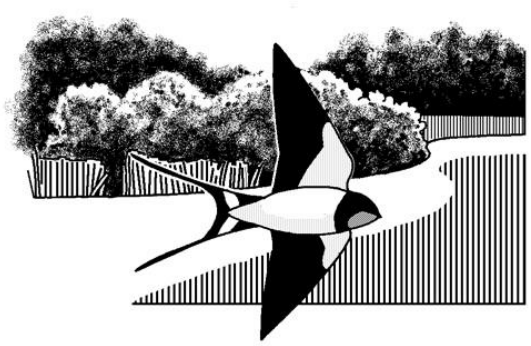


National Vegetation Classification survey of

Hinderclay Fen

With Site Condition Monitoring

Undertaken on behalf of the Little Ouse Headwaters Project by

OHES ENVIRONMENTAL

With Funding from

heritage lottery fund

Sustaining and transforming our heritage

This page has been left blank intentionally

National Vegetation Classification survey of

Hinderclay Fen

With Site Condition Monitoring

By OHES Environmental on behalf of:

Dr Helen Smith

Little Ouse Headwaters Project

Activity	Name	Position
Author	Jonny Stone	Senior Ecologist
Approved by	Mike Hill	Ecology and Fisheries Manager

1 The Courtyard
Denmark Street
Wokingham
Berkshire
RG40 2AZ
www.ohes.co.uk

This page has been left blank intentionally

CONTENTS

1. INTRODUCTION

1.1 The site

Hinderclay Fen [TM 024 787] lies along the southern flank of a narrow section of the River Little Ouse valley, between Thelnetham and Botesdale Brooks, as shown in Figure 1. The site includes the eastern fringe of the Thelnetham-Blo' Norton peatland and a peat-filled channel marking an earlier course of the Thelnetham Brook (West 2009). This channel cuts across the Lopham Terrace, which surrounds the southern side of the peat-filled embayment at the western end of the site. The degraded slopes of the sandy terrace extend over much of Hinderclay Fen in its central and eastern parts. The northern side of the Fen is marked by the spoil bank of the modern course of the river.

Figure 1. Site location

It is widely recognised (e.g. Ratcliffe 1977) that drainage by the modern course of the river, which cuts across the narrow peat-filled channel of the former river channel, has led to the loss or significant degradation of calcareous fen vegetation at Hinderclay Fen as recorded for example, by Bellamy and Rose (1960).

In 1983, the Fen was denotified from what is now known as the Blo'Norton and Thelnetham Fens Site of Special Scientific Interest (SSSI). Notwithstanding, the Fen supports a range of habitats associated with the remnant peatland, the dry sandy terrace soils, and the transitional belt of exposed terrace along the thinning peat margins near the river. For example, the periodically moist sands of the terrace margin support birch woodland and a continuous belt of Purple Moor-grass, likely to represent a remnant of the former valleyhead fen vegetation. Also, the dry and parched grasslands that have developed on the raised terrace sands form

one the best examples of the Dry Acid Grassland BAP Habitat in Suffolk outside of the Sandlings and Breckland.

Restoration measures carried out by the Little Ouse Headwaters Project (LOHP) since 2000 have been concentrated on the peatland habitats and their margins. The types of vegetation were assessed and mapped according to the National Vegetation Classification (NVC) by Ecology, Land and People (ELP) in 2005, when the early colonisation of restored parts of the peatland was reported.

1.2 The brief

As part of the programme of habitat restoration planned by LOHP, OHES Environmental has been asked to repeat the vegetation survey of all habitats at Hinderclay Fen using the National Vegetation Classification. The descriptions of each community are less detailed than those provided in the 2005 report by ELP, and greater emphasis is placed on an assessment of the condition of the habitats within the peatland and fen margin areas.

2. METHODOLOGY

The National Vegetation Classification (NVC) is the common standard for defining types of vegetation and describing them within a British and European context (JNCC 2012[1]). The classification is widely used by Natural England in the context of SSSI designation and assessment and in meeting their European obligations through implementing the Habitats Directive. Given the international significance of calcareous fen vegetation and the encompassing SAC designation, the NVC has been employed to describe the vegetation of much of the Little Ouse valley and its immediate surroundings, including other LOHP sites such as Hinderclay Fen.

The survey methodology is described in detail in Rodwell (2006). In summary, the types of vegetation at Hinderclay Fen are distinguished by the broad class of habitat (e.g. open fen and woodland) and by their plant species composition. Each vegetation type is described by selecting a number of representative plots (usually of 2 x 2 metres and up to 50 x 50 metres for woodland canopies) from within stands of that type. Each plot is assessed for the presence and areal cover of all plants and ground-dwelling bryophytes and lichens - using the Domin cover-abundance scale - and for other attributes such as height of the vegetation and the amount of bare ground or depth of standing water. Species authorities follow Stace (2010) for higher plants, Hill et al. (2008) for bryophytes and Coppins (2002) for lichens.

The sample plots for each vegetation type are then grouped together by their similarity – as Tables 2-7, 9-16 and 17-24 in section 3. Each species in a table is given a constancy score (from I to V) to show how frequently it tends to occur in that kind of vegetation in the surveyed area. The tables are then compared with the published NVC accounts (Rodwell 1991a,b-2000a).

In section 4, an assessment is made of the condition of the constituent groundwater-dependent habitats found within the peat and terrace-margin areas of the site. The assessment is based on JNCC's Common Stands Monitoring Guidance (JNCC 2004a,b), using tables of the attributes specified by this guidance drawn from data collected with the sampled vegetation plots.

In section 5, an interpretation of the character and condition of the site's vegetation is developed using the published accounts, other fieldwork in the area and also knowledge from examining similar kinds of vegetation elsewhere.

[1] c.f. http://jncc.defra.gov.uk/page-4259 [accessed 18th July 2012]

3. SURVEY RESULTS

The survey was undertaken during June 2012, following several weeks of lower than average sunshine, except immediately prior to the survey, and during a period of high rainfall[2].

No constraints to fieldwork were encountered.

Appendix 1 gives the location of survey sample plots, with the NVC codes to which the constituent stand is allocated. The distribution of the recorded vegetation stands is shown in Figure 2, found at the end of the report, and presented as a map of NVC communities in Figure 3, which follows it.

Appendix 2 gives a list of all species recorded from the sample plots and elsewhere on the site: those species occurring in the peatland and fen margin areas are noted.

A review of the survey results is presented in four sections:

3.1 Peatland communities
3.2 Fen margin communities
3.3 Sandy terrace communities
3.4 Riparian spoil

A brief account is given of all vegetation types recorded, which are listed in Tables 1, 8, 16 and 25 within the text. Further details of each community are given in the 2005 site vegetation survey report (ELP 2006). For convenience, all vegetation community tables are given at the end of the results section

3.1 Peatland communities

Six distinct vegetation types were identified within the peatland area of Hinderclay Fen. Table 1 refers to the stands where these communities are located, as shown in Figure 2; these are almost entirely at the western end of the site, corresponding to the peat-filled channel alongside Thelnetham Brook, and the eastern end of the Thelnetham-Blo' Norton peatland. Their floristic composition is given in Tables 2-7, in section 3.5.

The presence and character of these types of vegetation are compared with the 2005 survey in section 5.

The thin, linear sump woodland marking the Thelnetham Brook (Stand Aw) is placed within the *Lysimachia vulgaris* sub-community of the *Alnus glutinosa-Carex paniculata* woodland (W5b). The field and ground layer is very fragmentary and is represented by the small pond-sedge stands and scattered fen marginals towards the fringes of the stream course. Ferns are only

[2] http://www.guardian.co.uk/uk/series/last-month-s-weather [Accessed 10th July 2012]

frequent in small stands and groups on the margins and on the boles of the dominant alder canopy. As the Brook passes through the terrace, small seepages at its margins promote the growth of *Carex remota*, with ash seedlings, and these patches can be referred to the *Carex remota-Cirsium palustre* sub-community of the *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland (W7b). They are, however, a minor element of the woodland complex.

Table 1. Peatland NVC communities

Vegetation type	Stand ref.	NVC determination	Area Ha.	Table Ref.
Alder woodland	Aw	W5b *Alnus-Carex* woodland	1.16	2
Tufted Sedge swamp	Ce	S25c *Phragmites-Eupatorium* fen	0.44	3
Fen meadows	Js	M22a *Juncus-Cirsium* fen-meadow	0.14	4
Pond sedge swamp	Cp	Intermediate S6 *Carex riparia* swamp – S7 *Carex acutiformis* swamp	0.25	5
Reedbed	Rb	S25a *Phragmites-Eupatorium* fen	0.73	6
Sallow carr	Sc	W2a *Salix-Betula-Phragmites* woodland	0.05	7

The other communities form the open fen. Several species are constant throughout this habitat (*Phragmites australis, Eupatorium cannabinum, Solanum dulcamara* and *Mentha aquatica*) and indicate that the distinct variants evident across the fen could be amalgamated within a compendious S25 *Phragmites-Eupatorium* tall-herb fen. As shown in Figure 2, *Carex elata* (Stand Ce) and *Juncus subnodulosus* (Stand Js) mark a distinct track through the fen, often assuming dominance with a number of fen associates including *Lythrum salicaria*, *Angelica sylvestris* and *Scutellaria galericulata*. This is the only area where the moss *Calliergonella cuspidata* was recorded, and the ground surface was summer-wet or submerged during the survey. Most noticeable are the stands of *Juncus subnodulosus*. In the regularly-managed block of the rush, the vegetation approaches M22 *Juncus-Cirsium* fen-meadow, and this vegetation has been allocated to the Typical sub-community, though it may develop towards the *Carex elata* sub-community. The *Carex elata* stand itself cannot be regarded as a swamp, and is perhaps closest to the *Cladium mariscus* sub-community of S25 *Phragmites australis-Eupatorium cannabinum* fen, though the defining species is absent.

These stands are likely to be subject to calcareous groundwater influences. This is borne out by the shallow peat digging, which supports the stonewort *Chara virgata*.

The areas of Pond Sedge swamp (Stand Cp), Reedbed (Stand Rb) and Sallow Carr (Stand Sc) frame this central track and typically lack the peat surface wetness and indications of groundwater influence. They are each quite closely related to S25 *Phragmites-Eupatorium* fen, with the reedbed stand most closely related to the *Phragmites* sub-community (S25a). The reedbed stand samples display considerable variation in associate species, which is likely to reflect the disturbance to the peat surface following recent management.

The canopy of the encroaching sallow carr in the northeast of the peat embayment is coalescing in part, and can be assigned to an immature stage of the *Alnus glutinosa-Filipendula ulmaria* sub-community of *Salix cinerea-Betula pubescens-Phragmites australis* woodland (W2a). The Pond sedge swamp typically has a thick litter layer and is summer-dry; it is

therefore based placed as an intermediate between the S6 *Carex riparia* and S7 *Carex acutiformis* swamps, rather than included within the reedfen.

3.2 Fen margin communities

Eight rather different vegetation types were recorded along the transitional slope at the margin of the floodplain terrace, and are listed in Table 8 and located in Figure 2. Much of this suite of habitats remains very similar to that recorded in 2005, but there are marked differences in several stands, discussed in section 5.

The Purple Moor-grass *Molinia caerulea* grassland (Stand M) and woodland (Stand Wm) can be regarded as a remnant of slightly flushed vegetation along the upper part of the transitional slope. Though few other species, notably *Carex nigra*, are indicative of this kind of vegetation, small areas of comparable peat margin vegetation at Blo'Norton Fen suggest that this part of the terrace slope may once have supported vegetation close to M24 *Molinia caerulea-Cirsium dissectum* fen-meadow and W4 *Betula pubescens-Molinia caerulea* woodland. The current Purple Moor-grass grassland is indeterminate within the NVC, and supports species related to this kind of fen-meadow but also of dry acid grassland.

Table 8. Fen margin NVC communities

Vegetation type	Stand ref.	NVC determination	Area Ha.	Table ref.
Purple Moor-grass grassland	M	Indeterminate	0.48	9
Purple Moor-grass woodland	Wm	W4a *Betula-Molinia* woodland	1.43	10
Cleared birchwood	B	Indeterminate	0.19	11
Neutral grassland	Nc	MG5b *Cynosurus-Centaurea* grassland	0.02	12
Tall sedge grasslands	Hm/Ca	MG1b *Arrhenatherum elatius* grassland	0.34	13
Sallow scrub	Ss	W6a *Alnus-Urtica* woodland	0.42	14
Hemp-agrimony stand	E	Indeterminate	0.06	15
Dryopteris spp. fringe	-	Indeterminate	-	-

The woodland had been included within the W10 Oak-Birch woodland in the 2005 survey, but further samples indicate its relation to a dry and species-poor form of the *Dryopteris dilatata-Rubus fruticosus* sub-community of *Betula-Molinia* woodland (W4a). Stand B marks a cleared area of birchwood which is being colonised by species of open dry acid grassland. The stand is regarded as indeterminate within the NVC as it appears to be too dry to support W4 *Betula-Molinia* woodland, and active colonisation is most evident from the adjacent dry grassland species pool.

In a slightly lower part of the terrace margin, a small patch (c.10 m^2) of neutral grassland can be distinguished within the Purple Moor-grass grassland as Stand Nc, as shown in Figure 2. With abundant *Festuca rubra* and constant *Galium verum*, *Briza media* and *Thymus pulegioides*[3], the stand is assigned to the calcicolous *Galium verum* sub-community of

[3] Identified as *T. polytrichos* in 2005 survey

Cynosurus cristatus-Centaurea nigra grassland (MG5b). With the surrounding *Molinia grassland*, it may represent a relict seepage feature.

Two 'fen meadow' stands on the lower terrace slopes (Stands Hm and Ca) were treated individually in the 2005 survey, but are amalgamated here as 'Tall sedge grasslands'. While retaining many minor distinguishing features, both areas now share abundant *Arrhenatherum elatius* and *Carex acutiformis*, and a suite of eutrophile species, notably *Glechoma hederacea* and *Urtica dioica*. Species indicative of fen meadow vegetation are largely absent[4] and, where present, are very scarce. This vegetation can now be regarded as a form of the *Urtica dioica* sub-community of *Arrhenatherum elatius* grassland (MG1b).

The lowest parts of the terrace margin, typically with a humose topsoil in thin peat skirt areas, has frequently been colonised by *Salix cinerea*, forming sprawling coalescent scrub (Stand Ss), usually forming a dense canopy over a thin Nettle field layer with scattered patches of Common Reed. This kind of vegetation can be regarded as an incipient form of the Typical sub-community of the *Alnus glutinosa-Urtica dioica* woodland (W6a).

The terrace margin has an abrupt edge along the southern side of the western peat embayment and two further stands are recognised here. The first had been created before the 2005 survey by clearing the canopy at the margin of the peatland, and had been named for the abundance of Hemp Agrimony (Stand E), which is a fen species tolerant of drier situations. While the initial species assemblage had largely consisted of fen species with scattered dry woodland plants, its development has followed the trajectory set by the expansion of the unpalatable grass *Brachypodium sylvaticum* in drier areas, and of *Carex acutiformis* and the *Eupatorium* where it is more moist. The transitional gaps and boundaries between these species are also the locus for a group of uncommon and diminutive species, including *Carex lepidocarpa*, *Listera ovata* and the fern *Ophioglossum vulgatum*. Although the vegetation can be referred to the Eupatorietum cannabini R. Tuxen 1967 of some European schemes, it is indeterminate within the NVC.

The final terrace slope stand is the thin fringe of Buckler Ferns marking the edge of the peatland on its southern boundary, between stands Rb and Wd/Hd. Both Broad and Narrow Buckler Ferns *Dryopteris dilatata* and *D. carthusiana* are recorded in this distinctive vegetation of moist, peaty sand. It is not recognised within the NVC, but *D. carthusiana* is often recorded from the mildly acidic peats of raised areas in rich-fen and wet woodlands.

3.3 Sandy terrace communities

On the free-draining terrace sands, dry woodland and a suite of rabbit-grazed dry grasslands and scattered scrub are defined by nine vegetation types listed in Table 16 and described in Tables 17-24. The location of the sandy terrace stands is shown in Figure 2, with a sinuous boundary marking an often abrupt break in slope to the moister communities of the fen margin. Again, these communities are very similar to those recorded in 2005, often with little variation in species composition.

[4] As above-ground populations; they may be present in the soil seed-bank

Table 16. Sandy terrace NVC communities

Vegetation type	Stand ref.	NVC determination	Area Ha.	Table ref.
Ling heather vegetation	Cv	U1b *Festuca-Agrostis-Rumex* grassland	0.10	17
Acid lichen grassland	Ga	U1a *Festuca-Agrostis-Rumex* grassland	0.53	18
Parched acid grassland	Gp	U1b *Festuca-Agrostis-Rumex* grassland	0.57	19
Parched ruderal grassland	Gr	U1c *Festuca-Agrostis-Rumex* grassland	0.16	20
Dry circum-neutral grassland	Gn	U1d *Festuca-Agrostis-Rumex* grassland	0.14	21
Dry Yorkshire Fog grassland	Hd	U1d *Festuca-Agrostis-Rumex* grassland	0.23	22
Gorse scrub	Su	W23b *Ulex-Rubus* scrub	0.14	23
Oak-Birch woodland	Wd	W10d *Quercus-Pteridium-Rubus* woodland	1.55	24
Nutrient-rich scrub	Sn	W21b *Crataegus-Hedera* scrub	0.18	-

Two small areas of Ling Heather Vegetation (Stand Cv) serve to mark the lower edges of the dry terrace, and lack the open character of the adjacent parched grasslands. Rather than marking these stands as heathland, they can better be regarded as a grass-heath margin to the parched areas, and are referred to the Typical sub-community of *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland (U1b).

The main area of dry grassland is the very parched Acid Lichen Grassland (Stand Ga), which is restricted to the widest section of the terrace at Hinderclay Fen. Here, lichen cover is extensive and herb cover rarely exceeds 50 per cent cover and is typically less. Both lichen and moss species are well represented, but annual forbs are only infrequent. This stand is best accommodated within the *Cornicularia aculeata-Cladonia arbuscula* sub-community (U1a).

Three other distinct stands of dry grassland occur along the southern margin of the eastern half of the site. The area of Parched Acid Grassland (Stand Gp) retains a small group of lichen species, and an even larger group of mosses, but has a better developed cover of perennial grasses, and can be referred to the Typical sub-community (U1b). To the east, a more disturbed version of this vegetation - Parched Ruderal Grassland (Stand Gr) - lacks the group of lichens but supports an extensive suite of annual species including Annual Hair-grass *Aira praecox* and the ruderal Field Pansy *Viola arvensis* among many others. This stand is clearly referable to the *Erodium cicutarium-Teesdalia nudicaulis* sub-community (U1c). To the east of this stand, and marked by the appearance of Germander Speedwell *Veronica chamaedrys* and Lesser Stitchwort *Stellaria graminea*, is a Dry Circum-neutral Grassland (Stand Gn). This shares many of the annuals forbs that occur in Stand Gr, though in lower numbers, but has a greater cover and diversity of both perennial grass-type species and forbs. The sward is distinctly less parched and stronger-growing than the other stands in this part of the site, and fits within the *Anthoxanthum odoratum-Lotus corniculatus* sub-community (U1d).

Along the western half of Hinderclay Fen, the dry terrace lacks the characteristic species of the parched grasslands, and open swards are dominated by simple mixtures of *Holcus lanatus* and *Agrostis capillaris* grasses with *Rumex acetosella*. While this Dry Yorkshire Fog Grassland (Stand Hd) is less well developed than the sward of Stand Gn it is also referred to the *Anthoxanthum odoratum-Lotus corniculatus* sub-community (U1d). The stand contains large patches of Gorse Scrub, separated as Stand Su, and may be developing following scrub clearance. The scrub

itself can be related to the *Rumex acetosella* sub-community of the *Ulex europaeus-Rubus fruticosus* community (W23b), and stands Hd and Su are quite closely related floristically.

The most extensive vegetation type on the dry terrace sands is the Oak-Birch Woodland (Stand Wd, Figure 2). Though it has been separated from the Purple Moor-grass woodland (Stand Wm) in this survey, the blocks of woodland sampled each have their own character and physiognomy, but share often abundant populations of Oak (or Birch) and Yorkshire Fog. The shrub layer is very sparse, with only Hawthorn occurring with any frequency, and the relative lack of Bramble may indicate significant browsing. Apart from Yorkshire Fog, no other species occurs with any frequency in the ground layer.

A small block of Nutrient-rich Scrub (Stand Sn) on the western margin of the site was not reassessed, but is briefly described in the 2005 report.

3.4 Riparian spoil bank

The northern margin of Hinderclay Fen is marked by a bund of river spoil, which is clearly defined as an embankment above the level of the peat surface to the west of the site, while to the east its topography is more subdued, sometimes with no obvious margin with the low-lying terrace deposits. The bank is occupied by a large stand of *Urtica dioica*, with numerous associates, and by a scatter of woody species, principally *Betula pendula* and *Salix cinerea*. The vegetation has been described as a Riparian Nettlebed (Stand Rn, shown in Figure 2) in Table 25, and its floristic composition is given in Table 26.

Table 25. Riparian spoil NVC community

Vegetation type	Stand ref.	NVC determination	Area Ha.	Table ref.
Riparian nettlebed	Rn	OV24b *Urtica-Galium* community	1.49	26

The stand is assigned to the *Arrhenatherum elatius-Rubus fruticosus* agg. sub-community of the *Urtica dioica-Galium aparine* community (OV24b).

3.5 Vegetation community tables

(overleaf)

Table 2. Community composition of the Alder Woodland (W5b(W7b))

Stand Ref.	**Alder Woodland (Aw)**							
NVC	**W5b (W7b)**							
Sample Number	1	2	3	4	5	6		
Tree canopy								
Alnus glutinosa	8	10	9	10	9	8	V	(8-10)
Fraxinus excelsior	4			4	4		III	(4)
Betula pubescens	4			1		2	III	(1-2)
Populus x *canescens*						8	I	(8)
Shrub layer								
Fraxinus excelsior sapling		2	2	6	5		IV	(2-6)
Sambucus nigra			1		1	1	III	(1)
Populus x *canescens* sapling						3	I	(3)
Acer campestre sapling					1		I	(1)
Viburnum opulus		1					I	(1)
Ligustrum vulgare					1		I	(1)
Field and ground layer								
Urtica dioica	3		4	2	2	8	V	(2-8)
Solanum dulcamara	3	2	4	2	5		V	(2-5)
Brachythecium rivulare	2		3	2	3	3	V	(2-3)
Dryopteris dilatata		5	5	4	2	1	V	(1-5)
Kindbergia praelonga		4	2	1	4	4	V	(1-4)
Glechoma hederacea		4		3	3	7	IV	(3-7)
Scutellaria galericulata		1	3	4	5		IV	(1-5)
Lepraria spp.		1	2	2	3		IV	(1-3)
Lonicera periclymenum		1	2	1	2		IV	(1-2)
Holcus lanatus		2	1	1		1	IV	(1-2)
Cirsium palustre	1	1		1	1		IV	(1)
Iris pseudacorus	1	1		1	1		IV	(1)
Carex remota		5		3	3		III	(3-5)
Fraxinus excelsior seedling			3	3	3		III	(3)
Mentha aquatica	2			2	4		III	(2-4)
Eupatorium cannabinum	3			1	2		III	(1-3)
Galium aparine				1	1	3	III	(1-3)
Lycopus europaeus	2			1	2		III	(1-2)
Geranium robertianum		1		1	2		III	(1-2)
Pellia endiviifolia			1		1	2	III	(1-2)
Epilobium montanum			1	1	1		III	(1)
Athyrium filix-femina			4	4			II	(4)
Carex acutiformis	8				2		II	(2-8)
Bryum pseudotriquetrum				3	2		II	(2-3)
Cardamine pratensis		1	3				II	(1-3)
Hypnum cupressiforme		1			3		II	(1-3)

Cont'd.	Alder woodland (Aw)							
Brachythecium rutabulum			1	2			II	(1-2)
Ranunculus repens		2			1		II	(1-2)
Oxyrrhynchium hians				1	2		II	(1-2)
Plagiomnium undulatum				1	2		II	(1-2)
Humulus lupulus		1				1	II	(1)
Mnium hornum			1	1			II	(1)
Rumex sanguineus		2					I	(2)
Carex riparia		2					I	(2)
Amblystegium serpens				2			I	(2)
Phalaris arundinacea						2	I	(2)
Atrichum undulatum	1						I	(1)
Geum urbanum		1					I	(1)
Hypericum tetrapterum		1					I	(1)
Crataegus monogyna seedling			1				I	(1)
Hedera helix			1				I	(1)
Juncus effusus				1			I	(1)
Galium uliginosum					1		I	(1)
Myosoton aquaticum						1	I	(1)
Rubus fruticosus agg						1	I	(1)
Number of species		22	20	31	32	17		

Table 3. Community composition of the Tufted-sedge Swamp (S25c)

Stand Ref.	**Tufted-sedge Swamp (Ce)**											
NVC	**S25c**											
Sample number	1	2	3	4	5	6	7	8	9	10		
Phragmites australis	8	10	10	3	7	3	9	6	5	5	V	(3-10)
Carex elata	4	2	5	10	9	10	7	10	10	10	V	(2-10)
Eupatorium cannabinum		3		1	1	3	4	1	1	4	IV	(1-4)
Lythrum salicaria	3	1	2	2	1				2		III	(1-3)
Carex acutiformis		3	3		1			2	3		III	(1-3)
Solanum dulcamara	1		1		3	2				1	III	(1-3)
Mentha aquatica			5	3		1	2				II	(1-5)
Typha latifolia	2	2	1				1				II	(1-2)
Carex riparia	4		1							2	II	(1-4)
Angelica sylvestris								1	1	1	II	(1)
Galium palustre			2						2		I	(2)
Filipendula ulmaria									3	1	I	(1-3)
Calystegia sepium		1							2		I	(1-2)
Oxyrrhynchium speciosum	1		1								I	(1)
Carex pseudocyperus	5										I	(5)
Urtica dioica							4				I	(4)
Lycopus europaeus			2								I	(2)
Juncus subnodulosus					2						I	(2)
Phalaris arundinacea		2									I	(2)
Salix cinerea sapling								1			I	(1)
Cirsium palustre	1										I	(1)
Valeriana officinalis									1		I	(1)
Humulus lupulus				1							I	(1)
Cirsium arvense						1					I	(1)
Iris pseudacorus								1			I	(1)
Sward height (cm)	180	210	160	130	180	140	170	180	130	140		
Sward cover (%)	90	100	95	100	90	95	100	100	100	100		
Bryophyte cover (%)	0	0	0	0	0	0	0	0	0	0		
Litter cover (%)	40	40	60	70	80	70	70	70	70	70		
Bare ground (%)	30	30	10	0	0	0	0	0	0	0		
Water depth (cm)	0	6	5	3	4	3	0	0	0	2		
Number of species	9	8	11	6	7	6	6	7	10	7		Av. 7.7

Table 4. Community composition of Fen Meadow vegetation (M22a)

Stand Ref.	**Fen meadow (Js)**										
NVC	**M22a**										
Sample number	1	2	3	4	5	6	7	8	9		
Juncus subnodulosus	10	10	5	10	8	8	9	7	7	V	(5-10)
Mentha aquatica	3	4	3	2	3	2	4		5	V	(2-5)
Phragmites australis	5	3	10	6	8			7	5	IV	(3-10)
Eupatorium cannabinum	1		2	4	4	6	4	2		IV	(1-6)
Cirsium palustre	1	2	3	3	3	5	6			IV	(1-6)
Scutellaria galericulata	3	3	3	2			1	1		IV	(1-3)
Carex acutiformis	3	2		1	1			2		III	(1-3)
Carex elata		2		2	3			7		III	(2-7)
Calliergonella cuspidatum			2	5	6	4				III	(2-6)
Holcus lanatus			3			5	4			II	(3-5)
Kindbergia praelonga		1		2			4			II	(1-4)
Brachythecium rivulare		1			4		2			II	(1-4)
Agrostis stolonifera		1				3	3			II	(1-3)
Galium uliginosum		4	1	2						II	(1-3)
Solanum dulcamara	1				3			2		II	(1-3)
Lythrum salicaria		1		1					3	II	(1-3)
Galium aparine			1			2	1			II	(1-2)
Valeriana officinalis						5	3			II	(3-5)
Calamagrostis canescens	3						4			II	(3-4)
Poa trivialis						3	3			II	(3)
Carex riparia		2							7	II	(2-7)
Juncus effusus						4	2			II	(2-4)
Geranium robertianum						3	2			II	(2-3)
Lycopus europaeus							2		2	II	(2)
Bryum pseudotriquetrum			1			3				II	(1-3)
Typha latifolia			1		2					II	(1-2)
Galium palustre			1						2	II	(1-2)
Salix cinerea sapling		1							1	II	(1)
Angelica sylvestris		1						1		II	(1)
Scrophularia auriculata seedling	1	1								II	(1)
Hydrocotyle vulgaris				4						I	(4)
Carex disticha			2							I	(2)
Lychnis flos-cuculi				2						I	(2)
Lotus pedunculatus				2						I	(2)
Oxyrrhynchium speciosum					2					I	(2)
Agrostis canina					2					I	(2)
Festuca rubra							2			I	(2)
Vicia cracca									2	I	(2)
Epilobium parviflorum	1									I	(1)
Cirsium arvense	1									I	(1)
Filipendula ulmaria		1								I	(1)
Dryopteris carthusiana			1							I	(1)
Urtica dioica			1							I	(1)
Hypericum tetrapterum			1							I	(1)

Cont'd	Fen meadow (Js)										
Cardamine pratensis				1						I	(1)
Ranunculus flammula				1						I	(1)
Carex lepidocarpa							1			I	(1)
Carex paniculata							1			I	(1)
Sward height (cm)	130	130	140	130	130	105	120	150	150		
Sward cover (%)	95	100	95	100	100	100	100	90	95		
Bryophyte cover (%)	0	1	3	20	30	10	10	0	0		
Litter cover (%)	5	0	5	10	10	20	30	75	70		
Bare ground (%)	65	70	70	60	50	50	40	0	0		
Water depth (cm)	1	1	2	2	2	0	0	0	0		
Number of species	12	17	17	17	13	13	19	8	9		Av. 13.9

Table 5. Community composition of the Pond-sedge Swamp (S6-S7)

Stand Ref.	**Pond-sedge Swamp (Cp)**								
NVC									
Sample number	1	2	3	4	5	6	7		
Phragmites australis	10	9	10	2	3	10	10	V	(2-10)
Carex acutiformis	6	4	2	10	10	9	5	V	(2-10)
Solanum dulcamara	3			4	3	3	2	IV	(2-4)
Carex riparia	9	9	6				3	III	(3-9)
Eupatorium cannabinum			2	3	2		1	III	(1-3)
Mentha aquatica				3	1			II	(1-3)
Humulus lupulus			3			1		II	(1-3)
Lythrum salicaria			1		1			II	(1)
Salix cinerea sapling					4			I	(4)
Lycopus europaeus				2				I	(2)
Epilobium hirsutum		1						I	(1)
Carex pseudocyperus			1					I	(1)
Phalaris arundinacea			1					I	(1)
Iris pseudacorus							1	I	(1)
Sward height (cm)	200	170	160	160	145	220	180		
Sward cover (%)	100	100	100	100	95	100	100		
Bryophyte cover (%)	0	0	0	0	0	0	0		
Litter cover (%)	20	10	70	70	70	70	70		
Bare ground (%)	50	60	0	0	0	0	0		
Water depth (cm)	2	0	0	0	0	0	0		
Number of species	4	4	8	6	7	4	6		Av. 5.6

Table 6. Community composition of the Reedbed vegetation (S25a)

Stand Ref.	**Reedbed (Rb)**																
NVC	**S25a**																
Sample number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Shrub layer																	
Salix cinerea sapling		1	1			1	4	1	4							III	(1-4)
Betula pubescens sapling										4	1				3	I	(1-4)
Field layer																	
Phragmites australis	6	10	9	10	10	10	9	9	10	10	9	10	10	10	7	V	(6-10)
Solanum dulcamara		6	2	1		3		9	4	2		6	3	2		IV	(1-9)
Urtica dioica	3	2	3	3	2	3		2	3						2	IV	(2-3)
Humulus lupulus	1		1	2			4		2	4	6		3			III	(1-6)
Galium aparine	7	5	4				4			1	6			2		III	(1-7)
Eupatorium cannabinum	3	3	2	3						3	4					III	(2-4)
Cirsium palustre	1	2				1	1			1	1					III	(1-2)
Calamagrostis canescens		4	3			2									3	II	(2-4)
Cirsium arvense	2	3	2											3		II	(2-3)
Agrostis stolonifera	2		2		2										2	II	(2)
Mentha aquatica	2						2				2			1		II	(1-2)
Typha latifolia		1				1	2				1					II	(1-2)
Carex riparia					4		2							4		I	(2-4)
Carex acutiformis							3						2	3		I	(2-3)
Kindbergia praelonga			1							7	4					I	(1-7)
Juncus effusus	1									4	2				4	I	(1-4)
Calystegia sepium				1	3									1		I	(1-3)
Iris pseudacorus								2	1					1		I	(1-2)

Cont'd	Reedbed (Rb)																
Brachythecium rivulare										4	3					I	(3-4)
Juncus subnodulosus		3				3										I	(3)
Lycopus europaeus								3			1					I	(1-3)
Dryopteris carthusiana										2	1					I	(1-2)
Oxyrrhynchium speciosum		2				1										I	(1-2)
Angelica sylvestris	1						1									I	(1)
Filipendula ulmaria		1					1									I	(1)
Vicia cracca	1		1													I	(1)
Lythrum salicaria			1				1									I	(1)
Arrhenatherum elatius	7															I	(7)
Carex elata							4									I	(4)
Holcus lanatus															3	I	(3)
Myosotis arvensis	3															I	(3)
Carex pseudocyperus				3												I	(3)
Phalaris arundinacea					3											I	(3)
Agrostis canina															2	I	(2)
Dicranella cerviculata															2	I	(2)
Fissidens adianthoides										2						I	(2)
Brachythecium rutabulum			1													I	(1)
Equisetum palustre													1			I	(1)
Arctium minus agg	1															I	(1)
Bryonia dioica	1															I	(1)
Epilobium montanum										1						I	(1)
Myosoton aquaticum	1															I	(1)
Sward height (cm)	140	160	160	170	190	180	160	170	180	190	190	190	210	170	150		
Sward cover (%)	90	100	90	100	100	100	90	100	100	100	100	95	100	100	70		
Bryophyte cover (%)	0	1	0	0	0	1	0	0	0	40	5	0	0	0	1		
Litter cover (%)	65	50	80	70	70	70	80	70	70	60	60	80	70	70	40		
Bare ground (%)	10	20	0	0	0	0	0	0	0	10	10	0	0	0	50		
Water depth (cm)	0	0	0	0	0	0	0	0	0	2	4	2	5	0	0		
Number of species	17	13	14	7	6	9	13	6	6	13	13	2	5	9	9		Av. 9.4

Table 7. Community composition of the Sallow Carr (W2a)

Stand Ref.	**Sallow Carr (Sc)**			
NVC	**W2a**			
Sample number	3	4		
Shrub layer				
Salix cinerea sapling	8	9	2	(8-9)
Alnus glutinosa sapling	1	4	2	(1-4)
Field layer				
Phragmites australis	5	4	2	(4-5)
Solanum dulcamara	4	3	2	(3-4)
Agrostis stolonifera	2	3	2	(2-3)
Brachythecium rutabulum	2	1	2	(1-2)
Betula pendula seedling	1	1	2	(1)
Calamagrostis canescens	5		1	(5)
Lycopus europaeus		2	1	(2)
Carex riparia		2	1	(2)
Lythrum salicaria		1	1	(1)
Typha latifolia	1		1	(1)
Oxyrrhynchium speciosum		1	1	(1)
Epilobium montanum		1	1	(1)
Sward height (cm)	250	300		
Sward cover (%)	85	90		
Bryophyte cover (%)	1	0		
Litter cover (%)	15	10		
Bare ground (%)	65	60		
Water depth (cm)	0	0		
Number of species	9	12		Av. 10.5

Table 9. Community composition of the Purple Moor-grass Grassland (Indeterminate)

Stand Ref.	**Purple Moor-grass Grassland (M)**						
NVC	***Indeterminate***						
Sample Number	1	2	3	4	5		
Shrub layer							
Quercus robur sapling		1	1	1		III	(1)
Betula pubescens sapling	2				1	II	(1-2)
Ulex europaeus sapling			1		1	II	(1)
Field layer							
Molinia caerulea	8	8	8	8	7	V	(7-8)
Rumex acetosella	3	2	1	5	3	V	(1-5)
Festuca ovina	2	1	2	1	5	V	(1-5)
Pseudoscleropodium purum	4	4	2	2	2	V	(2-4)
Agrostis capillaris	4	3		2	2	IV	(2-4)
Carex nigra	3	1	2		2	IV	(1-3)
Cladonia squamosa	3		2			II	(2-3)
Campylopus pyriformis	2		2			II	(2)
Polytrichum juniperinum	2		1			II	(1-2)
Galium saxatile		1	1			II	(1)
Betula pendula seedling			2	1		II	(1-2)
Aira praecox	2				2	II	(2)
Brachythecium albicans				2	1	II	(1-2)
Hypnum cupressiforme			1		5	II	(1-5)
Luzula multiflora	1	1				II	(1)
Dicranum scoparium			1			I	(1)
Calluna vulgaris		1				I	(1)
Holcus lanatus				5		I	(5)
Cerastium fontanum				2		I	(2)
Veronica arvensis		1				I	(1)
Agrostis vinealis	1					I	(1)
Anthoxanthum odoratum					1	I	(1)
Glechoma hederacea				1		I	(1)
Holcus mollis		2				I	(2)
Hypnum jutlandicum			1			I	(1)
Juncus effusus			2			I	(2)
Cladonia fimbriata			3			I	(3)
Pohlia nutans					1	I	(1)
Senecio jacobaea				1		I	(1)
Stellaria pallida					1	I	(1)
Zygogonium ericetorum					1	I	(1)
Sward height (cm)	35	35	60	45	40		
Herb cover (%)	60	65	75	80	65		
Bryophyte cover (%)	15	10	5	2	15		
Litter cover (%)	30	40	50	50	15		
Bare ground (%)	25	15	5	0	20		
Number of species	13	12	17	12	15		Av. 13.8

Table 10. Community composition of the Purple Moor-grass woodland (W4a)

Stand Ref.	**Purple Moor-grass woodland (Wm)**						
NVC	**W4a**						
Sample No.	1	2	3	4	5		
Canopy							
Betula pendula	8	7	7	8	9	V	(7-9)
Quercus robur		5	8			II	(5-8)
Populus tremula	7					I	(7)
Shrub layer							
Betula pubescens	1	1			2	III	(1-2)
Populus tremula suckers	3		1			II	(1-3)
Field layer							
Molinia caerulea	7	7	4	5	6	V	(4-7)
Agrostis capillaris	3	1	3	2	1	V	(1-3)
Rubus fruticosus agg.	1		2	2	1	IV	(1-2)
Lonicera periclymenum		1	1	2	2	IV	(1-2)
Stellaria media	2		1	1	2	IV	(1-2)
Brachythecium rutabulum	2	1	1	1		IV	(1-2)
Kindbergia praelonga	1		2	1	1	IV	(1-2)
Holcus lanatus	3			8	5	III	(3-8)
Holcus mollis	2		6			II	(2-6)
Carex nigra	2	3				II	(2-3)
Festuca ovina		2		2		II	(2)
Galium saxatile				2	2	II	(2)
Arrhenatherum elatius				2	2	II	(2)
Anthoxanthum odoratum			4		1	II	(1-4)
Festuca rubra			1	4		II	(1-4)
Stellaria pallida	2			1		II	(1-2)
Mnium hornum			1	1		II	(1)
Rumex acetosella				4		I	(4)
Glechoma hederacea					4	I	(4)
Carex pilulifera	2					I	(2)
Campylopus introflexus		2				I	(2)
Lophocolea bidentata			2			I	(2)
Veronica chamaedrys				2		I	(2)
Hypnum cupressiforme		1				I	(1)
Stellaria graminea			1			I	(1)
Galium aparine			1			I	(1)
Atrichum undulatum				1		I	(1)
Dryopteris dilatata					1	I	(1)
Pseudotaxiphyllum elegans			1			I	(1)
Betula pubescens seedling					1	I	(1)
Dicranum scoparium	1					I	(1)
Campylopus flexuosus				1		I	(1)
Polytrichiastrum formosum			1			I	(1)
Quercus robur seedling	1					I	(1)
Dicranella heteromalla		1				I	(1)
Juncus effusus	1					I	(1)
No. of species	18	12	19	19	15		Av. 16.6

Table 11. Community composition of the Cleared Birchwood (Indet.)

Stand Ref.	**Cleared Birchwood (B)**						
NVC	**Indeterminate**						
Sample Number	1	2	3	4	5		
Rumex acetosella	4	6	8	8	4	V	(4-8)
Campylopus pyriformis	4	7	7	8	6	V	(4-8)
Molinia caerulea	5	8	2	2	7	V	(2-8)
Cladonia squamosa	4	3	2	2	1	V	(1-4)
Betula pubescens sapling	1	1	1	2	2	V	(1-2)
Dicranum scoparium	9		3	2	2	IV	(2-9)
Cladonia pyxidata	2	2	1		2	IV	(1-2)
Cladonia ramulosa	2	1		1	2	IV	(1-2)
Polytrichum juniperinum	7	1	3			III	(1-7)
Galium saxatile	2	1			1	III	(1-2)
Agrostis capillaris	5		1			II	(1-5)
Calluna vulgaris	2				1	II	(1-2)
Festuca ovina (filiformis)	2		1			II	(1-2)
Carex pilulifera	1			1		II	(1)
Ulex europaeus sapling		1			1	II	(1)
Betula pendula seedling				1	1	II	(1)
Campylopus introflexus		4				I	(4)
Polytrichum piliferum	3					I	(3)
Holcus lanatus	3					I	(3)
Funaria hygrometrica				2		I	(2)
Cladonia portentosa	2					I	(2)
Pseudoscleropodium purum	2					I	(2)
Cerastium fontanum	1					I	(1)
Veronica arvensis	1					I	(1)
Stellaria graminea	1					I	(1)
Sward height (cm)	10	70	12	18	70		
Herb cover (%)	20	70	60	60	45		
Bryophyte cover (%)	80	45	40	60	30		
Litter cover (%)	0	10	0	0	5		
Bare ground (%)	0	5	40	30	50		
Number of species	21	11	10	10	12		Av. 12.8

Table 12. Community composition of the Neutral Grassland (MG5b)

Stand Ref.	Neutral Grassland (Nc)			
NVC	MG5b			
Sample Number	23	24		
Festuca rubra	8	8	2	(8)
Holcus lanatus	6	7	2	(6-7)
Agrostis capillaris	5	4	2	(4-5)
Pseudoscleropodium purum	4	3	2	(3-4)
Glechoma hederacea	3	3	2	(3)
Galium verum	4	2	2	(2-4)
Potentilla reptans	4	2	2	(2-4)
Arrhenatherum elatius	4	2	2	(2-4)
Stellaria graminea	3	2	2	(2-3)
Thymus pulegioides	3	2	2	(2-3)
Dactylis glomerata	3	2	2	(2-3)
Cerastium fontanum	2	2	2	(2)
Prunella vulgaris	2	2	2	(2)
Veronica chamaedrys	1	4	2	(1-4)
Rumex acetosa	3	1	2	(1-3)
Medicago lupulina	2	1	2	(1-2)
Luzula campestris	2	1	2	(1-2)
Ranunculus bulbosus	1	2	2	(1-2)
Senecio jacobaea	1	2	2	(1-2)
Achillea millefolium	1	2	2	(1-2)
Briza media	1	1	2	(1)
Anthoxanthum odoratum	4		1	(4)
Rumex acetosella	3		1	(3)
Cirsium arvense		2	1	(2)
Viola hirta	1		1	(1)
Centaurea nigra		1	1	(1)
Quercus robur seedling		1	1	(1)
Carex flacca		1	1	(1)
Lotus corniculatus	1		1	(1)
Myosotis arvensis		1	1	(1)
Cirsium vulgare		1	1	(1)
Sward height (cm)	25	35		
Herb cover (%)	95	100		
Bryophyte cover (%)	5	2		
Litter cover (%)	25	20		
Bare ground (%)	25	25		
Number of species	25	27		Av. 26.0

Table 13. Community composition of the Tall Sedge Grasslands (MG1b)

Stand Ref.	**Tall Sedge Grassland (Ca)**						**Tall Sedge Grassland (Hm)**						
NVC	**MG1b**						**MG1b**						
Sample Number	1	2	3	4	5	6	1	2	3	4	5		
Arrhenatherum elatius	4	9	4	3	3	3	7	8	10	10	10	V	(3-10)
Glechoma hederacea	3	3	3	3	3	3	3	3	3	3	3	V	(3)
Festuca rubra		2	7	5	6	4	5	4		2	4	V	(2-7)
Carex acutiformis	10	3	9	10	9	9			1	2	4	V	(1-10)
Brachythecium rutabulum		1	5	2	4	2	2	1	1			IV	(1-5)
Urtica dioica	3				3	2		2	3	3	2	IV	(2-3)
Galium aparine	3	2	1	1	1	1				2		IV	(1-3)
Stellaria graminea			2	1			2		2		1	III	(1-2)
Elytrigia repens	2	3	3			2						II	(2-3)
Holcus lanatus	1					3	5	5				II	(1-5)
Agrostis stolonifera	2					2				3		II	(2-3)
Lamium album	1			2	2							II	(1-2)
Vicia cracca	1	2						2				II	(1-2)
Conium maculatum			1	2	1							II	(1-2)
Cirsium arvense	2					2						I	(2)
Linaria vulgaris		2						2				I	(2)
Myosotis arvensis								2			2	I	(2)
Chamerion angustifolium										1	4	I	(1-4)
Galeopsis tetrahit agg.			2		1							I	(1-2)
Poa trivialis		1				2						I	(1-2)
Silene latifolia				2		1						I	(1-2)
Lonicera periclymenum		1	1									I	(1)
Quercus robur seedling	1	1										I	(1)
Veronica arvensis			1	1								I	(1)
Juncus effusus					4							I	(4)
Agrostis capillaris							4					I	(4)
Carex hirta								3				I	(3)
Phalaris arundinacea		2										I	(2)
Populus tremula suckers					2							I	(2)
Anthoxanthum odoratum							2					I	(2)
Galium uliginosum							2					I	(2)
Galium verum								2				I	(2)
Lathyrus pratensis								2				I	(2)
Veronica chamaedrys							2					I	(2)
Dactylis glomerata	1											I	(1)
Rubus fruticosus agg	1											I	(1)
Viola arvensis					1							I	(1)
Achillea millefolium											1	I	(1)
Betula pendula seedling							1					I	(1)
Centaurea nigra								1				I	(1)
Molinia caerulea										1		I	(1)
Rumex acetosa								1				I	(1)
Sward height (cm)	80	75	75	65	80	70	110	110	120	125	120		
Herb cover (%)	100	95	100	100	95	90	90	90	100	100	100		
Bryophyte cover (%)	0	0	10	0	5	0	1	0	0	0	0		
Litter cover (%)	40	40	40	40	40	35	60	60	50	50	55		
Bare ground (%)	15	20	20	15	20	25	20	10	10	15	10		
Number of species	14	13	12	11	13	13	11	14	6	9	9	Av.	11.4

Table 14. Community composition of the Sallow Scrub (W6a)

Stand Ref.	**Sallow Scrub (Ss)**						
NVC							
Sample number	1	2	3	4	5		
Shrub layer							
Salix cinerea	10	8	8	8	7	V	(7-10)
Sambucus nigra		4		4		II	(4)
Betula pendula				5		I	(5)
Field and ground layers							
Galium aparine		4	4	4	3	IV	(3-4)
Urtica dioica	2	8	3	5		IV	(2-8)
Phragmites australis	7	5		5		III	(5-7)
Kindbergia praelonga	6		5	6		III	(5-6)
Glechoma hederacea		3	3		2	III	(2-3)
Carex acutiformis			7		7	II	(7)
Rubus fruticosus agg			5	4		II	(4-5)
Brachythecium rutabulum				4	4	II	(4)
Poa trivialis				3	3	II	(3)
Carex riparia	2	2				II	(2)
Vicia cracca		2	1			II	(1-2)
Arrhenatherum elatius					4	I	(4)
Calystegia sepium		2				I	(2)
Agrostis stolonifera			2			I	(2)
Lonicera periclymenum					2	I	(2)
Lycopus europaeus				2		I	(2)
Conium maculatum					1	I	(1)
Sward height (cm)	450	500	500	600	400		
Sward cover (%)	45	70	60	45	50		
Bryophyte cover (%)	30	0	25	30	5		
Litter cover (%)	20	15	50	20	40		
Bare ground (%)	50	60	10	20	25		
Water depth (cm)	0	0	0	0	0		
Number of species	5	9	9	11	9		Av. 8.6

Table 15. Community composition of the Hemp Agrimony stand (Indet.)

Stand Ref.	**Hemp Agrimony stand (B)**						
NVC	**Indeterminate**						
Sample Number	1	2	3	4	5		
Brachypodium sylvaticum	8	8	8	7	4	V	(4-8)
Eupatorium cannabinum	5	4	4	6	8	V	(4-8)
Brachythecium rutabulum	5	2	3	3	3	V	(2-5)
Agrostis stolonifera	4	2	3	2	2	V	(2-4)
Glechoma hederacea	3	2	2	2	2	V	(2-3)
Cirsium palustre	2	2	2	4	1	V	(1-4)
Potentilla reptans	3	2	2	1	1	V	(1-3)
Holcus lanatus		3	6	6	2	IV	(2-6)
Carex acutiformis	8	4	2		2	IV	(2-8)
Arrhenatherum elatius	5	3	2		4	IV	(2-5)
Phragmites australis	3	2	1		2	IV	(1-3)
Poa trivialis	2		1	2	2	IV	(1-2)
Agrostis capillaris		6	4	2		III	(2-6)
Ajuga reptans	3	2	2			III	(2-3)
Geranium robertianum	2	1		3		III	(1-3)
Angelica sylvestris	1		2	2		III	(1-2)
Filipendula ulmaria	1	1	2			III	(1-2)
Galium aparine	1	1	2			III	(1-2)
Myosotis arvensis	2		1	1		III	(1-2)
Juncus subnodulosus				6	3	II	(3-6)
Mentha aquatica				3	2	II	(2-3)
Elytrigia repens	3			2		II	(2-3)
Valeriana officinalis				2	2	II	(2)
Listera ovata		1		2		II	(1-2)
Populus tremula suckers		2	1			II	(1-2)
Vicia cracca		2			1	II	(1-2)
Juncus effusus			1	1		II	(1)
Carex lepidocarpa		1		1		II	(1)
Viola riviniana		1	1			II	(1)
Calamagrostis epigejos		4				I	(4)
Ophioglossum vulgatum	3					I	(3)
Ranunculus repens			2			I	(2)
Solanum dulcamara					2	I	(2)
Festuca rubra				2		I	(2)
Crataegus monogyna seedling				2		I	(2)
Rubus fruticosus agg		2				I	(2)
Luzula multiflora		2				I	(2)
Luzula campestris		2				I	(2)
Lonicera periclymenum			2			I	(2)
Rubus idaeus			2			I	(2)
Scutellaria galericulata					1	I	(1)
Lycopus europaeus					1	I	(1)
Carex riparia			1			I	(1)
Dryopteris carthusiana			1			I	(1)

Cont'd	Hemp-agrimony stand (B)						
Lithospermum officinale		1				I	(1)
Carex flacca		1				I	(1)
Rhytidiadelphus squarrosus	1					I	(1)
Triticum aestivum			1			I	(1)
Moehringia trinervia			1			I	(1)
Cerastium fontanum			1			I	(1)
Taraxacum officinale agg			1			I	(1)
Juncus articulatus					1	I	(1)
Carex remota					1	I	(1)
Fraxinus excelsior sapling					1	I	(1)
Sward height (cm)	40	25	45	70	75		
Sward cover (%)	100	100	95	90	90		
Bryophyte cover (%)	20	2	2	5	2		
Litter cover (%)	20	10	20	15	15		
Bare ground (%)	50	60	50	55	55		
Water depth (cm)	0	0	0	0	0		
Number of species	20	27	30	22	22		Av. 24.2

Table 17. Community composition of the Ling Heather vegetation (U1b)

Stand Ref.	**Ling Heather vegetation (Cv)**						
NVC	**U1b**						
Sample Number	1	2	3	4	5		
Calluna vulgaris	9	10	10	10	10	V	(9-10)
Pseudoscleropodium purum	6	5	8	6	7	V	(5-8)
Festuca filiformis	4	5	2	2		IV	(2-5)
Agrostis capillaris	4	4	1		2	IV	(1-4)
Rumex acetosella	2	2	2	1		IV	(1-2)
Galium saxatile	1	1	2	2		IV	(1-2)
Veronica officinalis	3	3		2		III	(2-3)
Carex pilulifera	2	1			2	III	(1-2)
Holcus lanatus	1	1	2			III	(1-2)
Luzula campestris	4	3				II	(3-4)
Pleurozium schreberi	2		4			II	(2-4)
Dicranum scoparium	2	3				II	(2-3)
Stellaria graminea	3	1				II	(1-3)
Cladonia furcata	1	2				II	(1-2)
Polytrichum juniperinum	2	1				II	(1-2)
Agrostis vinealis	1	1				II	(1)
Quercus robur seedling				1	1	II	(1)
Molinia caerulea				2		I	(2)
Brachythecium albicans		1				I	(1)
Betula pendula seedling	1					I	(1)
Hypnum cupressiforme		1				I	(1)
Sward height (cm)	15	18	45	50	60		
Herb cover (%)	95	100	100	100	90		
Lichen cover (%)	1	1	0	0	0		
Bryophyte cover (%)	35	30	70	30	40		
Litter cover (%)	10	15	20	30	35		
Bare ground (%)	0	0	10	10	20		
Number of species	17	17	8	8	5		Av. 11.0

Table 18. Community composition of the Acid Lichen Grassland (U1a)

Stand Ref.	**Acid Lichen Grassland (Ga)**						
NVC	**U1a**						
Sample Number	1	2	3	4	5		
Cladonia furcata	10	10	9	7	9	V	(7-10)
Rumex acetosella	5	8	6	5	6	V	(5-8)
Agrostis capillaris	3	3	4	5	4	V	(3-5)
Festuca ovina (filiformis)	3	1	4	6	2	V	(1-6)
Polytrichum juniperinum	3		4	5	4	IV	(3-5)
Dicranum scoparium	1		2	2	2	IV	(1-2)
Ceratodon purpureus	1	2		2	2	IV	(1-2)
Cladonia squamosa		1	2	1	2	IV	(1-2)
Aira praecox		1	1	2	1	IV	(1-2)
Cladonia fimbriata		1	1	1	2	IV	(1-2)
Zygogonium ericetorum		2	1	5		III	(1-5)
Brachythecium albicans	3		1	3		III	(1-3)
Cetraria aculeata	2		1		1	III	(1-2)
Galium saxatile	1		1	1		III	(1)
Agrostis vinealis	1		1		1	III	(1)
Cladonia pyxidata			1	1	1	III	(1)
Cladonia ramulosa		1	1	1		III	(1)
Cladonia coniocraea		1	1	1		III	(1)
Hypnum cupressiforme	5			2		II	(2-5)
Holcus mollis			3		2	II	(2-3)
Polytrichum piliferum		3	3			II	(3)
Luzula campestris		1	1			II	(1)
Holcus lanatus		1			1	II	(1)
Calluna vulgaris			4			I	(4)
Campylopus pyriformis					4	I	(4)
Viola canina				2		I	(2)
Cerastium fontanum			1			I	(1)
Veronica arvensis				1		I	(1)
Cladonia glauca			1			I	(1)
Aphanes australis		1				I	(1)
Lotus corniculatus				1		I	(1)
Campylopus introflexus					1	I	(1)
Carex pilulifera					1	I	(1)
Sward height (cm)	5	10	12	14	13		
Herb cover (%)	20	60	20	40	40		
Lichen cover (%)	95	95	95	40	95		
Bryophyte cover (%)	1	1	10	20	10		
Litter cover (%)	0	0	0	0	0		
Bare ground (%)	1	1	1	20	0		
Number of species	12	15	23	20	18		Av. 17.6

Table 19. Community composition of the Parched Acid Grassland (U1b)

Stand Ref.	**Parched Acid Grassland (Gp)**						
NVC	**U1b**						
Sample Number	1	2	3	4	5		
Rumex acetosella	6	7	9	8	8	V	(6-9)
Pseudoscleropodium purum	5	7	9	8	7	V	(5-9)
Agrostis capillaris	8	4	5	5	5	V	(4-8)
Brachythecium albicans	5	5	2	1	2	V	(1-5)
Galium saxatile	2	4	1	1	3	V	(1-4)
Hypnum cupressiforme	6		4	5	1	V	(1-6)
Cladonia furcata	6	1	2	1		V	(1-6)
Luzula campestris		5	1	2	1	V	(1-5)
Polytrichum juniperinum	4	3	3	1		V	(1-4)
Festuca ovina (filiformis)	1	3		1	2	V	(1-3)
Agrostis vinealis	2	2	1		1	V	(1-2)
Pilosella officinarum			2	7	4	III	(2-7)
Rhytidiadelphus squarrosus		4		1	1	III	(1-4)
Zygogonium ericetorum	2	2		1		III	(1-2)
Holcus lanatus	1	1			2	III	(1-2)
Cerastium fontanum	1	1	1			III	(1)
Veronica arvensis	1		1		1	III	(1)
Galium verum				4	3	II	(3-4)
Cladonia squamosa		2	2			II	(2)
Polytrichum piliferum		3		1		II	(1-3)
Aira praecox		1	2			II	(1-2)
Dicranum scoparium	2	1				II	(1-2)
Poa pratensis				1	1	II	(1)
Ceratodon purpureus		4				I	(4)
Lophocolea heterophylla					3	I	(3)
Campanula rotundifolia				3		I	(3)
Stellaria graminea					2	I	(2)
Carex caryophyllea				2		I	(2)
Veronica officinalis					2	I	(2)
Campylopus pyriformis					1	I	(1)
Senecio jacobaea			1			I	(1)
Bryum subapiculatum[5]		1				I	(1)
Carex hirta				1		I	(1)
Ulex europaeus seedling					1	I	(1)
Cephaloziella divaricata					1	I	(1)
Cladonia glauca	1					I	(1)
Molinia caerulea	1					I	(1)
Xanthoria parietina	1					I	(1)
Sward height (cm)	9	12	15	7	14		
Herb cover (%)	60	60	90	80	90		
Lichen cover (%)	30	0	0	0	0		
Bryophyte cover (%)	60	60	90	70	40		
Litter cover (%)	5	0	1	0	5		
Bare ground (%)	10	15	0	10	5		
Number of species	18	20	16	19	21		Av. 18.8

[5] Not confirmed

Table 20. Community composition of the Parched Ruderal Grassland (U1c)

Stand Ref.	**Parched Ruderal Grassland (Gr)**						
NVC	**U1c**						
Sample Number	1	2	3	4	5		
Rumex acetosella	7	8	9	9	8	V	(7-9)
Agrostis capillaris	5	5	3	3	3	V	(3-5)
Ceratodon purpureus	4	2	4	7	6	V	(2-7)
Brachythecium albicans	5	4	2	3	4	V	(2-5)
Cerastium semidecandrum	3	2	3	2	3	V	(2-3)
Festuca rubra	6	2	2	1	3	V	(1-6)
Cladonia furcata	1	1	2	2	4	V	(1-4)
Sagina apetala	2	2	3	1	2	V	(1-3)
Aira praecox	1	3	2	1	2	V	(1-3)
Cerastium fontanum	2	2	1	1	2	V	(1-2)
Viola arvensis	2	2	2	1	1	V	(1-2)
Taraxacum officinale agg	1	2	1	2	2	V	(1-2)
Geranium molle	1	1	1	1	2	V	(1-2)
Campylopus pyriformis	6	8	7	4		IV	(4-8)
Aphanes australis	3	3	3	3		IV	(3)
Erodium cicutarium	2	2		2	3	IV	(2-3)
Poa pratensis s.l.	3	2	1	2		IV	(1-3)
Polytrichum juniperinum	2	2	2	1		IV	(1-2)
Senecio jacobaea	2	1		2	2	IV	(1-2)
Veronica arvensis	2	1	1		2	IV	(1-2)
Arenaria serpyllifolia	1	1		1	2	IV	(1-2)
Vulpia bromoides	2		3		3	III	(2-3)
Holcus lanatus	4	1	1			III	(1-4)
Myosotis ramosissima		2	1	2		III	(1-2)
Glechoma hederacea	2				3	II	(2-3)
Luzula campestris	2				2	II	(2)
Pseudoscleropodium purum	1	1				II	(1)
Urtica dioica	1		1			II	(1)
Potentilla reptans					4	I	(4)
Bryum subapiculatum[6]	1					I	(1)
Brachythecium rutabulum				1		I	(1)
Bryum argenteum	1					I	(1)
Hypnum cupressiforme			1			I	(1)
Anagallis arvensis				1		I	(1)
Trifolium dubium	1					I	(1)
Phleum bertolonii					1	I	(1)
Bromus hordeaceus agg.		1				I	(1)
Epilobium ciliatum					1	I	(1)
Papaver dubium		1				I	(1)
Sonchus arvensis		1				I	(1)
Trifolium campestre	1					I	(1)

[6] Not confirmed

Cont'd	Parched ruderal grassland (Gr)					
Sward height (cm)	16	17	18	17	16	
Herb cover (%)	90	85	90	85	85	
Lichen cover (%)	0	0	0	0	1	
Bryophyte cover (%)	40	60	40	40	40	
Litter cover (%)	0	0	0	0	0	
Bare ground (%)	15	20	20	10	20	
Number of species	31	27	23	23	23	Av. 25.4

Table 21. Community composition of the Dry Circum-neutral Grassland (U1d)

Stand Ref.	**Dry Circum-neutral Grassland (Gn)**						
NVC	**U1d**						
Sample Number	1	2	3	4	5		
Agrostis capillaris	6	5	4	6	6	V	(4-6)
Festuca rubra	8	8	7	3	6	V	(3-8)
Potentilla reptans	3	3	3	3	3	V	(3)
Holcus lanatus	2	7	6	4	6	V	(2-7)
Veronica chamaedrys	3	4	3	2	3	V	(2-4)
Luzula campestris	2	1	2	4	5	V	(1-5)
Rumex acetosella	1	1	3	2	2	V	(1-3)
Glechoma hederacea	1	1	1	2	3	V	(1-3)
Bryum capillare	1	1	2	2	2	V	(1-2)
Pseudoscleropodium purum		4	4	3	5	IV	(3-5)
Erodium cicutarium		3	3	2	3	IV	(2-3)
Stellaria graminea	2	3		2	2	IV	(2-3)
Poa pratensis s.l.		2	1	2	3	IV	(1-3)
Cerastium fontanum	1	2	2	1		IV	(1-2)
Lophocolea heterophylla	1	1	2	2		IV	(1-2)
Senecio jacobaea	1	2	1	1		IV	(1-2)
Taraxacum officinale agg	1		1	1	2	IV	(1-2)
Arenaria serpyllifolia		1	2	1	1	IV	(1-2)
Carex hirta	3	2			5	III	(2-5)
Brachythecium rutabulum		2	4	2		III	(2-4)
Vulpia bromoides		1	3	2		III	(1-3)
Sagina apetala		1	3		1	III	(1-3)
Viola hirta	1	2			2	III	(1-2)
Aira praecox		1	2		1	III	(1-2)
Veronica arvensis		2	1	1		III	(1-2)
Ceratodon purpureus			4	2		II	(2-4)
Galium verum	2			3		II	(2-3)
Rhytidiadelphus squarrosus			2	2		II	(2)
Bryum argenteum			2	2		II	(2)
Achillea millefolium	3	1				II	(1-3)
Cerastium semidecandrum			2	1		II	(1-2)
Polytrichum juniperinum		2	1			II	(1-2)
Rumex acetosa	2				1	II	(1-2)
Hypnum cupressiforme		1			1	II	(1)
Anagallis arvensis		1	1			II	(1)
Aphanes australis		1			1	II	(1)
Reseda luteola			1	1		II	(1)
Trifolium dubium			1		1	II	(1)
Viola arvensis		1	1			II	(1)
Anthoxanthum odoratum	5					I	(5)
Carex arenaria				4		I	(4)
Galium saxatile				3		I	(3)
Urtica dioica	2					I	(2)
Arrhenatherum elatius					2	I	(2)
Phleum bertolonii		2				I	(2)

Cont'd	Dry Circum-neutral grassland (Gn)						
Sample Number	1	2	3	4	5		
Poa trivialis	2					I	(2)
Hypochaeris radicata		1				I	(1)
Brachythecium albicans			1			I	(1)
Anchusa arvensis		1				I	(1)
Geranium molle	1					I	(1)
Plantago lanceolata	1					I	(1)
Prunella vulgaris	1					I	(1)
Viola riviniana			1			I	(1)
Sward height (cm)	20	22	20	17	23		
Herb cover (%)	95	90	80	75	90		
Lichen cover (%)	0	0	0	0	0		
Bryophyte cover (%)	0	3	5	5	10		
Litter cover (%)	20	5	1	0	10		
Bare ground (%)	10	20	25	30	10		
Number of species	25	33	33	29	24	Av.	28.8

Table 22. Community composition of the Dry Yorkshire Fog Grassland (U1d)

Stand Ref.	**Dry Yorkshire Fog Grassland (Hd)**						
NVC	**U1d**						
Sample Number	1	2	3	4	5		
Agrostis capillaris	10	9	7	10	4	V	(4-10)
Holcus lanatus	4	6	5	4	9	V	(4-9)
Rumex acetosella	3	2	6		3	IV	(2-6)
Anthoxanthum odoratum			6	2		II	(2-6)
Dicranum scoparium		2	2			II	(2)
Festuca rubra	2			2		II	(2)
Rhytidiadelphus squarrosus	2			2		II	(2)
Ulex europaeus seedling	2			2		II	(2)
Galium saxatile	1	1				II	(1)
Quercus robur seedling				1	1	II	(1)
Senecio jacobaea	1		1			II	(1)
Dactylis glomerata	1			1		II	(1)
Rubus fruticosus agg	1			1		II	(1)
Brachythecium albicans			3			I	(3)
Pseudoscleropodium purum	2					I	(2)
Holcus mollis				2		I	(2)
Arrhenatherum elatius					2	I	(2)
Kindbergia praelonga				2		I	(2)
Hypnum cupressiforme			1			I	(1)
Cerastium fontanum				1		I	(1)
Lotus corniculatus			1			I	(1)
Galium verum			1			I	(1)
Poa pratensis s.l.		1				I	(1)
Taraxacum officinale agg			1			I	(1)
Urtica dioica					1	I	(1)
Hypochaeris radicata	1					I	(1)
Sward height (cm)	38	42	36	38	45		
Herb cover (%)	100	95	90	95	95		
Lichen cover (%)	0	0	0	0	0		
Bryophyte cover (%)	1	1	2	1	0		
Litter cover (%)	30	40	25	35	40		
Bare ground (%)	40	30	45	35	25		
Number of species	12	6	11	12	6		Av. 9.4

Table 23. Community composition of the Gorse Scrub (W23b)

Stand Ref.	**Gorse Scrub (Su)**						
NVC	**W23b**						
Sample number	1	2	3	4	5		
Canopy							
Quercus robur					6	I	(1)
Shrub layer							
Ulex europaeus	8	9	7	6	6	V	(6-9)
Rubus fruticosus agg.		4	4	7	4	IV	(4-7)
Lonicera periclymenum		2	1	3		III	(1-3)
Prunus spinosa					5	I	(5)
Field layer							
Holcus lanatus	6	5	5	6	3	V	(3-6)
Arrhenatherum elatius	4	5	6	7		IV	(4-7)
Rumex acetosella	4	2	3	1		IV	(1-4)
Cerastium fontanum	1	2	1	2		IV	(1-2)
Rhytidiadelphus squarrosus	5		4	4		III	(4-5)
Agrostis capillaris	5	3	5			III	(3-5)
Festuca rubra		3	2	3		III	(2-3)
Dactylis glomerata			2	3	2	III	(2-3)
Kindbergia praelonga				5	6	II	(5-6)
Anthoxanthum odoratum		4	4			II	(4)
Pseudoscleropodium purum	4	4				II	(4)
Veronica chamaedrys			2	3		II	(2-3)
Plantago lanceolata		2	1			II	(1-2)
Chamerion angustifolium				4		I	(4)
Urtica dioica					3	I	(3)
Senecio jacobaea				3		I	(3)
Silene dioica					2	I	(2)
Achillea millefolium				2		I	(2)
Galium saxatile	2					I	(2)
Crepis capillaris		2				I	(2)
Polytrichum juniperinum			2			I	(2)
Aira praecox	2					I	(2)
Shrub height (cm)	220	230	215	220	325		
Number of species	10	13	15	15	10		Av. 12.6

Table 24. Community composition of the Oak-Birch Woodland (W10d)

Stand ref.	**Oak – Birch Woodland (Wd)**							
NVC	**W10d**							
Sample number	1	2	3	4	5	6		
Canopy								
Quercus robur	8	9	9	4	10	8	V	(4-10)
Betula pendula	7			9	4		III	(4-9)
Fraxinus excelsior			4				I	(4)
Shrub layer								
Crataegus monogyna		2	1		1	1	IV	(1-2)
Betula pendula sapling						2	I	(2)
Sambucus nigra			1				I	(1)
Rosa canina agg.					1		I	(1)
Ulex europaeus					1		I	(1)
Field layer								
Holcus lanatus	2	9	10	3	4	10	V	(2-10)
Rubus fruticosus agg.		2	2		1	1	IV	(1-2)
Agrostis capillaris	5		1	2			III	(1-5)
Lonicera periclymenum				4	4	1	III	(1-4)
Rumex acetosella	3			1		4	III	(1-4)
Stellaria media		2	1	3			III	(1-3)
Galium aparine			1	3	1		III	(1-3)
Dryopteris dilatata				1	1	2	III	(1-2)
Fraxinus excelsior seedling			3		3		II	(3)
Dicranum scoparium	3					1	II	(1-3)
Betula pendula seedling	2			1			II	(1-2)
Quercus robur seedling		1	1				II	(1)
Glechoma hederacea		1	1				II	(1)
Holcus mollis		4					I	(4)
Atrichum undulatum			2				I	(2)
Geranium robertianum				2			I	(2)
Polytrichastrum formosum						2	I	(2)
Brachythecium rutabulum	1						I	(1)
Stellaria pallida	1						I	(1)
Galium saxatile	1						I	(1)
Poa annua	1						I	(1)
Anthoxanthum odoratum		1					I	(1)
Urtica dioica			1				I	(1)
Luzula multiflora				1			I	(1)
Arrhenatherum elatius					1		I	(1)
Crataegus monogyna seedling					1		I	(1)
Number of species	11	9	14	12	13	10		Av. 11.5

Table 26. Community composition of the Riparian Nettlebed (OV24b)

Stand Ref.	**Riparian Nettlebed (Rn)**						
NVC	**OV24b**						
Sample number	1	2	3	4	5		
Shrub layer							
Salix cinerea sapling	4	5	4			III	(4-5)
Betula pendula		5		8		II	(5-8)
Quercus robur			4			I	(4)
Sambucus nigra			1			I	(1)
Field and ground layers							
Urtica dioica	10	10	10	9	10	V	(9-10)
Galium aparine	4	3	2	3	6	V	(2-6)
Phragmites australis	2	2		3	4	IV	(2-4)
Conium maculatum	1	1	1		1	IV	(1)
Glechoma hederacea		1	1	3		III	(1-3)
Agrostis stolonifera		1	2		2	III	(1-2)
Brachythecium rutabulum			4		3	II	(3-4)
Rubus fruticosus agg		4		2		II	(2-4)
Carex riparia	2			2		II	(2)
Humulus lupulus	2		2			II	(2)
Poa trivialis			2	2		II	(2)
Vicia cracca	1				1	II	(1)
Arctium minus agg			1		1	II	(1)
Silene dioica			1		1	II	(1)
Carex acutiformis					4	I	(4)
Arrhenatherum elatius					3	I	(3)
Dactylis glomerata					3	I	(3)
Solanum dulcamara				2		I	(2)
Holcus lanatus		2				I	(2)
Potentilla reptans			2			I	(2)
Cirsium palustre					1	I	(1)
Sward height (cm)	180	450	200	800	200		
Sward cover (%)	100	100	100	90	90		
Bryophyte cover (%)	0	0	5	0	3		
Litter cover (%)	70	70	60	60	35		
Bare ground (%)	10	10	10	20	25		
Water depth (cm)	0	0	0	0	0		
Number of species	8	10	14	9	13		Av. 8.2

4. SITE CONDITION ASSESSMENT

4.1 Context of the vegetation assessment

Hinderclay Fen is a former part of the Blo'Norton and Thelnetham Fens Site of Special Scientific Interest (SSSI)[7], which now forms part of the Waveney and Little Ouse Valley Fens Special Area of Conservation (SAC) on the eastern edge of Breckland[1]. These sites all once contributed to a spectrum of calcareous fen vegetation, now recognised within two internationally important habitat-types within the European Union's Habitat Directive, for which this area is considered to be one of the best in the United Kingdom[8]:

6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

The SAC includes small areas of vegetation resembling M24 *Molinia caerulea – Cirsium dissectum* fen-meadow - associated with spring-fed valley fen systems in East Anglia - where *Molinia* grassland is otherwise very rare.

7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*

* Priority feature

The SAC occurs in the East Anglian centre of distribution of **calcareous fens** and contains very extensive *Cladium* beds, including managed examples, as well as stands in contact zones between small sedge mire and species-poor *Cladium*. The habitat type here occurs in a different hydrological situation to the Broads – spring-fed valley fen rather than flood-plain mire.

The types of vegetation found in these fens have been documented by Sylvia Haslam (1965), and is directly referred to in the Nature Conservation Review undertaken by the Nature Conservancy Council (Ratcliffe 1977) and in the National Vegetation Classification (Rodwell 1991a,b-2000a).

The de-notification of Hinderclay Fen in 1983 was related to drainage operations in the headwaters of the River Little Ouse that led to a lowering of the watertable, and the disappearance of sensitive plant species associated with calcareous spring-fed valley fens.

The current condition of the groundwater-dependent habitats on the Fen can therefore be assessed by two approaches:

1. Identification of vegetation associated with flushed valley margins and areas of groundwater seepage;

[7] See Appendix 3 for current SSSI citation

[8] http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0012882.pdf [accessed 18th July 2012]

2. Assessment of vegetation condition with reference to the requirements of the SSSI Site Condition Assessment Method[9] .

4.2 Identification of groundwater-dependent vegetation

The results of the NVC survey given in section 3 identify several NVC communities with species assemblages typically affected by groundwater influences, shown in Table 27:

Table 27 Stands containing groundwater-dependent vegetation at Hinderclay Fen

Habitat	Stand ref.		NVC Community	Table
Peatland	Aw	Alder woodland	W5b *Alnus-Carex* woodland	2
	Ce	Tufted Sedge swamp	S25c *Phragmites-Eupatorium* fen	3
	Js	Fen meadows	M22a *Juncus-Cirsium* fen-meadow	4
Fen margin	M	Purple Moor-grass grassland	Indeterminate	9
	Wm	Purple Moor-grass woodland	W4a *Betula-Molinia* woodland	10
	Nc	Neutral grassland	MG5b *Cynosurus-Centaurea* grassland	12
	E	Hemp Agrimony stand	Indeterminate	15
	-	*Dryopteris* spp. fringe	Indeterminate	-

Neither the peatland or fen margin stands listed in Table 27 extend across all available habitat. The area of long-established alderwood is largely confined to the former channel of Thelnetham Brook, extending as the western margin of the site as far north of the river spoil bank. Alder encroachment onto the now open fen has been cleared. The woodland has a seepage fringe within the confined channel, and the character of the ground layer on these margins bears resemblance to the valleyhead Alderwoods of the Wensum catchment and those of the southern Suffolk Sandlings.

The stands of Tufted-Sedge Swamp (Ce) and Fen Meadow (Js) occupy a broad track within the open fen of the main peatland, adjacent or close to the terrace margin. The stands are much wetter than elsewhere on the peat, and are likely to be summer wet as the area supports patches of the mosses *Calliergonella cuspidata* and *Bryum pseudotriquetrum*. In addition to *Carex elata* and *Juncus subnodulosus*, other species recorded include *Carex pseudocyperus*, *C. lepidocarpa* and a single tussock of *C. paniculata*. This is an assemblage of typical calcareous fen species. The recent excavation of turf pond diggings in this area has confirmed the influence of calcareous groundwater with the appearance of the stonewort *Chara virgata*. The presence of the grass *Calamagrostis canescens* is also notable as a key species of valleyhead fen recognised by Haslam (1965) from fens further to the west.

[9] JNCC (2004) Common Standards Monitoring Guidance for Lowland Wetlands Habitats, Version August 2004. JNCC, Perborough.

The fen margin includes a number of stands containing species likely to represent former flushed conditions along the edge of the terrace and may mark the former extent of a skirt of thinning peat extending over low-lying areas. The colonisation of dry grassland species into stands on the upper part of this zone, particularly noticeable in the area of Cleared Birchwood (Stand B), may be further evidence of their relict status. Nonetheless, the fen margin is much more extensive than that found on the nearby Blo'Norton Fen, and the remaining species pool (Stands M, Wm and Nc) includes a number of plants that may have constituted the types of fen meadow that may formerly have existed here. These include: *Molinia caerulea, Festuca ovina, Carex nigra, Luzula multiflora* and *Briza media.* The small patches of *Calluna vulgaris* on the boundary with the dry sandy terrace may represent an associated element on the upper fringe of the flushed slope.

Much of the lower slopes of the terrace margin in the central and eastern thirds of the site can no longer be regarded as significant areas with groundwater influence. However, in the 2005 survey, the Tall Sedge Grasslands (Stands Ca and Hm) included scattered records for *Potentilla erecta* and *Succisa pratensis*. Though not re-recorded in the current survey, these species would also have been part of the fen margin species pool, and may be retained in the soil seed bank.

The final area of vegetation to note is the recent development of Stand E, described as the Hemp Agrimony stand. The 2005 survey recorded a strong response by a group of fen species along this raised terrace margin. By 2012, *Eupatorium cannabinum* and *Brachypodium sylvaticum* have partitioned the stand into moist and dry facies, but the continued colonisation from the species pool has included *Listera ovata, Carex lepidocarpa, Ophioglossum vulgatum* and *Lithospermum officinale*. Although still in a development trajectory, this assemblage of species indicates the potential for the terrace fringes to support fen margin vegetation.

The distribution of these stands, as shown in Figure 2, indicates the large area of the site occupied by stands containing species associated with calcareous fen and fen margin vegetation.

4.3 Assessment of vegetation condition

"English Nature and the other statutory conservation agencies in the UK are monitoring designated sites, including SSSIs, according to an agreed framework of common standards.

The aim of the monitoring is to assess whether the nature conservation interest features of these sites are in favourable condition. Attributes of a particular interest feature are used to define favourable condition and targets for each attribute specify the thresholds beyond which change is of concern."

Robertson and Jefferson (2000)

The approach to site condition assessment taken here is based on JNCC (2004a and b). The assessment is based on field observations, supported by the NVC plot data.

4.3.1 Lowland Fen – Open Fen stands

1. Habitat extent. The area of the open fen covered by Stands Ce and Js is about half of the potential habitat. This may represent the extent of groundwater influence. However, in 2005, the *J. subnodulosus* stand was mapped as extending eastwards from its current position in the years immediately following restoration works on the peatland. This may indicate that there is the potential to enlarge the area of target vegetation by further management of the Reedbed stand in this part of the open fen.

2. Habitat composition. In addition to the target fen represented by Stands Ce and Js, Turf pond diggings and areas of drier reedbed form additional components of the open fen. The potential exists for further turf pond construction. There is also internal variation within the Reedbed stand, including a drier area with *Juncus effusus* and *Dryopteris carthusiana* (Samples Rb 10 and 11). It is also noted that some of this variation will be the consequence of peat disturbance during restoration works.

3. Habitat structure. The Lowland Fen, including the area occupied by woodland, includes several structural elements including the relict channel, the terrace margin and the artificial spoil bank, all of which affect the hydrological functioning of the fen. These are assumed to be stable features. The recent turf pond construction - and the definition of paths across the fen - are also of potential relevance.

4. Vegetation composition: positive indicator species. For the open fen habitats, the vegetation is classified as Lowland Fen (JNCC 2004b) and positive indicator species selected from S25 *Phragmites australis-Eupatorium cannabinum* fen and M13 *Schoenus nigricans-Juncus subnodulosus* mire, with the intention of reflecting the potential for calcareous fen conditions and the species composition of similar areas of Blo' Norton Fen.

Table 28. Positive indicator species for the Lowland Fen stands (19 plots)

Stand	Ce	Js	Total
Angelica sylvestris	3	2	5
Bryum pseudotriquetrum	0	2	2
Calliergonella cuspidata	0	4	4
Carex elata	10	4	14
Carex lepidocarpa	0	1	1
Cirsium palustre	1	7	8
Cladium mariscus	0	0	0
Eupatorium cannabinum	8	7	15
Filipendula ulmaria	2	1	3
Galium palustre	2	2	4
Hydrocotyle vulgaris	0	1	1
Juncus subnodulosus	1	9	19
Lythrum salicaria	6	3	9
Mentha aquatica	4	8	12
Phragmites australis	10	7	17
Scutellaria galericulata	0	6	6

As shown in Table 28, there is considerable overlap in the indicator species occurring in the Tufted-sedge Swamp and Fen Meadow stands. Table 29 lists those species occurring in the 19 plots representing this kind of vegetation, using the Frequency Classes defined in JNCC (2004b). The Open Fen stands meet the requirements for at least 5 species constant, which must include *Phragmites australis*.

Table 29. Positive indicator species: Open Fen stands

Frequency	Class	Species
>60%.	Constant	*Carex elata* *Eupatorium cannabinum* *Juncus subnodulosus* *Mentha aquatica* *Phragmites australis*
41-60%	Frequent	*Cirsium palustre* *Lythrum salicaria*
21-40%	Occasional	*Angelica sylvestris* *Calliergonella cuspidata* *Galium palustre*
1-20%	Rare	*Bryum pseudotriquetrum* *Carex lepidocarpa* *Filipendula ulmaria*

5. Vegetation composition: indicators of negative change. These are indicators of unwanted trends, inappropriate to the interest features. The herbaceous species associated with S25 *Phragmites-Eupatorium* fen are *Urtica dioica* and *Rubus fruticosus* agg. Of the two, Bramble was not recorded and Nettle was found as a minor element in both stands. Common Reed is identified as an indicator of negative change in M13 *Schoenus-Juncus* mire, and it attains canopy dominance in patches of both stands. Of woody species, occasional *Salix cinerea* saplings are present in both stands, with a very low cover.

Summary of condition – Open Fen stands

The area of the open fen covered by Stands Ce and Js may represent the extent of groundwater influence, though there are limited opportunities to extend the area by excavation and further management of parts of the neighbouring Reedbed. The peatland area cannot in itself be extended without removing the spoil bank or raising the watertable to overlap onto the lowest part of the terrace. The stands meet the attribute target for positive indicator species, and there are no concerns over the presence of negative species. The condition of this feature is recommended as being **FAVOURABLE**.

4.3.2 Lowland Fen - Fen Margin stands

1. Habitat extent. The extent of this feature is established as the area covered by the Purple Moor-grass stands (M and Wm), the small patch of Neutral Grassland (Nc) and by the Hemp Agrimony stand (E). It is apparent that the southern fringes of the Molinia stands are being encroached upon by elements of the dry grassland flora; this is almost certainly a consequence of very sub-optimal watertable depths.

2. Habitat composition. The area of this interest feature varies considerably in terms of shade levels and apparently in soil chemistry, which may be a product of the degree and duration of groundwater influence in the past, or of soil types. This has produced stands differing in wooded canopy, species composition reflecting soil chemistry, and in colonisation by fen species.

3. Habitat structure. The extent of each stand is affected by the angle of terrace slope. Unlike Blo'Norton Fen, gentle gradients have favoured the extensive zonation occupied by the *Molinia* stands.

4. Vegetation composition: positive indicator species. For the fen margin stands, the vegetation is classified as Lowland Fen (JNCC 2004b) and positive indicator species selected from M13 *Schoenus nigricans-Juncus subnodulosus* mire and M24 *Molinia caerulea-Cirsium dissectum* fen-meadow, with the intention of reflecting the potential for calcareous fen meadow conditions and the species composition of similar areas of Blo' Norton Fen.

As shown in Table 30, the range of potential fen meadow species on the fen margin is quite broad, but species with the exception of *Molinia* are insufficiently frequently occurring to meet the attribute requirements defined in JNCC (2004b).

Table 30. Positive indicator species for the fen margin stands (17 plots)

	M	Wm	Nc	E	Total
Angelica sylvestris	0	0	0	3	3
Anthoxanthum odoratum	1	2	1	0	4
Briza media	0	0	2	0	2
Carex nigra	4	2	0	0	6
Equisetum palustre	0	0	0	0	0
Eupatorium cannabinum	0	0	0	5	5
Filipendula ulmaria	0	0	0	3	3
Galium uliginosum	0	0	0	0	0
Juncus subnodulosus	0	0	0	2	2
Lotus pedunculatus	0	0	0	0	0
Luzula multiflora	2	0	0	0	2
Mentha aquatica	0	0	0	2	2
Molinia caerulea	5	5	0	0	10

5. Vegetation composition: indicators of negative change. In both *Molinia* stands, the constant presence of dry grassland species such as *Rumex acetosella* and *Agrostis capillaris* indicate the extensive negative change following drainage. The Birch canopy is also a significant factor in shading out large patches of the field and ground layers. In the small patch of Neutral Grassland, the presence of several species of tussock-forming grass – particularly *Holcus lanatus* – is likely to have a marked effect on seed germination and the survival of diminutive species, including seedlings.

Summary of condition – Fen Margin stands

Sub-optimal watertable levels of much of this feature, coupled with shade and low survival rates from seed have led to insufficient frequency of the potential fen-meadow species to meet the attribute target for positive indicator species. The condition of this feature is recommended as being **UNFAVOURABLE**.

4.3.3 Wet Woodland

Guidance for Common Standard Monitoring Guidance is given by JNCC (2004a). In addition to the extent of the feature, four attributes are identified: structure and natural processes, regeneration potential, composition (trees and shrubs) and indicators of local distinctiveness, including its flora.

1. Extent. With the exception of clearance from the open fen, the extent of the woodland is restricted by its location, and therefore of fixed extent.

2. Structure and natural processes. The canopy is uniformly structured by Alder - both as large coppice stools and swathes of single-stemmed trees. The two generations are a similar size class. While not uniform, the Alder canopy is typically nearly entire, with small scattered gaps. The understorey is thin with a scattered and patchy shrub layer of sapling tree species. Deadwood is uncommon.

3. Regeneration potential. As would expected, alder saplings or seedlings are uncommon, and the regeneration potential is largely expressed through Ash saplings beneath the largely intact and similar-aged canopy cover, which appears to have been unmanaged for several decades.

4. Composition (trees and shrubs). The canopy and understorey is uniformly Alder over scattered Ash saplings. This is one typical expression of W5 *Alnus-Carex* woodland fringed by a form of W7 *Alnus-Fraxinus-Lysimachia* woodland.

5. Indicators of local distinctiveness. The channel woodland is similar in location to the brook channel woodlands referred to by Rodwell and Dring (2001) in containing both sump (W5) and seepage (W7) elements. The sump woodland sits wet into the summer, with calcareous residues confirming the influence of groundwater.

Summary of condition – Wet Woodland

The confined channel woodland retains features of both sump and seepage woodland derived from groundwater influence, producing an Alder canopy over a thin shrub layer and a mixed fen-seepage ground flora. The condition of this feature is recommended as being **FAVOURABLE**.

5. INTERPRETATION OF VEGETATION CHARACTER AND CONDITION

5.1 Summary of ecological relationships between communities

The vegetation of Hinderclay Fen can be accommodated within three zones reflecting the long-term hydrological differences between the dry sandy terrace, the peat bodies of the brook channel and the eastern end of the Thelnetham-Blo' Norton peatland, and the transitional zone between them. The communities associated with each zone are listed in Tables 1, 8 and 16.

Figure 3 shows the distribution of these NVC communities and emphasises the atypical composition of most of the vegetation associated with the transitional slope of the terrace margin.

The most plastic area, however, currently appears to be the open fen at the west of the site, where species associated with wet calcareous fen have assembled in a broad track at or near the foot of the abrupt margin to the terrace in this section. There are marked differences in species presence and distribution since the 2005 survey, but two stands have consolidated around *Juncus subnodulosus* and *Carex elata*. Of particular note is the appearance and expansion of fen species populations, which require summer wet conditions and periodically high light levels to establish.

Shallow turf ponding in this area has initiated colonisation of open water with the appearance of a stonewort species in shallow water retained through the summer.

The surrounding Reedbed stand may also mask less obvious patterns in species distribution, including drier, less calcareous patches with *Dryopteris carthusiana* and *Juncus effusus*.

As shown in section 4.3.1, the strong response of fen species to the management in recent years has produced a recognisable area of young wet calcareous fen that is in favourable condition according to the criteria used in its assessment. It is likely that continued management will lead to the appearance of further fen species if the area can be maintained as summer-wet with sufficient light to enable successful germination. Its expansion may also be possible eastwards, though it is likely to be limited to the north by its proximity to the river.

The suite of Fen Margin communities listed in Table 8 can be considered in three groups.

The Purple Moor-grass grassland and woodland areas, and the cleared birchwood stand, possess many species in common, and are divided by the colonisation and clearance of birch. Their position closest to the dry sandy terrace has made them particularly prone to summer-dry conditions and colonisation by dry grassland species. It is therefore likely that these communities have been undergoing gradual changes through lack of regeneration and loss of fen meadow species, and their replacement by woodland or dry grassland colonists. The character species, *Molinia*, however, is a long-lived perennial which, as mature tussocks, is able to persist for long

periods before stands degenerate. The fourth stand in this group, the small area of neutral grassland, is likely to persist if grazing intensity is sufficient to subdue the development of tussock grasses.

The second group consists of the tall sedge grassland stands and sallow scrub. These persist in areas close to the river spoil bank, low down on a very degraded section of terrace slope. It is likely that these soils have a humic topsoil and may once have underlain thin peats. While it is evident that sallow scrub has invaded the open stands on their margins, the tall sedge grasslands remain essentially free of scrub colonists. This may indicate that the dominant *Arrhenatherum elatius* and *Carex acutiformis* swards act to deter successful development from seed through dense shading and the build-up of plant litter. Since 2005, a number of fen meadow species have not been re-recorded, and this may indicate a continuation of drainage along this riparian margin of the site.

The last group of Fen Margin stands occurs at the western end of the site on steeper terrace margins above the peatland. Here, *Dryopteris* species and a large group of fen and fen meadow species appear to occupy low-lying terrace locations with sufficient groundwater influence to meet their requirements.

As identified in section 4.3.2, the Fen Margin as a whole appears to have lost much of its character in recent decades and perhaps has been most affected by drainage. It is in unfavourable condition according to the criteria used in this assessment. Without the restoration of former groundwater conditions, it is likely that much of the upper Fen Margin will acquire characters of periodically moist acid grassland, while the lower areas of the terrace will increasingly resemble the eutrophic sallow scrub that forms the riparian frontage of Blo'Norton Fen. It is anticipated that the Fen Margin communities beside the western peatland will be retained.

The suite of communities associated with the sandy terrace along the southern part of the site have remained essentially unchanged since the 2005 survey, though the condition of the open grasslands would be expected to fluctuate with changes in the intensity of rabbit grazing, which appears to be sustaining them. There is an abrupt change in species composition between the open parched grasslands and the less species-rich area of the dry Yorkshire Fog grassland and gorse scrub. These stands occur over a discrete area of the terrace and may be related by scrub clearance. The dry woodlands on the terrace vary in age and character and the blocks dominated by birch would appear to be younger. The separation of these woodlands from the *Molinia* woods typically has a sharp boundary where a static front of *Molinia* (or the appearance of Aspen) marks a point on the terrace where groundwater influence affects species composition.

5.2 Summary of conservation value

The conservation value of Hinderclay Fen, from the perspective of its vegetation communities, can be summarised with reference to the areas of the Lopham Terrace, the former Thelnetham

Brook channel and the part of the Thelnetham-Blo' Norton peatland contained within its boundaries.

1. The dry and parched grasslands that have developed on the raised terrace sands form one the best examples of the Dry Acid Grassland BAP Habitat in Suffolk outside of the Sandlings and Breckland.

2. The small alderwood in the peatland channel represents a BAP Habitat as well, but is also an uncommon example of brook channel woodland in Eastern England. This kind of wet woodland has recently been recorded from several SSSIs in the Wensum catchment.

3. The area of open fen, following its restoration, has developed a young stand of calcareous fen, dominated by *Carex elata* and *Juncus subnodulosus* and remaining summer-wet.

4. This complex of habitats, in supporting an immature restored example of 7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (a Priority feature of the Habitats Directive), lies very close to the boundary of the Waveney and Little Ouse Valley Fens SAC, for which this is a key feature.

5. The active policy of land acquisition and conservation management by LOHP, and the measures in progress to support hydrological recovery in the valley, provide opportunities to establish management control over an enlarged area of the Thelnetham-Blo' Norton peatland, by reviewing the role of Hinderclay Fen in conserving these conservation features.

6. REFERENCES

Bellamy DJ and Rose F (1961) The Waveney-Ouse valley fens of the Norfolk-Suffolk border. *Transactions of the Suffolk Naturalist's Society* **11**, 368-385.

Coppins B.J. (2002) *Checklist of Lichens of Great Britain and Ireland*. British Lichen Society, London.

ELP (2006) *Hinderclay Fen: Vegetation Survey using the National Vegetation Classification*. Unpublished report to Little Ouse Headwaters Project.

Haslam S.M. (1965) Ecological studies in the Breck fens. I. Vegetation in relation to habitat. *Journal of Ecology*, **53**, 599–619.

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.

JNCC (2004a) Common Standards Monitoring Guidance for Woodland Habitats. Version February 2004.

JNCC (2004b) Common Standards Monitoring Guidance for Lowland Wetlands Habitats. Version August 2004.

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

Robertson H.J. & Jefferson R.G. (2000) *Monitoring the condition of lowland grassland SSSIs. Part 1 – English Nature's rapid assessment method*. ENRR No. 315. English Nature, Peterborough.

Rodwell J.S. ed. (1991a) *British Plant Communities. Volume 1. Woodlands and scrub*. Cambridge University Press.

Rodwell J.S. ed. (1991b) *British Plant Communities. Volume 2. Mires and heath*. Cambridge University Press.

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

Rodwell J.S. ed. (1995) *British Plant Communities. Volume 4. Aquatic communities, swamps and tall-herb fens*. Cambridge University Press.

Rodwell J.S. ed. (2000a) *British plant communities. Volume 5. Maritime communities and vegetation of open habitats*. Cambridge University Press.

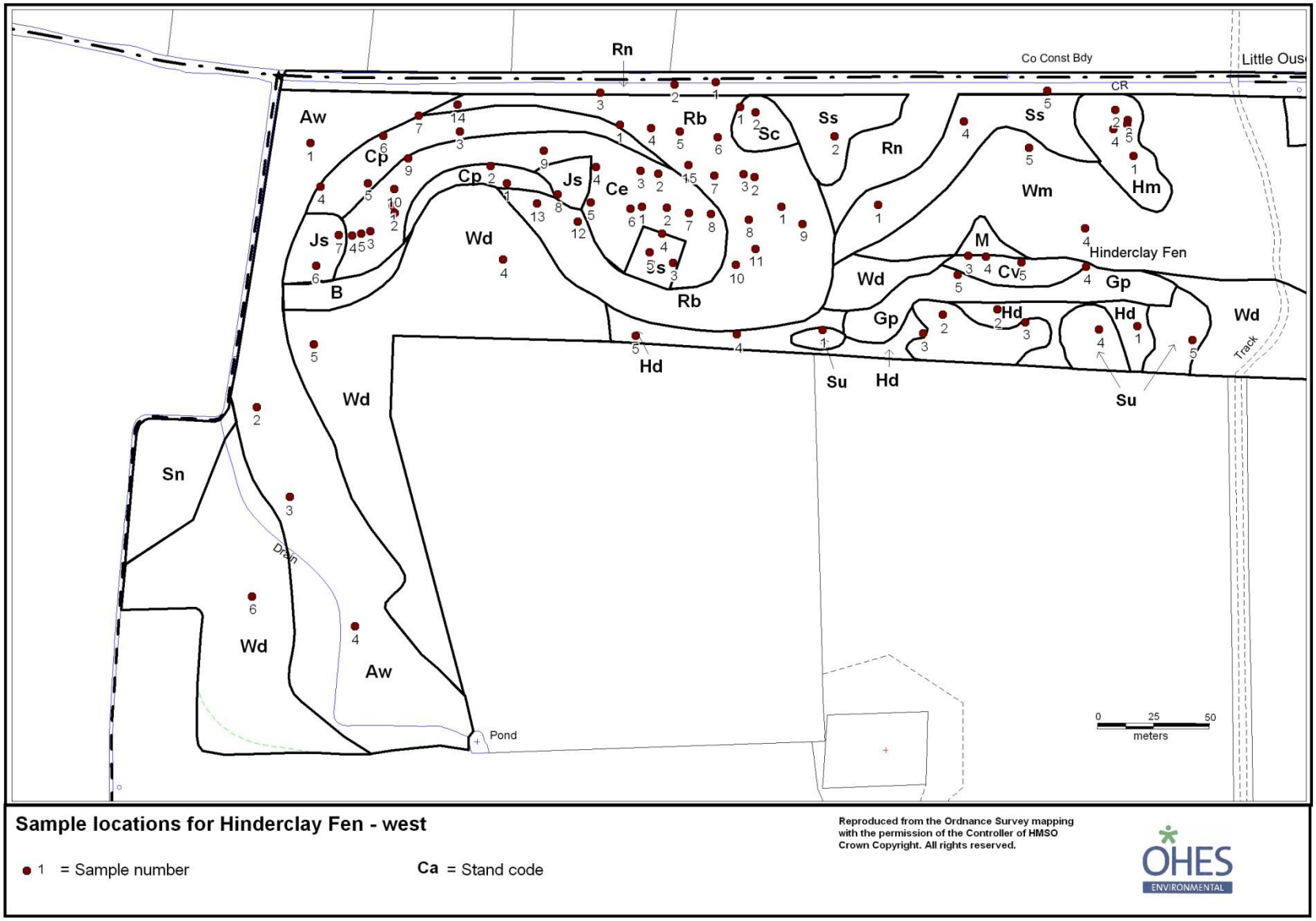
Rodwell J.S. (2006) *National Vegetation Classification: Users' Handbook*. Joint Nature Conservation Committee, Peterborough.

Rodwell J. and Dring J. (2001) *European significance of British woodland types*. English Nature Research Reports, No. 460.

Stace C. (2010) *New Flora of the British Isles*. Third Edition. Cambridge University Press, Cambridge.

West R. (2009) *From Brandon to Bungay – an exploration of the landscape history and geology of the Little Ouse and Waveney Rivers*. Suffolk Naturalists' Society, Ipswich.

Figure 2. Distribution of the recorded vegetation stands and samples



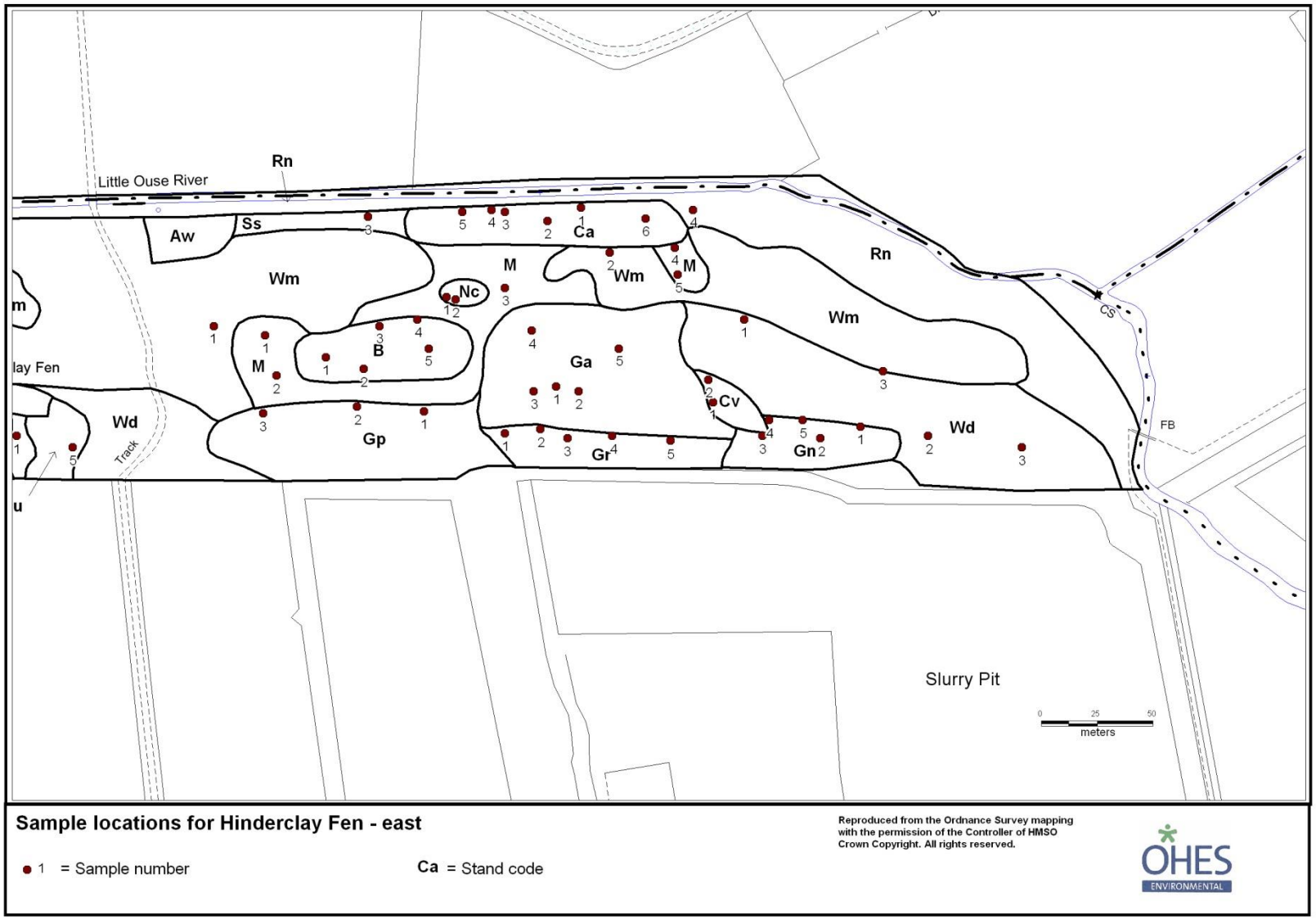
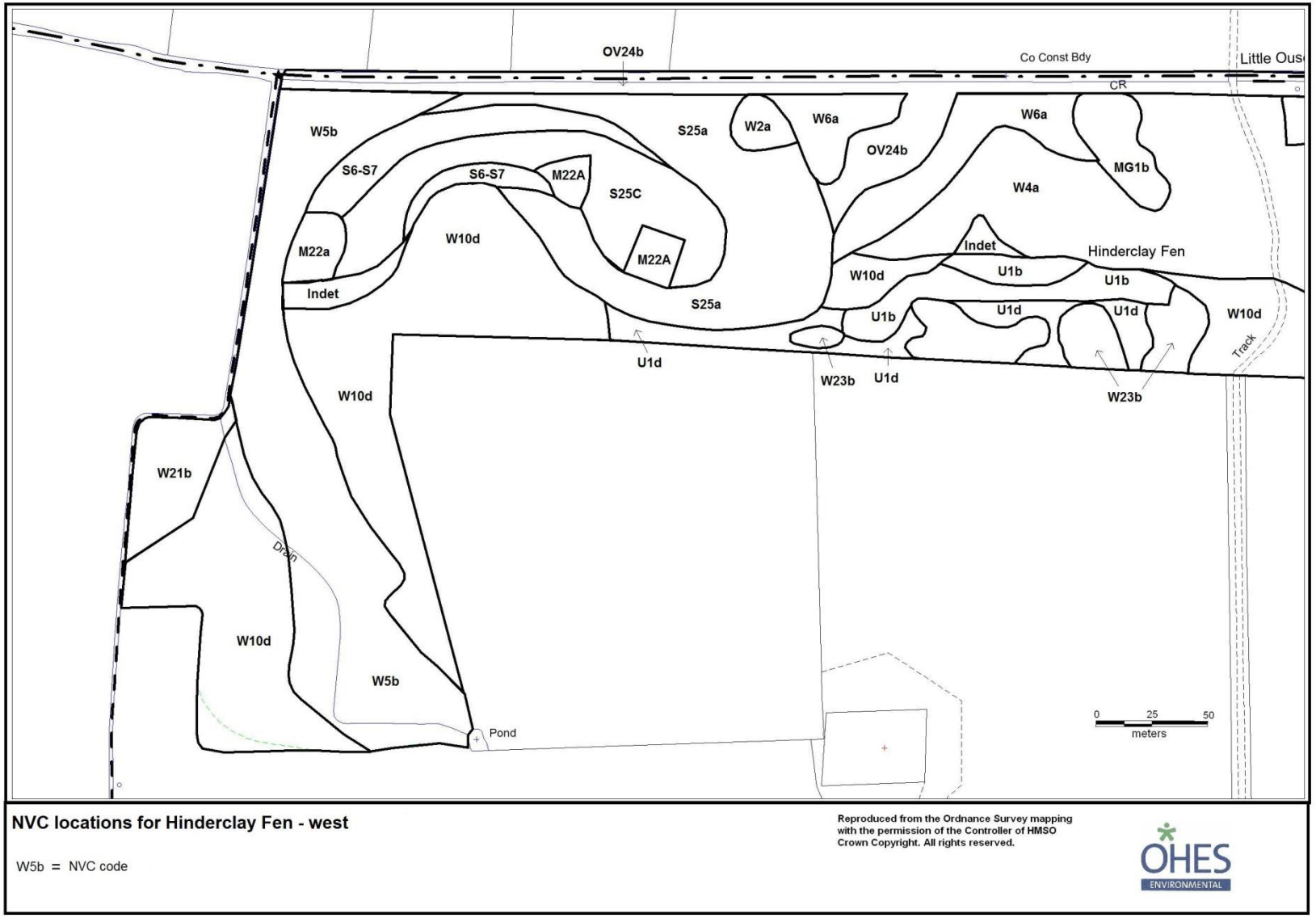
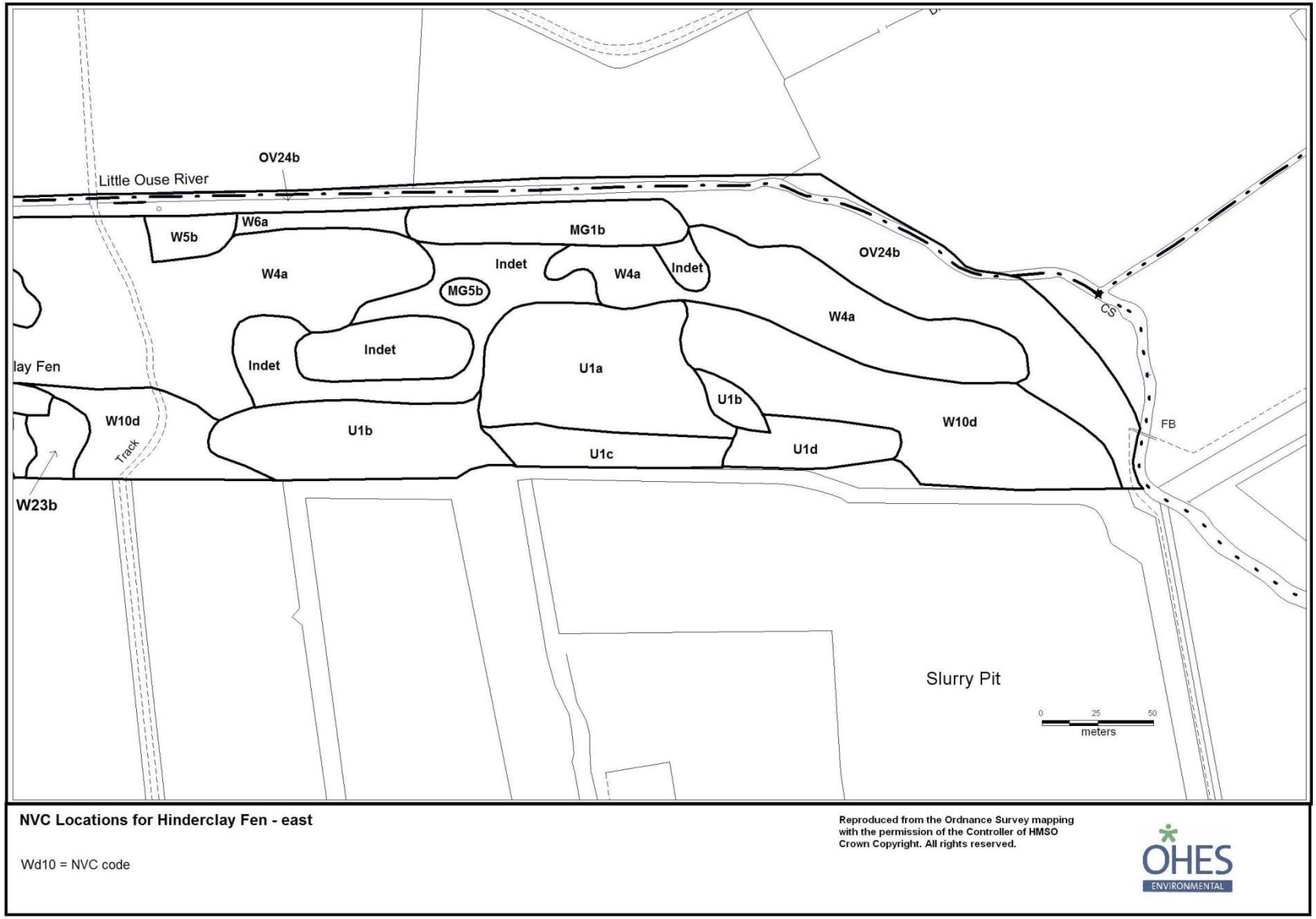

Little Ouse River
Rn
Aw
Ss
Wm
M
Nc
Ca
Wm
M
Rn
Wm
B
M
Ga
Cv
Wd
Gp
Gr
Gn
Wd
Track
FB
CS
Slurry Pit
0
25
50
meters
Sample locations for Hinderclay Fen - east
1 = Sample number
Ca = Stand code
Reproduced from the Ordnance Survey mapping with the permission of the Controller of HMSO Crown Copyright. All rights reserved.

Figure 3. Distribution of NVC communities at Hinderclay Fen





NVC Locations for Hinderclay Fen - east

Wd10 = NVC code

Appendix 1. Location of survey sample plots with allocated NVC codes

Stand	Plot	Easting	Northing	NVC code
Peatland habitats				
Alder woodland				
Aw	1	02129	78788	W5b(W7b)
Aw	2	02115	78677	W5b(W7b)
Aw	3	02133	78640	W5b(W7b)
Aw	4	02167	78587	W5b(W7b)
Aw	5	02186	75554	W5b(W7b)
Aw	6	02581	278819	W5b(W7b)
Tufted-sedge Swamp				
Ce	1	02266	78800	S25c
Ce	2	02285	78780	S25c
Ce	3	02277	78781	S25c
Ce	4	02257	78782	S25c
Ce	5	02256	78767	S25c
Ce	6	02274	78765	S25c
Ce	7	02300	78764	S25c
Ce	8	02310	78764	S25c
Ce	9	02173	78783	S25c
Ce	10	02168	78770	S25c
Fen meadow				
Js	1	02279	78766	M22a
Js	2	02290	78766	M22a
Js	3	02295	78743	M22a
Js	4	02289	78755	M22a
Js	5	02284	78747	M22a
Js	6	02136	78737	M22a
Js	7	02145	78750	M22a
Js	8	02241	78770	M22a
Js	9	02233	78788	M22a
Pond-sedge Swamp				
Cp	1	02218	78774	S6-S7
Cp	2	02210	78781	S6-S7
Cp	3	02195	78795	S6-S7
Cp	4	02135	78770	S6-S7
Cp	5	02156	78772	S6-S7
Cp	6	02161	78792	S6-S7
Cp	7	02176	78801	S6-S7
Reedbed				
Rb	1	02341	78768	S25a
Rb	2	02328	78780	S25a
Rb	3	02323	78781	S25a
Rb	4	02280	78799	S25a
Rb	5	02293	78798	S25a
Rb	6	02310	78796	S25a
Rb	7	02310	78780	S25a
Rb	8	02327	78762	S25a
Rb	9	02351	78761	S25a
Rb	10	02323	78743	S25a

Stand	Plot	Easting	Northing	NVC code
Rb	11	02331	78750	S25a
Rb	12	02251	78759	S25a
Rb	13	02232	78766	S25a
Rb	14	02193	78806	S25a
Rb	15	02298	78784	S25a
Sallow Carr				
Sc	1	02319	78809	W2a
Sc	2	02326	78807	W2a

Fen margin habitats

Purple Moor-grass Grassland				
M	1	02615	78768	Indet.
M	2	02620	78750	Indet.
M	3	02722	78789	Indet.
M	4	02798	78807	Indet.
M	5	02780	78797	Indet.
Purple Moor-grass Woodland				
Wm	1	02592	78772	W4a
Wm	2	02769	78805	W4a
Wm	3	02891	78752	W4a
Wm	4	02477	78763	W4a
Wm	5	02449	78796	W4a
Cleared Birchwood				
B	1	02642	78758	Indet.
B	2	02659	78753	Indet.
B	3	02666	78772	Indet.
B	4	02683	78775	Indet.
B	5	02688	78762	Indet.
Neutral Grassland				
Nc	1	02696	78785	MG5b
Nc	2	02700	78784	MG5b
Tall Sedge Grasslands				
Hm	1	02496	78794	MG1b
Hm	2	02486	78813	MG1b
Hm	3	02492	78809	MG1b
Hm	4	02486	78805	MG1b
Hm	5	02492	78807	MG1b
Ca	1	02756	78825	MG1b
Ca	2	02741	78819	MG1b
Ca	3	02722	78823	MG1b
Ca	4	02716	78824	MG1b
Ca	5	02703	78823	MG1b
Ca	6	02785	78820	MG1b
Sallow Scrub				
Ss	1	02384	78770	W6a
Ss	2	02362	78798	W6a
Ss	3	02661	78821	W6a
Ss	4	02419	78806	W6a
Ss	5	02455	78820	W6a
Hemp Agrimony stand				
Ec	1	02168	78763	Indet.
Ec	2	02169	78760	Indet.

Stand	Plot	Easting	Northing	NVC code
Ec	3	02159	78752	Indet.
Ec	4	02151	78750	Indet.
Ec	5	02155	78751	Indet.

Sandy terrace habitats

Ling Heather vegetation

Cv	1	02815	78738	U1b
Cv	2	02813	78748	U1b
Cv	3	02426	78750	U1b
Cv	4	02434	78750	U1b
Cv	5	02450	78748	U1b

Acid Lichen Grassland

Ga	1	02745	78745	U1a
Ga	2	02755	78743	U1a
Ga	3	02735	78743	U1a
Ga	4	02734	78770	U1a
Ga	5	02773	78762	U1a

Parched Acid Grassland

Gp	1	02686	78734	U1b
Gp	2	02656	78736	U1b
Gp	3	02614	78733	U1b
Gp	4	02479	78747	U1b
Gp	5	02422	78742	U1b

Parched Ruderal Grassland

Gr	1	02722	78724	U1c
Gr	2	02738	78726	U1c
Gr	3	02750	78722	U1c
Gr	4	02770	78723	U1c
Gr	5	02796	78721	U1c

Dry Circum-neutral grassland

Gn	1	02881	78727	U1d
Gn	2	02863	78722	U1d
Gn	3	02837	78723	U1d
Gn	4	02840	78730	U1d
Gn	5	02855	78730	U1d

Dry Yorkshire Fog Grassland

Hd	1	02504	78723	U1d
Hd	2	02441	78728	U1d
Hd	3	02409	78717	U1d
Hd	4	02326	78714	U1d
Hd	5	02281	78712	U1d

Gorse Scrub

Su	1	02364	78717	W23b
Su	2	02417	78725	W23b
Su	3	02454	78723	W23b
Su	4	02487	78721	W23b
Su	5	02529	78718	W23b

Oak-Birch Woodland

Wd	1	02829	78775	W10d
Wd	2	02911	78723	W10d

Stand	Plot	Easting	Northing	NVC code
Wd	3	02953	78718	W10d
Wd	4	02219	78742	W10d
Wd	5	02138	78704	W10d
Wd	6	02120	78598	W10d

Riparian spoil habitat

Riparian Nettlebed

Rn	1	02307	78819	OV24b
Rn	2	02289	78820	OV24b
Rn	3	02256	78813	OV24b
Rn	4	02806	78824	OV24b
Rn	5	08867	78814	OV24b

Appendix 2. Species list for Hinderclay Fen

This list is a record of species recorded within plots selected for the NVC survey, with the addition of further species identified following a supplementary assessment of the two wetland habitats – the peatland and the transitional slopes of the fen margin, with further species from the dry sandy terrace where these have been noted during fieldwork. Species found in the wetland habitats are indicated in this list.

Species	Common Name	Peatland habitat	Fen margin
Acer campestre	Field Maple	•	
Acer pseudoplatanus	Sycamore		
Achillea millefolium	Yarrow		•
Agrostis canina	Velvet Bent	•	
Agrostis capillaris	Common Bent		•
Agrostis stolonifera	Creeping Bent	•	•
Agrostis vinealis	Brown Bent		•
Aira praecox	Early Hair-grass		•
Ajuga reptans	Bugle		•
Alnus glutinosa	Alder	•	
Anagallis arvensis	Scarlet Pimpernel		
Anchusa arvensis	Bugloss		
Angelica sylvestris	Wild Angelica	•	•
Anthoxanthum odoratum	Sweet Vernal-grass		•
Aphanes australis	Slender Parsley-piert		
Arctium minus agg.	Lesser Burdock	•	
Arenaria serpyllifolia	Thyme-leaved Sandwort		
Arrhenatherum elatius	False Oat-Grass	•	•
Athyrium filix-femina	Lady-fern	•	
Betula pendula	Silver Birch	•	•
Betula pubescens	Downy Birch	•	•
Brachypodium sylvaticum	False-brome		•
Briza media	Quaking-grass		•
Bromus hordeaceus agg.	Soft-brome		
Bryonia dioica	White Bryony	•	
Calamagrostis canescens	Purple Small-reed	•	
Calamagrostis epigejos	Wood Small-reed		•
Calluna vulgaris	Heather		•
Calystegia sepium	Hedge Bindweed	•	•
Campanula rotundifolia	Harebell		
Cardamine flexuosa	Wavy Bitter-cress	•	
Cardamine pratensis	Cuckooflower	•	
Carex acutiformis	Lesser Pond-sedge	•	•
Carex arenaria	Sand Sedge		
Carex caryophyllea	Spring-sedge		
Carex disticha	Brown Sedge	•	
Carex elata	Tufted-sedge	•	
Carex flacca	Glaucous Sedge		•
Carex hirta	Hairy Sedge		•
Carex nigra	Common Sedge		
Carex lepidocarpa	Long-stalked Yellow-sedge	•	•
Carex paniculata	Greater Tussock-sedge	•	
Carex pilulifera	Pill Sedge		•

Species	Common Name	Peatland habitat	Fen margin
Carex pseudocyperus	Cyperus Sedge	•	
Carex remota	Remote Sedge	•	•
Carex riparia	Greater Pond-sedge	•	•
Centaurea nigra	Common Knapweed		•
Cerastium fontanum	Common Mouse-ear		•
Cerastium semidecandrum	Little Mouse-ear		
Chamerion angustifolium	Rosebay Willowherb		•
Cirsium arvense	Creeping Thistle	•	•
Cirsium palustre	Marsh Thistle	•	•
Cirsium vulgare	Spear Thistle		•
Conium maculatum	Hemlock		•
Cornus sanguinea	Dogwood	•	
Crataegus monogyna	Hawthorn	•	
Crepis capillaris	Smooth Hawk's-beard		
Dactylis glomerata	Cock's-foot		•
Digitalis purpurea	Foxglove		
Dryopteris carthusiana	Narrow Buckler-Fern	•	•
Dryopteris dilatata	Broad Buckler-fern	•	•
Dryopteris filix-mas	Male-fern		
Elytrigia repens	Common Couch		•
Epilobium ciliatum	American Willowherb		
Epilobium hirsutum	Great Willowherb	•	
Epilobium montanum	Broad-leaved Willowherb	•	
Epilobium parviflorum	Hoary Willowherb	•	
Equisetum palustre	Marsh Horsetail	•	
Erodium cicutarium	Common Stork's-bill		
Erophila verna	Common Whitlowgrass		
Euonymus europaeus	Spindle		
Eupatorium cannabinum	Hemp-agrimony	•	•
Festuca filiformis	Fine-leaved Sheep's-fescue		
Festuca ovina	Sheep's-fescue		•
Festuca rubra	Red Fescue	•	•
Filipendula ulmaria	Meadowsweet	•	•
Fraxinus excelsior	Ash	•	•
Galeopsis tetrahit agg.	Common Hemp-nettle		•
Galium aparine	Cleavers	•	•
Galium palustre	Marsh-bedstraw	•	
Galium saxatile	Heath Bedstraw		•
Galium uliginosum	Fen Bedstraw	•	•
Galium verum	Lady's Bedstraw		•
Geranium molle	Dove's-foot Crane's-bill		
Geranium robertianum	Herb-Robert	•	•
Geum urbanum	Wood Avens	•	
Glechoma hederacea	Ground-ivy	•	•
Hedera helix	Common Ivy	•	
Holcus lanatus	Yorkshire-fog	•	•
Holcus mollis	Creeping Soft-grass		•
Humulus lupulus	Hop	•	
Hydrocotyle vulgaris	Marsh Pennywort	•	
Hypericum tetrapterum	Square-stalked St John's-wort	•	
Hypochaeris radicata	Cat's-ear		
Ilex aquifolium	Holly		

Species	Common Name	Peatland habitat	Fen margin
Iris pseudacorus	Yellow Iris	•	
Juncus articulatus	Jointed Rush		•
Juncus effusus	Soft-rush	•	•
Juncus subnodulosus	Blunt-flowered Rush	•	•
Lamium album	White Dead-nettle		•
Lathyrus pratensis	Meadow Vetchling		•
Ligustrum vulgare	Wild Privet	•	
Linaria vulgaris	Common Toadflax		•
Listera ovata	Common Twayblade		•
Lithospermum officinale	Common Gromwell		•
Lonicera periclymenum	Honeysuckle	•	•
Lotus corniculatus	Common Bird's-foot-trefoil		•
Lotus pedunculatus	Greater Bird's-foot-trefoil	•	
Luzula campestris	Field Wood-rush		•
Luzula multiflora	Heath Wood-rush		•
Lychnis flos-cuculi	Ragged-Robin	•	
Lycopus europaeus	Gypsywort	•	•
Lythrum salicaria	Purple-loosestrife	•	
Medicago lupulina	Black Medick		•
Mentha aquatica	Water Mint	•	•
Moehringia trinervia	Three-nerved Sandwort		•
Molinia caerulea	Purple Moor-grass		•
Myosotis arvensis	Field Forget-me-not	•	•
Myosotis ramosissima	Early Forget-me-not		
Myosoton aquaticum	Water Chickweed	•	
Ophioglossum vulgatum	Adder's-tongue		•
Papaver dubium	Long-headed Poppy		
Phalaris arundinacea	Reed Canary-grass	•	•
Phleum bertolonii	Smaller Cat's-tail		
Phragmites australis	Common Reed	•	•
Pilosella officinarum	Mouse-ear-hawkweed		
Plantago lanceolata	Ribwort Plantain		
Plantago major	Greater Plantain		
Poa annua	Annual Meadow-grass		
Poa pratensis sens. lat.	Smooth Meadow-grass		
Poa trivialis	Rough Meadow-grass	•	•
Populus x canescens	Grey Poplar	•	
Populus tremula	Aspen		•
Potentilla reptans	Creeping Cinquefoil		•
Prunella vulgaris	Selfheal		•
Prunus spinosa	Blackthorn		
Pteridium aquilinum	Bracken		
Quercus robur	Pedunculate Oak		•
Ranunculus bulbosus	Bulbous Buttercup		•
Ranunculus flammula	Lesser Spearwort	•	
Ranunculus repens	Creeping Buttercup	•	•
Reseda luteola	Weld		
Rosa canina agg.	Dog-rose		
Rubus fruticosus agg.	Bramble	•	•
Rubus idaeus	Raspberry		•
Rumex acetosa	Common Sorrel		•
Rumex acetosella	Sheep's Sorrel		•

Species	Common Name	Peatland habitat	Fen margin
Rumex sanguineus	Wood Dock	•	
Sagina apetala	Annual Pearlwort		
Salix cinerea	Grey Willow	•	•
Sambucus nigra	Elder	•	•
Scrophularia auriculata	Water Figwort	•	
Scutellaria galericulata	Skullcap	•	•
Senecio jacobaea	Common Ragwort		•
Silene dioica	Red Campion		
Silene latifolia	White Campion		•
Solanum dulcamara	Bittersweet	•	•
Sonchus arvensis	Perennial Sow-thistle		
Stachys sylvatica	Hedge Woundwort	•	
Stellaria graminea	Lesser Stitchwort		•
Stellaria media	Common Chickweed		•
Stellaria pallida	Lesser Chickweed		•
Tamus communis	Black Bryony	•	
Taraxacum agg.	Dandelion		•
Thymus pulegioides	Large Thyme		•
Torilis japonica	Upright Hedge-parsley		
Trifolium campestre	Hop Trefoil		
Trifolium dubium	Lesser Trefoil		
Triticum aestivum	Bread Wheat		•
Typha latifolia	Bulrush	•	
Ulex europaeus	Gorse		•
Urtica dioica	Common Nettle	•	•
Valeriana officinalis	Common Valerian	•	•
Veronica arvensis	Wall Speedwell		•
Veronica chamaedrys	Germander Speedwell		•
Veronica officinalis	Heath Speedwell		
Veronica serpyllifolia	Thyme-leaved Speedwell		
Viburnum opulus	Guelder-rose	•	
Vicia cracca	Tufted Vetch	•	•
Vicia sativa	Common Vetch		
Viola arvensis	Field Pansy		•
Viola canina	Heath Dog-violet		
Viola hirta	Hairy Violet		•
Viola riviniana	Common Dog-violet		
Vulpia bromoides	Squirrel-tail Fescue		
Lichens			
Lepraria spp.		•	
Cladonia fimbriata			•
Cladonia portentosa			•
Cladonia pyxidata			•
Cladonia ramulosa			•
Cladonia squamosa			•
Algae			
Zygogonium ericetorum			•

Species	Peatland habitat	Fen margin	
Bryophytes			
Amblystegium serpens	•		
Atrichum undulatum	•	•	
Brachythecium albicans		•	
Brachythecium rivulare	•		
Brachythecium rutabulum	•	•	
Bryum argenteum			
Bryum capillare			
Bryum pseudotriquetrum	•		
Bryum subapiculatum			[not confirmed]
Calliergonella cuspidata	•		
Campylopus flexuosus		•	
Campylopus introflexus		•	
Campylopus pyriformis		•	
Cephaloziella divaricata			
Ceratodon purpureus			
Cetraria aculeata			
Dicranella cerviculata	•		
Dicranella heteromalla		•	
Dicranum scoparium		•	
Eurhynchium striatum	•	•	
Fissidens adianthoides	•		
Funaria hygrometrica		•	
Hypnum cupressiforme	•	•	
Hypnum jutlandicum		•	
Kindbergia praelonga	•	•	
Lophocolea bidentata		•	
Lophocolea heterophylla			
Mnium hornum	•	•	
Oxyrrhynchium hians	•		
Oxyrrhynchium speciosum	•		
Pellia endiviifolia	•		
Pellia epiphylla	•		
Plagiomnium undulatum	•		
Pleurozium schreberi			
Pohlia nutans		•	
Polytrichastrum formosum		•	
Polytrichum juniperinum		•	
Polytrichum piliferum		•	
Pseudoscleropodium purum		•	
Pseudotaxiphyllum elegans		•	
Rhytidiadelphus squarrosus		•	

Dry sandy terrace only

Lichens

Cladonia coniocraea
Cladonia furcata
Cladonia glauca
Lepraria spp.
Xanthoria parietina

Appendix 3. SSSI notification

COUNTY: SUFFOLK/NORFOLK SITE NAME: BLO' NORTON AND THELNETHAM FEN

DISTRICT:

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981.

Local Planning Authority: Breckland District Council, St Edmundsbury District Council

National Grid Reference: TM 017790 Area: 21.03 (ha.) 51.97 (ac.)

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TM 07 NW

Date Notified (Under 1949 Act): 1959 Date of Last Revision: 1972

Date Notified (Under 1981 Act): 1983 Date of Last Revision: –

Other Information:
The boundary has been modified by the deletion of Hinderclay Fen and of some arable land. Part of the site is managed as a nature reserve by the Suffolk Trust for Nature Conservation.

Reasons for Notification:
This site is of interest mainly because of the plant communities associated with the remaining areas of open fen. Additional interest is provided by the areas of carr woodland and by some of the meadows adjacent to the fen.

The areas of fen least affected by drainage still support calcareous valley fen vegetation with plants such as black bog rush *Schoenus nigricans*, saw sedge *Cladium mariscus*, which is dominant in some parts, and purple moor grass *Molinia caerulea*. A very large number of plant species are associated with these areas, notably 'Fen Orchid' *Dactylorchis praetermissa*, devil's bit scabious *Succisa pratensis*, long-stalked yellow sedge *Carex lepidocarpa* quaking grass *Briza media*, a small colony of grass of parnassus *Parnassia palustris* and a number of rare mosses. In other parts of the fen, where there is some drying-out in summer, this type of vegetation is replaced by taller vegetation dominated by reed *Phragmites australis* and meadowsweet *Filipendula ulmaria*. This vegetation has a different range of associated species including plants such as hemp agrimony *Eupatorium cannabinum*, purple loosestrife *Lythrum salicaria* and great hairy willowherb *Epilobium hirsutum*.

Woodland and scrub have invaded quite large areas of all three fens. The scrub consists mostly of dense sallow, whilst the woodland is mostly alder carr, with ash and oak on the drier parts of Blo' Norton Fen. Beneath the woodland canopy, the ground vegetation is made up of a restricted range of fen plants and weedy species such as nettle and cleavers.

In order to provide some control over the water table in the fen areas the site boundary also encompasses several small fields and ditches. These are of some interest in their own interest with plants such as ragged robin *Lychnis flos-cuculi*, marsh marigold *Caltha palustris* and Marsh thistle *Cirsium palustre* and purple loosestrife all occurring in considerable numbers.