Fieldwork to Support Habitat Restoration Work at Parkers Piece, Thelnetham

NVC survey and continuation of Vegetation Monitoring Programme June-July 2017

Undertaken on behalf of the Little Ouse Headwaters project

Prepared by: **Jonny Stone**
Prepared for: **Rowena Langston, LOHP Trustee and chair of the Monitoring Working Group**

Jonny Stone Vegetation Advisor, Lavender Cottage, The Street, Easton, Woodbridge Suffolk IP13 0ED

This page has been left blank intentionally

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 eastern half of Parkers Piece was included within the boundary of the SSSI to ensure that it could not be managed in a way that would threaten the hydrology of Thelnetham Fen. The western half grades onto a sandy terrace plateau above the fen. River frontage alongside the Little Ouse includes (part of) an uncanalized section of the river that retains its meanders, though has been over-deepened.

2. LOHP has requested that a National Vegetation Classification survey of Parkers Piece is carried out following a period of habitat restoration, and that a repeat Vegetation Monitoring Programme survey is conducted of the four permanent monitoring plots that were established in 2009, immediately following the initial phase of site restoration. The objective of this second full survey is to assess the changes that have occurred in the structure and composition of the swards since 2009.

3. In total, twelve NVC communities were identified. Two distinct grassland types are present on the sandy terrace in the western part of Parkers Piece. These are well-managed immature swards that have developed into a slightly weedy, close-cropped grassland abruptly separated from the ruderal-dominated slopes of a peat spoil heap placed on the higher ground during restoration of the adjacent fringes of Thelnetham Fen.

4. The main body of vegetation at Parkers Piece has developed on peat derived from the formation of Thelnetham Fen. Although drained by the deepened river, slow drainage and the restoration excavation have created a suite of fenland communities across the central and eastern parts of the site. Five herbaceous communities are recognised, four of which are confined to the main peatland, bounded by the fifth – a trampled and slightly rutted mown strip of fenny vegetation between the grazed areas and the riparian margin. The vegetation of the main peatland supports populations of Common Reed, Water Mint, Purple Loosestrife and Blunt-flowered Rush. As a group of species these are most commonly found growing together in slightly calcareous reed-fen and wet meadows. The wettest stand supports often thick growth of Branched Bur-reed.

5. The most favourable conditions for low-growing wet-fen specialists seems to be either side of the fen pool. Here, a scatter of Marsh Pennywort, Brookweed and the mosses Pointed Spear-moss and Marsh Bryum are present.

6. When recorded for the Vegetation Monitoring Programme in 2009, the excavated fen pool was open water, with a little Jointed Rush and scattered stoneworts. In this survey, over three-quarters of the waterbody was dominated by a simple reedswamp with abundant Common Reed and widely scattered Bulrush over an aquatic community including Small Pondweed, a notable species. The western side of the fen pool lacks the reed swamp which gives way to a carpet of Blunt-flowered Rush rhizomes supporting Marsh Pennywort and Brookweed. In the remaining open water, swathes of two notable stonewort species carpet the shallowing water.

7. The riparian margin is cut into a sandy substrate at the western end, and predominantly peat through the central and eastern sections. The only constant species recorded was Common Nettle, which was often dominant. Common Reed, False Oat-grass and Greater Pond Sedge were also dominant species in limited sections.

8. The remaining scrub - partly cleared in advance of peat excavation – forms a thin fringe along the southern edge of the peatland at Parkers Piece. The main stand consists of Grey Willow, with small groups of White Willow and several Crack Willows along the southern boundary of the site.

9. The four monitoring plots were established in 2009 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.

   P-01 Shallow scrape (20 cm) This plot is located in an area of shallow peat excavation to the west of the Fen Pool and lies on the margin of the zone occupied by fen meadow. It is notable for retaining gaps between rush tussocks and a number of wet-fen species are present, including Marsh Pennywort.

   P-02 Fen Pool monitoring plot The monitoring plot for the Fen Pool is set out at the southern end of the waterbody, which is now heavily shaded by reed and bulrush. Target conditions for the Fen Pool are set out in LOHP (2012); notwithstanding, it would be useful to clear emergents from part of the plot to provide conditions for the re-colonization of stoneworts into the monitored part of the waterbody.

   P-03 Peat scrape (40 cm) 1 monitoring plot This plot is situated within the deeper peat excavation in an area where it was anticipated that wet-fen species would colonise. The assembled vegetation is fen meadow but lacks low-growing species and was widely lodged at the time of survey.

   P-04 Peat scrape (40 cm) 2 monitoring plot The second permanent plot placed in the deeper peat excavation is situated on a similar substrate to Plot P-03 and it was anticipated that the assembling vegetation would follow a similar trajectory. Here, Greater Pond-sedge is abundant and there is no wet-fen ground flora.

10. This field report for the Vegetation Monitoring Programme makes three recommendations, that:

    The Vegetation Monitoring Programme is maintained at Parkers Piece as an aid to management decision-making.

    The means of achieving target conditions for each sward should be reviewed, in order to address the primary issue of reducing dominance by rush tussocks and sedge stands - as well as reducing both lodging and plant litter build-up - and the secondary issue of ensuring the scrub sapling impact is minimised.

    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 2
1.3 Survey reporting 2

2. SURVEY METHODOLOGIES **3**
2.1 NVC survey methodology 3
2.2 Vegetation monitoring survey methodology 4
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 the grassland communities 10
3.2.2 Synopsis of the peatland communities 12
3.2.3 Riparian fringe 17
3.2.4 Pond vegetation 18
3.2.5 Sallow scrub 19

4. EVALUATION OF HABITATS AND SPECIES **21**
4.1 Habitat evaluation 21
4.2 Notable plant species 22

5. MANAGEMENT CONSIDERATIONS **24**
5.1 As part of the landscape unit 24
5.2 At the site-scale 24

6. VEGETATION MONITORING PROGRAMME – FIELDWORK REPORT **27**
6.1 Locating the Monitoring Plots 27
6.2 Monitoring Plot Report – P-01 Shallow scrape (20 cm) 2017 29
6.3 Monitoring Plot Report – P-02 Fen Pool 2017 34
6.4 Monitoring Plot Report –P-03 Peat scrape (40 cm) 1 2017 38
6.5 Monitoring Plot Report – P-04 Peat scrape (40 cm) 2 2017 43
6.6 Interpretation of the Monitoring Plot surveys 48
6.7 Recommendations of the Vegetation Monitoring Programme 50

7. REFERENCES **51**

Figure 1. The location of Parkers Piece and surrounding land 1
Figure 2. Location of NVC survey plots 7
Figure 3. Location of NVC plant communities. 9
Figure 4. Location of permanent marker posts 28

Appendix 1. NVC sample plot national grid references
Appendix 2. Species recorded in NVC sample and monitoring plots
Appendix 3. NVC Grassland communities
Appendix 4. NVC Peatland community
Appendix 5. NVC Woodland community
Appendix 6. Field record for P-01 Shallow scrape (20 cm) monitoring plot
Appendix 7. Field record for P-02 Fen Pool monitoring plot
Appendix 8. Field Record for P-03 Peat scrape (40 cm) 1 monitoring plot
Appendix 9. Field record for P-04 Peat scrape (40 cm) 2 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 more extensive habitat, for which East Anglia had one of the most important concentrations in Western Europe. The eastern half of Parkers Piece (2.39 ha) was included within the boundary of the SSSI to ensure that it could not be managed in a way that would threaten the hydrology of Thelnetham Fen. The western half (c.2.1 ha) grades onto a sandy terrace plateau above the fen. River frontage alongside the Little Ouse includes (part of) an uncanalized section of the river that retains its meanders, though has been over-deepened. The site boundary is given in Figure 1.

Figure 1. The location of Parkers Piece, Thelnetham and surrounding land

1.2 Survey requirements and objectives

Since Parkers Piece was purchased in 2007, a programme of habitat restoration has been carried out, including excavation of surface peats in the central and eastern parts of the site. In 2009, permanent monitoring plots were established in this area. From 2011, funding for the ongoing restoration work has come from Natural England through a Higher Level Stewardship Scheme agreement[1].

The LOHP has requested that two vegetation surveys are carried out, a full NVC survey of the main habitats, and the re-survey of the vegetation monitoring plots established in 2009.

The NVC survey has the primary objective of establishing the character of grassland, fen and scrub vegetation making up the survey area. This Joint Nature Conservation Committee (JNCC) classification is 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 re-survey the permanent monitoring plots established in 2009. This is a continuation of the Vegetation Monitoring Programme initially established on Parkers Piece and Bleyswycks Bank and follows the Monitoring Plan field methodology (OHES 2010) with the objective of assessing the changes that may have occurred in the structure and composition of the swards since 2009.

1.3 Survey reporting

Jonny Stone has been commissioned by LOHP to undertake these vegetation surveys on Parkers Piece. 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 re-survey of the 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 (e.g. Rodwell et al. 2007). The classification (Rodwell 1991-2000) 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 grassland swards were sampled using 2 x 2m plots and fenland areas using 4 x 4m plots, including photographs taken 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.

Two areas were not separately sampled. The thin belt of willow scrub was too small and/or thin to be sampled by the standard plot size. The floristic composition of the canopy and vegetation in the field and ground layers are described as a single unit. The two areas of recently (2010) planted shrubs nettle-dominated vegetation in the western dry grasslands were also not sampled.

All vascular plants are named following Stace (2010); the bryophyte flora follows Hill et al. (2008), and stonewort species by John et al. (2002). Species recorded in NVC sample plots are listed in Appendix 2.

Field data was tabulated in Microsoft Excel and stand sample plots grouped by floristic similarity to show the common and typical characters; each ensuing vegetation type was then compared with the published NVC accounts (Rodwell 1991-2000). For the grassland swards, this comparison was refined following the European phytosociological framework recently adopted by the International Association for Vegetation Science (Mucina et al. 2016). Field data is presented in Appendices 3, 4 and 5.

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 ground surface 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.

2.2 Vegetation monitoring survey methodology

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

The methodology was originally applied in establishing four permanent plots at Parkers Piece, with the following objectives:

1. To establish permanent monitoring plots in the grassland and fen habitats, using the protocols developed in the Monitoring Plan.

2. To undertake the initial monitoring survey, using the 'full' Fieldwork Protocols.

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

This second Fieldwork Report follows the prescriptions of the Monitoring Plan (OHES 2010) and repeats the 'full' survey protocol carried out in 2009, using all 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 6, 7 and 8, and all species included in Appendix 2.

2.3 Limitations to the surveys

The dry grassland vegetation was assessed for the NVC survey in June 2017, and the remaining habitats and the monitoring plots were surveyed in July. No access issues were encountered. The dry grasslands had been subject to drought leading up to their survey, but the other habitats were assessed at an optimal time of year. There were no limitations affecting the location of grassland or peatland NVC sample plots, but the small size of the willow scrub constrained the use of woodland plots. 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. A supplementary visit was undertaken in August to confirm particular boundaries of vegetation types.

The locations of all permanent markers for the monitoring plots were re-located without any problems and the plots were re-established without issue.

3. VEGETATION SURVEY RESULTS

3.1 Character of the survey area

Parkers Piece forms part of the southern margin of the Thelnetham-Blo'Norton Fens (West 2009). As indicated on the geological map (BGS 1996), the western half of the site is situated on the margin of a sandy terrace (*sensu* Mathers et al. 1993) as it descends into the peatland that forms the eastern half. The toeslope of the terrace and the deeper peats are cut across by the modern course of the River Little Ouse.

Parkers Piece is not defined on Hodskinson's Map of Suffolk 1783 (Dymond 2003) as a distinct unit, though the site is shown as forming part of the southeast end of Thelnetham Fen. On the Ordnance Survey Six-inch England and Wales series, 1842-1952[2], the external site boundary is extant, and part of Parkers Piece is labelled as 'Thelnetham Fen': it is clear that this area supported fen vegetation that was continuous with that on Thelnetham Middle Fen, one of the village 'poors' fens. The sandy western part of the site is shown as improved, and therefore likely to be cultivated or treated as managed grassland. The course of the river, by this time, is at least partly re-aligned, with only a short section at the western end showing a gentle meander, which is assumed to be derived from natural processes.

A digital version[3] of the Land Utilisation Survey 1933-1949 provides an idea of the broad habitats present before the Second World War, with almost the whole site being mapped as managed grassland, with the exception of a small block of woodland shown at the south-eastern end.

The sequence of aerial photographs maintained by LOHP indicates Parkers Piece has been cultivated and used for arable agriculture at some point in the last 60 years. As reported by LOHP[4], free-range pigs were kept the site in the 1980s, "resulting in enrichment of the peat. This, together with drying-out of the valley as a result of artesian abstraction, compounded by droughts, resulted in the development of tall, coarse vegetation, dominated by stinging nettles and creeping thistles. Wetter conditions in the valley since 2000, have resulted in the re-development of elements of fen vegetation amongst the coarse perennials - pond sedge and occasional plants of yellow meadow rue for example."

Following acquisition in 2007, the key element of habitat restoration was the excavation of degraded surface peats from the central and eastern parts of the site, to produce a fen pool (to a depth of 100 cm), a sinuous central area of 'wet fen' (excavated to a depth of 40 cm below ground level) and an encompassing shallow excavation to a depth of 20 cm.

3.2 NVC survey results

At the time of survey, following several months of normal rainfall levels[5], the western grassland was already parched by 26th June. A separate grassland type was distinguished on the toeslope as, although the ground surface was also dry, the vegetation had retained a green shade quite distinct from the pale yellow of the drought-affected sward. The ground surface of the earthy peats on the valley floor

[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 28th September 2017)]
[3] http://magic.defra.gov.uk/MagicMap.aspx (accessed 14th January 2018)
[4] http://www.lohp.org.uk/our-sites/parkers-piece-bleyswycks-bank (accessed 14th January 2018)
[5] 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).

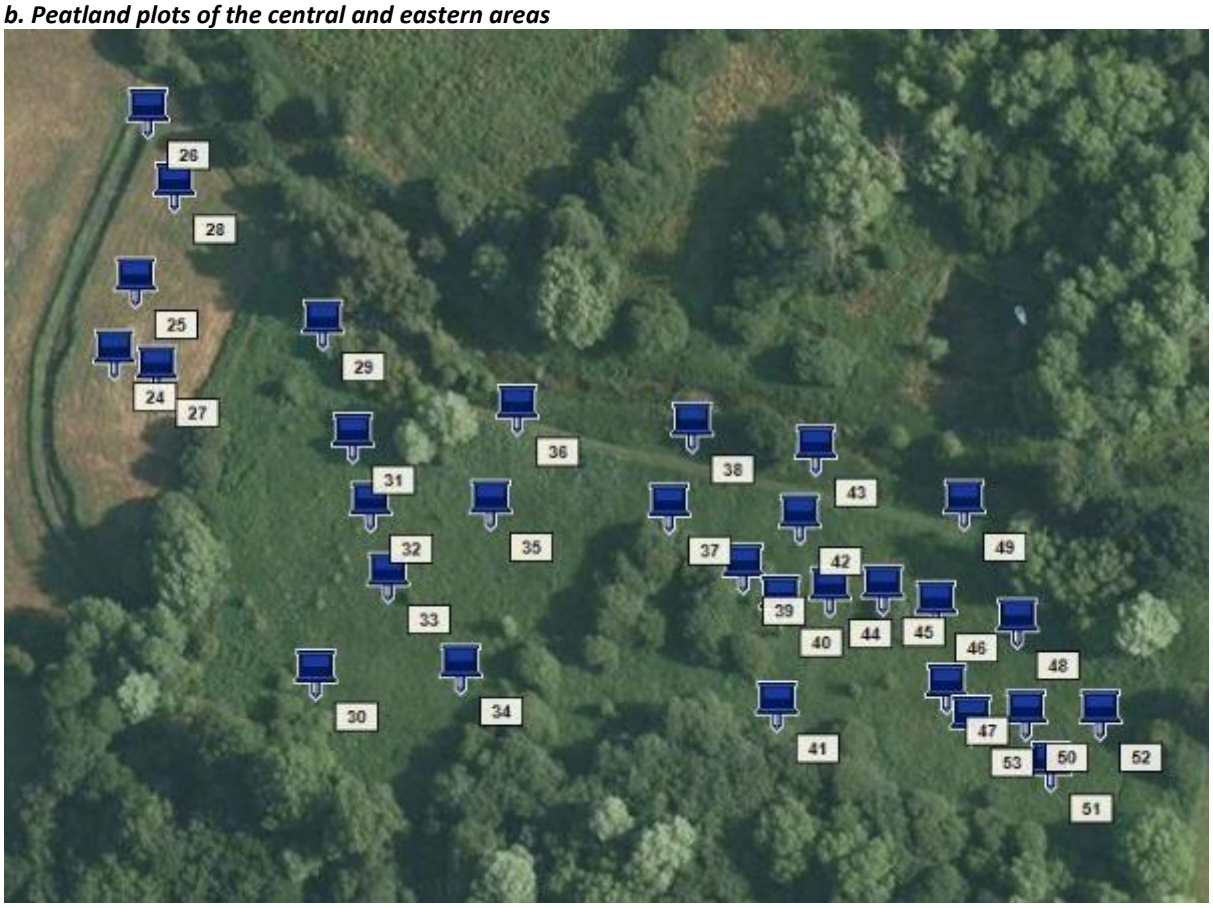
was found to be slightly damp to saturated, with the effects of stock poaching creating a marked micro-topography.

As shown in ***Figure 2. Location of NVC survey plots***, Parkers Piece was sampled by 53 mapped plots in representative locations. The fen pool was sampled by a further 3 plots, which are not mapped. 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.

Figure 2. Location of NVC survey plots
Map Data © 2018 Google Imagery © 2018 , DigitalGlobe , Get mapping plc , Infoterra Ltd & Bluesky

a. Grassland plots in the western field associated with the sandy terrace

b. Peatland plots of the central and eastern areas



c. Riparian plots, taken from the bank of the River Little Ouse

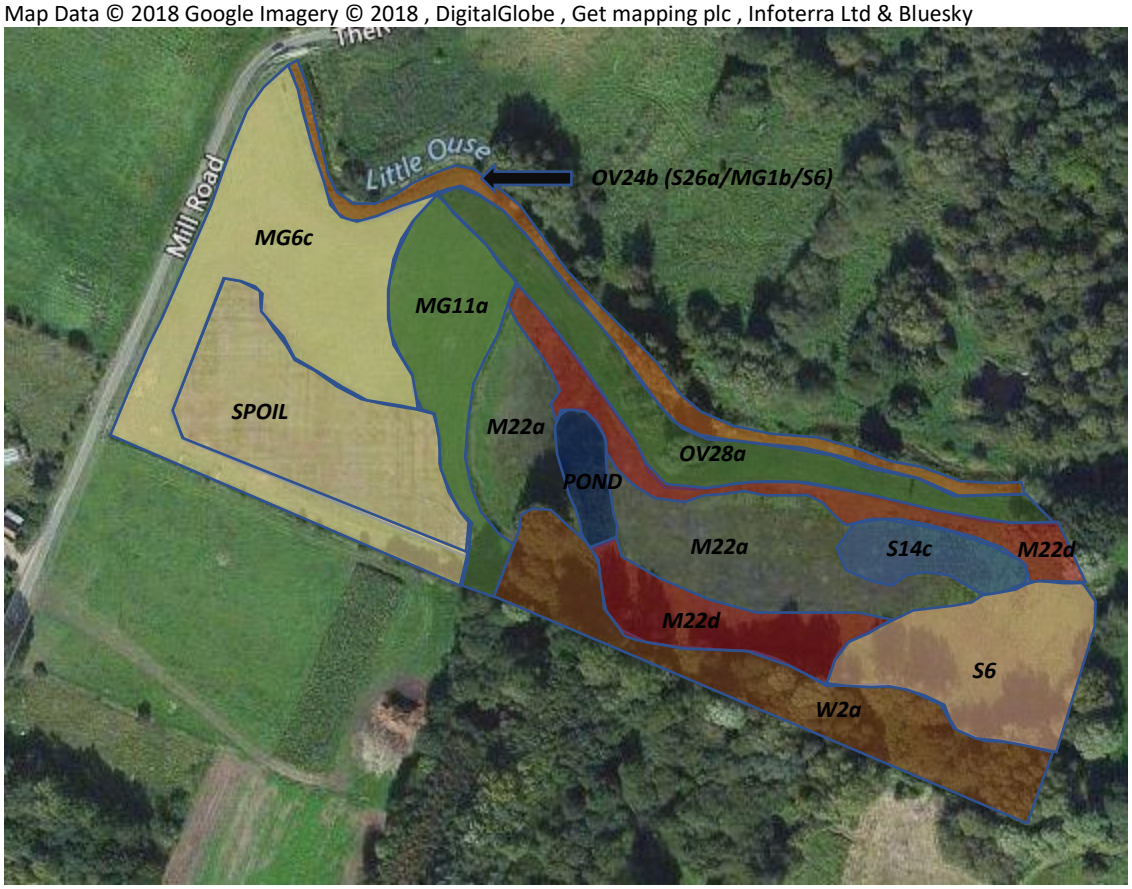
In total, twelve NVC communities were identified, which are listed in Table 3 and shown in ***Figure 3. Location of NVC plant communities***.

Table 3. NVC communities recorded from Parkers Piece, Thelnetham

Code	Community title	Area
Sandy grasslands		
MG6c	*Lolio-Cynosuretum cristati* grassland, *Trisetum flavescens* sub-community	0.71 ha
MG11a	*Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland, *Lolium perenne* sub-community [Lolio-Agrostetum stoloniferae (sensu Page 1980)]	0.45 ha
Peatland communities		
M22a	*Juncus subnodulosus-Cirsium palustre* fen-meadow, Typical sub-community	0.61 ha
M22d	*Juncus subnodulosus-Cirsium palustre* fen-meadow, *Iris pseudacorus* sub-community	0.47 ha
S14c	*Sparganietum erecti Roll 1938, Mentha aquatica sub-community*	0.14 ha
S6	*Caricetum ripariae* Soó 1928	0.39 ha
OV28a	*Agrostio-Ranunculetum repentis* Oberdorfer et al. 1967, *Polygonum hydropiper-Rorippa sylvestris* sub-community	0.37 ha
W2a	*Salix cinerea-Betula pubescens-Phragmites australis* woodland, *Alnus glutinosa-Filipendula ulmaria* sub-community	0.48 ha
Fen pool		
S4a	*Phragmitetum australis* (Gams 1927) Schmale 1939, *Phragmites australis* sub-community	0.08 ha
Riparian margin		
OV24b	*Urtica dioica-Galium aparine* community, *Arrhenatherum elatius-Rubus fruticosus* sub-community	0.19 ha
S26a	*Phragmites australis-Urtica dioica* tall-herb fen, *Filipendula ulmaria* sub-community	
MG1b	*Arrhenatheretum elatioris* Br.-Bl. 1919, *Urtica dioica* sub-community	
S6	*Caricetum ripariae* Soó 1928	

Full floristic and physiognomic data tables are given in Appendices 3, 4 and 5 for each habitat.

Figure 3. Location of NVC plant communities



3.2.1 Synopsis of the grassland communities

Two distinct grassland types are present on the sandy terrace in the western part of Parkers Piece. These are well-managed immature swards that have developed into a slightly weedy, close-cropped grassland abruptly separated from the ruderal-dominated slopes of the peat spoil heap. This was placed on the higher ground during restoration of the adjacent fringes of Thelnetham Fen. The grassland swards share a visible boundary which was very marked at the time of survey – evident as a change from the yellowing parched sward on elevated sandy soil to a muted green on the toeslope of the terrace.

The northern boundary of these stands is extended beyond the stock fence and across the strip of mown and trampled grass path, to the margin of the linear stand of riparian vegetation.

3.2.1.1 Ordinary Dry Grassland

Following the classification in the Nature Conservation Review (Ratcliffe 1977), the droughted sward can be regarded as an Ordinary Dry Grassland forming on a slightly calcareous substrate. It is rather similar to one grassland type on The Frith.

The sward is composed of an open grassy matrix of Cock's-foot, Perennial Ryegrass, Yorkshire Fog and the calcicolous Yellow Oat-grass. These species tend to cover about half of the sample plot swards, usually with Dandelion, Yarrow, White Clover and Ribwort Plantain. Sward gaps are at least partially filled by Rough-stalked Feather-moss and the annual Soft Brome. There is an extensive list of associate species, and average species-richness was recorded as 26.4 species amongst the plots (ranging from 21-34 species). Amongst the more favourable associates are acid tolerant species, including Common Bent, Common Ragwort and Cat's-ear. These are matched by mild calcicoles such as Lesser Trefoil, Smaller Cat's-tail, Ladies Bedstraw and Common Bird's-foot Trefoil.

Notwithstanding, the fertile topsoil continues to support subdued populations of Creeping Thistle and Common Nettle, and ruderals of fertile ground like White Campion and Long-headed Poppy.

This sward is aligned with the ***Trisetum flavescens*** **sub-community of** ***Lolio-Cynosuretum cristati*** **grassland (MG6c),** reflecting the calcareous character of this predominantly neutral grassland.

Ordinary Dry Grassland (MG6c *Lolio-Cynosuretum cristati*)

3.2.1.2 Ordinary Damp Grassland

As shown in Figure 3, this grassland type occupies a transition zone between the sandy terrace and peatland. Creeping Bent and Creeping Buttercup are abundant with Rough Meadow-grass, Yorkshire Fog and Dandelion. Creeping Thistle is very active in this stand and, even though the sward was tightly grazed, the thistle shoots remain very evident. Compared to the Ordinary Dry Grassland, this sward is relatively species-poor (15.4 species; range of 12-19 species).

In his review of British neutral grasslands, Page (1980) describes this type of damp grazed grassland as subject to periodic submersion in the winter. His *Lolio-Agrostetum stoloniferae* (sensu Page 1980) was subsumed within the NVC as part of the **MG11a *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland, *Lolium perenne* sub-community**, to which this stand is referred. It may be closely related to the ungrazed peatland fringe community (section 3.2.2.2) in its situation and floristic type.

Ordinary Damp Grassland (MG11a *Lolio-Agrostetum stoloniferae* (sensu Page 1980))

3.2.1.3 Ruderal vegetation

The peat spoil bank has revegetated and is periodically mown to give the appearance of a rough grassland. The abundance of Common Nettle and Creeping Thistle – typical of such situations – places the developing sward within the **OV25 *Urtica dioica-Cirsium arvense* community**, characteristic of disturbed areas of nutrient-rich soils.

Spoil bank vegetation (OV25 *Urtica dioica-Cirsium arvense* community)

3.2.2 Synopsis of peatland communities

The main body of vegetation at Parkers Piece has developed on peat derived from the formation of Thelnetham Fen. Although drained by the deepened river, slow drainage and the restoration excavation have created a suite of fenland communities across the central and eastern parts of the site.

A summary of the floristic characters of each peatland community 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.

As shown in Table 4, five herbaceous communities are recognised, four of which are confined to the main peatland, bounded by the fifth – a trampled and slightly rutted mown strip of fenny vegetation between the grazed areas and the riparian margin. All five vegetation types contain Creeping Bent, Rough Meadow-grass and Greater Pond-sedge. This group of species is tolerant of a wide spectrum of wetland situations at more fertile locations typical of south-east Britain.

The grazed vegetation within the fenced compartment broadly corresponds to the design specification for excavation. Each type supports populations of Common Reed, Water Mint, Purple Loosestrife and Blunt-flowered Rush. As a group of species these are most commonly found growing together in slightly calcareous reed-fen and wet meadows. The wettest stand supports often thick growth of Branched Bur-reed, which does not occur in the other fen types. These tend to be dominated either by rush species or Greater Pond-sedge. Hard and Jointed Rush thrive in calcareous substrates and are most frequent in the deeper and southern areas. Soft Rush, on the other hand, does not thrive in calcium-rich soil water and is more restricted to the western margin of the peat (where it can be abundant) and along the northern margins of the excavated peat area. This may suggest that rainwater plays a more significant role in the peat chemistry of these areas.

Greater Pond-sedge stands are most characteristic of circumneutral soil waters and have no affinity to calcareous conditions (Rodwell 1995, p. 157), where Lesser Pond-sedge tends to be prevalent.

The most favourable conditions for low-growing wet-fen specialists seems to be either side of the fen pool. Here, a scatter of Marsh Pennywort, Brookweed and the mosses Pointed Spear-moss and Marsh Bryum are present.

Table 4. Synopsis of the peatland communities

NVC code	M22a	M22d	S14c	S6	OV28a
Agrostis stolonifera	V	V	V	V	V
Poa trivialis	IV	III	II	V	V
Carex riparia	II	IV	IV	V	V
Phragmites australis	III	III	V	V	
Mentha aquatica	V	V	IV	V	
Lythrum salicaria	V	V	III	V	
Juncus subnodulosus	V	IV	III	II	
Salix cinerea sapling	IV	II	III	IV	
Phalaris arundinacea	III	II	V		IV
Juncus inflexus	V	V		V	
Juncus articulatus	V	II		II	
Carex acutiformis	II	III		II	
Ranunculus repens	V	II			V
Iris pseudacorus	II		II	IV	
Plantago major	II				III
Galium palustre	III			II	
Hydrocotyle vulgaris	III				
Salix alba sapling	III				
Calliergonella cuspidatum	III				
Bryum pseudotriquetrum	II				
Angelica sylvestris	II				
Brachythecium rutabulum	III	IV			
Deschampsia cespitosa	II	II			
Juncus effusus	III	III	IV		
Galium uliginosum		IV			
Thalictrum flavum		IV			
Eupatorium cannabinum		III			
Eurhynchium speciosum		II			
Potentilla anserina		II			
Hypericum tetrapterum		II			
Vicia cracca		II			
Sparganium erectum			V		
Persicaria maculosa			V	V	IV
Rumex sanguineus				IV	
Salix fragilis sapling				IV	
Cirsium arvense					V
Rumex conglomeratus					V
Holcus lanatus					IV
Lolium perenne					III
Elytrigia repens					II
Trifolium repens					II
Glechoma hederacea					II
Taraxacum agg.					II
Chenopodium album					II
Rumex obtusifolius					II
Cirsium palustre					II

3.2.2.1 Main Peatland

The middle of the peatland area, extending from the western fringe through the fen pool and to a diffuse boundary with the stand dominated by Greater Pond-sedge, is a belt of typical fen-meadow. Blunt-flowered and Hard Rush tend to dominate, with Soft Rush sometimes appearing in quantity on the western and northern margins of the stand. The fen herbs are typically represented by Water Mint and Purple Loosestrife, sometimes accompanied by Lesser Pond Sedge and Common Marsh-bedstraw. This stand also supports the group of low-growing wet-fen specialists listed above.

The stand continues to support a group of rush-pasture species, most commonly Creeping Buttercup and Rough Meadow-grass, which, with thinly scattered Common Reed and Reed Canary-grass, are likely to be remnants of the early colonizing species following excavation of the degraded surface peat.

It has also been of some concern to LOHP that this stand, with that dominated by Greater Pond-sedge, has been most favourable for colonizing willows, particularly Grey Willow. This is also noted by Rodwell (1991, p. 235).

This vegetation type can readily be assigned to a rather immature version of the **Typical sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow (M22a)**. The species-richness recorded in the plots varies from 12-18 species (average 16.0 species). This is comparable to many other sites where this type of fen-meadow occurs but is much less species-rich than the best examples, which tend to support many more fen specialists.

Marsh Pennywort growing in M22a *Juncus-Cirsium* fen-meadow

Around the fringes of the Typical sub-community, on a seemingly less soft substrate, is a second form of fen-meadow. Here, Hard Rush and Water Mint are often dominant, with Hemp Agrimony and Common Meadow-rue sometime prevalent. Here the aforementioned wet-fen specialists are absent and rush-pasture species such as the mosses Rough-stalked Feather-moss and Showy Feather-moss occur.

The two stands – north and south of the Typical sub-community, are a rather weakly developed variant of the ***Iris* sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow (M22d)**. This type of fen-meadow is usually best developed in swampy conditions subject to periodic waterlogging. At Parkers Piece, its presence in areas of shallow or no excavation may be a response to compaction created by the passage of agricultural machinery over degrading peat.

With an average recorded species-richness of 16.6 species in the sample plots (range 13-20 species) this type of fen-meadow is of similar species diversity to the Typical sub-community but extends the range of fen species present within the grazed part of Parkers Piece.

Blunt-flowered Rush with Water Mint, growing in M22d *Juncus-Cirsium* fen-meadow

As shown in Figure 3, a deeper excavated area in the eastern part of Parkers Piece supports a distinctly different stand of swampier vegetation, dominated by Branched Bur-reed. Stands of this species are thought to occur only occasionally on peat (Rodwell 1995, p. 189) and the eponymous species is known to be sensitive to heavy grazing by stock to which it is palatable (Cook 1961, in Rodwell 1995, p189).

Common Reed and Reed Canary-grass overtop the bur-reed but have developed into a canopy. The ground is sometimes thickly mantled by plant litter, but sprawls of Creeping Bent with clusters of the tussocks of Soft Rush and Greater Pond-sedge provide supplementary ground cover.

With recorded species varying from 8-15 species per plot (average 10.8 species) and in the absence of aquatic species, the stand supports species found in both of the two drier sub-communities for this type of swamp, with only a slightly stronger affinity for the ***Mentha aquatica* sub-community of the *Sparganietum erecti* Roll 1938 (S14c)**. This vegetation tends to be winter-flooded and exposed during the summer, though the capillary fringe within the peat substrate is likely to provide a source of water except during low-flow conditions in the nearby river channel.

The remaining vegetation type in the main area of peatland is the stand dominated by Greater Pond-sedge. Here, Hard Rush and Water Mint are frequent and occur throughout, typically with Flag Iris and several species found throughout the other communities of the main peatland. As shown in Appendix 3 (Plots 47 and 53), the stand grades into the adjacent fen-meadow vegetation without a clear boundary. In fact, the stand has the appearance of an area of fen-meadow eclipsed by the sedge, with the floristics of the vegetation otherwise quite similar to the neighbouring stand of the *Iris* sub-community (M22d). In this, there are parallels with the findings of a recent survey of Broadland fen vegetation (ELP 2010), where additional pond-sedge communities were provisionally included within the framework provided by the NVC.

Placed within the existing NVC framework, the Greater Pond-sedge stand can be subsumed within the **S6 *Caricetum ripariae* Soó 1928**. As indicated by Rodwell (1995, p. 157), however, the sedge can also

be a locally abundant constituent of other kinds of fen and may, for example, be a remnant of the wet woodland that was shown in the Land Utilisation Survey 1933-1949 (see section 3.1).

Pond-sedge swamp (eastern side) S6 *Caricetum ripariae* Soó 1928

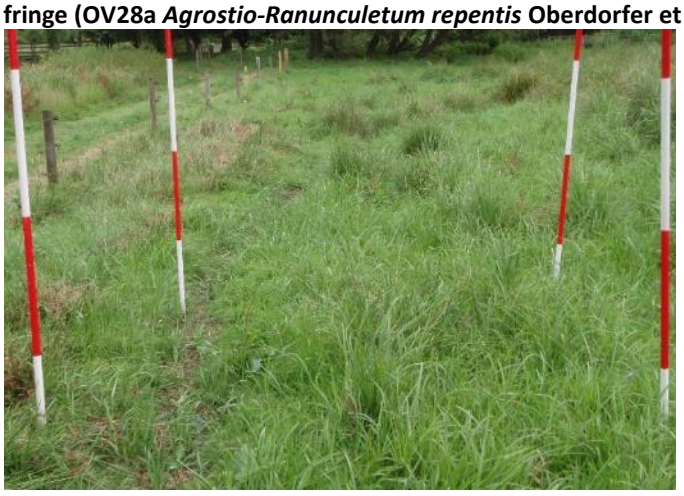
3.2.2.2 Peatland fringe

This thin stand occurs between the main peatland and the river bank. It occupies the strip of peat most likely to have been damaged by drainage to the river and form either the original land surface or - if river spoil has been added in the past – a slightly elevated platform.

As shown in the accompanying photograph, the sward is cut and slightly rutted. The sward overlaps in species composition with the Ordinary Damp Grassland (section 3.1.2.2) but is a typical community fringing peatland. The proximity to fen meadow and pond-sedge stands has led to some encroachment, particularly by the pond-sedge.

The vegetation is dominated by Creeping Bent with Creeping Buttercup, Creeping Thistle and Greater Pond-sedge all prominent. Soft Rush, Reed Canary-grass and Common Reed are each occasional but readily visible, with Fat-hen and dock seedlings largely restricted to the ruts, where Creeping Bent and Floating Sweet-grass sprawl.

Peatland fringe (OV28a *Agrostio-Ranunculetum repentis* Oberdorfer et al. 1967)



The stand can be readily assigned to the ***Polygonum hydropiper-Rorippa sylvestris*** **sub-community of the *Agrostio-Ranunculetum repentis* Oberdorfer et al. 1967 (OV28a).** This is typically vegetation of seasonally inundated areas, usually on damp silts and clays rather than peats. Here, it is assumed that the poorly draining peat has a capillary fringe retaining the water from high river levels, rainfall and occasional flooding through periods in the growing season. As unexcavated peat, it is likely that the peat is compacted through vehicle movements.

3.2.3 Riparian margin

The riparian margin is cut into a sandy substrate at the western end, and predominantly peat through the central and eastern sections, though pockets of sand were noted intermixed with peat in the central section. The only constant species recorded from the 13 sample plots was Common Nettle, which was often dominant. Common Reed, False Oat-grass and Greater Pond Sedge were also dominant species in limited sections. With the exception of the pond-sedge bed, sprawls of Ground-ivy were also constant, often carpeting the frequently heavily shaded ground surface beneath these species.

The most common type of vegetation is dominated by nettle with few other species attaining more than occasional cover in the sample plots. This is the ***Arrhenatherum elatius-Rubus fruticosus*** **(False Oat-grass and Bramble) sub-community of the *Urtica dioica-Galium aparine* tall ruderal community (OV24b)**.

Where False Oat-grass is dominant over Nettle, Creeping Thistle is also frequent and is joined by a scatter of rush-pasture individuals. These stands are assigned to the ***Urtica dioica*** **sub-community of the *Arrhenatheretum elatioris* Br.-Bl. 1919 (MG1b)**.

In rather moister situations, and where Common Reed is or has been an emergent in the river channel, it can spread up the bank to form a densely shading stand of the ***Phragmites australis-Urtica dioica*** **tall-herb fen, *Filipendula ulmaria* sub-community (S26a)**. Although Meadowsweet was not recorded from the plots, Great Willowherb and Reed Canary-grass are present.

Collectively, these three grade into one another and are presented as variants of the typical vegetation of the riparian margin in Appendix 4.

Riparian margin - MG1b *Arrhenatheretum elatioris* grassland

Riparian margin - S26a *Phragmites-Urtica* reedbed

One final type of vegetation in this situation is a short section of the river bank dominated by a dry form of **S6 *Caricetum ripariae* Soó 1928** (see section 3.2.2.1). Greater Pond-sedge is the overwhelming dominant with few other associates, including occasional Common Nettle, Reed Canary-grass and Common Couch.

3.2.4 Pond vegetation

When recorded for the Vegetation Monitoring Programme in 2009, the excavated fen pool was open water, with a little Jointed Rush and scattered stoneworts. In this survey, over three-quarters of the waterbody was dominated by a simple reedswamp with abundant Common Reed and widely scattered Bulrush. This is the ***Phragmites australis* sub-community of the *Phragmitetum australis* (Gams 1927) Schmale 1939 (S4a)**. Amongst the dense reed, are scattered clumps of Ivy-leaved Duckweed beneath a broken surface layer of Common Duckweed. Occasional Small Pondweed is also present, typically as short strands suspended in the water column. This aquatic vegetation is the **A2b *Lemnetum minoris* Soó 1947, *Lemna trisulca* sub-community**. It is an assemblage of species characteristic of permanent clear waters (Rodwell 1995, p. 31).

The western side of the fen pool lacks the reed swamp which largely gives way to a carpet of Blunt-flowered Rush rhizomes. Near the margin of the pond, the rush is associated with Jointed and Hard Rush and a suite of species also found in neighbouring fen-meadow vegetation, including Marsh Pennywort and Brookweed. This small stand abruptly terminates at the boundary of the saturated pool margin soils and is referred at a general level to undetermined **M22 *Juncus subnodulosus-Cirsium palustre* fen-meadow**.

Where neither reed or rush rhizomes have colonised the remaining open water, swathes of stonewort species carpet the shallowing water. Two species were recorded: Bristly and the smaller Common Stonewort. Stewart (2010) has also recorded Opposite Stonewort from the fen pool, but this species was not distinguished in this survey from the similar Common Stonewort (sensu John et al. 2002). Stoneworts are not assigned to a named community within the NVC[6] (Rodwell 1995), though a later publication (Rodwell et al. 2000) introduced the phytosociological framework employed in the Netherlands (Schaminee et al. 1995) and elsewhere.

[6] In Rodwell (1995) they are treated as associates within reedswamp, reed-fen and aquatic communities.

Blunt-flowered Rush stand (M22 *Juncus-Cirsium* fen-meadow)

Open water with stonewort meadow

3.2.5 Sallow scrub

The remaining scrub - partly cleared in advance of peat excavation – forms a thin fringe along the southern edge of the peatland at Parkers Piece. The main stand consists of Grey Willow, with small groups of White Willow – mainly at the eastern end - and several Crack Willows along the southern boundary of the site. The ground and field layer are on firm peat with occasional shallow hollows and is typically covered in a mantle of Rough Meadow Grass or pond-sedges. Occasional Tufted Sedge is present with a scatter of fen herbs, including Hemp Agrimony.

The vegetation is readily assigned to the ***Alnus glutinosa-Filipendula ulmaria*** **sub-community of the** ***Salix cinerea-Betula pubescens-Phragmites australis*** **woodland (W2a)** as a relatively dry form of sallow scrub.

Sallow scrub

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 5 (IEEM, 2006).

Table 5. Levels of Value of Ecological Resource

Level of Value	Examples
International	Internationally designated or proposed sites such as Ramsar Sites, Special Protected 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 5, the ecological value of the habitats in the surveyed area is indicated in Table 6.

The primary habitat of interest is the immature fen-meadow stands, surrounding and including the fen pool. The list of fen species – including the smaller group of wet-fen specialists – compares favourably with those of many other sites in East Anglia. As such, the stands are acquiring a suite of species similar to the general fenland vegetation of the headwater valley fens of the Special Area of Conservation. In so doing, the restoration programme at Parkers Piece has made considerable

progress towards the Target Habitat Types proposed by ELP (2008). By supporting the long-established fenland communities recognised as the conservation features of Blo'Norton and Thelnetham Fens SSSI, the current 'value of this ecological resource' is assessed as 'Moderate Local'. It is anticipated that this status would be raised in time, if conditions for the establishment of further wet-fen specialists - and the continued definition of the target plant communities - is sustained.

Table 6. Level of ecological value (geographic scale of importance

	Ecological feature
Moderate Local	M22a *Juncus subnodulosus-Cirsium palustre* fen-meadow, Typical sub-community M22d *Juncus subnodulosus-Cirsium palustre* fen-meadow, *Iris pseudacorus* sub-community S14c *Sparganietum erecti Roll 1938, Mentha aquatica* sub-community Stonewort meadow
Low Local	MG6c *Salix cinerea-Betula pubescens-Phragmites australis* woodland, *Alnus glutinosa-Filipendula ulmaria* sub-community S6 *Caricetum ripariae* Soó 1928 W2a *Salix cinerea-Betula pubescens-Phragmites australis* woodland, *Alnus glutinosa-Filipendula ulmaria* sub-community
Negligible	MG1b *Arrhenatheretum elatioris* Br.-Bl. 1919, *Urtica dioica* sub-community MG11a *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland, *Lolium perenne* sub-community [Lolio-Agrostetum stoloniferae (sensu Page 1980)] S4a *Phragmitetum australis* (Gams 1927) Schmale 1939, *Phragmites australis* sub-community S26a *Phragmites australis-Urtica dioica* tall-herb fen, *Filipendula ulmaria* sub-community OV24b *Urtica dioica-Galium aparine* community, *Arrhenatherum elatius-Rubus fruticosus* sub-community OV28a *Agrostio-Ranunculetum repentis* Oberdorfer et al. 1967, *Polygonum hydropiper-Rorippa sylvestris* sub-community

It should be noted that 'Lowland Fens' is listed under the Section 41 'habitats of principal importance (priority habitats)' requirement published by Natural England in August 2010. 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.

4.2 Notable plant species

Two notable plant species were recorded during the survey, Tufted Sedge *Carex elata* (from the Sallow Scrub) and Small Pondweed *Potamogeton berchtoldii* (from the Fen pool). These species are listed on the Rare Plant Register for Suffolk (Suffolk Biological Records Centre 2005). As such, they are classified as 'Locally Scarce' or 'Suffolk Rarities'.

Tufted Sedge
The Register notes "about 30 records from fens and marshes mainly in Breckland and the Waveney/Ouse valley". Nationally, it is classified as "Near Threatened" due to a reduction in its 'extent of occurrence' in England.

Tufted Sedge *Carex elata* All.

Status[1] - none	[1] Stewart et al. (1994)
GB Red List[2] - Threat Status: Least Concern	[2] Cheffings et al. (2005)
England Red List[3] - Threat Status: Near Threatened	[3] Stroh et al. (2014)

Small Pondweed

The Register notes "40 records, mainly from Broadland and the coastal marshes plus a few from inland clay sites and the fens". Local floras (Beckett & Bull 1999; Sanford & Fisk 2010) show no records from the Waveney/Little Ouse headwaters, and this sighting has been submitted to the Suffolk Biological Information Service.

Small Pondweed *Potamogeton berchtoldii* Fieber

Status[1] - none	[1] Stewart et al. (1994)
GB Red List[2] - Threat Status: Least Concern	[2] Cheffings et al. (2005)
England Red List[3] - Threat Status: Least Concern	[3] Stroh et al. (2014)

The presence of two confirmed stonewort species in the pond is of local interest – they are a feature of calcareous pools amongst the headwater fens. Both species were refound having been recorded from this location by Stewart (2010). Stewart recorded a third species, Opposite Stonewort, which was considered to be Nationally Scarce (Stewart & Church 1992) but has subsequently been shown to be more widespread than previously thought (Stewart 2004) and locally frequent in the Thames catchment and East Anglia.

5. MANAGEMENT CONSIDERATIONS

5.1 As part of the landscape unit

The eastern half of Parkers Piece was originally designated as part of the Blo'Norton and Thelnetham Fens SSSI to ensure that it could not be managed in a way that would threaten the hydrology of Thelnetham Fen. It's location in relation to Middle Fen also acts to buffer changes in river levels from affecting this very sensitive groundwater-dependent wetland (Krause et al. 2007).

Parkers Piece was of strategic importance with Bleyswycks Bank when these sites were purchased by LOHP in 2007: subsequent land acquisition has secured further parts of the peatland and several smaller blocks of the terrace/upland margin fronting this part of Thelnetham Fen. LOHP is now able to manage these peatland fields as part of a larger landscape unit, in collaboration with Suffolk Wildlife Trust.

The restoration of Parkers Piece has been a vital stage in the recovery of this part of Thelnetham Fen. Nevertheless, vegetation development is likely to remain sub-optimal when compared with relatively pristine parts of the fenland that have not been drained and cultivated. This is partly due to changes in the peat body itself but is also a consequence of the modified hydrological pathways affected locally by the over-deepened river channel.

5.2 At the site-scale

The framework for site-scale management is set out by LOHP (2012) and is largely derived from the Natural England Agreement.

Management of the dry grassland at the west of the site has produced a distinctive short sward in an area prone to summer droughting. The extensive list of plants recorded in the sample plots includes several very desirable species, such as Yellow Oat-grass, Ladies Bedstraw and Common Bird's-foot Trefoil, albeit in low numbers. The potential role of Creeping Thistle and Common Nettle has been effectively subdued, and the sward appears to be in good condition, given its previous history. With sustained, gentle grazing pressure, and the avoidance of ground disturbance, it is anticipated that the composition of the sward will slowly trend towards the slightly calcareous areas on The Frith, and constitute another uncommon example of dry, slightly calcareous grassland along the Waveney/Little Ouse river corridor.

The list of species recorded from the main peatland communities and the fen pool in the present survey is a long one and contains many general denizens of circumneutral fen peatland. Notwithstanding, a palimpsest of ruderal and rush-pasture species is still present, and it is important to view this vegetation as immature and having developed on a substrate with a history of modification. Drainage and cultivation are likely to have led to consolidation of the peat and changes in its chemical composition, and some areas may be wetter through compaction than might be expected in more natural situations.

The swards have vegetated with significant contributions from several calcicolous rushes and several taller fen plants, such as Water Mint and Purple Loosestrife. However, there are fewer and typically much more localised contributions from low-growing fen species, particularly those usually growing in intimate contact with summer-wet peat. The understorey is largely that of a somewhat ruderal rush-pasture.

There is also much evidence for under-grazing and over-trampling of the swards (as shown in the accompanying photographs). This is, unfortunately, a common problem where successful colonisation by strong-growing tussock and stand-forming species creates coalescing patches that can rapidly dominate the sward. When conditions are very wet into the growing season, it can be very difficult to manage this vigorous growth before it is tall and less palatable, when it tends to be trampled down. Once this has happened, light levels fall markedly, and seedlings and low-growing species are typically lost. This is often exacerbated by the build-up of plant litter, as this can be difficult to remove.

M22a *Juncus-Cirsium* fen-meadow, Typical sub-community. Here, c.90 per cent of rush shoots have collapsed; many shoots are dead and will contribute to thick plant litter.

M22d *Juncus-Cirsium* fen-meadow, *Iris* sub-community. A similar occurrence showing very low light levels within the sward; only Water Mint has been able to penetrate this, and many specimens were etiolated and drawn up.

Many fen meadows are prone to losing species-richness as the ground flora (low-growing plants and most bryophytes) appears for a few seasons following a major disturbance and then is effectively 'shut-out' of large areas of the stand by tall and thickly-growing species.

Within the management framework described in LOHP (2012), it may be difficult to 'break-out' of this cycle. In response to this trend, LOHP are considering the adoption of year-round grazing at a lower stocking rate. This may require supplementary interventions in the early stages of this innovation to 'force' initially favourable conditions but is likely to sustain a more open and patchy rush or sedge canopy.

Two supplementary measures are suggested:

Dry season mowing and removal. This measure is viewed – on the evidence of this survey – as a necessary measure additional to the grazing prescription. It can be applied to blocks of the fen on firmer ground during dry periods, as they occur. The intention is to re-condition parts of the fen[7] to make the recovering vegetation more palatable and provide an opportunity for seedling development. Where once burning would have been used in this management role, the target would be to cut back tussock and sedge shoots and remove much of the arisings and plant litter to encourage re-growth.

***Ad hoc* open patch creation**. This is viewed as an opportunity to enhance and sustain especially favourable patches of fen on an *ad hoc* basis. It is likely to be most necessary at the end of wet years, when strong growth has led to lodging of the taller vegetation. At Parkers Piece, the 'choice' area observed in this survey was located on the west side of the fen pool, sampled by Plots 24, 25 and 27. Here, the small group of 'wet-fen' specialists were scattered in the well-lit gaps between rush tussocks, amongst a low, grazed sward of Creeping Bent. It is suggested that an informal target for sward structure – at a finer scale than the Agreement specifications - should be the creation and retention of very open patches in the summer-wet areas of fen. Gaps between rush tussocks should be enlarged and plant litter removed to allow light to reach the ground surface.

A further issue recognised by LOHP is the persistent colonisation by willow species. These were recorded as seedlings in the 2009 monitoring plots, and one or more cohorts has developed into short saplings, often showing signs of wounding and regrowth. These are unlikely to be grazed out at current stocking rates, though hand-lopping or mowing should produce more palatable young shoots.

Successful colonization is in itself evidence that the ground surface where this occurs seldom dries out in most years, and LOHP may choose to view the ingress of these species as a positive indicator that fenland conditions are being sustained[8]. However routine interventions may be required to control the growth of woody plants until much of the sward is in favourable grazing condition.

[7] It is envisaged that this operation would take place only in appropriate years and tackle 10-25 per cent of the fen area.

[8] Although not as demanding as Common Alder, these species are nonetheless fairly precise in their water requirements for germination and establishment.

6. VEGETATION MONITORING PROGRAMME – FIELDWORK REPORT

Fieldwork to re-establish the permanent plots and undertake the second full survey of the permanent vegetation plots was undertaken on 25th and 31st July 2017.

6.1 Re-locating the Monitoring Plots

The permanent plots were originally established following excavation of the peat surface in 2009; at that time, the ground surface was largely exposed, and the terrestrial plots recorded a scatter of fen, rush-pasture and ruderal colonists. The fen pool was essentially a body of open water, with scattered fen colonists and the development of occasional strands of stonewort.

The four monitoring plots were re-located in the peatland part of Parkers Piece 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 codes for each plot are repeated from the initial survey, as follows:

P-01 Shallow scrape (20 cm). This plot is at the western end of the sequence and is situated on a flat surface of scraped peat set at a level 20 cm below the former land surface.

P-02 Fen pool. This plot extends from the margin into the deeper centre of the pond, excavated to 100 cm below the original peat surface.

P-03 Peat scrape (40 cm) 1. Along with P-04, this plot is located in a deeper scrape, set at a depth of 40 cm below ground level.

P-04 Peat scrape (40 cm) 2. As with P-03, this plot lies in the deeper scrape, and forms the eastern end of the sequence.

The locations of the permanent marker posts are given in Figure 4 and are visible as fence posts or as free-standing posts, each topped by white paint. The precise location of the monitoring plot is re-established by stretching a 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

Table 7. Details of permanent monitoring plot locations

VEGETATION TYPE 2017	PLOT CODE	MARKER POSTS	Marker Post Location	EASTING	NORTHING	Plot location
Rush-dominated vegetation	**P-01**	**P-01 N**	Fence post	601320	279020	NE plot corner is 25 m along the line between marker posts, south of the N post.
		P-01 S	NE corner of fenced exclosure	601272	278954	
Reed-dominated swamp with aquatics	**P-02**	**P-02 N**	Fence post	601357	278991	SE plot corner is 5 m along the line between marker posts, north of the S post.
		P-02 S	N post of piezometer cage	601314	278959	
Rush-dominated vegetation	**P-03**	**P-03 N**	Fence post	601396	278981	NE plot corner is 20 m along the line between marker posts, south of the N post.
		P-03 S	Free-standing	601390	278940	
Sedge-dominated vegetation	**P-04**	**P-04 N**	Fence post	601461	278970	NE plot corner is 35 m along the line between marker posts, south of the N post.
		P-04 S	Free-standing	601453	278919	

6.2 Monitoring Plot Report – P-01 Shallow scrape (20 cm) 2017

Plot code	P-01 Shallow scrape (20 cm)
Treatment type	**Summary of preceding Monitoring Plot Report**
Rush-dominated	• Ground conditions: Small pools of surface water and algal patches over granular earthy peat with some marl debris. Almost entirely bare peat ground, with patches of young moss development and almost no plant litter. • Vegetation: Thinly scattered ruderal vegetation with seedling fen and rush-pasture colonists, showing signs of light (rabbit) grazing.

Vegetation structure

• This plot is composed of dense rush tussocks, widely lodged at the time of survey, with stems wedging into the gaps between tussocks. Trampling is very evident, covering 40-60 % of the plot.
• Understorey is largely masked by rush growth, though these gaps support a mixed fen-meadow and rush-pasture flora.
• Plant litter is substantial, masking 30-40 % of plot; bare ground absent.

Floristics

• Fenland and rush-pasture species dominant. Mixed rush species are ubiquitous, with abundant calcicolous Blunt-flowered and Hard Rush. Tall Water Mint and Purple Loosestrife occur throughout, with rare Common Meadow-rue - confirming that taller species favoured by growing conditions.
• Occasional Marsh Pennywort and low-growing rush-pasture species indicate the presence of a subordinate suite of light-demanding species, largely masked by tussocks.
• A small group of ruderals are present - mostly associated with rush-pasture conditions - with only occasional Creeping Thistle and Common Nettle.

Summary of records and events

• Not available at the time of reporting.
• Field evidence suggests that the plot vegetation is largely free-growing early in the season, with stock making little impact on growth; trampling and lodging are, however, negatively impacting the lower-growing species through shading by lodged rushes and the accumulation of plant litter.

Relation to past and target conditions

• Development of the vegetation since 2009 has produced a rush-dominated sward, and partial coalescence of the tussocks. There are several calcicolous fen species - notably Blunt-flowered Rush and Marsh Pennywort. The calcicolous fen bryophyte Marsh Bryum is recorded from similar vegetation beyond the eastern side of the plot.
• Negative indicator species are few, though scrub colonists are present as saplings, and occasional nettle and creeping thistle occur in the plot.
• The establishing vegetation lies between fen-meadow and rush-pasture in composition and is closer to the former where the structure is more open and on its eastern side. The long-term target community would be the M22 *Juncus subnodulosus-Cirsium palustre* fen-meadow, which is developing in a small stand close to the deeper excavation on the western side of the fen pool.

Plot code P-01	Photographic Record 2017

Monitoring Plot Field Form – Vegetation structural characters

Monitoring Plot	**P-01 Shallow scrape (20 cm)**
Recorder	**Jonny Stone**
Survey Date	**31st July 2017**

Character of the ground surface

● The ground surface was fairly soft and composed of typically wet black, earthy structureless peat.
● The ground surface was planar - with an uneven surface - likely to slope very slightly to the southeast.

Soil wetness

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

	ATTRIBUTE	SAMPLE from each plot quarter 1	2	3	4	AVERAGE
Layer height	Standing water (cm)	0	0	0	0	0 cm
	Plant litter (cm)	6	8	5	5	6 cm
	Woody seedlings (cm)	0	5	5	4	3.5 cm
	Large sedges / rushes (cm)	70	70	60	60	65 cm
	Reed-like grasses (cm)	0	45	50	0	23.8 cm
	Woody saplings (cm)	20	25	25	0	17.5 cm
Cover value	Standing water (%)	0	0	0	0	0 %
	Trampling (%)	50	40	60	40	47.5 %
	Dunging (%)	+	+	+	+	0 %
	Bare ground (%)	0	0	0	0	0 %
	Plant litter (%)	40	30	30	40	35 %
	Bryophytes (%)	0	0	0	0	0 %
	Woody seedlings (%)	0	1	1	1	0.8 %
	Large sedges / rushes (%)	100	100	100	100	100 %
	Reed-like grasses (%)	0	+	+	0	0 %
	Woody saplings (%)	2	2	2	0	1.5 %

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

Monitoring Plot	**P-01 Shallow scrape (20 cm)**
Recorder	**Jonny Stone**
Survey Date	**31st July 2017**

The 2017 data is collated from the 20 1x1 m sub-samples given in Appendix 6.

Species	**2009** [ex 20]	**2017** [ex 20]
Fenland indicators		
Mentha aquatica	5	20
Lythrum salicaria		18
Juncus subnodulosus		15
Juncus articulatus	8	10
Hydrocotyle vulgaris		6
Phalaris arundinacea		4
Eupatorium cannabinum	7	2
Carex riparia		2
Myosoton aquaticum	1	1
Epilobium palustre		1
Thalictrum flavum		1
Rush pasture		
Juncus inflexus	15	15
Juncus effusus	3	13
Poa trivialis	4	10
Agrostis stolonifera		9
Ranunculus repens	3	7
Potentilla anserina		6
Carex hirta		5
Cirsium palustre	2	2
Deschampsia cespitosa		2
Cardamine pratensis		1
Holcus lanatus	4	
Wet disturbed ground		
Juncus bufonius agg.	2	1
Rorippa sylvestris		1
Negative indicators - Ruderals		
Plantago major	9	8
Persicaria maculosa		4
Cirsium arvense	6	3
Urtica dioica	1	3
Capsella bursa-pastoris		1
Chenopodium album		1
Bryum sp.	19	
Alopecurus myosuroides	12	
Polygonum aviculare	9	
Barbula unguiculata	5	
Anagallis arvensis	3	
Leptobryum pyriforme	3	
Stellaria media	6	
Cirsium vulgare	3	
Conium maculatum	3	
Carex sylvatica	2	
Papaver sp.	1	

Negative indicators – woody plants		
Salix cinerea seedling	1	6
Salix alba sapling		4
Salix fragilis sapling		3
Salix cinerea sapling		3

Floristic character	**2009**	**2017**
Fenland indicators	4	11
Rush pasture	6	10
Wet disturbed ground	1	2
Negative indicators - Ruderals	14	6
Negative indicators – Woody plants	1	4
No. of species	26	33

6.3 Monitoring Plot Report – P-02 Fen pool 2017

Plot code	P-02 Fen pool
Treatment type	**Summary of preceding Monitoring Plot Report**
Fen pool	• Ground conditions: marl with peat, submerged between 30-70 cm water. • Vegetation: open water with sparse regrowth of Jointed Rush (submerged) and occasional patches of stonewort.

Vegetation structure

• The fen pool plot is almost entirely located over a thick stand of reed swamp dominated by Common Reed with scattered Bulrush. Pond sedge intrudes across the shallow pond margin. A litter layer has built up over the base of the pond.

Floristics

• Although the reed-swamp forms a dense canopy over the water surface, thin Ivy-leaved Duckweed masses occur throughout, usually beneath a scattered surface layer of Common Duckweed. Occasional strands of Small Pondweed are also present.
• The only negative indicator is Grey Willow, which has achieved sapling stature, though only a single specimen was recorded from within the plot.

Summary of records and events

• Not available at the time of reporting.

• Field evidence indicates that the pond as a whole has retained an area of open water, where populations of stonewort species abound. The pond banks are grazed and, as shown in the accompanying photograph, the southern margin of the plot is also subject to stock grazing. The reed-swamp does not appear to be managed.

Relation to past and target conditions

• Strong colonisation by reed and bulrush has changed the appearance of the plot dramatically since 2009, though the presence of stonewort species and Small Pondweed in the pond confirm that conditions over the whole pond are favourable for these notable species.
• With a sufficient area of incident sunlight - achieved by cutting patches of the reed at the water surface when the level is low - the character of the fen pool can be retained.

Plot code P-02	Photographic Record 2017

Monitoring Plot Field Form – Vegetation structural characters

Monitoring Plot	**P-02 Fen pool**
Recorder	**Jonny Stone**
Survey Date	**31st July 2017**

Character of the ground surface

• In 2009, it was reported that, although a quantity of marl had been excavated and distributed in the surroundings, it remained as at least a partial 'liner' at the base of pond.

Soil wetness

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

	ATTRIBUTE	SAMPLE from each plot quarter 1	2	3	4	AVERAGE
Layer height	Standing water (cm)	38	38	60	60	49 cm
	Plant litter (cm)	8	7	6	9	7.5 cm
	Woody seedlings (cm)	0	0	0	0	0 cm
	Large sedges / rushes (cm)	130	140	0	0	67.5 cm
	Reed-like grasses (cm)	130	130	220	230	177.5 cm
	Woody saplings (cm)	56	0	0	0	14 cm
Cover value	Standing water (%)	100	100	100	100	100 %
	Trampling (%)	30	60	0	0	22.5 %
	Dunging (%)	0	0	0	0	0 %
	Bare ground (%)	0	0	0	0	0 %
	Plant litter (%)	100	100	100	100	100 %
	Bryophytes (%)	0	0	0	0	0 %
	Woody seedlings (%)	0	0	0	0	0 %
	Large sedges / rushes (%)	30	25	0	0	13.8 %
	Reed-like grasses (%)	30	70	100	100	75 %
	Woody saplings (%)	2	0	0	0	0.5 %

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

Monitoring Plot	**P-02 Fen pool**
Recorder	**Jonny Stone**
Survey Date	**31st July 2017**

The 2017 data is collated from the 20 1x1 m sub-samples given in Appendix 7.

Species	**2009** [ex 20]	**2017** [ex 20]
Fenland indicators		
Phragmites australis		20
Lemna trisulca		17
Lemna minor		16
Typha latifolia		15
Carex riparia		5
Potamogeton berchtoldii		2
Juncus articulatus	6	
Chara sp.	3	
Sparganium erectum	1	
Negative indicators - Woody plants		
Salix cinerea sapling		1

Floristic character	**2009**	**2017**
Fenland indicators	3	6
Negative indicators – Woody plants		1
No. of species	3	7

6.4 Monitoring Plot Report – P-03 Peat scrape (40 cm) 1 2017

Plot code	P-03 Peat scrape (40 cm) 1
Treatment type	**Summary of preceding Monitoring Plot Report**
Peat scrape (40 cm)	• Ground conditions: soft, marly surface with scattered shells and patches of semi-fibric peat. Largely exposed bare ground. • Vegetation: Very thin upper layer of Common Reed over scattered ruderal vegetation with many seedling fen and rush-pasture colonists, showing signs of light (rabbit) grazing.

Vegetation structure

• This is a stand of mixed rush species with scattered reed and pond sedge. Typical sward heights were recorded as c.100 cm for large rushes and sedges and c.170 cm for reed; this is high for fen-meadows.
• As shown in the accompanying photograph, the vegetation was widely lodged at the time of survey, with estimates for trampling ranging from 40-80 %. Standing plant litter was very evident, which is usually an indication of insufficient grazing during the growing season.
• It is also noted that low-growing species are absent, and this is very likely to be the result of rush dominance, with few gaps between tussocks and long periods of heavy shading.

Floristics

• Frequent Branched Bur-reed and Common Reed and occasional Flag Iris are indicators of wet conditions during the growing season.
• The common calcicoles Blunt-flowered and Hard Rush occur with the fen herbs Common Mint and Purple Loosestrife which, with scattered Common Meadow-rue, are all tall species drawn up into the canopy.
• Ground conditions have tended to favour the establishment of Grey Willow and Crack Willow saplings.

Summary of records and events

• Not available at the time of reporting.
• Field evidence suggests that the developing sward structure on wet ground has not favoured low-growing species, and that the stocking regime has tended to decrease light levels near the ground through lodging.
• The sinuous stems of the mint found trailing within the lodged rush tussocks are an indication that the rush tussocks are being periodically trampled during the growing season.

Relation to past and target conditions

• Since 2009, a thick reed-dominated sward has developed, including Blunt-flowered Rush, which is typical of calcareous fen. Associated species, such as Branched Bur-reed, confirm wet fen conditions and, in this, progress has been made in achieving target conditions.
• Notwithstanding, the impact of stock had not, at the time of survey, produced a diverse structure and concomitant variations in shading levels. This has meant that low-growing species, such as Marsh Pennywort and Pointed Spear-moss, are absent.

Plot code P-03	Photographic Record 2017

Monitoring Plot Field Form – Vegetation structural characters

Monitoring Plot	**P-03 Peat scrape (40 cm) 1**
Recorder	**Jonny Stone**
Survey Date	**25th July 2017**

Character of the ground surface

• In 2009, the ground surface was described as composed of a large proportion of humic marl with calcareous fragments. This was intermixed with a thin layer of black, grainy sapric peat containing scattered shells; areas with brown, semi-fibric peat were also evident in places.

Soil wetness

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

	ATTRIBUTE	SAMPLE from each plot quarter 1	2	3	4	AVERAGE
Layer height	Standing water (cm)	0	0	0	0	0 cm
	Plant litter (cm)	10	5	10	5	7.5 cm
	Woody seedlings (cm)	0	0	0	0	0 cm
	Large sedges / rushes (cm)	100	100	95	100	98.8 cm
	Reed-like grasses (cm)	170	160	180	170	170 cm
	Woody saplings (cm)	30	40	40	50	40 cm
Cover value	Standing water (%)	0	0	0	0	0 %
	Trampling (%)	40	50	80	60	57.5 %
	Dunging (%)	+	+	+	+	0 %
	Bare ground (%)	0	0	0	0	0 %
	Plant litter (%)	20	20	20	20	20 %
	Bryophytes (%)	0	0	0	0	0 %
	Woody seedlings (%)	0	0	0	0	0 %
	Large sedges / rushes (%)	95	100	80	100	93.8 %
	Reed-like grasses (%)	+	+	+	+	0 %
	Woody saplings (%)	+	+	+	2	0.5 %

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

Monitoring Plot	**P-03 Peat scrape (40 cm) 1**
Recorder	**Jonny Stone**
Survey Date	**25th July 2017**

This data is collated from the 20 1x1 m sub-samples given in Appendix 8.

Species	**2009** [ex 20]	**2017** [ex 20]
Fenland indicators		
Mentha aquatica	4	14
Phragmites australis	19	12
Juncus subnodulosus		12
Carex riparia		10
Sparganium erectum		9
Lythrum salicaria		9
Juncus articulatus	16	8
Iris pseudacorus		3
Thalictrum flavum		2
Eupatorium cannabinum	8	
Myosoton aquaticum	2	
Equisetum palustre	2	
Rush pasture		
Agrostis stolonifera		15
Juncus inflexus	12	13
Juncus effusus	2	10
Poa trivialis	4	4
Deschampsia cespitosa	16	4
Ranunculus repens	5	
Cirsium palustre	1	
Trifolium repens	1	
Wet disturbed ground		
Ranunculus sceleratus	3	
Barbarea vulgaris	2	
Negative indicators - Ruderals		
Persicaria maculosa		7
Plantago major	11	
Bryum sp.	6	
Polygonum aviculare	6	
Stellaria media	3	
Senecio jacobaea	3	
Sonchus oleraceus	2	
Urtica dioica	1	
Negative indicators - Woody plants		
Salix cinerea sapling		7
Salix fragilis sapling		4
Salix cinerea seedling	6	

Floristic character	2009	2017
Fenland indicators	6	9
Rush pasture	7	5
Wet disturbed ground	2	0
Negative indicators – Ruderals	7	1
Negative indicators – Woody plants	1	2
No. of species	23	17

6.5 Monitoring Plot Report – P-04 Peat scrape (40 cm) 2 2017

Plot code	P-04 Peat scrape (40 cm) 2
Treatment type	**Summary of preceding Monitoring Plot Report**
Peat scrape (40 cm)	• Ground conditions: soft, marly surface with scattered shells and patches of semi-fibric peat. High levels of bare ground, with very low levels of plant litter and only occasional bryophytes. • Vegetation: Very thin upper layer of Common Reed over scattered ruderal vegetation with many seedling fen and rush-pasture colonists, showing signs of light (rabbit) grazing.

Vegetation structure

• As shown in the accompanying photograph, plot P-04 is structurally dominated by pond sedge, with a rush understorey. The sedge canopy, at 120-130 cm, is typical for this species.
• Trampling is very evident, however, and this had led to lodging of some 30-60 % of the plot at the time of survey. Nonetheless gaps between sedge tufts and rush tussocks are sufficiently common for a few low-growing species to be favoured, including juvenile Water Mint and two rush-pasture bryophytes.
• The amount of plant litter is relatively less than within the rush-dominated plots, at 20-30 %.

Floristics

• Greater Pond-sedge is abundant in the plot, with lesser amounts of Hard Rush and Jointed Rush. Blunt-flowered Rush and Lesser Pond-sedge are present in small quantities. Water Mint is present in prolific amounts and is the main fen herb, occurring with scattered Purple Loosestrife. Rough-stalked Feather-moss is uncommonly frequent, sometimes associated with Showy Feather-moss.
• There is little scrub colonization of the plot and ruderals are almost absent.

Summary of records and events

• Not available at the time of reporting.

• Field evidence suggests that the plot is sampling a much larger stand dominated by Greater Pond-sedge, which extends over the deeper and shallow scraped areas at the eastern end of the Parkers Piece fen area.
• Vertical height of the sedge in full sun is prodigious and suggests that a supply of water is available throughout the growth period.
• Within the plot, however, the sedge is rarely dominant, and stock trampling may continue to keep part of the sward open.

Relation to past and target conditions

• The pond sedge and most other species have colonized since 2009 to produce a sward potentially trending towards fen-meadow. Common Reed has remained only an occasional associate of these species, and the plot lacks the 'wet fen' suite of species present in P-03.
• The vegetation is a fairly typical example of sedge swamp in its current composition, though progressive control of the sedge would shift the sward towards fen-meadow.

Plot code P-04	Photographic Record 2017

Monitoring Plot Field Form – Vegetation structural characters

Monitoring Plot	**P-04 Peat scrape (40 cm) 2**
Recorder	**Jonny Stone**
Survey Date	**25th July 2017**

Character of the ground surface

• In 2009, the ground surface was described as largely mantled by sometimes large lumps of humic marl, mixed with scattered lenses of black, grainy sapric peat containing scattered shells. Areas with brown, semi-fibric peat were also evident in places.

Soil wetness

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

	ATTRIBUTE	SAMPLE from each plot quarter 1	2	3	4	AVERAGE
Layer height	Standing water (cm)	0	0	0	0	0 cm
	Plant litter (cm)	8	12	9	15	11 cm
	Woody seedlings (cm)	0	0	10	0	2.5 cm
	Large sedges / rushes (cm)	120	130	120	130	125 cm
	Reed-like grasses (cm)	150	140	130	150	142.5 cm
	Woody saplings (cm)	0	0	60	90	37.5 cm
Cover value	Standing water (%)	0	0	0	0	0 %
	Trampling (%)	30	50	60	40	45 %
	Dunging (%)	2	1	2	1	1.5 %
	Bare ground (%)	0	0	0	0	0 %
	Plant litter (%)	30	20	30	20	25 %
	Bryophytes (%)	5	5	3	2	3.8 %
	Woody seedlings (%)	0	0	+	0	0 %
	Large sedges / rushes (%)	95	100	95	95	96.3 %
	Reed-like grasses (%)	+	+	+	+	0 %
	Woody saplings (%)	0	0	1	5	1.5 %

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

Monitoring Plot	**P-04 Peat scrape (40 cm) 2**
Recorder	**Jonny Stone**
Survey Date	**25th July 2017**

The 2017 data is collated from the 20 1x1 m sub-samples given in Appendix 8.

Species	**2009** [ex 20]	**2017** [ex 20]
Fenland indicators		
Mentha aquatica	5	20
Carex riparia		20
Lythrum salicaria		14
Juncus articulatus	14	11
Juncus subnodulosus		7
Phragmites australis	6	6
Carex acutiformis		6
Myosoton aquaticum		1
Galium uliginosum		1
Eupatorium cannabinum	6	
Equisetum palustre	1	
Phalaris arundinacea	1	
Angelica sylvestris	1	
Rush pasture species		
Juncus inflexus	6	20
Brachythecium rutabulum		16
Agrostis stolonifera		8
Eurhynchium speciosum		5
Poa trivialis		3
Deschampsia cespitosa	18	2
Juncus effusus	3	1
Potentilla anserina		1
Ranunculus repens	6	
Cirsium palustre	2	
Wet disturbed ground		
Juncus bufonius agg.	1	
Negative indicators - Ruderals		
Potentilla reptans		2
Plantago major	8	
Bryum sp.	5	
Leptobryum pyriforme	2	
Cirsium arvense	2	
Stellaria media	2	
Senecio jacobaea	2	
Negative indicators - Woody plants		
Salix cinerea seedling	3	1
Salix fragilis sapling		1
Salix cinerea sapling		1

Floristic character	2009	2017
Fenland indicators	7	9
Rush pasture	5	8
Wet disturbed ground	1	0
Negative indicators – Ruderals	6	1
Negative indicators – Woody plants	1	3
No. of species	20	21

6.6 Interpretation of the Monitoring Plot surveys

The four monitoring plots were established in 2009 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 6.2-6.5 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.

P-01 Shallow scrape (20 cm)
This plot is located in a level area of shallow peat excavation to the west of the Fen Pool. In 2009, disturbed marl was mixed into the soil surface, which was saturated with small pools of surface water. At this shallower level, it was anticipated that the plot would lie within a zone where either rush pasture or fen meadow would develop. The distinction between the two would be evident from the species of colonizing rush: Soft Rush with some Hard Rush for rush-pasture, with no or very little Blunt-flowered or Jointed Rush; fen-meadow would be composed of Blunt-flowered, Jointed and some Hard Rush but Soft Rush would be no more than occasional. For rush pasture, the ground flora would lack fen species and support ruderal denizens of rush pasture. In fen meadow, fen and potentially wet fen species would be present and ground conditions would be too wet for more than occasional ruderals.

The 2017 survey has recorded equal numbers of fenland and rush pasture species, with the balance of rush species and the number of fenland indicators confirming that the plot should be regarded as lying near the margin of an area of fen meadow. In Figure 3, it is placed within the Typical sub-community of *Juncus subnodulosus-Cirsium palustre* fen-meadow, and this should continue to be the target condition. The plot also samples an area of this stand where rush tussocks have not completely coalesced, and a number of wet-fen species are present, including Marsh Pennywort. One measure of favourable condition here would be the preservation of gaps between tussocks and the continued presence of wet-fen species.

Negative indicator species are few, though scrub colonists are present as saplings, and occasional nettle and creeping thistle occur in the plot. A second measure of favourable condition would be continuing to ensure that neither ruderals nor woody plants increase their cover.

P-02 Fen pool
The monitoring plot for the Fen Pool is set out at the southern end of the waterbody. In 2009, this was open water with occasional shoots of Jointed Rush and strands of stonewort. The Fen Pool was situated on a bed of calcareous marl, and the plot was intended to record the presence of a representative emergent and aquatic flora. By chance, the remaining open area of the pool lies outside the monitoring plot, and further details of the waterbody's vegetation should be taken from section 3.2.4.

Since 2009, two emergent species – Common Reed and Bulrush – have spread through the plot, and now heavily shade much of it; trampling and grazing along the margin provide a small 'key-hole' for light penetration during the summer. The aquatic flora has retained fragments of Small Pondweed, a notable species (see section 4.2) and populations of two duckweed species (A2b *Lemnetum minoris*, *Lemna trisulca* sub-community), but stoneworts were not recorded from within the plot.

Target conditions for the Fen Pool are set out in LOHP (2012). It would be useful to clear emergents from part of the plot to provide conditions for the re-colonization of stoneworts into the monitored part of the waterbody.

P-03 Peat scrape (40 cm) 1
This permanent plot is situated within the deeper peat excavation in an area where it was anticipated that wet fen species would colonise and form a component of a stand dominated by general fenland indicators. Through management, the plot was expected to develop towards a form of fen meadow characterized by species tolerant of mildly calcareous waterlogged conditions typical of the M22 *Juncus subnodulosus-Cirsium palustre* community. Over a longer period, this may itself develop to reflect the successful colonisation of particular species of very wet calcareous fen, such as Great Fen-sedge or Black Bog-rush.

As shown in Figure 3, the plot includes both the *Iris* and *Typical* sub-communities of the M22 *Juncus-Cirsium* fen-meadow community and may be a useful indicator of vegetation development across this transition. It also supports an outlier of the Branched Bur-reed population on the fen, most of which is found to the east.

Since 2009, the vegetation that has assembled is of a rather mixed composition, with significant contributions from tall fenland and rush-pasture species. Surprisingly, species richness has declined since initial colonisation in 2009, though many absent species were ruderals. Although the plot vegetation is fen meadow, it lacks low-growing species and was widely lodged at the time of survey. Frequent Branched Bur-reed and Common Reed and occasional Flag Iris are indicators of wet conditions during the growing season.

Negative indicators are largely restricted to willow saplings discussed in section 5.2, which also identifies the issue of stalled species colonisation and suggests possible remedies.

P-04 Peat scrape (40 cm) 2
The second permanent plot placed in the deeper peat excavation is situated on a similar substrate to Plot P-03 and it was anticipated that the assembling vegetation would follow a similar trajectory. By this survey, a similar balance of fenland and rush-pasture species had colonised, though the plot lacks Branched Bur-reed and Flag Iris and Greater Pond-sedge dominates. Calcareous rush species are similarly abundant though Soft Rush is almost absent. Like P-03, however, the wet-fen ground layer is also not present and lodging of the taller species is common.

The surrounding stand is assigned to the S6 *Caricetum ripariae*, though, as discussed in section 3.2.2.1, the floristics are akin to a sedge-dominated form of fen-meadow.

Following the discussion in section 5.2, it is evident that positive development of the stand – as represented by this plot – is likely to require additional measures to reduce shading through lodging and the build-up of plant litter.

6.7 Recommendations of the Vegetation Monitoring Programme

It is recommended that:

The Vegetation Monitoring Programme is maintained at Parkers Piece by those responsible for ensuring appropriate management of the site. This second Fieldwork Report successfully repeated the permanent plot surveys using the 'full' survey method (photographs, physiognomy and floristics). The Monitoring Plan (OHES 2010) proposes several means to integrate vegetation monitoring as a management decision-making tool.

The means of achieving target conditions for each sward should be reviewed, based on the comments made in the previous section and section 5.2. Although it is evident that considerable progress has been made in diverting the overall structural and floristic characters towards 'fen meadow' and 'fen pool' targets there is one over-arching issue that should be addressed. That is achieving reduced dominance by rush tussocks and sedge stands, as well as reducing lodging and plant litter build-up.

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 sward. 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.

7. REFERENCES

Beckett G. & Bull A. (1999) A Flora of Norfolk. Privately Published.

British Geological Survey (1996) 1:50 000 Series England and Wales. Sheet 175 Diss; Solid and Drift Geology. Ordnance Survey, Southampton.

Cheffings C.M. & Farrell L. (Eds), Dines T.D., Jones R.A., Leach S.J., McKean D.R., Pearman D.A., Preston C.D., Rumsey F.J. & Taylor I. (2005) The Vascular Plant Red Data List for Great Britain. Species Status 7: 1-116. Joint Nature Conservation Committee, Peterborough.

CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester

Cook C.D.K. (1961) *Sparganium* in Britain. Watsonia 5, pp. 1-10)

Dymond D.P. (2003) Hodskinson's Map of Suffolk in 1783. Larks Press, Dereham.

ELP (2008) Habitat Management Work at Parkers Piece and Bleyswycks Bank - Supporting The Restoration of Blo' Norton and Thelnetham Fens SSSI/SAC. Unpublished report to Little Ouse Headwaters Project.

ELP (2010) Fen plant communities of Broadland. Results of a Comprehensive Survey 2005-2009. Unpublished Report to Broads Authority and Natural England.

Hill M.O., Blackstock T.H., Long D.G. and Rothero G.P. (2008) A Checklist and Census Catalogue of British and Irish Bryophytes. British Bryological Society, Middlewich.

IEEM (2006) Guidelines for Ecological Evaluation and Impact Assessment. In Practice: The Bulletin of the Institute of Ecology and Environmental Management 29.

John D.M., Whitton B.A. & Brook A.J. (2002) The Freshwater Algal Flora of the British Isles. Cambridge University Press, Cambridge.

Krause S., Heathwaite A.L., Miller F., Hulme P & Crowe A. (2007) Groundwater-Dependent Wetlands in the UK and Ireland: Controls, Functioning and Assessing the Likelihood of Damage from Human Activities. Water Resources Management 21 (12), 2015–2025.

Little Ouse Headwaters Project (2012) LOHP Conservation Sites Management Plan 2012. Internal Report.

Mathers S.J., Horton A. & Bristow C.R. (1993) *Geology of the country around Diss*. Memoir for 1 : 50,000 geological sheet 175 (England and Wales. British Geological Survey. HMSO, London.

Mucina L., Bültmann H., Dierßen K., Theurillat J.-P., Raus T., Carni A., Sumberová K., Willner W., Dengler J., García R.G., Chytry M., Hájek M., Di Pietro R., Iakushenko D., Pallas J., Daniëls F.J.A., Bergmeier E., Guerra A.S., Ermakov N., Valachovič M., Schaminée J.H.J., Lysenko T., Didukh Y.P., Pignatti S., Rodwell J.S., Capelo J., Weber H.E., Solomeshch A., Dimopoulos P., Aguiar C., Hennekens S.M. & Tichy L. (2016) Vegetation of Europe: hierarchical floristic classification system of vascular plant, bryophyte, lichen, and algal communities. Applied Vegetation Science 19 (Suppl. 1) pp.3–264.

OHES (2010) Fen restoration vegetation monitoring programme for Parker's Piece and Bleyswyck's bank. Monitoring Plan 2010. Unpublished report to Little Ouse Headwaters Project.

Page M.L. (1980) Phytosociological Classification of British Neutral Grasslands. PhD Thesis, Exeter University.

Ratcliffe D.A. (ed.) (1977) A Nature Conservation Review. Volume 1. Cambridge University Press, Cambridge.

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

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

Rodwell J.S. (ed.) (1992) British Plant Communities. Volume 3. Grasslands and montane communities. Cambridge University Press, Cambridge.

Rodwell J.S. (ed.) (1995) British Plant Communities. Volume 4: Aquatic Communities, Swamps and Tall-Herb Fens. Cambridge University Press, Cambridge.
Rodwell J.S. (ed.) (2000) British Plant Communities. Volume 5. Maritime Communities and Vegetation of Open Habitats. Cambridge University Press, Cambridge.
Rodwell J.S. (2006) National Vegetation Classification: Users' Handbook. Joint Nature Conservation Committee, Peterborough.
Rodwell J.S., Morgan V., Jefferson R.G. & Moss D. (2007) The European context of British Lowland Grasslands. JNCC Report No. 394. Joint Nature Conservation Committee, Peterborough.
Sanford M. & Fisk R. (2010) A Flora of Suffolk. Privately Published, Ipswich.
Schaminée J.H.J., Weeda E.J. & Westhoff V. (1995) De Vegetatie van Nederland. Deel 2. Plantengemeenschappen van Wateren, Moerassesn en natte heiden. Opulus Press, Uppsala, Leiden.
Stace C.A. (2010) New Flora of the British Isles. Third Edition. Cambridge University Press, Cambridge.
Stewart N.F. (2004) Important stonewort areas: An assessment of the best areas for stoneworts in the United Kingdom. Plantlife International, Salisbury, UK.
Stewart N. (2010) Stoneworts of the Little Ouse Headwaters Fens. Unpublished Report to Little Ouse Headwaters Project.
Stewart N.F. & Church J.M. (1992) Red data Books of Britain and Ireland: Stoneworts. J.N.C.C./O.P.W. Peterborough.
Stewart A., Pearman D.A. & Preston C.D. (1994) Scarce Plants in Britain. JNCC, Peterborough.
Stroh P.A., Leach S.J., August T.A., Walker K.J., Pearman D.A., Rumsey F.J., Harrower C.A., Fay M.F., Martin J.P., Pankhurst T., Preston C.D. & Taylor, I. (2014) A Vascular Plant Red List for England. Botanical Society of Britain and Ireland, Bristol.
Suffolk Biological Records Centre (2005) Rare Plant Register for Suffolk.
West R. (2009) From Brandon to Bungay: an exploration of the geology and landscape history of the Little Ouse and Waveney rivers. Healeys, Ipswich.

Appendix 1. NVC SAMPLE PLOT NATIONAL GRID REFERENCES

Plot	Easting	Northing	NVC code
1	601166	279020	MG6c
2	601189	279065	MG6c
3	601225	279037	MG6c
4	601262	279045	MG11a
5	601255	279013	MG11a
6	601278	278941	MG11a
7	601196	279088	MG6c
8	601237	279007	MG6c
9	601261	278997	MG11a
10	601282	279043	MG11a
11	601210	279098	MG1b
12	601219	279064	MG1b
13	601248	279065	OV24b
14	601273	279076	S26a
15	601301	279052	OV24b
16	601318	279031	OV24b
17	601337	279013	OV24b
18	601379	278983	S26a
19	601396	278984	S6
20	601412	278982	S6
21	601446	278974	MG1b
22	601467	278969	OV24b
23	601495	278975	OV24b
24	601290	278984	M22a
25	601294	278999	M22a
26	601295	279034	OV28a
27	601299	278981	M22a
28	601301	279019	M22a
29	601333	278992	OV28a
30	601334	278920	M22d
31	601340	278969	M22a
32	601344	278955	M22a
33	601349	278940	M22a
34	601364	278922	M22d
35	601369	278956	M22d
36	601374	278976	OV28a
37	601406	278957	M22a
38	601410	278974	OV28a
39	601422	278945	S14c
40	601430	278939	S14c

Plot	Easting	Northing	NVC code
41	601430	278917	M22d
42	601433	278956	M22d
43	601436	278970	OV28a
44	601440	278941	S14c
45	601451	278942	S14c
46	601462	278939	S14c
47	601465	278922	S6
48	601479	278936	S6
49	601467	278960	OV28a
50	601482	278917	S6
51	601487	278907	S6
52	601497	278918	S6
53	601470	278916	S6

Appendix 2. SPECIES RECORDED IN NVC SAMPLES AND MONITORING PLOTS

Scientific Name	Common Name
Achillea millefolium	Yarrow
Agrostis capillaris	Common Bent
Agrostis stolonifera	Creeping Bent
Alliaria petiolata	Garlic Mustard
Angelica sylvestris	Wild Angelica
Anthriscus sylvestris	Cow Parsley
Arctium minus agg.	Lesser Burdock
Arrhenatherum elatius	False Oat-grass
Bromus hordeaceus	Soft Brome
Calystegia sepium	Hedge Bindweed
Cardamine pratensis	Cuckooflower
Carduus crispus	Welted Thistle
Carex acutiformis	Lesser Pond-sedge
Carex elata	Tufted Sedge
Carex hirta	Hairy Sedge
Carex otrubae	False Fox-sedge
Carex remota	Remote Sedge
Carex riparia	Greater Pond-sedge
Cerastium fontanum	Common Mouse-ear
Cerastium glomeratum	Sticky Mouse-ear
Chaerophyllum temulum	Rough Chervil
Chenopodium album	Fat-hen
Cirsium arvense	Creeping Thistle
Cirsium palustre	Marsh Thistle
Cirsium vulgare	Spear Thistle
Conium maculatum	Hemlock
Crataegus monogyna	Common Hawthorn
Crepis capillaris	Smooth Hawksbeard
Dactylis glomerata	Cock's-foot
Deschampsia cespitosa	Tufted Hair-grass
Elytrigia repens	Common Couch
Epilobium hirsutum	Hairy Willowherb
Epilobium parviflorum	Hoary Willowherb
Equisetum fluviatile	Water Horsetail
Equisetum palustre	Marsh Horsetail
Eupatorium cannabinum	Hemp Agrimony
Festuca rubra	Red Fescue
Filipendula ulmaria	Meadowsweet
Fraxinus excelsior	Ash
Galium aparine	Cleavers
Galium palustre	Common Marsh-bedstraw
Galium uliginosum	Fen Bedstraw
Galium verum	Lady's Bedstraw
Geranium dissectum	Cut-leaved Cranesbill
Geranium molle	Soft Cranesbill
Geranium robertianum	Herb Robert
Glechoma hederacea	Ground-ivy
Glyceria fluitans	Floating Sweet-grass
Heracleum sphondylium	Hogweed
Holcus lanatus	Yorkshire Fog

Hydrocotyle vulgaris	Marsh Pennywort
Hypericum tetrapterum	Square-stemmed St John's-wort
Hypochaeris radicata	Cat's-ear
Iris pseudacorus	Flag Iris
Juncus articulatus	Jointed Rush
Juncus bufonius	Toad Rush
Juncus effusus	Soft Rush
Juncus inflexus	Hard Rush
Juncus subnodulosus	Blunt-flowered Rush
Lamium album	White Dead-nettle
Lemna minor	Common Duckweed
Lemna trisulca	Ivy-leaved Duckweed
Lolium perenne	Perennial Ryegrass
Lotus corniculatus	Common Bird's-foot Trefoil
Lycopus europaeus	Gipsywort
Lythrum salicaria	Purple Loosestrife
Medicago lupulina	Black Medick
Mentha aquatica	Water Mint
Myosotis arvensis	Field Forget-me-not
Myosotis laxa	Tufted Forget-me-not
Myosoton aquaticum	Water Chickweed
Papaver dubium	Long-headed Poppy
Papaver rhoeas	Common Poppy
Persicaria amphibia	Amphibious Bistort
Persicaria maculosa	Redshank
Phalaris arundinacea	Reed Canary-grass
Phleum bertolonii	Smaller Cat's-tail
Phleum pratense	Meadow Foxtail
Phragmites australis	Common Reed
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Poa trivialis	Rough Meadow-grass
Potamogeton berchtoldii	Small Pondweed
Potentilla anserina	Silverweed
Prunella vulgaris	Self-heal
Prunus spinosa	Blackthorn
Ranunculus repens	Creeping Buttercup
Rorippa sylvestris	Creeping Yellowcress
Rumex conglomeratus	Conglomerate Dock
Rumex obtusifolius	Broad-leaved Dock
Rumex sanguineus	Wood Dock
Salix alba	While Willow
Salix cinerea	Grey Willow
Salix fragilis	Crack Willow
Samolus valerendi	Brookweed
Senecio jacobaea	Common Ragwort
Silene latifolia	White Campion
Sonchus asper	Prickly Sow-thistle
Sparganium erectum	Branched Bur-reed
Stachys palustris	Marsh Woundwort
Stellaria graminea	Lesser Stitchwort
Taraxacum agg.	Dandelion
Thalictrum flavum	Common Meadow-rue
Tragopogon pratensis	Goat's-beard
Trifolium dubium	Lesser Trefoil

Trifolium pratense	Red Clover
Trifolium repens	White Clover
Trisetum flavescens	Yellow Oat-grass
Typha latifolia	Bulrush
Urtica dioica	Common Nettle
Veronica arvensis	Field Speedwell
Veronica catenata	Pink Water-speedwell
Veronica chamaedrys	Germander Speedwell
Vicia cracca	Tufted Vetch
Stoneworts	
Chara hispida	Bristly Stonewort
Chara vulgaris	Common Stonewort
Bryophytes	
Brachythecium albicans	Whitish Feather-moss
Brachythecium rutabulum	Rough-stalked Feather-moss
Bryum pseudotriquetrum	Marsh Bryum
Calliergonella cuspidatum	Pointed Spear-moss
Leptobryum pyriforme	Golden Thread-moss
Marchantia polymorpha	Star-headed Liverwort
Oxyrrhynchium speciosum	Showy Feather-moss

MG6c *Lolio-Cynosuretum cristati* grassland, *Trisetum flavescens* sub-community

Plot	1	2	3	7	8		
Dactylis glomerata	5	6	6	6	6	V	(5-6)
Agrostis stolonifera	6	5	5	4	6	V	(4-6)
Brachythecium rutabulum	2	5	4	7	5	V	(2-7)
Holcus lanatus	5	3	4	2	5	V	(2-5)
Lolium perenne	4	4	5	3	2	V	(2-5)
Taraxacum agg.	1	5	5	5	4	V	(1-5)
Trisetum flavescens	4	1	1	3	1	V	(1-4)
Bromus hordeaceus	2	3	3	2	1	V	(1-3)
Achillea millefolium	3	2		5	4	IV	(2-5)
Trifolium repens		2	4	4	2	IV	(2-4)
Plantago lanceolata	2	3	3	2		IV	(2-3)
Cirsium vulgare		2	2	2	3	IV	(2-3)
Festuca rubra	2	2	2	2		IV	(2)
Agrostis capillaris	4	1	2		4	IV	(1-4)
Cirsium arvense		1	2	3	3	IV	(1-3)
Trifolium dubium	2	1	2	2		IV	(1-2)
Urtica dioica		1	2	2	2	IV	(1-2)
Trifolium pratense	1	1	1	1		IV	(1)
Crepis capillaris	3	3		2		III	(2-3)
Senecio jacobaea	2	2	2			III	(2)
Glechoma hederacea		2		2	2	III	(2)
Deschampsia cespitosa		1	4		3	III	(1-4)
Ranunculus repens		2	4		1	III	(1-4)
Phleum bertolonii	3	1		1		III	(1-3)
Hypochaeris radicata		3		3	1	III	(1-3)
Geranium molle	2	2	1			III	(1-2)
Cerastium glomeratum	1	1	1			III	(1)
Veronica arvensis	1	1			1	III	(1)
Poa trivialis	2	2				II	(2)
Cerastium fontanum		1	2			II	(1-2)
Veronica chamaedrys		1	1			II	(1)
Arrhenatherum elatius		1	1			II	(1)
Heracleum sphondylium		1	1			II	(1)
Anthriscus sylvestris		1		1		II	(1)
Medicago lupulina			4			I	(4)
Poa pratensis					2	I	(2)
Galium verum	2					I	(2)
Lotus corniculatus			1			I	(1)
Geranium dissectum				1		I	(1)
Plantago major					1	I	(1)
Papaver dubium	1					I	(1)
Tragopogon pratensis	1					I	(1)
Silene latifolia	1					I	(1)
Brachythecium albicans	1					I	(1)
Sward height (cm)	4	3	3	3	5		
% Total veg cover	90	80	95	100	90		
% Plant litter	30	50	30	30	30		
% Bryophyte cover	2	20	5	40	20		
% Lichen cover	0	0	0	0	0		
% Bare ground	10	5	5	0	10		
No. of species	26	34	28	23	21	Av.	26.4

MG11a *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland, *Lolium perenne* sub-community [Lolio-Agrostetum stoloniferae (sensu Page 1980)]

Plot	4	5	6	9	10		
Agrostis stolonifera	7	8	9	9	8	V	(7-9)
Cirsium arvense	5	5	5	6	6	V	(5-6)
Ranunculus repens	7	4	6	5	5	V	(4-7)
Poa trivialis	5	6	7	4	5	V	(4-7)
Holcus lanatus	8	6	2	6	7	V	(2-8)
Taraxacum agg.	3	7	1	3	6	V	(1-7)
Lolium perenne	2	4	2	2	2	V	(1-4)
Trifolium repens	2	2	4	4		IV	(2-4)
Urtica dioica	3	2	3		2	IV	(2-3)
Glechoma hederacea	1	1		2	2	IV	(1-2)
Bromus hordeaceus	1			1	2	III	(1-2)
Arrhenatherum elatius	1	2			1	III	(1-2)
Cirsium vulgare	1	1			1	III	(1)
Carex hirta			5	2		II	(2-5)
Geranium dissectum	2	2				II	(2)
Elytrigia repens	2		2			II	(2)
Dactylis glomerata	2	1				II	(1-2)
Plantago major			1	2		II	(1-2)
Senecio jacobaea	1	1				II	(1)
Mentha aquatica			2			I	(2)
Brachythecium rutabulum		1				I	(1)
Deschampsia cespitosa		1				I	(1)
Trifolium dubium	1					I	(1)
Geranium molle					1	I	(1)
Cerastium fontanum		1				I	(1)
Stellaria graminea	1					I	(1)
Carduus crispus		1				I	(1)
Cirsium palustre			1			I	(1)
Sward height (cm)	8	6	6	8	9		
% Total veg cover	95	90	100	95	95		
% Plant litter	10	15	5	5	5		
% Bryophyte cover	0	0	0	0	0		
% Lichen cover	0	0	0	0	0		
% Bare ground	5	10	0	5	5		
No. of species	19	19	14	12	13	Av.	15.4

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

Plot	24	25	27	31	32	33	37		
Juncus subnodulosus	4	7	8	9	7	8	8	V	(4-9)
Agrostis stolonifera	4	4	4	4	4	5	6	V	(4-6)
Mentha aquatica	4	2	3	4	4	3	5	V	(2-5)
Lythrum salicaria	4	2	3	3	2	3	3	V	(2-4
Juncus inflexus	6	6	7	1	5	4	4	V	(1-7)
Ranunculus repens	4	2	1	2	1	2	1	V	(1-4)
Juncus articulatus	5	4	5	2	3	1		V	(1-5)
Poa trivialis	6	2	2		2	2		IV	(2-6)
Salix cinerea sapling		1	2		2	3	2	IV	(1-3)
Hydrocotyle vulgaris	5	3	6		2			III	(2-6)
Juncus effusus	7	7		1			5	III	(1-7)
Brachythecium rutabulum	3		1		1	2		III	(1-3)
Calliergonella cuspidatum	1		2		3	1		III	(1-3)
Galium palustre		2		1	2	1		III	(1-2)
Phalaris arundinacea	2		3	1				III	(1-3)
Phragmites australis				3	1	2		III	(1-3)
Salix alba sapling		1				1	1	III	(1)
Plantago major		1	1					III	(1)
Deschampsia cespitosa	1	1						III	(1)
Carex acutiformis					4	2		II	(2-4)
Bryum pseudotriquetrum	2		2					II	(2)
Carex riparia				1			3	II	(1-3)
Angelica sylvestris					1	1		II	
Iris pseudacorus						1	1	II	
Samolus valerendi			3					I	(3)
Carex hirta		2						I	(2)
Equisetum palustre							2	I	(2)
Marchantia polymorpha	2							I	(2)
Persicaria maculosa			1					I	(1)
Taraxacum agg		1						I	(1)
Cirsium palustre			1					I	(1)
Oxyrrhynchium speciosum	1							I	(1)
Carex otrubae				1				I	(1)
Veronica catenata					1			I	(1)
Salix fragilis sapling				1				I	(1)
Sward height (cm)	60	80	40	60	70	70	60		
% Total veg cover	90	90	90	100	90	90	95		
% Plant litter	30	30	20	50	40	30	70		
% Bryophyte cover	4	0	3	0	2	2	0		
% Lichen cover	0	0	0	0	0	0	0		
% Bare ground	5	1	2	0	2	1	0		
Depth of surface water (cm)	0	0	0	0	0	0	0		
No. of species	17	17	18	14	17	17	12	Av.	16.0

M22d *Juncus subnodulosus-Cirsium palustre* fen-meadow, *Iris pseudacorus* sub-community
With additional plots included in the vegetation stand.

NVC	M22d							M22a	S6
Plot	30	34	35	41	42			28	48
Juncus inflexus	8	8	10	7	7	V	(7-10)	4	
Mentha aquatica	8	7	5	9	3	V	(3-9)	3	1
Lythrum salicaria	2	2	4	3	2	V	(2-4)	2	1
Agrostis stolonifera	2	1	3	2	7	V	(1-7)	2	6
Juncus subnodulosus	5	4	5		5	IV	(4-5)	2	
Carex riparia	1		3	4	5	IV	(1-5)		8
Brachythecium rutabulum	1	2	2	2		IV	(1-2)	2	
Galium uliginosum	1	1	2	2		IV	(1-2)		
Thalictrum flavum	1	1	1	1		IV	(1)		
Phragmites australis	2	3		2		III	(2-3)	1	
Juncus effusus			1	1	4	III	(1-4)	10	5
Poa trivialis		1	3		1	III	(1-3)	2	3
Carex acutiformis	1	1		2		III	(1-2)		
Eupatorium cannabinum	1	2		1		III	(1-2)		
Phalaris arundinacea			3		2	II	(2-3)		2
Juncus articulatus	2			2		II	(2)	2	
Oxyrrhynchium speciosum	2			2		II	(2)		
Deschampsia cespitosa		1		4		II	(1-4)	1	
Potentilla anserina		1	3			II	(1-3)		
Salix cinerea sapling			2		1	II	(1-2)	1	1
Ranunculus repens	1		2			II	(1-2)	2	
Hypericum tetrapterum	1	1				II	(1)		
Vicia cracca		1		1		II	(1)		
Persicaria maculosa					3	I	(3)		2
Persicaria amphibia					1	I	(1)		2
Galium palustre					1	I	(1)	1	
Glechoma hederacea			1			I	(1)		
Hydrocotyle vulgaris			1			I	(1)		
Salix alba sapling			1			I	(1)		
Carex otrubae			1			I	(1)		
Leptobryum pyriforme			1			I	(1)		
Epilobium parviflorum				1		I	(1)		
Sparganium erectum				1		I	(1)		
Plantago major								2	
Taraxacum agg								1	
Carex hirta								1	
Cardamine pratensis								1	
Chenopodium album									2
Holcus lanatus									1
Glyceria fluitans									1
Equisetum fluviatile									1
Sward height (cm)	100	110	80	120	65			75	85
% Total veg cover	100	100	100	100	100			100	90
% Plant litter	20	30	20	30	50			40	40
% Bryophyte cover	3	2	3	4	0			2	0
% Lichen cover	0	0	0	0	0			0	0
% Bare ground	0	0	0	0	0			0	10
Depth of surface water (cm)	0	0	0	0	0			0	0
No. of species	16	16	20	18	13	Av.	16.6	18	14

S14c *Sparganietum erecti* Roll 1938, *Mentha aquatica* sub-community

Plot	39	40	44	45	46		
Sparganium erectum	7	8	4	8	8	V	(4-8)
Agrostis stolonifera	2	1	10	2	4	V	(1-10)
Phalaris arundinacea	2	2	1	2	5	V	(1-5)
Phragmites australis	2	3	3	2	1	V	(1-3)
Persicaria maculosa	1	2	3	2	2	V	(1-3)
Juncus effusus		2	6	4	2	IV	(2-6)
Carex riparia	7	5	1		2	IV	(1-7)
Mentha aquatica		1	2	1	1	IV	(1-2)
Lythrum salicaria	2		2	2		III	(2)
Juncus subnodulosus	1		2	2		III	(1-2)
Salix cinerea sapling	1		1	1		III	(1)
Poa trivialis			2	2		II	(2)
Iris pseudacorus				1	1	II	(1)
Equisetum palustre			2			I	(2)
Juncus inflexus	1					I	(1)
Juncus articulatus			1			I	(1)
Galium palustre			1			I	(1)
Sward height (cm)	90	80	75	90	90		
% Total veg cover	90	85	95	85	85		
% Plant litter	70	30	20	20	20		
% Bryophyte cover	0	0	0	0	0		
% Lichen cover	0	0	0	0	0		
% Bare ground	0	0	5	5	0		
Depth of surface water (cm)	0	0	0	0	0		
No. of species	10	8	15	12	9	Av.	10.8

S6 *Caricetum ripariae* Soó 1928

Plot	47	50	51	52	53		
Carex riparia	10	10	10	10	10	V	(10)
Mentha aquatica	5	6	4	6	4	V	(4-6)
Juncus inflexus	10	4	3	4	5	V	(3-10)
Poa trivialis	2	3	8	3	4	V	(2-8)
Agrostis stolonifera	3	4	3	3	5	V	(3-5)
Persicaria maculosa	2	3	3	3	2	V	(2-3)
Lythrum salicaria	2	1	2	1	3	V	(1-3)
Phragmites australis	2	1	1	1	2	V	(1-2)
Salix cinerea sapling	2	1	2		1	IV	(1-2)
Rumex sanguineus		2	1	2	1	IV	(1-2)
Iris pseudacorus	1	1		1	1	IV	(1)
Salix fragilis sapling		1	1	1	1	IV	(1)
Juncus articulatus	3				2	II	(2-3)
Juncus subnodulosus	3				1	II	(1-3)
Carex acutiformis	2				2	II	(2)
Galium palustre	1				1	II	(1)
Juncus effusus	1					I	(1)
Rumex obtusifolius		1				I	(1)
Carex otrubae		1				I	(1)
Sonchus asper	1					I	(1)
Sward height (cm)	75	80	60	50	75		
% Total veg cover	100	100	100	100	100		
% Plant litter	30	50	40	40	50		
% Bryophyte cover	0	0	0	0	0		
% Lichen cover	0	0	0	0	0		
% Bare ground	1	0	0	0	0		
Depth of surface water (cm)	0	0	0	0	0		
No. of species	16	14	11	11	16	Av.	13.6

OV28a *Agrostio-Ranunculetum repentis* Oberdorfer et al. 1967, *Polygonum hydropiper-Rorippa sylvestris* sub-community

Plot	26	29	36	38	43	49		
Agrostis stolonifera	9	8	8	8	9	10	V	(8-10)
Ranunculus repens	2	10	3	3	2	2	V	(2-10)
Poa trivialis	3	3	4	3	2	2	V	(2-4)
Cirsium arvense	5	5	5	2		4	V	(2-5)
Carex riparia	2	1	4	6	6		V	(1-6)
Rumex conglomeratus		1	1	1	1	1	V	(1)
Holcus lanatus	2	1		2		2	IV	(1-2)
Phalaris arundinacea			2	3	2	2	IV	(2-3)
Persicaria maculosa			2	3	2	1	IV	(1-3)
Lolium perenne	3			2		3	III	(2-3)
Plantago major		2		1	2		III	(1-2)
Elytrigia repens		2	3				II	(2-3)
Trifolium repens		4				1	II	(1-4)
Glechoma hederacea	3		1				II	(1-3)
Taraxacum agg.	2				2		II	(2)
Chenopodium album				2	1		II	(1-2)
Cirsium palustre			1		1		II	(1)
Rumex obtusifolius			1	1			II	(1)
Arrhenatherum elatius	4						I	(4)
Phragmites australis		3					I	(3)
Juncus effusus					2		I	(2)
Glyceria fluitans						2	I	(2)
Urtica dioica	2						I	(2)
Deschampsia cespitosa		1					I	(1)
Carex hirta		1					I	(1)
Equisetum palustre				1			I	(1)
Cerastium fontanum		1					I	(1)
Conium maculatum	1						I	(1)
Geranium molle	1						I	(1)
Myosotis arvensis		1					I	(1)
Stachys palustris			1				I	(1)
Sward height (cm)	10	22	35	25	30	18		
% Total veg cover	100	98	95	95	90	100		
% Plant litter	10	5	10	5	2	5		
% Bryophyte cover	0	0	0	0	0	0		
% Lichen cover	0	0	0	0	0	0		
% Bare ground	0	2	5	5	10	0		
Depth of surface water (cm)	0	0	0	0	0	0		
No. of species	13	15	13	14	12	11	Av.	13.0

Riparian margin

OV24b *Urtica dioica-Galium aparine* community, *Arrhenatherum elatius-Rubus fruticosus* sub-community
Grading to:
S26a *Phragmites australis-Urtica dioica* tall-herb fen, *Filipendula ulmaria* sub-community
MG1b *Arrhenatheretum elatioris* Br.-Bl. 1919, *Urtica dioica* sub-community
With a small stand of:
S6 *Caricetum ripariae* Soó 1928

NVC	OV24b						S26a		MG1b					S6	
Plots	17	16	22	15	13	23	14	18	11	12	21			19	20
Urtica dioica	6	8	10	9	10	10	9	8	6	7	6	V	(6-10)	3	3
Glechoma hederacea	2	10	3	4	8	9	8	3	7	6	2	V	(2-10)		
Arrhenatherum elatius	4	3	3	2					9	10	9	IV	(2-10)		2
Elytrigia repens	1	1	4	2				1	2	2	2	IV	(1-4)	1	2
Phragmites australis				3	2		5	10			2	III	(2-10)	2	
Agrostis stolonifera	2		5	2		3					2	III	(2-5)	2	
Cirsium arvense	1			2					4	7	2	III	(1-7)		1
Dactylis glomerata				1	1			1	2	1		III	(1-2)		
Holcus lanatus	8	5		1					1			II	(1-8)		
Lamium album				3	2		2					II	(2-3)		
Chaerophyllum temulum							1		5			I	(1-5)		
Epilobium hirsutum			2					1				I	(1-2)		
Phalaris arundinacea								2			1	I	(1-2)	2	1
Senecio jacobaea									1	1		I	(1)		
Silene latifolia		1					1					I	(1)		
Festuca rubra										4		I	(4)		
Calystegia sepium				2								I	(2)		
Vicia cracca				2								I	(2)		
Persicaria maculosa											2	I	(2)	1	
Poa trivialis											2	I	(2)		
Ranunculus repens											2	I	(2)		
Anthriscus sylvestris	1											I	(1)		
Conium maculatum		1										I	(1)		
Arctium minus agg				1								I	(1)		
Heracleum sphondylium					1							I	(1)		1
Galium aparine						1						I	(1)		
Papaver rhoeas									1			I	(1)		
Phleum pratense									1			I	(1)		
Lolium perenne										1		I	(1)		
Carex otrubae											1	I	(1)		
Juncus effusus											1	I	(1)		
Rumex obtusifolius											1	I	(1)	1	
Carex riparia														10	10
Sward height (cm)	45	50	60	60	60	60	160	180	65	70	70			80	85
% Total veg cover	85	100	100	90	100	100	95	100	95	100	95			100	100
% Plant litter	5	5	30	30	5	5	10	5	10	10	10			40	50
% Bryophyte cover	0	0	0	0	0	0	0	0	0	0	0			0	0
% Lichen cover	0	0	0	0	0	0	0	0	0	0	0			0	0
% Bare ground	10	0	0	0	0	0	0	0	0	0	0			0	0
Depth of surface water (cm)	0	0	0	0	0	0	0	0	0	0	0			0	0
No. of species	8	7	6	13	6	4	6	7	11	9	14	Av.	8.3	8	7

Appendix 5. NVC FEN POOL VEGETATION

S4a *Phragmitetum australis* (Gams 1927) Schmale 1939, *Phragmites australis* sub-community
Several small vegetation stands occupy the body and fringe of the pond and are also included here. Each stand was sampled in its entirety.

Primary stand	**S4a**		
Secondary stands	**A2b**	**Aquatic**	**M22**
Phragmites australis	10	2	1
Typha latifolia	3		
Juncus subnodulosus	2	8	2
Carex riparia	1		
Lemna minor	9		
Lemna trisulca	8		
Potamogeton berchtoldii	2		
Chara hispida		8	
Chara contraria		4	
Filamentous algae		3	
Equisetum palustre		1	2
Lythrum salicaria		1	3
Juncus inflexus			7
Juncus articulatus			5
Agrostis stolonifera			5
Mentha aquatica			4
Plantago major			3
Hydrocotyle vulgaris			2
Myosotis laxa			2
Prunus spinosa seedling			2
Persicaria maculosa			2
Ranunculus repens			2
Prunella vulgaris			2
Persicaria amphibia			2
Iris pseudacorus			1
Eupatorium cannabinum			1
Samolus valerendi			1
Salix cinerea seedling			1
Myosoton aquaticum			1
Juncus bufonius			1
Juncus effusus			1
Rorippa sylvestris			1
Deschampsia cespitosa			1

Appendix 6. FIELD RECORD FOR P-01 SHALLOW SCRAPE (20CM) VEGETATION 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
Mentha aquatica	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	20
Lythrum salicaria	P	P	P		P	P	P	P	P	P		P	P	P	P	P	P	P	P	P	18
Juncus subnodulosus		P	P	P	P	P			P	P	P	P	P	P	P	P		P	P		15
Juncus inflexus	P	P				P	P	P	P	P	P			P	P	P	P	P	P	P	15
Juncus effusus		P	P	P		P		P	P	P		P	P		P	P	P	P			13
Juncus articulatus	P							P	P		P	P	P			P	P		P	P	10
Poa trivialis						P	P	P	P						P	P	P	P	P	P	10
Agrostis stolonifera	P	P				P		P	P	P							P	P		P	9
Plantago major	P	P	P					P	P	P							P			P	8
Ranunculus repens	P	P							P	P								P	P	P	7
Salix cinerea seedling							P	P			P			P				P		P	6
Hydrocotyle vulgaris			P	P	P							P	P	P							6
Potentilla anserina	P	P	P					P	P										P		6
Carex hirta						P	P	P	P							P					5
Salix alba sapling	P										P	P			P						4
Phalaris arundinacea									P	P							P	P			4
Persicaria maculosa		P				P	P										P				4
Salix fragilis sapling				P	P							P									3
Salix cinerea sapling						P	P	P													3
Cirsium arvense	P																	P	P		3
Urtica dioica	P								P	P											3
Eupatorium cannabinum										P						P					2
Carex riparia								P										P			2
Cirsium palustre					P								P								2
Deschampsia cespitosa																		P	P		2
Myosoton aquaticum																			P		1
Epilobium palustre				P																	1
Thalictrum flavum					P																1
Cardamine pratensis									P												1
Juncus bufonius agg.														P							1
Rorippa sylvestris	P																				1
Capsella bursa-pastoris																				P	1
Chenopodium album						P															1
No. of species	12	10	7	6	7	11	8	13	15	11	6	8	7	7	7	9	10	13	12	10	Av. 9.5

Appendix 7. FIELD RECORD FOR P-02 FEN POOL 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
Phragmites australis	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	20
Lemna trisulca				P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	17
Lemna minor					P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	16
Typha latifolia		P		P		P		P	P	P	P	P	P		P	P	P	P	P	P	15
Carex riparia	P		P	P	P		P											P			5
Potamogeton berchtoldii													P								2
Salix cinerea sapling		P																			1
No. of species	2	3	2	4	4	4	4	4	4	4	4	4	5	3	4	4	4	5	4	4	Av. 3.8

Appendix 8. FIELD RECORD FOR P-03 PEAT SCRAPE (40CM) 1 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
Agrostis stolonifera	P	P		P	P	P		P	P		P	P	P	P			P	P	P	P	15
Mentha aquatica		P	P	P			P	P	P	P		P	P	P	P	P		P	P		14
Juncus inflexus	P	P			P	P				P	P		P	P	P	P	P		P	P	13
Phragmites australis	P		P	P		P	P		P		P	P			P	P	P			P	12
Juncus subnodulosus				P	P		P	P	P	P	P	P				P	P	P	P		12
Carex riparia	P	P	P			P		P					P	P	P		P			P	10
Juncus effusus			P	P			P	P	P	P		P	P					P	P		10
Sparganium erectum		P			P			P		P			P	P		P		P	P		9
Lythrum salicaria		P	P				P	P	P				P	P		P		P			9
Juncus articulatus	P			P		P				P		P	P		P					P	8
Persicaria maculosa	P		P	P		P	P		P			P									7
Salix cinerea sapling					P				P			P				P		P	P	P	7
Poa trivialis	P	P									P			P							4
Deschampsia cespitosa											P				P		P			P	4
Salix fragilis sapling				P				P						P			P				4
Iris pseudacorus								P		P				P							3
Thalictrum flavum									P						P						2
Number of species	7	7	6	8	5	6	6	9	9	7	6	8	8	9	7	7	7	7	7	7	Av. 7.2

Appendix 9. FIELD RECORD FOR P-04 PEAT SCRAPE (40CM) 2 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
Mentha aquatica	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	20
Carex riparia	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	20
Juncus inflexus	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	20
Brachythecium rutabulum	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	P	P			16
Lythrum salicaria		P		P	P	P	P	P		P	P	P	P	P		P		P		P	14
Juncus articulatus	P	P					P	P		P	P		P	P				P	P	P	11
Agrostis stolonifera				P	P		P	P				P	P		P	P					8
Juncus subnodulosus		P	P										P	P			P	P	P		7
Phragmites australis	P			P					P		P					P	P				6
Carex acutiformis				P	P	P									P	P					6
Eurhynchium speciosum		P	P									P	P				P				5
Poa trivialis		P	P						P												3
Deschampsia cespitosa														P		P					2
Potentilla reptans		P																		P	2
Myosoton aquaticum					P																1
Galium uliginosum																	P				1
Juncus effusus																		P			1
Potentilla anserina							P														1
Salix cinerea seedling												P									1
Salix fragilis sapling														P							1
Salix cinerea sapling																			P		1
Number of species	6	10	7	8	8	6	8	7	6	6	7	8	8	9	6	9	8	8	6	6	Av. 7.4