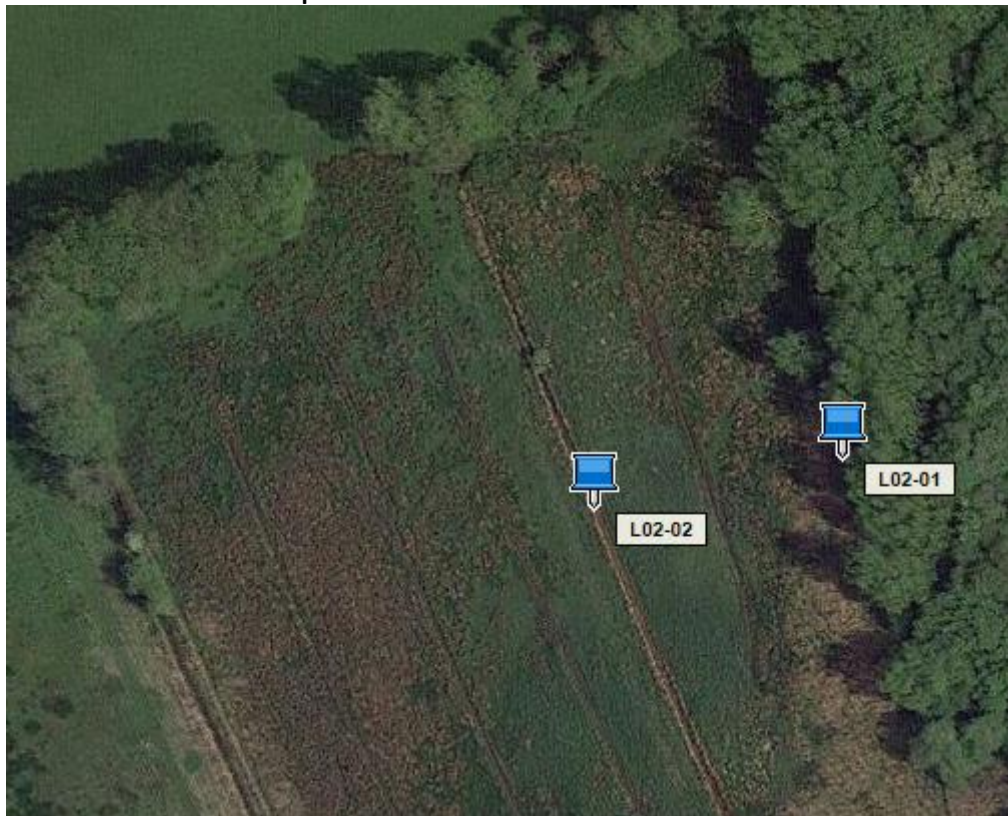
Figure 4. Location of permanent marker posts

Source: Map data c 2017 Google Imagery, GigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky

Stand A – Ordinary Dry Grassland



Stand D – Hard Rush Rush-pasture



Stand F – Blunt-flowered Rush Fen-meadow



Table 7. Details of permanent monitoring plot locations

VEGETATION TYPE	PLOT CODE	MARKER POSTS	Marker Post Location	EASTING	NORTHING	Plot location
Ordinary Dry Grassland	L01	L01-01	The free-standing marker post is near the fenceline.	603237	279297	The southwest corner of the plot is 20 metres east of L01-01
		L01-02	The marker post is on the fenceline.	603278	279294	
Hard Rush Rush-pasture	L02	L02-01	The marker post is on the fenceline.	603309	279169	The northeast corner of the plot is 15 metres west of L02-01
		L02-02	The free-standing marker post is beside the drain.	603264	279158	
Blunt-flowered Rush Fen-meadow	L03	L03-01	The free-standing marker post is beside the drain.	603292	279049	The southwest corner of the plot is 20 metres east of L03-01
		L03-02	The marker post is on the fenceline.	603340	279049	

6.2 Monitoring Plot Report – L01 Ordinary Dry Grassland 2017

Plot code	L01 Ordinary Dry Grassland
Treatment type	Summary of preceding Monitoring Plot Report
Ordinary Dry Grassland	This is the initial Monitoring Plot Report

Vegetation structure

- In 2017, the ground surface was firm, dry to slightly damp, with no surface saturation or surface water.
- Plant litter was occasional and consisted of a thin thatch below the living sward; the sole bryophyte, Rough-stalked Feather-moss, occurred throughout the plots as scattered wefts, and rarely occupied a patch larger than a £2 coin.
- The sward structure was dominated by grasses, with few flowering stems present, forming a short lawn with frequent creeping stems of herbs and scattered basal rosettes. The plot contained several ungrazed clumps of Spear Thistle. Woody seedlings were scattered through the plot, though all appeared to be from the current season.
- The photographic record is an accurate representation of the plot's sward structure; elsewhere in Stand A, though grazing was similarly intense in patches, the sward was frequently taller, also with few flowering grass stems.

Floristics

- This is a grass-dominated sward, with Perennial Ryegrass, Common Bent and Rough Meadow-grass abundant throughout. Smaller Cat's-tail and Cock's-foot (dry conditions) are intermingled with Meadow Foxtail (moist conditions).
- Herbs are frequent throughout, with White Clover, Common Mouse-ear and Dandelion predominant, with some Lesser Trefoil and scattered Spear Thistle. Creeping Buttercup (moist conditions) also present.
- There are few negative indicators: occasional Creeping Thistle sprouts and single Common Ragwort basal rosette (first year).

Summary of records and events

- Not available at the time of reporting.
- Field evidence suggests that the sward has been in stable management since at least 2005 (Stone 2006) with an increasingly even sward and reduced proliferation of Creeping Thistle and Nettle. Creeping Thistle has been reduced to the extent that strong infestations can now be mapped as distinct from the main sward, as represented by the monitoring plot.

Relation to past and target conditions

- This survey initiates the Vegetation Monitoring Programme and provides a baseline for assessing subsequent meadow vegetation development.
- Vegetation characters suggest that the plot can be regarded as a stable form of rather dry mesotrophic sward with, as yet, little bias towards either acidic or calcareous conditions. An appropriate target condition would include (a) the removal of residual Creeping Thistle, and (b) further definition of the sward as 'dry grassland' with additional indicators of either acidic or calcareous ground conditions.

Plot code L01

Photographic Record 2017



Monitoring Plot Field Form – Vegetation structural characters

Monitoring Plot	L01 Ordinary Dry Grassland
Recorder	Jonny Stone
Survey Date	9th June 2017

Character of the ground surface

- The ground surface was firm and composed of dry, sandy clay loam with a slightly humic topsoil.
- The ground surface was planar with slight southerly slope; distinct hoof-prints on the surface but no evidence of sward tearing or poaching; several flattened molehills present.

Soil wetness

Dry, dusty	Dry, firm	Slightly damp	Moist	Wet	Saturated
I	II	I			

ATTRIBUTE		SAMPLE from each plot quarter				AVERAGE
		1	2	3	4	
Layer height	Standing water (cm)	0	0	0	0	0 cm
	Plant litter (cm)	0	0	0	0	0 cm
	Woody seedlings (cm)	0	4	4	4	3 cm
	Large sedges / rushes (cm)	0	0	0	0	0 cm
	Reed-like grasses (cm)	0	0	0	0	0 cm
	Woody saplings (cm)	0	0	0	0	0 cm
Cover value	Standing water (%)	0	0	0	0	0 %
	Trampling (%)	0	0	0	0	0 %
	Dunging (%)	1	0	2	1	1 %
	Bare ground (%)	5	0	2	5	3 %
	Plant litter (%)	2	1	2	1	1.5 %
	Bryophytes (%)	5	10	5	1	5.3 %
	Woody seedlings (%)	0	1	1	1	0.8 %
	Large sedges / rushes (%)	0	0	0	0	0.5 %
	Reed-like grasses (%)	0	0	0	0	0.5 %
	Woody saplings (%)	0	0	0	0	0.5 %

Monitoring Plot Field Form – Floristic sub-sampling – all survey years

Monitoring Plot

L01 Ordinary Dry Grassland

Recorder

Jonny Stone

Survey Date

9th June 2017

This data is collated from the 20 1x1 m sub-samples given in Appendix 5.

Species		2017
		[ex 20]
Dry Grassland species		
<i>Lolium perenne</i>	Perennial Ryegrass	20
<i>Agrostis capillaris</i>	Common Bent	18
<i>Trifolium repens</i>	White Clover	17
<i>Poa trivialis</i>	Rough Meadow-grass	17
<i>Cerastium fontanum</i>	Common Mouse-ear	14
<i>Brachythecium rutabulum</i>	Rough-stalked Feather-moss	14
<i>Dactylis glomerata</i>	Cock's-foot	12
<i>Taraxacum agg.</i>	Dandelion	11
<i>Holcus lanatus</i>	Yorkshire Fog	10
<i>Phleum bertolonii</i>	Smaller Cat's-tail	10
<i>Trifolium dubium</i>	Lesser Trefoil	8
<i>Festuca rubra</i>	Red Fescue	4
<i>Cirsium vulgare</i>	Spear Thistle	3
<i>Potentilla reptans</i>	Creeping Cinquefoil	3
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill	2
<i>Veronica chamaedrys</i>	Germander Speedwell	2
<i>Stellaria graminea</i>	Lesser Stitchwort	2
<i>Veronica serpyllifolia</i>	Thyme-leaved Speedwell	1
<i>Poa annua</i>	Annual Meadow-grass	1
<i>Achillea millefolium</i>	Yarrow	1
<i>Senecio jacobaea</i>	Common Ragwort	1
<i>Scorzoneroides autumnalis</i>	Autumnal Hawkbit	1
Damp grassland species		
<i>Agrostis stolonifera</i>	Creeping Bent	11
<i>Ranunculus repens</i>	Creeping Buttercup	7
<i>Alopecurus pratensis</i>	Meadow Foxtail	7
Negative indicators		
<i>Prunus spinosa seedling</i>	Blackthorn	5
<i>Quercus robur seedling</i>	Pedunculate Oak	3
<i>Cirsium arvense</i>	Creeping Thistle	2

Floristic character	2017
Dry grassland species	22
Damp grassland species	3
Negative indicators	3
Total species	28

6.3 Monitoring Plot Report – L02 Hard Rush Rush-pasture 2017

Plot code	L02 Hard Rush Rush-pasture
Treatment type	Summary of preceding Monitoring Plot Report
Ordinary Damp Meadow	This is the initial Monitoring Plot Report

Vegetation structure

- The ground surface was moist, though quite firm and composed of black, earthy structureless peat.
- Thick plant litter, although present, was thinly scattered and accounted for c.10 per cent plot cover. Very little bare ground was evident when viewed from above the sward canopy, and what there was (c.5-10 per cent) occurs between the thick tufts and small tussocks.
- The plot covers a smaller, grass-dominated area and a stand with Hard Rush and grasses and short stems of colonizing Common Reed. The herb component is largely composed of low-growing species and a suite of scramblers. There are few tall herbs and woody plants are absent.

Floristics

- Hard Rush is the dominant rush and the suite of grasses is typical of fertile rush-pasture. There are frequent short shoots of Common Reed with some Reed Canary-grass. The herbs are typical of fertile, disturbed conditions, though several fen species are present, such as Fen Bedstraw and Square-stemmed St John's-wort.
- Common Nettle and Creeping Thistle are scattered throughout and can be regarded as negative indicators.

Summary of records and events

- Not available at the time of reporting.
- Field evidence suggests that the plot is sampling the margin of the area of rush-pasture, partly colonised by Common Reed. Management intensity in this area is currently low. There is little evidence that the ground surface has been recently disturbed, with few hoof-prints or dunging, and no wheel-ruts.

Relation to past and target conditions

- This survey initiates the Vegetation Monitoring Programme and provides a baseline for assessing subsequent fen vegetation development.
- Vegetation characters suggest that the plot can be regarded as having derived from rush-pasture with additional colonization by Common Reed and a group of species indicating quite dry, fertile conditions. This is likely to correspond with changes in management and hydrology described in LOHP (2012).
- The monitoring plot is likely to be sensitive to changes in hydrology and management regime. Unfavourable trends may be detected by an increase in the cover of (a) the identified negative indicators, and (b) Common Reed.
- Potential target conditions are likely to be determined by the condition of the superficial peat layers, the hydrological regime, and the intensity of management. The location of the monitoring plot on the margin of the area identified as Hard Rush Rush-pasture suggests that a sub-optimal target condition is likely in the monitored plot, with fewer fen species able to colonize, and persistent reed incursion likely.

Plot code L02

Photographic Record 2017



Monitoring Plot Field Form – Vegetation structural characters

Monitoring Plot	L02 Hard Rush Rush-pasture
Recorder	Jonny Stone
Survey Date	9th June 2017

Character of the ground surface

- The ground surface was moist, though quite firm and composed of black, earthy structureless peat; the surface was gently uneven with few hoof-prints and no wheel-ruts.
- The plot is located on a level plane with no discernable slope or micro-topographical features.

Soil wetness

Dry, dusty	Dry, firm	Slightly damp	Moist	Wet	Saturated
		I	III		

ATTRIBUTE		SAMPLE from each plot quarter				AVERAGE
		1	2	3	4	
Layer height	Standing water (cm)	0	0	0	0	0 cm
	Plant litter (cm)	1	10	2	2	3.8 cm
	Woody seedlings (cm)	0	0	0	0	0 cm
	Large sedges / rushes (cm)	60	80	70	70	70 cm
	Reed-like grasses (cm)	50	60	50	60	55 cm
	Woody saplings (cm)	0	0	0	0	0 cm
Cover value	Standing water (%)	0	0	0	0	0 %
	Trampling (%)	0	5	0	10	3.8 %
	Dunging (%)	0	1	0	1	0.5 %
	Bare ground (%)	0	1	0	5	1.5 %
	Plant litter (%)	20	15	20	10	16.3 %
	Bryophytes (%)	5	5	2	1	3.3 %
	Woody seedlings (%)	0	0	0	0	0 %
	Large sedges / rushes (%)	30	40	100	70	60 %
	Reed-like grasses (%)	10	15	15	5	11.3 %
	Woody saplings (%)	0	0	0	0	0 %

Monitoring Plot Field Form – Floristic sub-sampling – all survey years

Monitoring Plot

L02 Hard Rush Rush-pasture

Recorder

Jonny Stone

Survey Date

9th June 2017

This data is collated from the 20 1x1 m sub-samples given in Appendix 6. [The groups into which recorded species are allocated are indicative and context-specific. They are intended to provide a general indication over time of changes in the floristic composition of the monitoring plot in relation to the specified target condition.]

Species		2017
		[ex 20]
Fen species		
<i>Phragmites australis</i>	Common Reed	16
<i>Hypericum tetrapterum</i>	Square-stemmed St John's-wort	3
<i>Epilobium parviflorum</i>	Hoary Willowherb	2
Fen-meadow species		
<i>Galium uliginosum</i>	Fen Bedstraw	5
<i>Lathyrus pratensis</i>	Meadow Vetchling	5
<i>Vicia cracca</i>	Tufted Vetch	3
<i>Juncus subnodulosus</i>	Blunt-flowered Rush	2
<i>Carex acutiformis</i>	Lesser Pond-sedge	1
<i>Cirsium palustre</i>	Marsh Thistle	1
Wet grassland species		
<i>Agrostis stolonifera</i>	Creeping Bent	18
<i>Poa trivialis</i>	Rough Meadow-grass	18
<i>Festuca rubra</i>	Red Fescue	14
<i>Juncus inflexus</i>	Hard Rush	13
<i>Brachythecium rutabulum</i>	Rough-stalked Feather-moss	12
<i>Holcus lanatus</i>	Yorkshire Fog	11
<i>Carex hirta</i>	Hairy Sedge	10
<i>Cerastium fontanum</i>	Common Mouse-ear	9
<i>Taraxacum</i> agg.	Dandelion	8
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	7
<i>Ranunculus repens</i>	Creeping Buttercup	6
<i>Phalaris arundinacea</i>	Reed Canary-grass	5
<i>Cardamine pratensis</i>	Cuckoo-flower	2
<i>Juncus effusus</i>	Soft Rush	2
<i>Schedonorus pratensis</i>	Meadow Fescue	2
<i>Plantago major</i>	Greater Plantain	1
<i>Trifolium repens</i>	White Clover	1
Ruderal species		
<i>Urtica dioica</i>	Common Nettle	10
<i>Cirsium arvense</i>	Creeping Thistle	7
<i>Equisetum arvense</i>	Field Horsetail	2
<i>Galium aparine</i>	Cleavers	2
<i>Epilobium obscurum</i>	Short-fruited Willowherb	1

Floristic character	2017
Fen species	3
Fen-meadow species	6
Wet grassland species	17
Ruderal species	5
Total species	31

6.4 Monitoring Plot Report – L03 Blunt-flowered Rush Fen-meadow 2017

Plot code	L03 Blunt-flowered Rush Fen-meadow
Treatment type	Summary of preceding Monitoring Plot Report
Ordinary Damp Meadow	This is the initial Monitoring Plot Report

Vegetation structure

- The ground surface was wet to saturated, with occasional small patches of standing water. The surface was composed of black to dark brown, structureless to hemic peat.
- Plant litter, was patchy and concentrated beneath and amongst the rush tussocks and accounted for c.15 per cent plot cover, usually more than the proportion of bare ground (5-10 %).
- The dominant rush cover was typically overstood by Common Reed, and accompanied by a number of tall fen herbs. Low light levels and often thick plant litter are likely to restrict ground plants and seedling development.

Floristics

- Soft and Blunt-flowered Rushes form the sward matrix, occasionally co-dominant with Lesser Pond-sedge, Marsh Thistle, Common Meadow-rue and Common Skullcap. The canopy of Common Reed is patchy and relatively thin (as shown in the accompanying photograph). The ground layer contains very few grasses or seedlings and the most common species is Cuckooflower.
- The floristics are not typical of the stand, as the monitoring plot lies on its southeast fringe, where active reed colonization is extending from the neighbouring stand.

Summary of records and events

- Not available at the time of reporting.
- Field evidence suggests that the sward had not been recently disturbed; management intensity in this area is currently low. There is little evidence that the ground surface has been recently disturbed, with few hoof-prints or dunging, and no wheel-ruts.

Relation to past and target conditions

- This survey initiates the Vegetation Monitoring Programme and provides a baseline for assessing subsequent fen vegetation development.
- Vegetation characters suggest that the plot can be regarded as recovering fen-meadow with additional colonization by Common Reed and a group of species indicating quite dry, fertile conditions. This is likely to correspond with changes in management and hydrology described in LOHP (2012).
- The monitoring plot is likely to be sensitive to changes in hydrology and management regime. Unfavourable trends may be detected by an increase in the cover of (a) vegetative indicators (Common Nettle and Cleavers), and (b) Common Reed.
- Potential target conditions are likely to be determined by the condition of the superficial peat layers, the hydrological regime, and the intensity of management. The location of the monitoring plot on the margin of the Blunt-flowered Rush Fen-meadow suggests that a sub-optimal target condition is likely in the monitored plot, with fewer fen species able to colonize, and persistent reed incursion likely. The ubiquity of Soft Rush in this part of the stand – which may indicate standing water – is also likely to mitigate achieving an optimal target for calcareous fen-meadow.

Plot code L03

Photographic Record 2017



Monitoring Plot Field Form – Vegetation structural characters

Monitoring Plot	L03 Blunt-flowered Rush Fen-meadow
Recorder	Jonny Stone
Survey Date	9th June 2017

Character of the ground surface

- The ground surface was wet to saturated, with occasional small patches of standing water. The surface was composed of black to dark brown, structureless to hemic peat. The ground surface was typically smooth with very gentle undulations, without any indication of a general slope.

Soil wetness

Dry, dusty	Dry, firm	Slightly damp	Moist	Wet	Saturated
				II	II

ATTRIBUTE		SAMPLE from each plot quarter				AVERAGE
		1	2	3	4	
Layer height	Standing water (cm)	1	0	1	0	0.5 cm
	Plant litter (cm)	8	10	10	11	9.8 cm
	Woody seedlings (cm)	0	0	0	0	0 cm
	Large sedges / rushes (cm)	70	65	70	70	68.8 cm
	Reed-like grasses (cm)	160	130	125	110	131.3 cm
	Woody saplings (cm)	0	0	0	0	0 cm
Cover value	Standing water (%)	5	0	1	0	1.5 %
	Trampling (%)	1	2	0	2	1.2 %
	Dunging (%)	0	1	0	0	0.3 %
	Bare ground (%)	0	5	10	5	5 %
	Plant litter (%)	20	15	10	15	15 %
	Bryophytes (%)	2	1	2	0	1.2 %
	Woody seedlings (%)	0	0	0	0	0 %
	Large sedges / rushes (%)	95	80	85	70	82.5 %
	Reed-like grasses (%)	10	25	20	20	18.8 %
Woody saplings (%)	0	0	0	0	0 %	

Monitoring Plot Field Form – Floristic sub-sampling – all survey years

Monitoring Plot

L03 Blunt-flowered Rush Fen-meadow

Recorder

Jonny Stone

Survey Date

9th June 2017

This data is collated from the 20 1x1 m sub-samples given in Appendix 7. [The groups into which recorded species are allocated are indicative and context-specific. They are intended to provide a general indication over time of changes in the floristic composition of the monitoring plot in relation to the specified target condition.]

Species		2017
		[ex 20]
Fen species		
<i>Phragmites australis</i>	Common Reed	20
<i>Thalictrum flavum</i>	Common Meadow-rue	8
<i>Scutellaria galericulata</i>	Common Skullcap	7
<i>Epilobium palustre</i>	Marsh Willowherb	6
<i>Lythrum salicaria</i>	Purple Loosestrife	3
<i>Eupatorium cannabinum</i>	Hemp Agrimony	2
<i>Filipendula ulmaria</i>	Meadowsweet	2
<i>Epilobium parviflorum</i>	Hoary Willowherb	1
<i>Calystegia sepium</i>	Hedge Bindweed	1
Fen-meadow species		
<i>Cirsium palustre</i>	Marsh Thistle	19
<i>Juncus subnodulosus</i>	Blunt-flowered Rush	15
<i>Carex acutiformis</i>	Lesser Pond-sedge	6
<i>Galium uliginosum</i>	Fen Bedstraw	2
Wet grassland species		
<i>Juncus effusus</i>	Soft Rush	19
<i>Cardamine pratensis</i>	Cuckooflower	7
<i>Brachythecium rutabulum</i>	Rough-stalked Feather-moss	5
<i>Poa trivialis</i>	Rough Meadow-grass	3
<i>Agrostis stolonifera</i>	Creeping Bent	1
<i>Juncus inflexus</i>	Hard Rush	1
<i>Phalaris arundinacea</i>	Reed Canary-grass	1
<i>Stellaria graminea</i>	Lesser Stitchwort	1
Ruderal species		
<i>Urtica dioica</i>	Common Nettle	9
<i>Galium aparine</i>	Cleavers	6
<i>Equisetum arvense</i>	Field Horsetail	5

Floristic character	2017
Fen species	9
Fen-meadow species	4
Wet grassland species	8
Ruderal species	3
Total species	24

6.5 Interpretation of the Monitoring Plot surveys

The three monitoring plots were established in situations intended to represent vegetation units that have many of the distinguishing features of the habitat-type in which they are located, but are also likely to be sensitive to changes in management and hydrological influence. In sections 6.2-6.4 each plot is described in terms of the vegetation-type mapped by the accompanying NVC survey (see Figure 3) and the presence of negative indicator species in the monitoring plot is identified.

L01 Ordinary Dry Grassland

Field evidence suggests that the sward has been in stable management since at least 2005 (Stone 2006) with an increasingly even sward and reduced proliferation of two negative indicator species, Creeping Thistle and Nettle. Creeping Thistle has been reduced to the extent that strong infestations can now be mapped as distinct from the main sward (which is represented by the monitoring plot) as shown in Figure 3.

Vegetation characters suggest that the plot can be regarded as a stable form of rather dry mesotrophic sward with, as yet, little bias towards either acidic or calcareous conditions. An appropriate target condition would include:

- (a) the removal of residual Creeping Thistle and a reduction in species indicating fertile conditions (notable Creeping Buttercup and Meadow Foxtail), and
- (b) further definition of the sward as 'dry grassland' with the occurrence additional indicator species of either acidic or calcareous ground conditions.

In comparison with the 2005 site condition assessment (Stone 2006), sward structure has thickened considerably, and the proportions of Creeping Thistle and Nettle has declined. As anticipated by that survey, the sward has consolidated into the Perennial Ryegrass-Ribwort Plantain sub-community (MG7e) of the Lolio-Plantaginion grassland community (Rodwell 1992), and the monitoring plot is well placed to detect further changes in species composition. The general trend is likely to be the increase in species such as Ribwort Plantain and Red Fescue, but further species additions – which may indicate a shift in community-type – will be dependent upon the 'species pool' accessible by the site. One key colonist would be the grass Crested Dog's-tail, and it is anticipated that further colonists may include species typical of mildly acidic or calcareous soil conditions. This would confirm a change in the status of the grassland from 'improved' to 'semi-improved' as defined, for example, in Natural England (2008).

L02 Hard Rush Rush-pasture

Field evidence suggests that the plot is sampling the margin of the area of rush-pasture, partly colonised by Common Reed. Management intensity in this area is currently low. There is little evidence that the ground surface has been recently disturbed, with few hoof-prints or dunging, and no wheel-ruts. Vegetation characters suggest that the plot can be regarded as having derived from rush-pasture with additional colonization by Common Reed and a group of species indicating quite dry, fertile conditions. This is likely to correspond with changes in management and hydrology described in LOHP (2012).

The monitoring plot is likely to be sensitive to changes in hydrology and management regime. Unfavourable trends may be detected by an increase in the cover of (a) the identified negative indicators, particularly Common Nettle; and (b) Common Reed.

Ideal levels of management and hydrological regime would encourage the whole stand represented by the monitoring plot to shift further towards fen meadow, and provide favourable conditions for the expansion of fen species tolerant of grazing and high groundwater levels. Potential target conditions are likely to be determined by the condition of the superficial peat layers, the

hydrological regime, and the intensity of management. The location of the monitoring plot on the margin of the area identified as Hard Rush Rush-pasture suggests that a sub-optimal target condition is likely in the monitored plot – compared to the central area of this stand - with fewer fen species able to colonize, and persistent reed incursion likely.

L03 Blunt-flowered Rush Fen-meadow

Field evidence suggests that the sward had not been recently disturbed; management intensity in this area is currently low. There is little evidence that the ground surface has been recently disturbed, with few hoof-prints or dunging, and no wheel-ruts. Vegetation characters suggest that the plot can be regarded as recovering fen-meadow with additional colonization by Common Reed and a group of species indicating quite dry, fertile conditions. This is likely to correspond with changes in management and hydrology described in LOHP (2012).

The monitoring plot is likely to be sensitive to changes in hydrology and management regime. Unfavourable trends may be detected by an increase in the cover of (a) negative indicators (Common Nettle and Cleavers), and (b) Common Reed.

Ideal levels of management and hydrological regime would encourage the whole stand represented by the monitoring plot to remain as fen meadow, without significant shading by Common Reed, continuing to provide favourable conditions for the expansion of fen species tolerant of grazing and high groundwater levels. Potential target conditions are likely to be determined by the condition of the superficial peat layers, the hydrological regime, and the intensity of management. The location of the monitoring plot on the margin of the Blunt-flowered Rush Fen-meadow suggests that a sub-optimal target condition is likely in the monitored plot, with fewer fen species able to colonize, and persistent reed incursion likely. The ubiquity of Soft Rush in this part of the stand – which may indicate standing water⁷ – is also likely to mitigate achieving an optimal target for calcareous fen-meadow.

⁷ Water lying on the surface is likely to be derived from floodwaters which, being derived from rainwater runoff, would favour Soft Rush rather than the calcicolous rushes.

6.6 Recommendations of the Vegetation Monitoring Programme

It is recommended that:

1. ***The Vegetation Monitoring Programme is adopted*** at The Lows, Blo’Norton by those responsible for ensuring appropriate management of the grasslands. This first Fieldwork Report provides details of the successful installation of the permanent plot markers, and the completion of a baseline survey of each plot using the ‘full’ survey method (photographs, physiognomy and floristics). The Monitoring Plan (ELP 2010) proposes several means to integrate vegetation monitoring as a management decision-making tool.
2. ***Target conditions for each sward should be devised***, based on the initial descriptions of the grassland and fen vegetation types and character given in the Fieldwork Report - supplemented by the NVC survey. Target conditions should reflect the restoration approaches to be employed, and management capacity. As indicated in the report, the valley slope grasslands appear to be on a positive trajectory towards low-fertility dry grassland. The two valley floor plots, being located on the margins of the two NVC types described in section 3.2, are in positions likely to record the general and edge-specific changes in relation to the potential recovery to forms of fen meadow.
3. ***Monitoring surveys should be repeated regularly***, and the results incorporated into management decision-making. As recommended in the Monitoring Plan, the ‘rapid survey’ technique (plot photographs) is a useful annual device to assess gross changes in the swards. This should ideally be supplemented by a rapid walkover survey to identify the presence of colonising plant species, particularly when these can be interpreted as indicators of positive (or negative) change. The ‘full survey’ should provide a summative statement of the floristic and physiognomic changes that have occurred over a period of several years and should be integrated into a periodic review of restoration progress.

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Appendix 1. NVC SAMPLE PLOT NATIONAL GRID REFERENCES

<i>Plot</i>	<i>Easting</i>	<i>Northing</i>	<i>NVC code</i>
A1	603285	279315	MG7e
A2	603253	279301	MG7e
A3	603212	279271	MG7e
A4	603185	279255	MG7e
A5	603148	279238	MG7e
B1	603241	279305	OV25c
B2	603209	279289	OV25c
B3	603239	279273	OV25c
C1	603163	279210	MG7b
C2	603191	279224	MG7b
C3	603223	279242	MG7b
C4	603249	279255	MG7b
C5	603275	279268	MG7b
D1	603221	279196	MG10b
D2	603213	279149	MG10b
D3	603227	279117	MG10b
D4	603283	279207	MG10b
D5	603286	279163	MG10b
E1	603242	279078	S7
E2	603262	279109	S7
E3	603292	279021	S7
E4	603283	279138	S7
E5	603262	279178	S7
F1	603257	279046	M22a
F2	603284	279049	M22a
F3	603315	279104	M22a
F4	603316	279049	M22a
F5	603293	279073	M22a
G1	603284	278994	M27c
G2	603323	279018	M27c
G3	603324	279060	M27c
G4	603328	279083	M27c
G5	603303	279142	M27c

Appendix 2. SPECIES RECORDED IN NVC AND MONITORING PLOTS

The following species were recorded within the survey sample plots. Several spikes of the Early Marsh Orchid *Dactylorhiza incarnata* were also noted from the south-east part of the Hard Rush Rush-pasture.

The 'Valley Floor' column is an informal indication of the main valley-floor habitat typically occupied by relevant species: Reed-fen (infrequently or unmanaged fen, dominated by grazing-sensitive species); Fen-meadow (frequently managed fen, dominated by grazing-tolerant species); Wet-grassland (frequently managed grassland supporting largely dryland species tolerant of periodic waterlogging); Ruderal species (dryland species colonising disturbed and often nutrient-rich fen margins). Rough-stalked Feather-moss is treated as generalist amongst this habitat-group. See section 3.2.2.

Species name	Common Name	Valley Floor
<i>Achillea millefolium</i>	Yarrow	
<i>Agrostis canina</i>	Velvet Bent	Fen-meadow
<i>Agrostis capillaris</i>	Common Bent	
<i>Agrostis stolonifera</i>	Creeping Bent	Wet grassland
<i>Alopecurus pratensis</i>	Meadow Foxtail	
<i>Angelica sylvestris</i>	Wild Angelica	Reed-fen
<i>Arrhenatherum elatius</i>	False Oat-grass	Ruderal
<i>Bromus hordeaceus</i>	Soft Brome	
<i>Calystegia sepium</i>	Hedge Bindweed	Reed-fen
<i>Cardamine pratensis</i>	Cuckooflower	Wet grassland
<i>Carex acutiformis</i>	Lesser Pond-sedge	Fen-meadow
<i>Carex disticha</i>	Brown Sedge	Fen-meadow
<i>Carex hirta</i>	Hairy Sedge	Ruderal
<i>Carex hostiana</i>	Tawny Sedge	Fen-meadow
<i>Carex nigra</i>	Common Sedge	Fen-meadow
<i>Carex spicata</i>	Spiked Sedge	
<i>Cerastium fontanum</i>	Common Mouse-ear	Wet grassland
<i>Cirsium arvense</i>	Creeping Thistle	Ruderal
<i>Cirsium palustre</i>	Marsh Thistle	Fen-meadow
<i>Cirsium vulgare</i>	Spear Thistle	
<i>Convolvulus arvensis</i>	Field Bindweed	
<i>Dactylis glomerata</i>	Cock's-foot	
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	Wet grassland
<i>Elytrigia repens</i>	Common Couch	
<i>Epilobium obscurum</i>	Short-fruited Willowherb	Ruderal
<i>Epilobium palustre</i>	Marsh Willowherb	Reed-fen
<i>Epilobium parviflorum</i>	Hoary Willowherb	Reed-fen
<i>Equisetum arvense</i>	Field Horsetail	Ruderal
<i>Eupatorium cannabinum</i>	Hemp Agrimony	Reed-fen
<i>Festuca rubra</i>	Red Fescue	Wet grassland
<i>Filipendula ulmaria</i>	Meadowsweet	Reed-fen
<i>Galium aparine</i>	Cleavers	Ruderal
<i>Galium uliginosum</i>	Fen Bedstraw	Fen-meadow
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill	
<i>Glechoma hederacea</i>	Ground-ivy	Ruderal
<i>Holcus lanatus</i>	Yorkshire Fog	Wet grassland
<i>Hordeum murinum</i>	Wall Barley	
<i>Hypericum tetrapterum</i>	Square-stemmed St John's-wort	Reed-fen
<i>Juncus acutiflorus</i>	Sharp-flowered Rush	Fen-meadow
<i>Juncus articulatus</i>	Jointed Rush	Fen-meadow

Species name	Common Name	Valley Floor
<i>Juncus effusus</i>	Soft Rush	Wet grassland
<i>Juncus inflexus</i>	Hard Rush	Wet grassland
<i>Juncus subnodulosus</i>	Blunt-flowered Rush	Fen-meadow
<i>Lathyrus pratensis</i>	Meadow Vetchling	Fen-meadow
<i>Lolium perenne</i>	Perennial Ryegrass	
<i>Lotus pedunculatus</i>	Marsh Bird's-foot Trefoil	Fen-meadow
<i>Lythrum salicaria</i>	Purple Loosestrife	Reed-fen
<i>Mentha aquatica</i>	Water Mint	Reed-fen
<i>Pericaria maculosa</i>	Redshank	Wet grassland
<i>Phalaris arundinacea</i>	Reed Canary-grass	Wet grassland
<i>Phleum bertolonii</i>	Smaller Cat's-tail	
<i>Phragmites australis</i>	Common Reed	Reed-fen
<i>Plantago lanceolata</i>	Ribwort Plantain	
<i>Plantago major</i>	Greater Plantain	Wet grassland
<i>Poa annua</i>	Annual Meadow-grass	
<i>Poa trivialis</i>	Rough Meadow-grass	Wet grassland
<i>Potentilla reptans</i>	Creeping Cinquefoil	
<i>Prunella vulgaris</i>	Self-heal	
<i>Prunus spinosa seedling</i>	Blackthorn	
<i>Pulicaria dysenterica</i>	Common Fleabane	Wet grassland
<i>Quercus robur seedling</i>	Pedunculate Oak	
<i>Ranunculus repens</i>	Creeping Buttercup	Wet grassland
<i>Rumex acetosa</i>	Common Sorrel	Wet grassland
<i>Rumex crispus</i>	Curled Dock	
<i>Samolus valerendi</i>	Brookweed	Reed-fen
<i>Schedonorus pratensis</i>	Meadow Fescue	Wet grassland
<i>Scorzonerooides autumnalis</i>	Autumnal Hawkbit	
<i>Scutellaria galericulata</i>	Common Skullcap	Reed-fen
<i>Senecio jacobaea</i>	Common Ragwort	
<i>Stellaria graminea</i>	Lesser Stitchwort	Wet grassland
<i>Taraxacum agg.</i>	Dandelion	Wet grassland
<i>Thalictrum flavum</i>	Common Meadow-Rue	Reed-fen
<i>Trifolium dubium</i>	Lesser Trefoil	
<i>Trifolium repens</i>	White Clover	Wet grassland
<i>Urtica dioica</i>	Common Nettle	Ruderal
<i>Veronica chamaedrys</i>	Germander Speedwell	
<i>Veronica serpyllifolia</i>	Thyme-leaved Speedwell	
<i>Vicia cracca</i>	Tufted Vetch	Fen-meadow
Bryophytes		
<i>Brachythecium rutabulum</i>	Rough-stalked Feather-moss	(generalist)
<i>Calliergonella cuspidatum</i>	Pointed Spear-moss	Fen-meadow
<i>Oxyrrhynchium hians</i>	Swartz's Feather-moss	Wet grassland

Appendix 3. NVC VALLEY SLOPE COMMUNITIES

Stand A: MG7e *Lolio-Plantaginion* Sissingh 1969 p.p., *Lolium perenne-Plantago lanceolata* grassland

Stand B: OV25c *Urtica dioica-Cirsium arvense* community, *Lolium perenne-Papaver rhoeas* sub-community

Plot	Stand A							Stand B		
	A1	A2	A3	A4	A5			B1	B2	B3
<i>Agrostis capillaris</i>	8	8	9	7	7	V	(7-9)	3	4	4
<i>Holcus lanatus</i>	4	5	6	7	5	V	(4-7)	2	4	4
<i>Lolium perenne</i>	6	4	4	5	6	V	(4-6)	5	6	5
<i>Trifolium repens</i>	5	6	4	5	5	V	(4-6)	2	3	2
<i>Poa trivialis</i>	5	4	2	4	5	V	(2-5)	3	3	5
<i>Dactylis glomerata</i>	4	4	2	2	2	V	(2-4)	2	1	3
<i>Cirsium arvense</i>	3	1	3	2	2	V	(1-3)	2	4	8
<i>Cerastium fontanum</i>	2	1	3	3	2	V	(1-3)	1		1
<i>Taraxacum</i> agg.	2	1	2	1	2	V	(1-2)	1	2	1
<i>Bromus hordeaceus</i>	2		2		1	III	(1-2)	1		1
<i>Geranium dissectum</i>	1			2	1	III	(1-2)		1	1
<i>Plantago lanceolata</i>	1	1		1		III	(1)			
<i>Festuca rubra</i>		4			2	II	(2-4)			
<i>Agrostis stolonifera</i>				1	2	II	(1-2)	2	2	2
<i>Ranunculus repens</i>		1		1		II	(1)	1		
<i>Trifolium dubium</i>	1	1				II	(1)			
<i>Prunus spinosa</i> seedling				2		I	(2)			
<i>Stellaria graminea</i>		2				I	(2)			
<i>Carex spicata</i>	2					I	(2)			
<i>Brachythecium rutabulum</i>		1				I	(1)			
<i>Veronica chamaedrys</i>			1			I	(1)	1	2	
<i>Phleum bertolonii</i>			1			I	(1)			
<i>Alopecurus pratensis</i>					1	I	(1)			
<i>Potentilla reptans</i>			1			I	(1)			
<i>Veronica serpyllifolia</i>					1	I	(1)			
<i>Rumex crispus</i>				1		I	(1)	1		
<i>Deschampsia cespitosa</i>			1			I	(1)			
<i>Prunella vulgaris</i>		1				I	(1)			
<i>Convolvulus arvensis</i>					1	I	(1)			
<i>Hordeum murinum</i>								8	7	
<i>Urtica dioica</i>								3	5	2
<i>Elytrigia repens</i>								1		
Sward height (cm)	7	5	6	4	6			22	19	33
Sward cover (%)	95	100	100	100	90			90	85	95
Bryophyte cover (%)	0	1	0	0	0			0	0	0
Plant litter cover (%)	1	1	1	1	1			10	10	5
Bare ground (%)	5	0	0	0	10			10	15	5
No. of species	14	16	14	15	16	Av.	15.0	17	13	13

Stand C: MG7b Lolio-Plantaginion Sissingh 1969 p.p., *Lolium perenne* – *Poa trivialis* leys

<i>Plot</i>	C1	C2	C3	C4	C5		
<i>Poa trivialis</i>	9	8	9	8	9	V	(8-9)
<i>Agrostis stolonifera</i>	6	5	6	5	4	V	(4-6)
<i>Holcus lanatus</i>	4	4	4	4	3	V	(3-4)
<i>Lolium perenne</i>		4	4	4	5	IV	(4-5)
<i>Trifolium repens</i>	4	4		3	5	IV	(3-5)
<i>Ranunculus repens</i>	3	5	2	6		IV	(2-6)
<i>Cirsium arvense</i>	3		2	4	1	IV	(1-4)
<i>Cerastium fontanum</i>	2		1	1	3	IV	(1-3)
<i>Juncus effusus</i>	1	1			1	III	(1)
<i>Festuca rubra</i>		4	2			II	(2-4)
<i>Juncus inflexus</i>			1	4		II	(1-4)
<i>Deschampsia cespitosa</i>		1		1		II	(1)
<i>Dactylis glomerata</i>	2					I	(2)
<i>Alopecurus pratensis</i>		2				I	(2)
<i>Urtica dioica</i>			1			I	(1)
Sward height (cm)	7	8	6	10	9		
Sward cover (%)	90	95	95	95	95		
Bryophyte cover (%)	0	0	0	0	0		
Plant litter cover (%)	1	1	1	1	1		
Bare ground (%)	10	5	5	5	5		
No. of species	9	10	10	10	8	Av.	9.4

Appendix 4. NVC VALLEY FLOOR COMMUNITIES

Stand D: MG10b *Holco-Juncetum effusi* rush-pasture, *Juncus inflexus* sub-community

Plot	D1	D2	D3	D4	D5		
<i>Juncus inflexus</i>	9	9	9	6	8	V	(6-9)
<i>Agrostis stolonifera</i>	5	5	4	5	9	V	(4-9)
<i>Carex hirta</i>	5	4	4	6	5	V	(4-6)
<i>Juncus effusus</i>	1	4	4	8	1	V	(1-8)
<i>Brachythecium rutabulum</i>	1	5	5	2	6	V	(1-6)
<i>Ranunculus repens</i>	3	2	2	2	1	V	(1-3)
<i>Taraxacum</i> agg.	1	3	2	3	2	V	(1-3)
<i>Cerastium fontanum</i>	1	1	2	1	2	V	(1-2)
<i>Poa trivialis</i>	2		1	5	9	IV	(1-9)
<i>Holcus lanatus</i>	2		1	2	6	IV	(1-6)
<i>Urtica dioica</i>	1		1	1	5	IV	(1-5)
<i>Schedonorus pratensis</i>	3	1		1	1	IV	(1-3)
<i>Galium uliginosum</i>		1	2	2	1	IV	(1-2)
<i>Festuca rubra</i>			4	6	7	III	(4-7)
<i>Agrostis canina</i>		2	5	4		III	(2-5)
<i>Equisetum arvense</i>		4	3		1	III	(1-4)
<i>Trifolium repens</i>	3		1		1	III	(1-3)
<i>Deschampsia cespitosa</i>	2			1	2	III	(1-2)
<i>Cirsium arvense</i>		1		2	2	III	(1-2)
<i>Cirsium palustre</i>		1	1		1	III	(1)
<i>Epilobium parviflorum</i>	1		1		1	III	(1)
<i>Calliergonella cuspidatum</i>		2	5			II	(2-5)
<i>Juncus articulatus</i>	2		2			II	(2)
<i>Juncus subnodulosus</i>				4	1	II	(1-4)
<i>Phalaris arundinacea</i>				3	1	II	(1-3)
<i>Lathyrus pratensis</i>				2	1	II	(1-2)
<i>Cardamine pratensis</i>				1	1	II	(1)
<i>Galium aparine</i>		1			1	II	(1)
<i>Hypericum tetrapterum</i>				1	1	II	(1)
<i>Phragmites australis</i>					7	I	(7)
<i>Juncus acutiflorus</i>				5		I	(5)
<i>Carex nigra</i>			2			I	(2)
<i>Carex disticha</i>			2			I	(2)
<i>Glechoma hederacea</i>		2				I	(2)
<i>Oxyrrhynchium hians</i>			2			I	(2)
<i>Epilobium obscurum</i>					1	I	(1)
<i>Thalictrum flavum</i>			1			I	(1)
<i>Mentha aquatica</i>		1				I	(1)
<i>Carex acutiformis</i>					1	I	(1)
<i>Stellaria graminea</i>				1		I	(1)
<i>Samolus valerendi</i>			1			I	(1)
<i>Arrhenatherum elatius</i>				1		I	(1)
<i>Vicia cracca</i>					1	I	(1)
<i>Pulicaria dysenterica</i>		1				I	(1)
<i>Plantago major</i>					1	I	(1)
Sward height (cm)	65	70	65	50	150		
Sward cover (%)	95	95	95	100	100		
Bryophyte cover (%)	1	20	35	2	35		
Plant litter cover (%)	15	15	20	20	15		
Bare ground (%)	5	5	0	0	5		
No. of species	16	19	25	25	31	Av.	23.2

Stand E: S7 *Caricetum acutiformis* swamp

Plot	E1	E2	E3	E4	E5		
<i>Carex acutiformis</i>	10	10	10	10	10	V	(10)
<i>Poa trivialis</i>	2	1		1	1	IV	(1-2)
<i>Galium uliginosum</i>	2	2	1			III	(1-2)
<i>Phragmites australis</i>	2	1	1			III	(1-2)
<i>Juncus effusus</i>	1	1	1			III	(1)
<i>Juncus inflexus</i>	4	3				II	(3-4)
<i>Galium aparine</i>				1	3	II	(1-3)
<i>Equisetum arvense</i>		2		1		II	(1-2)
<i>Thalictrum flavum</i>	1		1			II	(1)
<i>Phalaris arundinacea</i>		1	1			II	(1)
<i>Holcus lanatus</i>	1	1				II	(1)
<i>Juncus subnodulosus</i>		4				I	(4)
<i>Festuca rubra</i>	4					I	(4)
<i>Cerastium fontanum</i>	3					I	(3)
<i>Cirsium arvense</i>					3	I	(3)
<i>Agrostis stolonifera</i>		3				I	(3)
<i>Carex hirta</i>	3					I	(3)
<i>Brachythecium rutabulum</i>	2					I	(2)
<i>Carex hostiana</i>	2					I	(2)
<i>Urtica dioica</i>				1		I	(1)
<i>Persicaria maculosa</i>			1			I	(1)
<i>Glechoma hederacea</i>					1	I	(1)
Sward height (cm)	70	65	70	70	65		
Sward cover (%)	100	100	100	100	100		
Bryophyte cover (%)	2	0	0	0	0		
Plant litter cover (%)	20	25	25	20	20		
Bare ground (%)	5	0	0	0	5		
No. of species	13	11	7	5	5	Av.	8.2

Stand F: M22a *Juncus subnodulosus*-*Cirsium palustre* fen-meadow, Typical sub-community

Plot	F1	F2	F3	F4	F5		
<i>Juncus subnodulosus</i>	9	9	6	8	8	V	(6-9)
<i>Poa trivialis</i>	3	3	8	2	2	V	(2-8)
<i>Urtica dioica</i>	1	2	1	5	3	V	(1-5)
<i>Equisetum arvense</i>	1	1	3	3	1	V	(1-3)
<i>Galium uliginosum</i>	2	2	1	1	2	V	(1-2)
<i>Juncus effusus</i>		4	4	6	4	IV	(4-6)
<i>Phragmites australis</i>		2	7	8	5	IV	(2-8)
<i>Brachythecium rutabulum</i>	2	3		3	2	IV	(2-3)
<i>Juncus inflexus</i>	4	2		1	4	IV	(1-4)
<i>Agrostis stolonifera</i>	4	3		1	2	IV	(1-4)
<i>Cerastium fontanum</i>	2	2	1		1	IV	(1-2)
<i>Festuca rubra</i>	4	5	4			III	(4-5)
<i>Cirsium palustre</i>		2		5	5	III	(2-5)
<i>Mentha aquatica</i>		2	2		3	III	(2-3)
<i>Thalictrum flavum</i>	4			4	1	III	(1-4)
<i>Carex acutiformis</i>			1	4	4	III	(1-4)
<i>Cardamine pratensis</i>		1		4	2	III	(1-4)
<i>Carex disticha</i>		6			4	II	(4-6)
<i>Lathyrus pratensis</i>	1		4			II	(1-4)
<i>Epilobium palustre</i>				4	1	II	(1-4)
<i>Glechoma hederacea</i>	1		3			II	(1-3)
<i>Filipendula ulmaria</i>				1	2	II	(1-2)
<i>Phalaris arundinacea</i>		2		1		II	(1-2)
<i>Holcus lanatus</i>	2	1				II	(1-2)
<i>Calystegia sepium</i>			1	2		II	(1-2)
<i>Epilobium parviflorum</i>			1	1		II	(1)
<i>Scutellaria galericulata</i>				4		I	(4)
<i>Juncus articulatus</i>	4					I	(4)
<i>Galium aparine</i>				3		I	(3)
<i>Carex hirta</i>	3					I	(3)
<i>Agrostis canina</i>	3					I	(3)
<i>Lythrum salicaria</i>				2		I	(2)
<i>Vicia cracca</i>	2					I	(2)
<i>Cirsium arvense</i>			1			I	(1)
<i>Ranunculus repens</i>		1				I	(1)
<i>Samolus valerendi</i>		1				I	(1)
<i>Eupatorium cannabinum</i>				1		I	(1)
<i>Deschampsia cespitosa</i>	1					I	(1)
<i>Oxyrrhynchium hians</i>	1					I	(1)
<i>Arrhenatherum elatius</i>	1					I	(1)
Sward height (cm)	65	55	170	180	160		
Sward cover (%)	95	100	95	100	90		
Bryophyte cover (%)	2	3	0	3	2		
Plant litter cover (%)	5	5	10	5	5		
Bare ground (%)	5	10	5	5	10		
No. of species	21	20	16	23	19	Av.	18.8

Stand G: M27c *Filipendula ulmaria*-*Angelica sylvestris* mire, *Juncus effusus*-*Holcus lanatus* sub-community

Plot	G1	G2	G3	G4	G5		
<i>Phragmites australis</i>	6	7	9	9	9	V	(7-9)
<i>Poa trivialis</i>	5	6	3	4	4	V	(3-6)
<i>Filipendula ulmaria</i>	8	2	2	3	2	V	(2-8)
<i>Juncus effusus</i>	6	7	5	4	2	V	(2-7)
<i>Urtica dioica</i>	3	2	2	3	2	V	(2-3)
<i>Cirsium palustre</i>	2	5	3	2	1	V	(1-5)
<i>Brachythecium rutabulum</i>		4	2	2	1	IV	(1-4)
<i>Cardamine pratensis</i>	2		1	2	3	IV	(1-3)
<i>Galium aparine</i>	3		2	1	2	IV	(1-3)
<i>Epilobium obscurum</i>		3	2	1	1	IV	(1-3)
<i>Angelica sylvestris</i>		2	2	3		III	(2-3)
<i>Thalictrum flavum</i>	3	2	2			III	(2-3)
<i>Lotus pedunculatus</i>	4	5	1			III	(1-5)
<i>Mentha aquatica</i>			1	2	1	III	(1-2)
<i>Equisetum arvense</i>				2	2	II	(2)
<i>Galium uliginosum</i>		1	1			II	(1)
<i>Rumex acetosa</i>	7					I	(7)
<i>Juncus subnodulosus</i>			4			I	(4)
<i>Calliergonella cuspidatum</i>		2				I	(2)
<i>Juncus inflexus</i>					1	I	(1)
<i>Cerastium fontanum</i>			1			I	(1)
<i>Lathyrus pratensis</i>			1			I	(1)
<i>Cirsium arvense</i>			1			I	(1)
<i>Persicaria maculosa</i>			1			I	(1)
<i>Lythrum salicaria</i>		1				I	(1)
Sward height (cm)	120	130	190	180	180		
Sward cover (%)	95	90	100	95	95		
Bryophyte cover (%)	0	5	2	2	1		
Plant litter cover (%)	10	5	10	10	5		
Bare ground (%)	10	15	5	10	10		
No. of species	11	14	20	13	13	Av.	14.2

Appendix 5. FIELD RECORD FOR L01 ORDINARY DRY GRASSLAND MONITORING PLOT P = present in sub-plot

Sub-plots	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	2017
<i>Lolium perenne</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	20
<i>Agrostis capillaris</i>		P	P	P	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	18
<i>Trifolium repens</i>	P		P	P	P		P	P	P	P		P	P	P	P	P	P	P	P	P	17
<i>Poa trivialis</i>	P	P	P				P	P	P	P	P	P	P	P	P	P	P	P	P	P	17
<i>Cerastium fontanum</i>		P		P	P	P	P	P			P		P		P	P	P	P	P	P	14
<i>Brachythecium rutabulum</i>	P	P	P	P	P	P	P	P	P	P	P	P	P			P					14
<i>Dactylis glomerata</i>				P	P	P	P	P					P		P	P	P	P	P	P	12
<i>Taraxacum agg.</i>	P		P		P		P	P			P	P	P			P	P	P			11
<i>Agrostis stolonifera</i>	P	P	P				P	P	P	P	P	P	P	P							11
<i>Holcus lanatus</i>	P	P	P			P	P			P	P	P	P			P					10
<i>Phleum bertolonii</i>				P	P	P	P								P	P	P	P	P	P	10
<i>Trifolium dubium</i>									P					P	P	P	P	P	P	P	8
<i>Ranunculus repens</i>	P	P					P	P		P	P		P								7
<i>Alopecurus pratensis</i>	P	P	P				P			P	P	P									7
<i>Prunus spinosa</i> seedling											P	P			P	P	P				5
<i>Festuca rubra</i>																	P	P	P	P	4
<i>Potentilla reptans</i>		P					P	P													3
<i>Cirsium vulgare</i>				P		P											P				3
<i>Quercus robur</i> seedling							P					P			P						3
<i>Cirsium arvense</i>											P	P									2
<i>Geranium dissectum</i>																		P	P		2
<i>Stellaria graminea</i>																	P			P	2
<i>Veronica chamaedrys</i>																	P	P			2
<i>Veronica serpyllifolia</i>															P						1
<i>Achillea millefolium</i>					P																1
<i>Poa annua</i>				P																	1
<i>Scorzoneroides autumnalis</i>																	P				1
<i>Senecio jacobaea</i>																P					1
No. of species	9	10	9	9	9	8	15	12	7	8	11	12	12	6	11	13	14	12	11	10	Av. 10.4

Appendix 6. FIELD RECORD FOR L02 HARD RUSH RUSH-PASTURE MONITORING PLOT P = present in sub-plot

Sub-plots	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	2017	
<i>Poa trivialis</i>	P	P	P	P	P	P	P	P	P	P	P		P	P	P	P		P	P	P	P	18
<i>Agrostis stolonifera</i>	P	P	P	P	P	P	P	P	P	P	P	P	P		P		P	P	P	P		18
<i>Phragmites australis</i>		P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P				16
<i>Festuca rubra</i>	P	P	P	P	P	P		P	P	P	P	P	P						P	P		14
<i>Juncus inflexus</i>	P	P	P			P	P	P	P			P	P	P			P	P	P			13
<i>Brachytecium rutabulum</i>		P	P	P	P	P	P	P	P	P	P				P					P		12
<i>Holcus lanatus</i>	P	P	P	P	P				P	P			P	P			P		P			11
<i>Carex hirta</i>			P	P	P				P	P	P			P	P					P		10
<i>Urtica dioica</i>	P	P				P	P	P				P	P	P			P	P				10
<i>Cerastium fontanum</i>			P	P	P				P	P	P						P	P		P		9
<i>Taraxacum agg.</i>		P	P	P	P					P	P				P							8
<i>Deschampsia cespitosa</i>				P						P	P				P					P		7
<i>Cirsium arvense</i>		P				P		P				P		P			P	P				7
<i>Ranunculus repens</i>					P				P	P	P	P			P							6
<i>Galium uliginosum</i>			P				P	P					P	P								5
<i>Lathyrus pratensis</i>											P			P	P				P	P		5
<i>Phalaris arundinacea</i>	P		P						P			P							P			5
<i>Hypericum tetrapterum</i>		P											P						P			3
<i>Vicia cracca</i>		P	P																			3
<i>Epilobium parviflorum</i>	P											P										2
<i>Juncus subnodulosus</i>																	P			P		2
<i>Juncus effusus</i>				P						P												2
<i>Cardamine pratensis</i>					P										P							2
<i>Schedonorus pratensis</i>							P						P									2
<i>Galium aparine</i>		P																P				2
<i>Equisetum arvense</i>				P	P																	2
<i>Cirsium palustre</i>					P																	1
<i>Carex acutiformis</i>														P								1
<i>Plantago major</i>													P									1
<i>Trifolium repens</i>															P							1
<i>Epilobium obscurum</i>						P																1
No. of species	8	13	13	12	13	9	8	9	11	12	11	10	11	10	11	9	6	9	6	8	Av. 10.0	

Appendix 7. FIELD RECORD FOR L03 BLUNT-FLOWERED RUSH FEN-MEADOW MONITORING PLOT P = present in sub-plot

Sub-plots	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	2017
<i>Phragmites australis</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	20
<i>Cirsium palustre</i>	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	19
<i>Juncus effusus</i>	P	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	19
<i>Juncus subnodulosus</i>	P	P	P	P	P	P	P		P	P	P		P	P	P			P	P		15
<i>Urtica dioica</i>	P		P		P		P	P	P			P		P	P						9
<i>Thalictrum flavum</i>		P	P			P										P	P	P	P	P	8
<i>Scutellaria galericulata</i>						P	P	P	P	P	P		P								7
<i>Cardamine pratensis</i>	P				P		P					P	P	P	P						7
<i>Epilobium palustre</i>			P	P	P			P						P	P						6
<i>Carex acutiformis</i>		P									P					P	P	P		P	6
<i>Galium aparine</i>			P		P			P	P					P	P						6
<i>Brachythecium rutabulum</i>	P			P		P						P	P								5
<i>Equisetum arvense</i>			P		P						P			P					P		5
<i>Lythrum salicaria</i>		P	P									P									3
<i>Poa trivialis</i>						P		P								P					3
<i>Eupatorium cannabinum</i>				P									P								2
<i>Filipendula ulmaria</i>									P								P				2
<i>Galium uliginosum</i>		P									P										2
<i>Epilobium parviflorum</i>														P							1
<i>Calystegia sepium</i>			P																		1
<i>Agrostis stolonifera</i>															P						1
<i>Juncus inflexus</i>										P											1
<i>Phalaris arundinacea</i>																				P	1
<i>Stellaria graminea</i>							P														1
No. of species	7	8	11	7	9	8	7	8	8	6	8	7	8	10	9	6	5	6	6	6	Av. 7.5