British Energy Group PLC
Sizewell National Vegetation Classification Report 2008

1. Introduction

1.1 Purpose of this Report

British Energy (BE) is currently investigating the feasibility of building new nuclear power stations at a range of sites within their UK land holding. Sizewell has been identified as one potential site for investigation and likely progression through an Environmental Impact Assessment (EIA). Entec UK Ltd has been appointed to lead and co-ordinate the terrestrial ecological work and subsequent environmental assessment for Sizewell

An initial Extended Phase 1 Survey conducted in March 2007 (Entec doc ref 19801c36) identified that extensive areas of semi-natural vegetation were present within and adjacent to the proposed development footprint. Much of the area surrounding the likely location of any new plant is included within statutorily designated sites of nature conservation importance, with botanical communities forming an important part of the cited interest of these.

To investigate the botanical quality of these areas of the habitats present, and to provide a basis for determining appropriate environmental measures to address any potential habitat change or loss, Entec sub-contracted specialist botanical surveyors Ecology Land & People (ELP). Initial botanical surveys of the proposed power station location (plus a perimeter area around it of 200m), the access route and indicative locations of the construction compounds were undertaken in 2007 (Entec report reference 19801cb145). Following the recommendations made in this report, the survey area was extended to incorporate additional areas of semi-natural habitat around the likely build area; botanical surveys of these habitats were undertaken during 2008.

1.2 Background to Development

An area of land directly north of the Sizewell 'A' and 'B' Power Stations has been identified as having the potential to accommodate nuclear new build. This area, which covers 0.32 km^2/32 ha and has an approximate central grid reference of TM 473 640, is referred to in this document as 'the preliminary works area' and is shown in **Figure 1.1**. The indicative positions of the access track and construction compounds are also illustrated. It should be noted that this initial development footprint is purely indicative, as environmental, landscape and visual, hydrological and other constraints have not yet been considered and taken into account. These would all be addressed as a matter of course as part of an EIA.

1.3 Survey Area

1.3.1 Description and Context

The Preliminary Works Area

The eastern boundary of the proposed power station area comprises bare shingle and heavily disturbed, poorly developed dune grassland. To the west of this dune system is a bank of improved grassland and scattered scrub. Further inland, habitats are dominated by improved grazed pasture with two small belts of semi-natural broad-leaved woodland. In the southwest of the proposed power station area is land previously associated with the construction zone of Sizewell 'B'. In this area the dune habitats have been replaced by semi-improved tussocky grassland, with planted native scrub species.

The Indicative Route of the Access Road

The proposed access road route would run through the (mainly) coniferous plantation of Dunwich Forest and Goose Hills and along the edge of some agricultural fields, using the route of an existing agricultural track. At some points along the route, the woodland has also been planted with broad-leaved species and therefore has a mixed composition. The route of the access road passes over and adjacent to a number of ditches that form part of the Sizewell Belts dyke system, to the south of Dunwich Forest. The ditches are generally between 3 and 5m in width, with a variable flow, and generally support a diverse aquatic flora. At points where the water table is high, the track passes through carr[1] woodland, and at the most easterly point of the proposed route, the access road passes over a small part of the Sizewell Marshes Site of Special Scientific Interest (SSSI) and an area of semi-improved grassland, before meeting the preliminary works area.

The Indicative Location of the Construction Compound

The proposed construction compound is situated adjacent to the proposed access road and comprises a mixture of arable land, a small belt of deciduous woodland and a large area of pine plantation. A single small wet ditch (linked to the wider ditch system) is located on the southern boundary of the indicative construction compound. This ditch is currently heavily shaded by alder (*Alnus glutinosa*).

The Wider Area

The BE Estate covers approximately 669ha and in addition to the preliminary works area, as described above, incorporates the Sizewell Marshes SSSI (**Figure 1.2**). This designation covers 104.33ha of lowland, unimproved wet meadows, with an extensive network of ditches in a low-lying basin of deep fen peat. Further areas of reedbed and alder carr are also included in the SSSI boundaries (Natural England, 2008a).

Lying adjacent to the BE estate boundary to the north is the Minsmere to Walberswick Heaths and Marshes SSSI. Much of this 2325.89ha site is also designated as a Special Protection Area (SPA) under EC Directive 79/409 on the Conservation of Wild Birds, and as a Wetland of International Importance under the Ramsar Convention. The site supports a number of important wetland habitats, including the largest continuous stand of reedbed in England and Wales, mudflats, shingle beach and grazing marsh. A 20ha area of shallow lagoons and islands

[1] Carr is a form of scrub woodland that develops in unmanaged fens; it tends to be dominated by sallows, and progressively replaced by birches and alder to form woodland.

has also been created for wading birds and wildfowl, whilst higher ground supports lowland heath, unimproved acid grassland, woodland and scrub (Natural England, 2008a, and Ramsar, 2008).

The Minsmere to Walberswick Heaths and Marshes SSSI lies within the Suffolk Coast and Heaths Natural Area. This covers the land extending as far as Great Yarmouth in the north, and Harwich in the south. The area is described as:

> *"A land of lonely estuaries and marshes, of big skies over large sandy arable fields with few hedgerows, of conifer plantations, and open heath"*. (Natural England, 2008b).

The area is generally very flat with land-use dominated by arable farming, particularly for root crops, although cattle farming is common on the low-lying land adjacent to the coast. Whilst heathlands were extensive throughout the area in the eighteenth and nineteenth centuries, only a small fraction of these remain with most being taken over for arable and forestry. The estuary habitats present along the coastline are considered to be of international importance for nature conservation (Natural England, 2008b).

1.3.2 Botanical Surveys in 2008

The recommendations made in the vegetation survey report for the 2007 fieldwork (Entec report reference 19801cb145) set out three objectives for undertaking further surveys in an expanded survey area incorporating additional blocks of semi-natural habitat around the likely build area:

- To provide a more precise quantitative and qualitative understanding of the habitat and plant species which may be impacted by works within the preliminary works area;
- To provide a better understanding of the habitats and plant communities of the wider Sizewell Marshes area and in particular areas of hydrological sensitivity. These may be affected by changes in water quality or water table regime arising from the works, or in the case of the dyke system, these may be sensitive to pollutants arising from the construction phase;
- To undertake the necessary scientific and technical work in order to develop robust mitigation and enhancement measures that are credible and also fit within the current management framework of the Sizewell Marshes.

The following surveys were therefore undertaken:

a) Survey of the Aquatic Vegetation of the Sizewell Marshes SSSI Dykes

During the 2007 work, the dykes to the north of the PWA were surveyed as they may be possible accidental receptors for any arisings from the PWA. The aquatic vegetation of the dykes of Sizewell Marsh SSSI within 200m of the PWA was also surveyed.

In 2008, the survey area was extended to include the dykes over the remainder of Sizewell Marshes SSSI. These dykes are similarly vulnerable to potential contaminants and also to the possible impacts of a change in hydrological condition. The combined survey area of this habitat therefore provides a coherent data set which would identify all sensitive areas and support development of mitigation and enhancement measures. It would also form part of the data set used for the hydrological assessments. Finally, it would be useful in informing the long-term management of the Company's Estate.

The areas of dyke surveyed in 2007 and 2008 are shown in **Figure 1.3**.

b) Survey of the Terrestrial Areas of Sizewell Marshes SSSI

The 2007 survey included blocks of fen meadow, reedbed and wet woodland that fall within 200m of the Preliminary Works Area. In 2008, the survey area was extended to cover the entire extent of these habitats within the Sizewell Marshes SSSI, with additional assessment of adjacent valley slope grassland on part of the southern margin of the SSSI, and Leiston Carr on its northern edge.

In including this additional area, the assessment of the terrestrial habitats over the rest of Sizewell Marshes SSSI completes the vegetation data set for BE's floodplain landholding begun in 2007. This provides an up-to-date assessment of the current fen communities, defining their condition, extent and location on the site. Such information is needed for the impact assessment and will also be required in order to characterise the eco-hydrological sensitivities of the features.

The areas of fen meadow, reedbed, wet woodland and other marshland habitats surveyed in 2007 and 2008 are shown in **Figure 1.3**.

c) Survey of Goose Hill and Kenton Hills Woodland Rides

In 2007, the botanical survey of the woodlands and rides of Goose Hill and Kenton Hills included areas containing semi-natural habitat along and in the vicinity of the proposed access road route and construction compound. The survey identified the planted dry woodland as having considerable potential for restoration to heathland by virtue of the remnant vegetation along the rides and the sandy soils. Attention was also drawn to the floristic links between the acid dune vegetation of the coast and this area.

In 2008, further survey provided supplemental coverage of the ride vegetation on the higher ground of Goose Hill and the eastern parts of the Kenton Hills. This fieldwork provides a boundary to the area of remnant heathland vegetation within the survey area, and provides a sound science and evidence base for the possible development of a mitigation strategy for this area. When combined with the assessment undertaken in 2007, the survey helps to identify (a) the target vegetation communities which could be restored and (b) those areas of high quality vegetation which could be used as a source for seeds or direct planting.

The area of dry woodland and rides surveyed in 2007 and 2008 are shown in **Figure 1.3**.

d) Survey of the Coastal Embankment Habitats

In 2008, the grassland and scrub habitats of the coastal embankments falling within the PWA were formally sampled. These data can be used to characterise these vegetation stands within the framework of the National Vegetation Classification, and complete the vegetation data set for the PWA.

The areas of the PWA habitats surveyed in 2007 and 2008 are shown in **Figure 1.3**.

2. Methods

2.1 Desk Study

2.1.1 Sizewell Marshes SSSI Dyke Vegetation

As discussed in the report of the 2007 vegetation survey (Entec report reference 19801cb145), there have been several previous surveys of the floristic composition and condition of the SSSI dyke system (Casey *et al* 1993; Casey 1998; Hemphill 2006). In describing the aquatic vegetation, these authors employed the classification developed for the Essex and Suffolk coastal marshes (Wolfe-Murphy *et al*., 1991; Doark and Leach, 1990). Whilst not developed in relation to the NVC, this system provides a broad correlation between classifications. In order to allow cross-reference with the findings discussed most recently by Hemphill (2006), the classification has been incorporated into the vegetation stand accounts in section 3.2. It is noted that these earlier surveys employ a different sampling technique and do not assess the Main Drains.

No additional desk study has been undertaken to inform the 2008 survey.

2.1.2 Sizewell Marshes Fen Meadows, Reedbeds and Wet Woodland

The primary site-specific source employed in reviewing existing information about the fen meadow and reedbed habitats is ***An Ecological Survey of Sizewell Belts*** (Casey *et al* 1993). This report details a formal NVC survey of an almost identical area of Sizewell Marshes to the current survey, and was conducted in a similar level of detail at a similar time of year. A comparison of the recorded changes in the vegetation since 1993 is summarised in section 4.

As referred to in the 2007 report, the series of reports on the woodland and fen meadow vegetation of the Sizewell Marshes SSSI (Parmenter 1996-2001; Stone, 2003-2008) give a partial view of the character and condition of these habitats. In particular, the fen meadow permanent plots emphasise the changes in floristic composition and, latterly, the sward character in the surveyed swards during the monitoring period. Stone (2007, 2008) was consulted in developing the site accounts in section 3.3.

2.1.3 Woodland Rides and Coastal Embankment Habitats

No further desk study was undertaken in relation to the woodland rides or coastal embankment surveys.

2.2 Field Surveys

The fieldwork was undertaken between May and September 2008, inclusive, and followed the same methodology adopted for the 2007 surveys. Throughout the report, reference is made to the Suffolk Wildlife Trust compartment numbering system (Suffolk Wildlife Trust, 1993) and to formal names sometimes applied to parts of the SSSI, such as Goose Hill Marsh. All locations are given in Figure 2.1.

The framework of the National Vegetation Classification (NVC) (Rodwell 1991a, 1991b, 1992, 1995, 2000) was employed as a descriptor for all semi-natural habitats, and other vegetation stands wherever possible[2].

[2] This is consistent with the 2007 Report. It should also be noted that an NVC survey is *not* designed to provide a total inventory of all plant species that may be found on a site. Where plants of interest were seen outside of sample locations, these were noted and are included as applicable in the stand descriptions.

Botanical names are given according to Stace (1997) for vascular plants; the authorities for mosses, liverworts and lichens are Smith (2004), Paton (1999) and Dobson (2005) respectively. Stoneworts and freshwater algae follow the nomenclature given in John, Whitton & Brook (2002).

Sizewell Marshes Dyke Vegetation Survey

The NVC sampling method uses a plot size of $4m^2$, which in practice was normally configured as a 4 x 1 metre plot along a stretch of seemingly homogeneous aquatic vegetation within the dyke channel. 136 plots were sampled throughout the study area, taking one sample per dyke section, or the equivalent density on longer reaches. Using repeated 'grabs' of a grapnel for the floating and submerged flora, all plant species within the plot were recorded, including emergents. The bank itself was not sampled, as the focus of the survey was on the aquatic, rather than marginal, vegetation.

This method is in line with the use of the NVC as the UK standard and is therefore different to that employed by earlier surveys (see section 2.1.1). Nonetheless, it has been possible to gain a broad correlation between the various classifications.

In presenting the results of this survey in section 3, the plot samples have been combined for analysis and presentation with the eleven samples taken in 2007 from the area of Sizewell Marshes SSSI shown in Figure 1.3. The 'community' names given in the 2007 report for these samples are thus discarded, and the samples are regarded as forming part of the larger data set collected in 2008. This allows all sampled dykes on Sizewell Marshes SSSI to be considered in this report.

Sizewell Marshes - Fen Meadows, Reedbeds and Wet Woodland

Fen meadow samples were 2 x 2m in area, reedbed samples were 4 x 4m (or 10 x 10m in species-poor stands) and wet woodland samples were 50 x 50m, with nested sample areas for the shrub, field and ground layers. All vascular plants, bryophytes and ground lichens were recorded from the sample areas.

In presenting the results of this survey in section 3, the plot samples have been combined for analysis and presentation with the samples taken in 2007 from the area of Sizewell Marshes SSSI shown in Figure 1.3. The 'community' names given in the 2007 report for these samples are thus discarded, and the samples are regarded as forming part of the larger data set collected in 2008. This allows all sampled terrestrial habitats on Sizewell Marshes SSSI to be considered in this report.

Goose Hill and Kenton Hills – Woodland Rides

All woodland ride samples were 2 x 2m in area. All vascular plants, bryophytes and ground lichens were recorded from the sample areas.

In order to characterise the ride vegetation displaying features of remnant heathland, samples from the relevant communities identified by the 2007 survey were combined with those of 2008 and re-analysed to produce more precisely defined stands. This allows all sampled rides with this character from Goose Hill and Kenton Hills to be considered in this report.

Coastal Embankment – Habitats

Grassland samples were 2 x 2m in area. Sampled scrub stands were 4 x 4m where practicable.

2.3 Personnel

Jonny Stone undertook the majority of the field survey on the Sizewell site. He has been a vegetation ecologist working in nature conservation since 1985, and has a BSc in Geography from Durham University. Jonny specialises in vegetation survey and its application in site restoration and management, and has been conducting the annual vegetation monitoring programme at Sizewell Marshes since 2003. Jonny has been involved in training the NVC methodology since the late 1980s and has recently undertaken NVC surveys for Natural England, Defence Estates and Suffolk Wildlife Trust, amongst others.

Sampling of the dyke vegetation was also carried out by Kirsty Spencer (*nee* Smith). Kirsty is an experienced vegetation surveyor, with considerable experience of aquatic plant identification. She has surveyed these habitats throughout the UK and has been with ELP for the last 7 years. Kirsty has a BSc in Conservation Management.

2.4 Exclusions and Constraints to Survey

Sizewell Marshes Dyke Vegetation Survey

As experienced in 2007, movement around Goodram's Fen was impeded by deep water and willow scrub; in addition, some dyke sections were reed-filled and no aquatic plants were present. For this reason, few samples were taken from this section of the survey area.

A number of dyke sections within or on the margins of established woodland, notably Grimsey's Wood and Leiston Carr, were deliberately excluded, as the deep shade cast by the woodland vegetation, and the unmanaged condition of the dykes, was judged to make them very unfavourable for the development of an aquatic flora (shading is a pertinent and significant factor influencing species composition of affected dykes).

Sizewell Marshes Fen Meadows, Reedbeds and Wet Woodland

All parts of the survey area were assessed except for some areas of wet woodland; at Round Covert and Rookyard Wood which were inaccessible due to water levels. At the time of survey, Suffolk Wildlife Trust had undertaken routine topping of fen meadow vegetation in compartments G56, G58 and G62. Samples were not taken from the recently topped area in G62; otherwise the fen meadow meadow survey was not affected.

There were no constraints to survey of the woodland rides or the coastal embankment.

2.5 Valuation Methodology

Valuation of Receptors

The evaluation methodology has been adapted from guidelines produced by the Institute of Ecology and Environmental Management (IEEM 2006).

A key consideration in assessing the effects of any development on flora (and fauna) is to define the areas of habitat and the species that need to be considered. This requires the identification of a potential zone of influence, which is defined as those areas and resources that may be affected by biophysical changes caused by project activities, however remote from the project site (IEEM, 2006).

In identifying these receptors, it is important to recognise that a development can affect flora (and fauna) directly, such as through land-take required, and/or indirectly, by affecting land beyond the development site (e.g. through hydrological impacts).

It is impractical for an assessment of the ecological effects of a development to consider every species and habitat that may be affected; instead it should focus on 'valued ecological receptors' i.e. species and habitats that are both valued in some way and could be affected by the proposed development.

The value of species populations and habitats is assessed with reference to:

- Their importance in terms of 'biodiversity conservation' value (which relates to the need to conserve representative areas of different habitats and the genetic diversity of species populations);
- Any social benefits that species and habitats deliver (e.g. relating to enjoyment of flora and fauna by the public); and
- Any economic benefits that they provide.

Valued ecological receptors are valued according to the scale set out in **Table 2.1** which includes examples of the type of criteria used when defining the level of value.

Table 2.1 Examples of the Criteria Used to Define the Value of Vegetation Receptors Relevant to the Proposed Development at Bradwell

Level of Value	Examples of Criteria
International	An internationally important site e.g. SPA, SAC, Ramsar (or a site considered worthy of such designation)
National (UK)	A nationally designated site e.g. SSSI, or a site considered worthy of such designation;
	A viable area of a habitat type listed in Annex 1 of the Habitats Directive or of smaller areas of such habitat which are essential to maintain the viability of a larger whole;
	A feature identified as of critical importance in the UK BAP.
Regional	Areas of internationally or nationally important habitats which are degraded but are considered readily restored;
	A regularly occurring, locally significant population of a species listed as being nationally scarce.
County	Viable areas of priority habitat identified in the LBAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole;
	A site which meets the qualifying criteria for a non statutory designated site e.g. a Local Wildlife Site, regardless of whether it has actually been designated[3];
	A regularly occurring, substantial population of a nationally scarce species, including species listed on the UK and Local BAPs.
	A regularly occurring, substantial population of an Essex Red Data List species.

[3] http://www.suffolk.gov.uk/Environment/Biodiversity/CountyWildlifeSites.htm - Suffolk County Wildlife Site Selection Criteria 2007

Table 2.1 (continued) Examples of the Criteria Used to Define the Value of Vegetation Receptors Relevant to the Proposed Development at Bradwell

Level of Value	Examples of Criteria
Parish (site and its vicinity, including areas of habitats contiguous with or linked to those on site)	Areas of internationally or nationally important habitats which are degraded and have little or no potential for restoration; A good example of a common or widespread habitat in the local area, e.g. those listed as broad habitats on the LBAP. Species of national or local importance, but which are only present very infrequently or in very low numbers within the subject area.
Less than Parish	Areas of heavily modified or managed vegetation of low species diversity or low value as habitat to species of nature conservation interest; Common and widespread species.

Evaluations of habitats falling within both the 2007 and 2008 survey areas have been collated and are given in Table 4.1.

3. Field Surveys

3.1 Overview

In the 2008 report, the term ‘stand’ is reserved for an area or areas of homogeneous vegetation. Where more than one area of a similar type of vegetation has been identified, these have been combined to form a single stand. Each stand is normally represented by the species composition and general vegetation characters recorded at a number of representative sample plots.

A total of 347 vegetation samples were taken from the survey areas defined in Section 2. Analysis of the data has defined 34 vegetation stands, which are listed in ***Table 2.*** The location of the samples and of the vegetation stands they represent are given in Figures 3.1-3.4.

In certain cases, stands of visually distinct aquatic or fen meadow vegetation are placed within the same NVC community but are retained as distinct areas in the accounts given in sections 3.2-3.5. If one characteristic of a stand is particularly visible – normally the abundance or constant presence of a species - the stand may be named as a distinctive ‘variant’ of a particular sub-community within the NVC.

In this report, the term ‘community’ is reserved for the published NVC vegetation units, and is not used as a synonym for a stand. This convention is employed as a way of distinguishing between the characters of the vegetation found in the survey area, and those of the NVC communities themselves. This means that several types of vegetation identified by the 2007 report as communities are renamed in this report as stands. Where Sizewell Marshes SSSI samples taken in 2007 are collated with the 2008 data set, they have been re-assigned to the stands to which they have a closest match.

Where several similar stands are identified in particular habitats, a synoptic (summary) table is included in the accounts. Each table presents the summary data for the group of stands, which allows for comparison of their floristic characters.

For each stand, species are listed according to their constancy within the stand as shown in **Table 3.1**. For example, where a stand is composed of ten samples, the synoptic table would include all species occurring with a constancy of one or more. Where less than five samples were taken in defining a stand, the number of samples is given for species occurring in more than 20 per cent of the samples. This summary (or synoptic) table should be consulted when reading the stand accounts.

Table 3.1 Constancy Categories Used in Vegetation Tables

Constancy	Range (%)	
V	81-100	
IV	61-80	
III	41-60	
II	21-40	
I	1-20	Excluded from the synoptic table

Wherever possible, the stands are described in terms of the NVC, and are titled accordingly. Nonetheless, it should be evident from the stand descriptions, and the detailed stand tables presented in ***Appendix A. Data Tables for the Plant Communities***, that some areas of distinct vegetation recorded by the survey are not accurate reflections of the published communities. In some cases, stands may be singular local representatives of a type of vegetation defined with reference to vegetation elsewhere in Britain. Other stands, such as most of the fen meadow vegetation, are distinct in the field, but are all subsumed in a broadly defined community (or sub-community) within the NVC. A few stands, such as the drier grasslands found on parts of the power station embankment and on the southern valley slopes, are not represented within the NVC; these are given descriptive names, though an attempt is made to align these kinds of vegetation within the broad framework of the NVC.

Vegetation is either mapped as homogeneous blocks, such as the fen meadow stands, or their distribution is illustrated by mapping only the sample locations (where different stands are intermingled (as with the dykes) or occur in only limited parts of the survey area (as is the case with the ride survey)).

Table 3.2 Summary of Vegetation Stands Present Within the Study area[4]

Habitat	NVC Community		Stand
Dyke vegetation	A4 *Hydrocharis morsus ranae-Stratiotes aloides* community	Full sun variant	DY1a
		Shade variants	DY1b
		Stonewort variant	DY1c
		Elodea canadensis variant	DY1d
	A2b *Lemna minor* community, *Lemna trisulca* sub-community over		DY2
	A6 *Ceratophyllum submersum* community		
	A2c *Lemna minor* community, *Riccia fluitans-Ricciocarpus* sub-community over		DY3
	A16 *Callitriche stagnalis* community with		
	S23 Other water margin vegetation		
	A2a *Lemna minor* community, Typical sub-community over		DY4
	A16 *Callitriche stagnalis* community with		
	S23 Other water margin vegetation		
	A2a *Lemna minor* community, Typical sub-community over		DY5
	S23 Other water margin vegetation		
	A2a *Lemna minor* community, Typical sub-community with		DY6
	S4a *Phragmites australis* community, *Phragmites australis* sub-community		
	A2a *Lemna minor* community, Typical sub-community		DY7
Fen meadow	M22b *Juncus subnodulosus*-Cirsium palustre fen-meadow, *Briza media-Trifolium spp*. sub-community	Stand a	FM1a
		Stand b	FM1b
		Persicaria amphibia variant	FM1c
		Menyanthes trifoliata variant	FM1d
	M22b *Juncus subnodulosus-Cirsium palustre* fen-meadow, *Briza media-Trifolium* spp. sub-community with affinities to		FM2
	MG8 *Cynosurus cristatus-Caltha palustris* grassland		
	M22b *Juncus subnodulosus-Cirsium palustre* fen-meadow, *Briza media-Trifolium* spp. sub-community with affinities to		FM3a
	MG12a *Festuca arundinacea* grassland, *Lolium perenne-Holcus lanatus* sub-community		FM3b
			FM3c

[4] Note that the table incorporates those stands or groups of samples surveyed in 2007 that fall within the current survey areas in order to provide a full account of the occurrence and character of each surveyed stand. NB the table does not include other types of vegetation surveyed in 2007.

Table 3.2 (continued) Summary of Vegetation Stands Present Within the Study area[5]

Habitat	NVC Community	Stand
	M22d *Juncus subnodulosus-Cirsium palustre* fen-meadow, *Iris pseudacorus* sub-community with affinities to	FM4
	MG12a *Festuca arundinacea* grassland, *Lolium perenne-Holcus lanatus* sub-community	
	M22b *Juncus subnodulosus-Cirsium palustre* fen-meadow, *Briza media-Trifolium* spp. sub-community / MG10a *Holcus lanatus-Juncus effusus* grassland, Typical sub-community. Intermediate.	FM5
	MG10a *Holcus lanatus-Juncus effusus* grassland, Typical sub-community	FM6
Valleyslope grasslands	*Holcus lanatus* grassland	VG1
	U1d *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland, *Anthoxanthum odoratum-Lotus corniculatus* sub-community	VG2
Reedbed	S26 *Phragmites australis-Urtica dioica* fen	RB1
Wet Woodland	W6a *Alnus glutinosa-Urtica dioica* woodland, Typical sub-community	WW1
	W2a *Salix cinerea-Betula pubescens-Phragmites australis* woodland, *Alnus glutinosa-Filipendula ulmaria* sub-community	WW2
	W5a *Alnus glutinosa-Carex paniculata* woodland, *Phragmites australis* sub-community	WW3
	W10d *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Holcus lanatus* sub-community	WW4
Ride vegetation	U1c *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland, *Erodium cicutarium-Teesdalia nudicaulis* sub-community	RI34
	With affinities to	
	SD12a *Carex arenaria-Festuca ovina-Agrostis capillaris* dune grassland, *Anthoxanthum odoratum* sub-community	
	U4b *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland, *Holcus lanatus-Trifolium repens* sub-community	RI35
Coastal embankment	SD8 *Festuca rubra-Galium verum* fixed dune grassland	CE1
	Parched grassland	CE2
	W23 *Ulex europaeus-Rubus fruticosus* scrub	CE3

[5] Note that the table incorporates those stands or groups of samples surveyed in 2007 that fall within the current survey areas in order to provide a full account of the occurrence and character of each surveyed stand. NB the table does not include other types of vegetation surveyed in 2007.

3.2 Aquatic Vegetation of the Sizewell Marshes SSSI Dykes

The 2007 survey of the dykes within 200m of the Preliminary Works Area (which took in part of the Minsmere Levels to the north), included 11 samples from dykes within Goose Hill Marsh and Goodram's Fen within the Sizewell Marshes SSSI. These were added to the 136 samples taken in 2008 from the fen meadow compartments and accessible areas of Goodram's Fen with an aquatic flora. This has allowed a comprehensive assessment of the aquatic vegetation of Sizewell Marshes SSSI, based on a total of 147 samples.

The aquatic species recorded in these samples have been subdivided into floating (9) and submerged species (16), along with aquatic algae genera (5). The floating plants include one moss (*Drepanocladus fluitans*, solely recorded when detached from the bank and floating on the water surface), a liverwort (*Riccia fluitans*) and an aquatic fern (*Azolla filiculoides*). This category also includes the floating form of *Persicaria amphibia*, but is dominated by *Lemna minor, L. trisulca* and *Hydrocharis morsus-ranae*. Of the submerged aquatic species, *Ceratophyllum demersum, Elodea canadensis* and *Callitriche stagnalis* are particularly evident, though several dykes have abundant *Ceratophyllum submersum* and *Chara vulgaris*.

In addition, 12 species were recorded as marginal emergents. These are species found within the waterbody that can form stoloniferous[6] 'rafts' from the bank. Detached fragments of the stolons may also occur within the floating aquatic flora; of these, the aquatic form of *Berula erecta* is particularly common in many dykes. Swamp and fen emergents were also recorded where stems arise within the waterbody. Where prolific, these species are recognized as a separate swamp community, but in most samples species such as *Sparganium erectum* and *Equisetum fluviatile* are subsumed within the aquatic communities of the NVC.

Of the vascular plants, two are Nationally Scarce[7]: *Potamogeton coloratus* and *Myriophyllum verticillatum. Ceratophyllum submersum*[8], *Hydrocharis morsus-ranae* and *Hottonia palustris* are uncommon (Preston, Pearman & Dines, 2002) but occur in more than 100 10 km squares and exceed the threshold for this conservation category. Several samples, taken from the dykes surrounding compartments G27, G37 and G39 (Figure 2.1), contain records of another locally scarce species, *Carex diandra*, which occurs on the bankside margin of the waterbodies.

In the following stand descriptions, species-richness refers solely to the average score of the number of aquatic (floating plus submerged) species in each sample. There is no nationally adopted standard for determining species richness of aquatic plant communities. Reference is also made to the classification of Wolfe-Murphy *et al*. (1991); their endgroups[9] are correlated by the authors to the nearest equivalent NVC communities, and are referred to in each stand description. Because of the different sample size, no direct comparison should be made with previous surveys in the study area referred to in Section 3.1: the samples were taken with the sole intent of classifying the vegetation within the NVC, and the reference to endgroups is intended as indicative rather than a definitive definition.

[6] Stoloniferous – a root-like stem

[7] 'Nationally Scarce' defines those species that have been recorded from 16-100 10 km squares of the UK National Grid; the category is assigned to relevant species in, for example, Stace (1997) and Preston *et al* 2002).

[8] Given as Nationally Scarce by Casey (1998), but removed from this list by 1994 (Stewart, Pearman and Preston 1994).

[9] This is a term used in statistics to denote a group of samples with similar characteristics brought together following the application of a statistical procedure.

As shown in **Figure 3.1** and listed in **Table 3.2.**, seven distinct stands are identified, with often quite discrete distributions through the survey area. They are named in terms of the NVC syntaxa[10] that are closest in character and species composition. One stand is further sub-divided into a number of variants, which describe distinct species compositions or ecological situations. Where appropriate, the dyke stands are described in terms of more than one NVC syntaxon; for example, a group of similar samples may contain a community of floating aquatic species over a submerged or swamp community, often dominated by one species, such as *Ceratophyllum submersum* or *Phragmites australis*.

In broad terms, stands DY1 and DY2 occur within the fen meadow dykes, while the remaining communities are found along the Mains Drains, in heavy shade or on the margins of Sizewell Marshes. This separation is likely to reflect differing water chemistry, mediated by different light regimes and management occurring within the survey area.

A comparison of each stand is given in **Table 3.3** according to the frequency of occurrence of species in each sample group. The species groups are ordered by the floating, submerged, marginal and swamp/fen habit of each species.

Table 3.3 Synoptic Table for the Aquatic and Swamp Stands Recorded from Sizewell Marshes:

Dyke Vegetation	DY1a	DY1b	DY1c	DY1d	DY2	DY3	DY4	DY5	DY6	DY7
Floating										
Lemna minor	IV	V		II	V	2	V	V	4	V
Lemna trisulca	V	III	IV	V	IV	2			1	
Hydrocharis morsus-ranae	V	V	V	IV	II				1	
Persicaria amphibia		II								
Riccia fluitans						2				
Submerged										
Utricularia vulgaris	II	III		II						
Ceratophyllum demersum	III	V								
Chara vulgaris			V							
Elodea canadensis				V			II			
Ceratophyllum submersum					V					
Callitriche stagnalis						2	V	II		
Aquatic algae										
Spirogyra sp.	II	II	III	III	III	2	II			
Cladophora sp.						1				

[10] In vegetation classification, a syntaxon is a taxonomic unit of the classification of any rank – amongst the communities identified, reference may be made to a community, sub-community or variant of a published community within the NVC.

Table 3.3 (continued) Synoptic Table for the Aquatic and Swamp Stands Recorded from Sizewell Marshes

Dyke Vegetation	DY1a	DY1b	DY1c	DY1d	DY2	DY3	DY4	DY5	DY6	DY7
Marginal										
Berula erecta	IV	III	IV	V	IV	2	III	IV	1	
Agrostis stolonifera		III		II	II				1	
Mentha aquatica	II			II	II	2		III		
Rorippa nasturtium-aquaticum				II			III	III		
Alisma plantago-aquatica				II						
Veronica beccabunga						1		II		
Swamp-Fen										
Phragmites australis	IV	III	III	IV	III		III		4	II
Juncus subnodulosus	II		III		II	1				
Iris pseudacorus	II		II					III		II
Rumex hydrolapathum	II		II	II					1	
Carex pseudocyperus	II		III	II						
Carex riparia		II		II						
Equisetum fluviatile			II			2				
Sparganium erectum				III		1				
Juncus effusus						2				
Juncus articulatus						2				
Glyceria maxima								II		

3.2.1 Stand DY1 - A4 *Hydrocharis morsus-ranae – Stratiotes aloides* Community

The four stands that relate to this NVC community are maintained as separate variants in order to emphasise the distinct differences in species composition and appearance. While each is considered separately, it is emphasized that the stands can be regarded as variants of the same NVC community. As such, an overall statement regarding the limited distribution of the community as a whole is reserved for the end of the stand accounts, and refers to all four stands.

Stand DY1a - A4 *Hydrocharis morsus-ranae – Stratiotes aloides* community – Full sun variant

Twenty-three samples were taken from this stand, which occurs exclusively in full sunlight, particularly in dykes north of Reckham Pits Wood (often in association with Stand DY1c) and south of Rookyard Wood.

The stand is characterised by a constant layer of floating species, usually *Hydrocharis morsus-ranae* subtended by suspended agglomerations of *Lemna trisulca*. The aquatic form of *Berula erecta* occurs throughout the stand, with stolon segments scattered over the surface. Scattered

shoots of *Juncus subnodulosus*, *Rumex hydrolapathum* and *Iris pseudacorus* are common, and shoots of *Phragmites australis* are sometimes sufficiently frequent to give the appearance of swamp patches along several dyke sections.

Submerged aquatic species, while present throughout, rarely attain prominence in this stand. While *Ceratophyllum demersum* may sometimes be abundant, the dyke samples are characterised by contributions from several species, such as *Utricularia vulgaris* and the Nationally Scarce *Myriophyllum verticillatum*. *Callitriche stagnalis* and *Elodea canadensis*, though present, do not form mats as they do in Stands DY1d and DY4.

The average number of floating and submerged aquatic species is 4.0 (range 2-8 species per sample), making this the least species-rich variant of Stand DY1 in terms of its flora, though it compares favourably with the other dyke vegetation communities on this measure.

Stand DY1b - A4 *Hydrocharis morsus-ranae – Stratiotes aloides* Community – Shade Variants

Thirty four samples were taken from this stand, which occurred where dyke sections were at least partly shaded by alder and other trees and shrubs. Dykes where this vegetation occurs are mainly located within the fen meadow compartments, though some samples were taken from peat areas along the boundary with the power station. The proportion of cover directly above the sample was measured by eye, and the samples are further divided into light and heavy shade forms. While this stand shows some distinctive features that are a likely response to lower light levels, other factors such as the orientation of the dyke, the amount of tree leaf-litter and the amount of skylight percolating through the canopy may contribute to the differences.

While *Hydrocharis morsus-ranae* and *Lemna trisulca* are present throughout, the floating vegetation layer is frequently dominated by *Lemna minor*. This species frequently forms a thick carpet over the surface, particularly in the heavy shaded form of the stand. *Spirodela polyrhiza* is also present in limited sections, and the occasional frond of *Persicaria amphibia* occurs sporadically.

Many samples recorded a thick tangle of *Ceratophyllum demersum*, sometimes accompanied or replaced by *Utricularia vulgaris*. *C. demersum*, in particular, is widely recognised as being tolerant of some shading, and may also be responding to the additional nutrient store provided by the input of leaf and other detritus into the waterbodies supporting this stand. These species are present in quantity in both shade forms, but are much less frequent under heavy shade conditions, where they are often absent. Associated submerged species are particularly common in the light shade form of the stand, with *Myriophyllum verticillatum, Potamogeton berchtoldii* and *Chara globularis* all present.

The light shade form of the stand also includes plentiful algal masses, with *Spirogyra* spp., *Cladophora* spp. and *Enteromorpha* spp. all being present in quantity. The latter genus is sometimes ubiquitous in particular dyke sections.

The marginal and swamp/fen species are also better represented in the light shade form, with *Berula erecta* and *Phragmites australis* being particularly common. Here, too, extension growths from the bankside flora occupy the margins of the dykes; *Agrostis stolonifera* and *Carex riparia* representing a range of associates in this stand. Of particular note are the occasional, scattered tussocks of *Carex diandra* that occur low down on the bankside.

The average number of floating and submerged aquatic species for the stand is 5.2 (range 1-8 species per sample), making this the most species-rich variant of Stand DY1 in terms of its

flora. The light shade form (average 5.6) is significantly more species-rich than the heavy shade form (average 4.4), though it should be stressed that the latter does not include dyke sections where a flora was absent.

Stand DY1c - A4 *Hydrocharis morsus-ranae – Stratiotes aloides* community – Stonewort variant

This stand is represented by 12 samples from dyke sections in the most species-rich areas of fen meadow, north of Reckham Pits Wood and Rookyard Wood. Both are in central areas of the marsh in full sunlight.

In the western area above Reckham Pits Wood, the stand is dominated by the floating vegetation – *Hydrocharis morsus-ranae* and *Lemna trisulca*, with a discontinuous raft of *Berula erecta*. Beneath this canopy, *Chara vulgaris* and *Spirogyra* spp. are constant but never abundant, sometimes accompanied by *Myriophyllum verticillatum*.

In the eastern area, north of Rookyard Wood, the stonewort forms extensive, lime-encrusted swathes, with occasional contributions from the other species. In patches where the floating vegetation does dominate, the stonewort, which is notably light-demanding, is itself reduced to scattered individuals, and the presence of *Ceratophyllum demersum* and *Utricularis vulgaris* suggest the stonewort variant is giving way to other forms of the DY1 stand.

Swamp/fen associates are scattered and diverse: the stand includes both species occurring in the fen meadows, but also the occasional *Oenanthe lachenalii* and *Bolboschoenus maritimus*. These species are an indication that the stand may have some relation with Stand DY28 – *Chara vulgaris* aquatic community, which was recorded from the brackish parts of Sizewell Levels in 2007.

The average number of floating and submerged aquatic species for the stand is 4.6 (range 2-8 species per sample), making this one of the more species-rich variants of Stand DY1 in terms of its flora. This value lies between that given for Stand DY28 (3.0) and the light shade form of Stand DY1b (5.6).

Stand DY1d - A4 Hydrocharis Morsus-Ranae – Stratiotes aloides Community – *Elodea canadensis* Variant

This stand occurs in fragmented locations to the northeast of Reckham Pits Wood and along the southern margin of the marshes between Keeper's Cottage and Rosery Cottages. Nine samples were taken from open and partly shaded situations from dykes on the margins of areas supporting other variants of Stand DY1.

The stand is dominated by floating vegetation – *Hydrocharis morsus-ranae* and *Lemna triculca* - with a discontinuous raft of *Berula erecta*. The algal genus *Spirogyra* is also well represented, and blanketweed sometimes forms a thick mat on or near the water surface. *Elodea canadensis* is also constant and is the most common submerged species; it forms thick, ropey tangles along lengths of the dyke sections, giving way periodically to blanketweed or, in one section, to fine strands of *Chara globularis*. Other submerged species are no more than occasional, though *Utricularia vulgaris* and both *Ceratophyllum* species are present.

With the exception of *Berula erecta*, marginals are uncommon, and *Phragmites australis* and *Sparganium erectum* are the most frequent swamp species. In places, both species form patches of marginal swamp stands, but rarely cover the dyke surface.

The average number of floating and submerged aquatic species is 4.2 (range 2-7 species per sample), making this a stand of moderate species-richness within the survey area. It is similar in species composition and character to Stand DY25, encountered in 2007 on the Sizewell Levels to the north of the survey area, though it is less species-rich than that stand.

Evaluation of Stand DY1

The aquatic vegetation of all four above stands representing this type of vegetation all correspond to Endgroup 1 of the Wolfe-Murphy *et al*. (1991) classification, which they summarise (using NVC codes) as:

> Mainly floating carpets of *Lemna minor* (A2) and / or *Hydrochaeris morsus-ranae-Lemna* (synonymy *Spirodela*) *polyrhiza* (A3) over submerged vegetation dominated by *Ceratophyllum demersum* (A5), occasionally *Elodea canadensis* (A15).

Wolfe-Murphy *et al* note that the bulk of this vegetation is equivalent to the *Hydrochaeris-Spirodela* community (A3).

The addition of several species to the vegetation described by Wolfe-Murphy *et al* (1991), particularly *Myriophyllum verticillatum* and *Hottonia palustris*, for which the *Hydrocharis-Stratiotes* community (A4) is preferential, highlights a significant difference from the vegetation they described. Although the variants are distinct and display different species compositions, the stand as a whole can be referred to the *Hydrocharis morsus-ranae-Stratiotes aloides* community (A4). According to Rodwell (1995) this vegetation "….is now very local and mostly confined to Broadland". Its representation at Sizewell Marshes is particularly notable in Suffolk as the site has a peat substrate, which is not a common feature of the county coastline; in addition, the shingle beach ridge has protected the Marshes from all but occasional saline intrusions. This community represents part of the complex of dyke vegetation noted in the SSSI citation.

Stand DY2 - A2b *Lemna minor* Community, *Lemna trisulca* Sub-Community over A6 *Ceratophyllum submersum* Community

A further 11 samples were added during the 2008 survey to the six samples gathered from a discrete area of this stand type (mapped in 2007 as DY26) on Goose Hill Marsh. This type of aquatic vegetation extends from Goose Hill Marsh southwards as far as Grimsey's Wood and into one dyke on Goodram's Fen. Other examples of this type of vegetation were identified from several dykes to the south of Leiston Carr and in scattered locations northeast of Reckham Pits Wood.

The distribution of floating vegetation is markedly variable amongst the dykes where this stand occurs. In some dyke sections, *Lemna minor* forms a dense carpet over the surface and, where the species is present, a mixed assemblage of *Hydrocharis morsus-ranae*, *Lemna trisulca* and occasional *Spirodela polyrhiza* also occurs. *Berula erecta* is a constant companion, though only occasional in number, and stray stolons of *Agrostis stolonifera* are often found trailing among these species.

The distinguishing feature of the stand, however, is *Ceratophyllum submersum*, which forms a thick tangle just below the water surface, usually suspended below dense masses of algae, predominently *Spirogyra* species. In two samples, lime-encrusted strands of the stonewort *Chara vulgaris* were recorded.

The average number of floating and submerged aquatic species is 3.7 (range 3-7 species per sample), making this vegetation less species-rich than those referred to the A4 *Hydrocharis-Stratiotes* community, though clearly associated with them.

The aquatic vegetation corresponds to Endgroup 3 of the Wolfe-Murphy *et al*. (1991) classification, which they summarise (using NVC codes) as:

> Endgroup 3: Invariably beds of *Ceratophyllum submersum (A6)* beneath floating carpets *of A2b*.

In summary, the stand can be referred to the *Ceratophyllum submersum* community (A6) beneath floating carpets of *Lemna trisulca* sub-community of the *Lemna minor* community (A2b). According to Rodwell (1995), the *C. submersum* community "… is mostly confined to sites on or near the coast of south-eastern England, with scattered localities to the west". The *Lemna trisulca* vegetation is also centred on the southeast of lowland Britain. This community represents part of the complex of dyke vegetation noted in the SSSI citation.

Stand DY3 - A2c *Lemna minor* Community, *Riccia fluitans-Ricciocarpus natans* Sub-Community over A16 *Callitriche stagnalis* community with S23 Other Water Margin Vegetation

This minor stand is of limited extent, and is recorded from two dykes on the fringes of Compartment G63 by Lover's Lane. It resembles Stand DY4 in many respects, but has a more developed floating plant flora including masses of *Riccia fluitans* suspended near the surface of the water column. In the recent Flora of Norfolk, the distribution of this aquatic liverwort is described as 'widely scattered' (Stevenson, R in Beckett & Bull 1999) and has been recorded from only 9 10 km-squares in that county. In Suffolk, its distribution is uncertain, though it has been recorded in 2008 from Docwra's Ditch near Coastguard Cottages, Dunwich by the author.

The submerged flora is limited to *Callitriche stagnalis* and the stand also includes a patchily developed marginal flora, sometimes dominated by *Berula erecta*, with *Veronica beccabunga* and *Mentha aquatica* associated.

The average number of floating and submerged aquatic species in the two samples referred to this stand is 3.9 (range 5-6 species per sample), making this vegetation less species-rich than those referred to the A4 *Hydrocharis-Stratiotes* community.

The aquatic vegetation broadly corresponds to Endgroup 2 of the Wolfe-Murphy *et al*. (1991) classification, which they summarise (using NVC codes) as:

> Endgroup 2: Includes mixtures of *Lemna minor* (typically A2a) and the *Callitriche stagnalis* (A16) but with associated brackish species, notably *Ranunculus baudotii* (A21).

Clearly, the stand lacks evidence for brackish influences.

In summary, this small stand can be referred to the *Riccia fluitans-Ricciocarpus natans* sub-community of the *Lemna minor* community (A2c), over the *Callitriche stagnalis* community (A16) with other water margin vegetation (S23). According to Rodwell (1995), the *Riccia-Ricciocarpus* sub-community is south-eastern in its distribution, and the limited occurrence of the character species (at least in East Anglia) suggests that this is an uncommon community. Both the A16 and S23 communities are widespread and common in lowland Britain.

Stand DY4 - A2a *Lemna minor* Community, Typical Sub-Community over A16 *Callitriche stagnalis* Community with S23 Other Water Margin Vegetation

Eleven samples were taken of this stand, which largely occurs along sections of the main drains, often in association with Stand DY5, and is recorded from all dykes surrounding compartment G59 towards the west of the survey area. It resembles Stand DY3 in many respects, but lacks *Riccia fluitans* amongst the floating flora. Here, *Lemna minor* is ubiquitous and forms patchy dense carpets along many sections. A scattered marginal flora is also often present, with *Berula erecta*, *Rorippa nasturtium-aquaticum* and sometimes spreads of *Catabrosa aquatica*, though this species appears to be less frequently occurring in some of the dykes and drains (personal observation); this may, in part, be a temporary consequence of recent dyke management. Swamp species are infrequent, with scattered *Phragmites australis* and *Iris pseudacorus*.

The submerged flora consists largely of *Callitriche* species. Identification of this genus remains uncertain in the absence of fruiting material: it is likely that *Callitriche stagnalis*, *C. obtusangula* and *C. platycarpa* are all represented, though most plant material was referred to *C. stagnalis*. *Elodea canadensis* is also present, particularly along the Leiston Drain, and there are scattered records of *Ceratophyllum demersum* and *Potamogeton berchtoldii*.

The average number of floating and submerged aquatic species in the two samples referred to this stand is 3.6 (range 2-6 species per sample), making this vegetation less species-rich than those referred to the A4 *Hydrocharis-Stratiotes* community.

As with Stand DY3, the aquatic vegetation broadly corresponds to Endgroup 2 of the Wolfe-Murphy *et al*. (1991) classification, which they summarise (using NVC codes) as:

> Endgroup 2: Includes mixtures of *Lemna minor* (typically A2a) and the *Callitriche stagnalis* (A16) but with associated brackish species, notably *Ranunculus baudotii* (A21).

Clearly, the stand lacks evidence for brackish influences.

In summary, this stand can be referred to the Typical sub-community of the *Lemna minor* community (A2a), over the *Callitriche stagnalis* community (A16) with Other water margin vegetation (S23). According to Rodwell (1995), all these communities are amongst the most common in lowland Britain, and are associated with standing water to moderately flowing waters, often of moderate to high fertility.

Stand DY5 - A2a *Lemna minor* Community, Typical Sub-Community over S23 Other Water Margin Vegetation

Ten samples were taken of this stand, which largely occurs along sections of the Main Drains, often in association with Stand DY4, as well as in standing waters often in shade in some dyke sections near the southern Main Drain beneath Reckham Pits Wood. There is a small outlier in a single dyke section near Round Covert.

Aquatic vegetation is largely represented by patches of *Lemna minor*, which seldom attain extensive proportions and are more typically found in the most slow-flowing sections of the Main Drains, often in the lee of coarse woody debris and amongst the stilt roots of bankside shrubs and trees. *Callitriche stagnalis* also occurs occasionally, emphasising the close relation of this vegetation with Stand DY4. Swamp/fen species are also present, with *Iris pseudacorus* and *Glyceria maxima* often present.

Much of the character of these stands lies in the often vigorous growths of marginal vegetation. *Berula erecta, Mentha aquatica* and *Rorippa nasturtium-aquaticum* all occur as lush, thick beds extending across the water surface, often in association with *Veronica beccabunga* and *Agrostis stolonifera*.

The average number of floating and submerged aquatic species is only 1.7 (range 1-5 species per sample), making this the poorest stand within the study area for aquatic plant species.

The aquatic vegetation predominantly corresponds to Endgroup 4 of the Wolfe-Murphy *et al*. (1991) classification, which they summarise (using NVC codes) as:

> Endgroup 4: Generally species-poor *Lemna minor* (A2), although often with *Lemna trisulca* and then referrable to the (A2b) sub-community.

All samples in this stand can be directly referred to the Typical sub-community of the *Lemna minor* community (A2a), where the floating carpet can vary from sparse to continuous. This is a common aquatic community throughout lowland Britain. Similarly, the S23 Other water margin vegetation is common and typical of ditches and slow-flowing streams.

Stand DY6 - A2a *Lemna minor* Community, Typical Sub-Community with S4a *Phragmites australis* Community, *Phragmites australis* Sub-Community

This minor stand has been recorded from the dykes surrounding the reedbed south of Grimsey's Wood, and along the southern Main Drain where it passes beside Goodram's Fen. In both cases, dense growth of reed produces strong shade over the water surface, and it is likely that the aquatic vegetation is affected by low light levels.

The four samples referred to this stand have a simple structure with an often complete and dense carpet of *Lemna minor* over the water surface, and advancing stands of pure *Phragmites australis* extending from the channel margins. Two unassigned samples from the marginal marsh dyke in compartment G52 are also included here – these dyke sections contain reedswamp without the *Lemna minor* layer and one sample has recorded an area of the pondweed *Potamogeton pectinatus*.

The average number of floating and submerged aquatic species is only 1.8 (range 1-3 species per sample), making this one of the poorest communities within the study area for aquatic plant species.

The aquatic vegetation predominantly corresponds to Endgroup 4 of the Wolfe-Murphy *et al.* (1991) classification, which they summarise (using NVC codes) as:

> Endgroup 4: Generally species-poor *Lemna minor* (A2), although often with *Lemna trisulca* and then referrable to the (A2b) sub-community.

All samples in this stand can be directly referred to the Typical sub-community of the *Lemna minor* community (A2a), where the floating carpet can vary from sparse to continuous. This is a common aquatic community throughout lowland Britain. Similarly, the S4a *Phragmites australis* swamp, although less widespread, can be typical of disturbed peatlands and has low conservation value for its limited flora.

Stand DY7 – S2a *Lemna minor* Aquatic Community

Throughout the survey area, a number of sampled dykes lack the character species of the other communities. A group of 23 samples (including five samples from 2007) have been brought

together to form a rather diffuse stand that often occurs in dyke sections amongst other aquatic vegetation. The stand is characterised by the constant and sometimes ubiquitous floating carpet usually dominated by *Lemna minor*, though with a number of floating species making an occasional appearance. The submerged associates are infrequent or absent, and the emergent layer, if present, is largely restricted to *Phragmites australis*, *Glyceria maxima* or, in a few cases, by the taller fen meadow species of the bankside.

The average number of floating and submerged aquatic species is only 1.8 (range 1-4 species per sample), making this one of the poorest communities within the study area for aquatic plant species.

This stand is typical of particular peripheral drains and dykes and, sometimes in association with stand DY6, defines waterbodies that are either unfavourable for aquatic plant growth, or subject to forms of disturbance or constraint that restrict the development of aquatic vegetation.

The aquatic vegetation predominantly corresponds to Endgroup 4 of the Wolfe-Murphy *et al.* (1991) classification, which they summarise (using NVC codes) as:

> Endgroup 4: Generally species-poor *Lemna minor* (A2), although often with *Lemna trisulca* and then referrable to the (A2b) sub-community.

All but a few of the samples in stand DY7 can be directly referred to the Typical sub-community of the *Lemna minor* community (A2a), where the floating carpet can vary from sparse to continuous. This is a common aquatic community throughout lowland Britain. A few samples, by virtue of the presence of *L. trisulca*, may be referred to the *L. trisulca* sub-community (A2b), which is more frequently found in the southeast. Almost all samples lack a significant development of a submerged flora.

3.3 Sizewell Marshes SSSI Fen Meadows, Reedbeds and Wet Woodland

3.3.1 Fen Meadows

Fen meadow compartments within Sizewell Marshes are extensive, but exclude Goodram's Fen and the two reedbed compartments, G25 and M7. The communities identified in the compartments covered by the 2007 survey (G17-23 and G26-27) have been grouped with the vegetation types identified in this report and mapped, in **Figure 3.2**, according to the NVC communities to which they have been referred.

While none of the recorded species are recognized as Nationally Scarce, many of the plants are uncommon in Suffolk and listed by Suffolk Biological Records Centre (SBRC)[11] (http://www.users.globalnet.co.uk/~sbrc/Fens&Marshes.htm); they are frequently restricted to semi-natural wetland habitats. In this category can be included *Anagallis tenella, Cirsium dissectum, Pedicularis palustris, Valeriana dioica, Carex echinata* and *C. pulicaris*. Of equal note are the limited numbers of *Isolepis cernua* that occur on trampled ground within several compartments.

As shown in **Figure 3.2**, six distinct stands are identified, with often quite discrete distributions within the Marshes. They are listed below in terms of the nearest NVC community. Two stands

[11] This reference refers to the lists of 'Really Useful Species' produced by the Records Centre to describe the plants that have a restricted county distribution centred on particular semi-natural habitats, such as fens and marshes. By default, the plants tend to be uncommon in the county.

are further divided into a number of homogeneous sub-stands and variants[12], which describe distinct species compositions.

Most fen meadow stands are referred to the *Briza media-Trifolium* spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22b). However, the species composition and species-richness of the stands varies markedly. The distribution and nature of these variations is strongly suggestive of differing locations, management histories or hydro-chemical conditions. For this reason, some stands are described as distinct entities showing differing aspects of one NVC sub-community (as in FM1), or are described with reference to a secondary NVC syntaxon. For example, FM4, while clearly related to the *Iris pseudacorus* sub-community of the *Juncus-Cirsium* fen-meadow (M22d), also contains patches and gradients referrable to the *Lolium perenne-Holcus lanatus* sub-community of the *Festuca arundinacea* grassland (MG12a). At Sizewell Marshes, the necessity to refer to secondary vegetation features in naming the stands can often be explained with reference to its grazing history, or to the influence of occasional brackish incursions on species composition.

According to Rodwell (1991) M22 *Juncus-Cirsium* fen-meadow is most commonly encountered in East Anglia, and Rodwell *et a*l (2007, Figure 30) show a distribution restricted to areas with calcareous groundwater, particularly in the Breckland, the Waveney Valley, and within the small coastal valleys bisecting the Sandlings in east Suffolk.

The remaining stands occur towards the margin of the Marshes, and are either referred to as an intermediate between M22 *Juncus-Cirsium* and the *Holcus lanatus-Juncus effusus* rush-pasture, or can be regarded as representative of the latter community. In each case, the composition of the stands reflects the reduced influence of soil water during the growing season.

In general terms, Stand FM1, in its several versions, occupies the deeper peats away from the valley margins, and includes zones of vegetation containing many of the less common species found within the Marshes. To the south, the margins of the fen meadows are occupied by distinct bands of communities where *Juncus subnodulosus* is replaced by the more common rushes *Juncus inflexus* and *J. effusus*. On the northern side of Grimsey's Wood, the rush-dominated stands are often simpler in character and tend to be dominated by *Juncus articulatus* and be poorer in species. Lastly, on the southern and western extremities of the Marshes, the vegetation is more closely aligned to rush pasture, and many of the fen species are absent.

A comparison of each stand is presented in **Table3.4** according to the frequency of occurrence of species in each sample group.

[12] If one characteristic of a stand is particularly visible – normally the abundance or constant presence of a species - the stand may be named as a distinctive 'variant' of a particular sub-community within the NVC.

Table 3.4 Synoptic Table for the Fen Meadow Communities Recorded from Sizewell Marshes in 2008*.

	FM1a	FM1b	FM1c	FM1d	FM2	FM3a	FM3b	FM3c	FM4	FM5	FM6
Juncus articulatus	V	V	IV	4	V	IV	V	4	III	V	II
Holcus lanatus	V	III	V	4	V	IV	V	2	V	V	V
Festuca rubra	V	V	IV	4	IV	IV	IV		IV	II	
Plantago lanceolata	V	V	V	3	IV	IV	III		III	III	
Anthoxanthum odoratum	V	II	V	3	IV	II	III		III		
Ranunculus acris	V	V	III	2	III	III	III		III		
Calliergonella cuspidatum	V	V	III	4	II	III	V	1	III		
Carex nigra	V	V	III	4	II	IV	III		III		
Carex panicea	V	V	II	4		III	III				
Juncus subnodulosus	V		V	2		V			V		
Agrostis stolonifera	IV	V	III	4	V	IV	V	3	IV	IV	V
Ranunculus repens	IV	III	V	1	IV	II	III	2	IV	V	V
Trifolium pratense	IV	V	V	3	III	III	III		IV	V	II
Cynosurus cristatus	IV	V	III	1	II		II		II		
Carex disticha	IV	V	IV	4	IV	V	V	2	IV		
Phragmites australis	IV					II	II		II		
Dactylorhiza fuchsii	IV	III	III	2							
Anagallis tenella	IV	II				II					
Valeriana dioica	IV			1							

Table 3.4 (continued) **Synoptic Table for the Fen Meadow Communities Recorded from Sizewell Marshes in 2008*.**

	FM1a	FM1b	FM1c	FM1d	FM2	FM3a	FM3b	FM3c	FM4	FM5	FM6
Briza media	IV	II		2							
Lotus pedunculatus	III	III	V	3	V	IV	V		V	IV	
Trifolium repens	III	V	III	2	II	III	III		II	III	IV
Taraxacum officinale agg	III	IV	III	1	II					III	II
Cardamine pratensis	III	V	V	2	III	III	II		II	III	
Galium uliginosum	III		II								
Succisa pratensis	III	III		1							
Cerastium fontanum	II		IV	3			II		II	V	II
Brachythecium rutabulum	II	II	IV		III	III	II		III	III	
Festuca pratensis	II		IV	1	II	II			II		
Equisetum fluviatile	II			4	II	II	III	4	III		
Juncus inflexus	II	II	II			V	V	1			
Cirsium palustre	II										
Ranunculus flammula	II	III	II	1		III	III	3			
Festuca arundinacea	II	II	II	2		V	IV		III		
Rhinanthus minor	II			3							
Lychnis flos-cuculi	II		II	3		II					
Carex flacca	II			3							
Mentha aquatica	II					III	II	1	II		
Rhytidiadelphus squarrosus		III		2							

Table 3.4 (continued) **Synoptic Table for the Fen Meadow Communities Recorded from Sizewell Marshes in 2008*.**

	FM1a	FM1b	FM1c	FM1d	FM2	FM3a	FM3b	FM3c	FM4	FM5	FM6
Potentilla anserine		II	IV		II	III	V		II	V	II
Rumex acetosa		II	IV	2	III		II		II	IV	
Cratoneuron filicinum		II		1							
Potentilla erecta		II									
Prunella vulgaris		II									
Danthonia decumbens		II									
Persicaria amphibia			V			III	II	2	II		
Poa trivialis			IV	3					III	V	V
Equisetum palustre			IV	1			II		III		II
Vicia cracca			III	3		II	II		IV		
Carex hirta			II				II			III	IV
Stellaria graminea			II							III	
Lathyrus pratensis			II	2	II				II		
Eleocharis palustris			II								
Galium palustre				4		IV	II	2	III		
Menyanthes trifoliata				4							
Iris pseudacorus				3				1	IV		
Dactylorhiza praetermissa				2					II		
Glyceria fluitans				1			II	1			
Amblystegium riparium				1							

Table 3.4 (continued) **Synoptic Table for the Fen Meadow Communities Recorded from Sizewell Marshes in 2008*.**

	FM1a	FM1b	FM1c	FM1d	FM2	FM3a	FM3b	FM3c	FM4	FM5	FM6
Climacium dendroides				1							
Juncus effusus					IV	II	III	2			II
Rumex conglomeratus					II			3	II	II	III
Hydrocotyle vulgaris						II					
Triglochin palustris						II		1			
Isolepis setacea							II				
Eleocharis uniglumis								2			
Oenanthe lachenalii								2			
Drepanocladus cossonii								2			
Carex otrubae								1			
Epilobium palustre								1			
Epilobium parviflorum								1			
Hippurus vulgaris								1			
Carex acutiformis									II		
Lolium perenne										V	V
Equisetum arvense										II	
Alopecurus geniculatus											II
Cirsium arvense											II

* Showing the communities where species occur in more than 20 per cent of the samples allocated to each stand

Stand FM1a - M22b *Juncus subnodulosus-Cirsium palustre* fen-meadow, *Briza media-Trifolium* spp. sub-community – Stand A

This stand is largely confined to three fields in the central area of the floodplain, compartments G37, G38 and G39. The block of fields is surrounded on three sides by a woodland belt formed within the double dyke network, and is separated by species-rich internal dykes. An outlier has also been recorded from Compartment M12 (samples 43 and 44). The stand is one of the group dominated by *Juncus subnodulosus*, with *Juncus articulatus* patchily co-dominant, in this case occasionally accompanied by *Juncus inflexus* and *J. effusus*. A suite of grasses and sedges form an often continuous understorey, and the stand is notable for containing large areas where the rushes give way to a short sward characterised by the presence of *Anagallis tenella*.

In addition to the rushes, *Carex nigra, C. panicea, C. disticha* all occur frequently, often with *Carex flacca* and the grasses *Festuca rubra, Holcus lanatus*, *Anthoxanthum odoratum* and, rather less commonly, other species such as *Cynosurus cristatus* and *Briza media*. *Phragmites australis* and *Festuca arundinacea* are no more than occasional, and the potential height of these species may produce a very thin and patchy supra-canopy[13] late in the growing season if unmanaged.

Of the forbs[14], *Plantago lanceolata* and *Ranunculus acris* are ubiquitous, often accompanied by *Trifolium pratense, Ranunculus repens* and *Dactylorhiza fuchsii*. *Valeriana dioica* and *Succisa pratensis* are also present through much of the stand and, with *Anagallis tenella*, signal the species-richness of this form of fen meadow. A considerable number of associates are scattered within the vegetation, of which *Rhinanthus minor, Hydrocotyle vulgaris, Eriophorum angustifolium, Menyanthes trifoliata, Dactylorhiza praetermissa* and *Carex pulicaris* are notable for the site in being 'Really Useful Species'[15] but also in having a limited distribution within the fen meadow habitat at Sizewell Marshes.

The bryophyte layer is marked by the frequency of *Calliergonella cuspidata*, which forms thick carpets of wefts[16] over extensive areas, and is rarely absent. *Brachythecium rutabulum, Cratoneuron filicinum* and *Rhytidiadelphus squarrosus* are also present.

The average number of species is 25.3 (range 19-30 species per sample) making this one of the more species rich stands on the Marshes. With Stand FM1b, it forms a largely discrete area marked by the presence of the group of species (such as *Anagallis tenella* and *Succisa pratensis*) most commonly associated with nutrient poor fen.

Stand FM1a, with FM1b, is closely associated with the *Briza media-Trifolium* spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22b) and both stands are well-developed examples of this NVC syntaxon. The singular separation of the stands is based on the abundance of *Juncus subnodulosus* and *Valeriana dioica* in this stand, which may indicate a somewhat greater influence of calcareous groundwater in the root-zone.

[13] A supra-canopy is a secondary canopy forming above the general height of the sward; it is composed of the tall stems of late-flowering grasses and forbs, and lends a temporary impression of height.

[14] Non-woody plants other than grasses, sedges or rushes, bryophytes, ferns and fern allies.

[15] SBRC (http://www.users.globalnet.co.uk/~sbrc/Fens&Marshes.htm)

[16] A weft is one of ten life forms typical for mosses – annual, cushion, short turf, tall turf, dendroid, fan, mat, pendant, tail and weft. They are noted to suggest adaptive evolution with wefts being at the extreme of high humidity and low irradiation (Smith, 1982).

Notwithstanding, the vegetation, particularly with its suite of associated species, is seldom as well-developed in Suffolk, and can be regarded as being particularly uncommon in the county with a very restricted distribution.

Stand FM1b - M22b *Juncus subnodulosus-Cirsium palustre* Fen-Meadow*, Briza media-Trifolium* spp. Sub-Community – Stand B

This stand is located in a single area to the southwest of the main area of Stand FM1a, with which it has many similarities. It occupies much of Field G38, where it abuts Stand FM1a and contains a similar group of uncommon species with additional plants not recorded elsewhere in the survey area. The stand extends into the corner of Field G58, though it is less well developed here and may be transitional to Stand FM2. The largest area of this vegetation, however, is found over much of Field G40, where it displays a distinctive physiognomy and species composition.

Like Stand FM1a, this is typically short vegetation, dominated by the sedges *Carex disticha, C. nigra* and *C. panicea*. Amongst the sedges, the moss *Calliergonella cuspidata* is often abundant, frequently accompanied by *Rhytidiadelphus squarrosus*. While *Juncus articulatus* is abundant in patches, rushes are nowhere dominant, and *Juncus subnodulosus* is noticeably absent. Patches of low ground in the stand support a group of species also found in Stand FM1a. These include *Cardamine pratensis, Plantago lanceolata* and *Trifolium repens*, as well as the uncommon *Succisa pratensis, Briza media* and *Anagallis tenella*.

The distinctive character of Stand FM1b that distinguishes it from other stands on Sizewell Marshes is the occasional presence of a suite of species frequently associated with nutrient-poor fen, and not recorded from Stand FM1a. In particular, the grasses *Danthonia decumbens* and *Agrostis canina*, and the forbs *Pedicularis palustris* and *Cirsium dissectum*, in addition to the uncommon species found in both stands, separate Stands FM1b and FM1a from the remaining areas of fen meadow.

The average number of species is 24.1 (range 17-29 species per sample) making this one of the more species rich stands on the Marshes. With Stand FM1a, it forms a largely discrete area marked by the presence of the group of species most commonly associated with nutrient-poor fen.

Stand FM1b, with FM1a, is closely associated with the *Briza media-Trifolium* spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22b). Both stands are well-developed examples of this NVC syntaxon. The group of distinctive species in stand FM1b, such as *Potentilla erecta, Prunella vulgaris* and *Danthonia decumbens*, are typical of low-fertility situations, but may represent a less calcareous area of the Marshes than that occupied by Stand FM1a, as indicated by their typical tolerance for acidity (Hill *et al*, 2004). The two stands together may represent variations in hydro-chemical conditions in this area of Sizewell Marshes – a feature of notable importance in understanding the eco-hydrology of fen-meadow vegetation. Notwithstanding, the vegetation, particularly with its suite of associated species, is seldom as well-developed in Suffolk, and can be regarded as particularly uncommon with a very restricted distribution.

Stand FM1c - M22b *Juncus subnodulosus-Cirsium palustre* Fen-Meadow*, Briza media-Trifolium* spp. Sub-Community – *Persicaria amphibia* Variant

This large block of vegetation extends up the increasingly narrow floodplain westwards from compartments G33 and M12. The floristic composition of this stand is broadly similar to Stands

FM1a, FM3a and FM4, though it lacks many of the uncommon species recorded from Stand FM1a, and the group of reedfen species defining Stand FM4 occurs no more than occasionally. The large suite of constants is dominated by the rushes *Juncus subnodulosus* and *J. articulatus*, however, and few other species have a high cover in any sample. Of these, it is *Carex disticha*, rather than *C. nigra*, that is the most common sedge, while *Holcus lanatus, Agrostis stolonifera* and *Festuca rubra* are the only grasses that are sward-forming beneath the rush canopy. Nonetheless other grass species can be common, notably *Anthoxanthum odoratum, Poa trivialis* and *Festuca pratensis*. Amongst the forbs, *Plantago lanceolata, Lotus pedunculatus, Ranunculus repens, Trifolium pratense* and *Cardamine pratensis* are typical, and *Brachythecium rutabulum* and *Calliergonella cuspidata* are both frequent at low cover.

The distinguishing species in this stand are *Persicaria amphibia* (terrestrial form), *Carex hirta* and *Stellaria graminea*. These species lend a rather weedy character to the vegetation, and their frequency suggests that large parts of the stand can be characterised by disturbance and that there are periods during the growing season when the watertable fluctuates markedly within the root zone.

The average number of species is 25.4 (range 20-35 species per sample) making this one of the more species rich stands on the Marshes. It also includes many of the most species-rich fen-meadow samples from Sizewell Marshes. Its location south of the Kenton Hills represents an extension of the species-rich forms of fen meadow westwards into the more confined valley floor. At its eastward margin, the stand abuts areas of the wettest fen-meadow stands (FM4 and FM1d), while to the west it gives way to much drier vegetation, transitional to MG10 *Holcus-Juncus* rush-pasture. It therefore represents the vegetation situated in the centre of an east-west gradient of reducing soil wetness.

The species composition of Stand FM1c contains a group of species, represented by *Persicaria amphibia*, that suggests a less stable watertable than is typical of the *Briza media-Trifolium* spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22b). However, the bulk of the vegetation accords well with this community.

Stand FM1d - M22b *Juncus subnodulosus-Cirsium palustre* Fen-Meadow*, Briza media-Trifolium* spp. Sub-Community – *Menyanthes trifoliata* Variant

This stand is restricted to low-lying areas within compartments G34 and G35 with unsampled fragments of this kind of vegetation also noted to be present in compartments G37 and G39.

This distinctive vegetation is a short sward dominated by *Menyanthes trifoliata*, which forms a thick carpet restricting the development of other species. Nonetheless, a distinctive range of constants from Stands FM1a, FM3a and FM4 are typically present, with the rush *Juncus articulatus*, sometimes accompanied by *J. subnodulosus*; the full complement of sedges: *Carex disticha, C. nigra, C. panicea* and *C. flacca*; a suite of grasses dominated by *Holcus lanatus* and *Festuca rubra* with *Agrostis stolonifera* and *Anthoxanthum odoratum*; and a wide range of forbs including *Equisetum fluviatile, Galium palustre* and *Lotus pedunculatus*. Many of the less common species found in Stands FM1a and 1b are also present, such as *Valeriana dioica, Rhinanthus minor* and *Succisa pratensis*. The bryophyte layer is also similar to Stand FM1a, and also includes occasional *Climacium dendroides*.

The average number of species is 27.8 (range 20-35 species per sample) making the patches of this vegetation the most species-rich in Sizewell Marshes,

This vegetation occurs within Stand FM4 (and also in FM1a) where it is restricted to shallow hollows and the stand can be regarded as a local variant falling within the compass of the *Briza media-Trifolium* spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22b). Bogbean has a restricted distribution in Suffolk, and the majority of records are from river valleys. This variant of M22 *Juncus-Cirsium* fen-meadow can therefore be regarded as particularly uncommon in the county.

Stand FM2 - M22d *Juncus subnodulosus-Cirsium palustre* fen-Meadow, *Iris pseudacorus* Sub-Community with Affinities to MG8 *Cynosurus cristatus-Caltha palustris* Grassland

This stand is widely found along the southern margin of the floodplain from Reckham Pits Wood to beyond Rosery Cottages on the extremity of the survey area. It was recorded from Fields G35 and G58, where it clearly lies on higher ground than the abutting fen-meadow stands, as well as in Fields G39, G56, G64, G66 and G51, where it forms marginal rush-pasture on the edges of the valley floor. The stand is also common in the Goose Hill fields to the north, where it was recorded in various forms from Fields G20, G21 and G24 in this survey and as FM15 in the other Goose Hill fields (compartments G17, G18, G19, G22 and G23) in 2007.

The rushes *Juncus articulatus* and *J. effusus* are commonly dominant, and *J. inflexus* and *J. subnodulosus* are no more than occasional. Of the sedges, *Carex disticha* is commonly abundant, and *C. nigra* occasionally prominent. Despite the often overwhelming dominance of the rushes and sedges, *Holcus lanatus* and *Agrostis stolonifera* can also proliferate, and both species are abundant throughout the stand; *Festuca rubra* and *Anthoxanthum odoratum* are also common. Of the forbs, *Lotus pedunculatus, Plantago lanceolata* and *Ranunculus repens* are the most frequently occurring. Bird's-foot trefoil (*Lotus*) sometimes smothers the surrounding vegetation, particularly in Field G51.

Although many other species were recorded from this stand, and less common species such as *Dactylorhiza fuchsii, Eriophorum angustifolium* and *Ranunculus flammula* occur occasionally, the stand has few low-growing areas where sedges form the main canopy, and large areas are dominated by *Juncus articulatus*.

The average number of species is 15.1 (range 8-22 species per sample) making the stand one of the least species-rich fen meadow types in Sizewell Marshes.

The stand can broadly be referred to the *Briza media-Trifolium* spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22b). However, the absence of many of the distinctive species and the rather patchy mosaic of rush-dominated areas amongst a grassier sward, suggest that the stand may also be referred to a development from floodplain grassland. In this, the *Cynosurus cristatus-Caltha palustris* grassland community (MG8) may best describe some of the floristic features present in the stand. In some fields, notably compartment G24, the occurrence of species such as *Eriophorum angustifolium*, albeit as occasional, scattered individuals, may indicate a more developed form of the *Briza-Trifolium* sub-community. Similarly, the rather rudimentary vegetation in compartment G51 near Rosery Cottages is rather closer to rank *Holcus-Juncus* rush-pasture (MG10).

This variability within the stand may correlate with proximity to the valley footslope. The passing similarity to the floristics of MG8 *Cynosurus-Caltha* grassland may reflect the influence of groundwater seepage or localised inundation, key factors in the distribution of this "scarce and locally distributed community of lowland flood pastures and spring-heads through the English lowlands, East Anglia and the Pennine valley sides with scattered localities in Scotland …" (Rodwell et al 2007).

Stand FM3 - M22b *Juncus subnodulosus-Cirsium palustre* Fen-Meadow, *Briza media-Trifolium* spp. Sub-Community with Affinity to MG12a *Festuca arundinacea* Grassland, *Lolium perenne-Holcus lanatus* Sub-Community

Three distinct forms of this vegetation were identified from a restricted, but quite extensive, area of the Marshes, to the east and southeast of compartment G39. This area, though clearly related to the adjacent stand FM1a, has a distinct character produced by the abundance of *Juncus inflexus* over large areas in association with *Festuca arundinacea* and *Potentilla anserina*. These species may indicate rather more fertile, calcareous conditions (Hill *et al*, 2004) than those suggested for Stand FM1, with topsoils that may remain waterlogged for long periods during the growing season.

The three stands are maintained as separate units in order to emphasise the distinct differences in species composition and appearance. While each is considered separately, it is emphasized that the stands can be regarded as variants of the same NVC community. As such, an overall statement regarding the limited distribution of the community as a whole is reserved for the end of the stand accounts.

Stand FM3a M22b *Juncus subnodulosus-Cirsium palustre* Fen-Meadow, *Briza media-Trifolium* spp. Sub-Community with Affinities to MG12a Festuca Arundinacea Grassland, *Lolium perenne-Holcus lanatus* Sub-Community

This vegetation is partly located along the eastern boundary of compartment G39 (Stand FM1a) forming a sinuous strip through Fields G49, M9, G41-3 and G45. It was also recorded as a small area along the northern fringe of Field G38, amongst Stand FM1a vegetation. The stand often forms the edge of the survey area in this part of Sizewell Marshes, though Stand FM3b is sometimes interposed.

The stand is dominated by *Juncus subnodulosus* and shares many constant species with Stand FM1a, notably *Juncus articulatus, Carex nigra, C. panicea* and *C. disticha*. It also has a similar grouping of common grasses - *Festuca rubra, Holcus lanatus* and *Agrostis stolonifera* – but *Briza media* and *Cynosurus cristatus* are absent. While *Plantago lanceolata, Ranuncus acris* and *Trifolium pratense* remain common, and *Anagallis tenella* is also present, many of the less common forbs recorded in Stands FM1a and 1b are absent.

The stands also differ as this vegetation is composed of substantially more frequent *Juncus inflexus* and *Festuca arundinacea,* with *Galium palustre, Lotus pedunculatus* and *Potentilla anserina* amongst a group of species tolerant of periods of inundation during the growing season, including *Triglochin palustris* and the terrestrial form of *Persicaria amphibia*. Part of the stand character is described by the presence of *Juncus gerardii* (saltmarsh rush) in discrete areas of low-lying land. Saltmarsh rush is often accompanied by *Eleocharis uniglumis, Carex otrubae* and *Oenanthe lachenalii,* further developing the distinctive appearance of the sward. However, this vegetation occurs only sporadically and in small patches within the general sward, and was not sampled separately.

The bryophyte layer is rather patchy, with scattered strands of *Calliergonella cuspidata* and *Brachythecium rutabulum*.

Several field entrances are mantled in open swards of *Juncus bufonius* and *Isolepis setacea,* with occasional *Sagina procumbens, Veronica scutellata* and *Isolepis cernua*. The latter species has been a feature of such small, disturbed areas of this stand throughout the Fen Meadow Vegetation Monitoring Programme (Stone 2003-2008).

The average number of species is 19.1 (range 12-24 species per sample) making this stand of moderate species-richness amongst the fen-meadow stands.

The species composition of much of the sward is clearly allied to the adjacent Stand FM1a, though the very shallow depressions picked out by the key species *Potentilla anserina* and *Juncus gerardii* are distinctive features. The latter species, in particular, indicates a brackish influence within the root zone, and the preponderance of *Carex disticha* and *Festuca arundinacea* over much of the stand suggests that large areas of the stand remain wet during the growing season. While the stand clearly falls within the compass of the *Briza media-Trifolium* spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22b), many species are also commonly found within the *Lolium perenne-Holcus lanatus* sub-community of *Festuca arundinacea* grassland (MG12a).

Stand FM3b - M22b *Juncus subnodulosus-Cirsium palustre* Fen-Meadow, *Briza media-Trifolium* spp. Sub-Community with Affinities to MG12a *Festuca arundinacea* Grassland, *Lolium perenne-Holcus lanatus* Sub-Community

This stand is found in association with Stand FM3a on the margins of the central channel of the floodplain, principally in compartments G50, G65 and G44. While the species composition is similar, this vegetation occurs further away from the central areas of fen-meadow defined by Stands FM1a and 1b.

It is distinguished from Stand FM3a by the marked absence of *Juncus subnodulosus*, and by the replacement of some wetland species by plants more commonly associated with periods during the growing season when the watertable drops below the rooting zone.

In common with Stand FM3a, large areas are dominated by the rushes *Juncus articulatus* and *J. inflexus*, with *J. effusus* a common associate. The sedges *Carex disticha* and *C. nigra* are also frequently abundant, with constant *C. panicea*, but the stand also contains *C. hirta*, a species indicative of summer drawdown. The grasses *Holcus lanatus, Agrostis stolonifera, Festuca rubra* and *F. arundinacea* are predominant, though the presence of *Cynosurus cristatus* helps to separate this vegetation from Stand FM3a.

The forbs of both stands are very similar in composition, with *Lotus pedunculatus* and *Potentilla anserina* being particularly common in this stand, while *Galium palustre* is no more than occasional and *Anagallis tenella* is absent. *Isolepis setacea* is also present here, where it is commonly found on trampled ground in Field G44. The distinct brackish patches found in Stand FM3a are absent, and the ground surface, though still prone to seasonal waterlogging, is less clearly subject to inundation.

The average number of species is 18.8 (range 14-25 species per sample) making this stand of moderate species-richness amongst the fen-meadow stands.

Stand FM3c - M22b *Juncus subnodulosus-Cirsium palustre* Fen-Meadow, *Briza media-Trifolium* spp. Sub-Community with Affinity to MG12a *Festuca arundinacea* Grassland, *Lolium perenne-Holcus lanatus* Sub-Community

This small stand occurs in two areas of the central part of the floodplain (within compartments G42 and G39). Each area is defined by the abundance of the horsetail *Equisetum fluviatile*, which can dominate the vegetation in hollows and on the margins of dykes. In compartment G39, the stand has developed in the wettest area of *Juncus articulatus*-dominated rush-pasture and associates with the horsetail and rush are few: *Juncus effusus, Holcus lanatus* and *Ranunculus repens* are constant, with some *Agrostis stolonifera* and *Carex otrubae*.

The second area occurs in an inundation hollow within compartment G42 amongst vegetation assigned to Stand FM4. Here, *E. fluviatile* grows as a swamp dominant with *Eleocharis uniglumis* and the mosses *Drepanocladus cossonii* and *Calliergonella cuspidata*. *Agrostis stolonifera* is ubiquitous and, with species such as *Persicaria amphibia* and *Oenanthe lachenalii*, indicates that the hollow remains inundated for long periods during the growing season but periodically dries out. This vegetation has been notable in recent years (Stone 2008) for supporting a population of the terrestrial form of *Hippurus vulgaris*, though the species was inconspicuous at the time of this survey.

The average number of species is 11.3 (range 8-15 species per sample) making examples of this vegetation amongst the least species-rich of the fen-meadow stands.

Over the area covered by the three variants of Stand FM3, the species composition of much of the sward is clearly allied to the adjacent Stand FM1a, though the very shallow depressions picked out by the key species *Potentilla anserina* and *Juncus gerardii* are distinctive features. The latter species, in particular, indicates a brackish influence within the root zone, and the preponderance of *Carex disticha* and *Festuca arundinacea* over much of stands FM3a and 3b suggest that large areas remain wet during the growing season. While the group of stands clearly fall within the compass of the *Briza media-Trifolium* spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22b), many species of FM3a and 3b are also commonly found within the *Lolium perenne-Holcus lanatus* sub-community of *Festuca arundinacea* grassland (MG12a). The small patches of *Equisetum fluviatile* swamp occurring in wet hollows, separated as FM3c, are readily subsumed within M22b.

According to Rodwell (1991) M22 *Juncus-Cirsium* fen-meadow is most commonly encountered in East Anglia, and Rodwell *et al* (2007, Figure 30) show a distribution restricted to areas with calcareous groundwater, particularly in the Breckland, the Waveney Valley, and within the small coastal valleys bisecting the Sandlings in east Suffolk.

Rodwell (1992) locates MG12 *Festuca arundinacea* grassland exclusively in coastal estuaries and salt-marshes around the British coast, and its presence in fen-meadow vegetation at Sizewell Marshes may be a distinctive but infrequent feature of this habitat along the Suffolk coast, where occasional saline incursions influence the character of the vegetation.

Stand FM4 - M22d *Juncus subnodulosus-Cirsium palustre* Fen-Meadow, *Iris pseudacorus* Sub-Community with Affinity to MG12a Festuca Arundinacea Grassland, *Lolium perenne-Holcus lanatus* Sub-Community

The areas of vegetation comprising this stand lie in the central part of the floodplain, mainly to the northwest of Stand FM1a. There are three discrete areas, the larger abutting the reedbeds of fields G25 and M7, and occupying areas of fields M12 and G32-35, and the smaller stands extending into fields G28, 30 and 47 from the dyke, and occupying part of Field G42. In each case, it would appear that the stand is occupying areas of low-lying land. In the larger area, shallow hollows are occupied by the *Menyanthes trifoliata* swards of Stand FM1d.

The stand bears a clear resemblance to Stand FM16, surveyed in 2007, which was recorded over compartments G26 and G27.

In common with Stand FM1, *Juncus subnodulosus* and *J. articulatus* are common and often co-dominant rushes, while *Carex disticha, Holcus lanatus, Festuca rubra* and *Agrostis stolonifera* are the most common grasses and sedges. *Lotus pedunculatus, Trifolium pratense* and *Ranunculus repens* are all constant forbs, and this stand supports many of the flood-tolerant

species of Stand FM3a, while lacking many less common species recorded in Stand FM1a. *Juncus gerardii* patches are present in localised areas within compartment G42, suggesting that this part of the stand experiences similar hydrological conditions to Stand FM3a.

However, the distinctive feature of this vegetation is the small suite of species, typified by *Iris pseudacorus, Vicia cracca, Equisetum fluviatile* and *Carex acutiformis*, which also occur in reedfen. Flag iris (*Iris pseudacorus*), in particular, is ubiquitous throughout the stand, and the rhizomatous *Carex acutiformis*, where it occurs, is frequently dominant, particularly along dyke margins.

The bryophyte layer is rather patchy, with scattered strands of *Calliergonella cuspidata* and *Brachythecium rutabulum*.

The average number of species is 22.9 (range 12-29 species per sample) making this stand one of the more species-rich types of fen-meadow, though samples indicate that the dominance of one of the character species leads to species impoverishment; this is particularly evident in *Carex acutiformis* patches, where there are commonly few associates.

The location of the stand amongst the FM1 stands confirms that the vegetation can readily be assigned to the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22). However, the distinctive and colourful drapes of *Vicia cracca* over *Iris pseudacorus* and the rush canopy mark a shift in species composition towards the *Iris pseudacorus* sub-community (M22d), which is known to be concentrated in the East Anglian topogenous mires and is one of the less commonly encountered sub-communities of this kind of fen meadow. It is rather more frequently encountered in association with reedfen and wet woodland. In Suffolk, it tends to occur as small stands in wet hollows, and is uncommon with limited distribution in peatland areas.

Stand FM5 - M22b *Juncus subnodulosus-Cirsium palustre* Fen-Meadow, *Briza media-Trifolium* spp. Sub-Community / MG10a *Holcus lanatus-Juncus effusus* Grassland, Typical Sub-Community. Intermediate.

This stand is located in the western section of the floodplain towards Leiston. Fields G61 and G63, where this vegetation occurs, are distinctly drier than those on the eastern side, and it is likely that summer drawdown of the watertable produces periods of droughting in the root zone. Nonetheless, the presence of large numbers of *Potentilla anserina, Lotus pedunculatus* and *Carex hirta* are indicative of moist ground conditions during much of the growing season. Indeed, the stand is dominated by *Juncus articulatus*, usually growing with abundant *Poa trivialis*, and these species form an often dense canopy over *Holcus lanatus*, *Lolium perenne* and a number of forbs. Amongst these, *Trifolium pratense, Cerastium fontanum, Ranunculus repens* and *Rumex acetosa* are constant associates.

The stand lacks a bryophyte layer, with *Brachythecium rutabulum* and the occasional strand of *Kindbergia praelonga*[17] providing only thin ground cover.

The average number of species is 15.0 (range 10-19 species per sample) making this stand one of the least species-rich types of fen-meadow at Sizewell Marshes.

This vegetation is intermediate in species composition between fen-meadow and rush pasture. While it shares some characters of Stand FM1c to the east and FM6 to the west, it is sufficiently distinct to be separated from them and regarded as intermediate between the *Briza media-*

[17] This species was formerly known as *Eurhynchium praelongum*

Trifolium spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen-meadow community (M22b) and the Typical sub-community of *Holcus lanatus-Juncus effusus* rush-pasture (MG10a). *Holcus-Juncus* rush-pasture is a common form of rush-dominated vegetation in degraded pastures on drained peat and mineral substrates, and is a relatively frequent community in suitable locations throughout Suffolk.

Stand FM6 – MG10a *Holcus lanatus-Juncus effusus* Grassland, Typical Sub-Community

Many fields are marked by a distinct low bund along dykes margins, or include the toeslopes of the southern valley side. The sometimes diffuse areas of vegetation sampled on this slightly raised ground are grouped together in this stand, which extends from Field G63 at the western end of the survey area, around Rackham Pits Wood, and as far as Field G52 near Rosery Cottages. While the ground in some areas may be sufficiently moist to support occasional tussocks of *Juncus articulatus*, or patches of *Glyceria declinata*, the stand is characterised by a small groups of species, consisting of the grasses *Holcus lanatus*, *Poa trivialis*, *Lolium perenne* and *Agrostis stolonifera*, the sedge *Carex hirta*, and the forbs *Ranunculus repens* and *Trifolium repens*.

This stand also subsumes two samples recorded in 2007 from a low dyke-side bund in Goose Hill Marsh (Stand FM17).

The sward is usually low and tightly knit, and many areas show signs of rabbit grazing. As the soils are predominantly composed of a sandy substrate, cattle-trampling along this drier ground tends to accentuate the 'lawn'-like character of the sward. The raised position of the stand means that it is also subject to trampling by site visitors and is used as a routeway by vehicles and stock. In some parts, the stand abuts patches of scrub, usually blackthorn, that are used as sheltered lays by the cattle.

The boundary of the sward with the neighbouring rush-pasture and fen-meadow tends to be abrupt where the stand occurs on bunded materials. However, where the stand occurs on toeslopes, as in Field G47 and G34, the vegetation may merge into rush-dominated vegetation quite slowly as the depth of surface peat thickens into the floodplain. In these situations, the peat may remain shallow far into the floodplain, and the diffuse boundary may be marked by the local presence of *Juncus effusus* in addition to the typical flora of the neighbouring stands.

The average number of species is 11.0 (range 6-15 species per sample) making this stand the least species-rich type of sward at Sizewell Marshes.

Although no rush species is more than occasional, the bulk of the sward components are constants of the Typical sub-community of *Holcus lanatus-Juncus effusus* rush-pasture (MG10a), to which the whole stand is referred. Some small areas, particularly on the more trampled parts of dyke-side bunds, could be allocated to the *Lolium perenne* sub-community of the *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland (MG11a), although it is noted that *P. anserina* is an infrequent associate in these areas. *Holcus-Juncus* rush-pasture is a common form of rush-dominated vegetation in degraded pastures on drained peat and mineral substrates, and is a relatively frequent community in suitable locations throughout Suffolk.

3.3.2 Valley Slope Grasslands

As an adjunct to the survey of the fen meadows, two valley slope fields were also assessed during the fieldwork.

The first field – compartment G52 – was also surveyed in 1993, when it was referred to an MG7 *Lolium perenne-Trifolium repens* ley. Since that time, the species composition has changed considerably, and a rather homogeneous *Lolium perenne*-dominated sward has been replaced by *Holcus lanatus*, with mixtures of *Agrostis stolonifera*, *Festuca rubra* and *Agrostis capillaris* revealing a distinct soil moisture gradient across the slope.

A similar variation in soil moisture conditions was recorded in the second field, not surveyed in 1993, which occupies the valley slopes to the northwest of compartment G58. Here, *Holcus lanatus* and *Agrostis capillaris* are dominant over much of the sward, which is very dry and locally droughty except along the footslope.

As shown in **Figure 3.2** the two grassland stands occupy the whole of the two fields, though further sampling would no doubt show some division in each between the dry and moist areas on the slopes. Stand VG1 (compartment G52) is referred to as a *Holcus lanatus* grassland, as its species composition does not bear relation to the published NVC communities. Stand VG2 supports a suite of species commonly found in the *Anthoxanthum odoratum-Lotus corniculatus* sub-community of the *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland (U1d).

A comparison of each stand is presented in **Table 3.5**.

Table 3.5 Synoptic Table for the Valleyslope Grasslands Communities Recorded from the Margin of Sizewell Marshes*.

	VG1	VG2
Holcus lanatus	V	V
Cerastium fontanum	IV	V
Agrostis capillaris	III	V
Agrostis stolonifera	IV	
Festuca rubra	IV	
Bromus hordeaceus hordeaceus	III	
Cirsium arvense	III	
Urtica dioica	III	
Veronica chamaedrys	III	
Senecio jacobaea		V
Hypochaeris radicata		V
Plantago lanceolata		V
Trifolium repens		V
Brachythecium albicans		IV
Dactylis glomerata		IV
Ornithopus perpusillus		IV
Vulpia bromoides		IV

Table 3.5 (continued) Synoptic Table for the Valleyslope Grasslands Communities Recorded from the Margin of Sizewell Marshes*

	VG1	VG2
Rumex acetosella		III
Trifolium dubium		III
Aira caryophyllea		II
Aira praecox		II
Crepis capillaris		II
Filago vulgaris		II
Spergularia rubra		II
Trifolium glomeratum		II

* Showing the communities where species occur in more than 20 per cent of the samples allocated to each stand

Stand VG1 – *Holcus lanatus* Grassland

This rather diffuse stand is dominated by the character species, *Holcus lanatus*. On the lower slopes, *Agrostis stolonifera* is co-dominant with *Urtica dioica* being the primary associate. This tall herb forms extensive patches, particularly in areas of rabbit disturbance, and the grassland sometimes gives way to the *Urtica dioica-Cirsium arvense* community (OV25). In drier areas, notably upslope, *Agrostis capillaris* accompanies the other grasses and, together with *Festuca rubra*, these species form a simple short sward favoured by rabbits. In some areas, where grazing is pronounced, the unpalatable *Veronica chamaedrys* is frequent. In other, more open patches, the annual grass *Bromus hordeaceus* proliferates.

There are few other associates, and the average number of species per sample is 7.0 (range 6-9), which is poor for many grazed grasslands.

This vegetation was not successfully matched with the NVC. The lack of species and the under-developed character of the sward give this grassland little conservation value for its flora, and the type of vegetation is most likely to be found on fertile, freely drained soils, typically in situations of recent arable reversion.

This area lies within the Sizewell Marshes SSSI although it does not support a habitat feature for which the site has been designated. In comparison with the vegetation recorded in 1993, the stand has changed considerably in character and now reveals the different degrees of soil wetness within the field. This development can be regarded as an increase in conservation value and, in time, further species should colonise the drought-prone drier slopes or the diffuse transition on the footslope with the fen meadow margin.

Stand VG2 - U1d Festuca ovina-*Agrostis capillaris-Rumex acetosella* Grassland, *Anthoxanthum odoratum-Lotus corniculatus* Sub-Community

The drought prone slopes of this field have developed into young grassland with a number of constant species, including *Holcus lanatus* and *Agrostis capillaris* as the dominant grasses.

Several forbs, notably *Hypochaeris radicata*, were recorded from all samples, which revealed a long list of associate species. In particular, the stand is characterised by the presence of a suite of species typically recorded from moderately acid parched grassland, typical of the upper layers of Red Crag, or of silty sands and gravels. In particular, *Ornithopus perpusillus, Trifolium glomeratum* and *Rumex acetosella* are frequent with the moss *Brachythecium albicans*. Gaps in the sward are frequently occupied by annual grasses – *Vulpia bromoides* and the two *Aira* species.

The average number of species is 16.0 (range 12-19 species per sample).

With reference to the NVC, this young grassland is floristically closest to the *Anthoxanthum odoratum-Lotus corniculatus* sub-community of the *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland (U1d). The community "occurs widely over suitable substrates throughout the warm and dry lowlands of England and Wales" (Rodwell 1992); the *Anthoxanthum-Lotus* sub-community is centred on East Anglia and marks "a shift on to less parched soils and ones which are perhaps less impoverished".

If allowed to mature as a managed sward, it may prove to be a successful reversion from arable to dry sandy grassland. As such, it is a valuable development within the Sandlings in demonstrating the potential for creating dry grasslands on crag valley slopes. It is noted, however, that *Senecio jacobaea* (listed as a Noxious Weed in the Weeds Act 1959) was present in low numbers in each sample and has the potential to seed more extensively into the sward. The grassland also retains some characteristics of less mature ruderal vegetation, and could quickly revert to more open, weedy rough grassland if under-managed.

Lying outwith the SSSI, stand VG2 is considered to be of only local nature conservation value

3.3.3 Reedbeds

Two reedbeds was surveyed as part of the survey. Stand RB1 is located in compartments G25 and M7 and, as demonstrated by the 1993 survey, areas of the vegetation may have developed from rush pasture. The stand has similarities with the stands of reed-dominated vegetation found in Goodram's Fen, surveyed in 2007 as RB19 and RB20. Stand RB2 is reed-dominated vegetation separating the dune grasslands north of the embankment from the 'Saltmarsh' fen meadows on the eastern side of Goose Hill.

Stand RB1 - S26 *Phragmites australis-Urtica dioica* Tall-Herb Fen

Ten samples of the reedbed revealed considerable variation in the species composition and structure of the vegetation. The west of the stand contains areas where *Arrhenatherum elatius* is common and may patchily be the dominant species. Further east, *Juncus articulatus*, accompanied by *Agrostis stolonifera*, replaces *Arrhenatherum* as a large tussock-forming dominant. Much of the eastern part of the reedbed, however, is reed-dominated, with a number of fen associates including *Galium palustre, Carex acutiformis* and *Calystegia sepium*. Even in this area, though, reed is sometimes overtopped by *Phalaris arundinacea* in patches, though this tall grass does not share the overwhelming dominance of reed.

The distribution of these variations within the reedbed, which are mirrored in the woodland to the north of compartment G25, indicates that the footslope of the hillside extends deep into Sizewell Marshes in this area, and is only covered in a thin layer of peat. This is borne out by the increase in peat wetness in the eastern part of the stand and the change in the character of the vegetation. Nonetheless, the patchy canopy of *Phragmites australis* extends across the reedbed, accompanied by *Urtica dioica*, and the whole reedbed can be regarded as a single stand. With

reference to the NVC, the Stand can be placed within the *Phragmites australis-Urtica dioica* tall herb fen (S26). This is a common form of reedbed in lowland Britain, and is particularly associated with fertile situations.

The average number of species is 13.1, making this stand one of the more species-rich tall herb fens, comparing favourably with stands recorded from Goodram's Fen.

Stand RB2 - S26 Phragmites australis-Urtica dioica Tall-Herb Fen

This species-poor reedbed occupies the surficial peats along the inland margins of the shingle ridge north of the embankment. The soil has been much disturbed in the past, with hollows, shallow drains and low embankments creating a patchwork of uneven ground. Phragmites australis is the overwhelming dominant over much of the reedbed, and is accompanied by nettle Urtica dioica and bramble Rubus fruticosus agg. in the drier areas, and pond sedge Carex riparia in the wetter areas. Scattered sallow scrub and birch trees are both present on the edges of the stand, and the northern margin gives way abruptly to dry scrub marking the margins of the dune grassland.

The reedbed vegetation is species-poor, and no samples are included in the report.

3.3.4 Wet Woodlands

This part of the Sizewell Marshes vegetation survey is a further, partial development of the woodland blocks surveyed in 2007. Three areas were included in the 2008 fieldwork; compartment G48 and the western half of Grimsey's Wood (both of which lie within Sizewell Marshes SSSI) together with Leiston Carr, which lies outwith Sizewell Marshes SSSI but within the CWS. Each wood has a different species composition, and is located in different situations within and on the margins of Sizewell Marshes.

Leiston Carr, like the Turf Pits woodland to the northeast, lies on thin peats at the margin of the marsh. Mature *Alnus glutinosa* is the most common canopy-forming tree species, but nowhere forms an extensive canopy. In the shrub layer, *Salix cinerea* is frequent and, in places, forms areas of intact sub-canopy in the absence of alder. The young carr woodland developing on Compartment G48 has yet to develop a mature canopy, and young sallow, alder and some birch have formed a scrubby thicket over remnants over the tall herb fen that preceded it. The western half of Grimsey's Wood is a mature block of valley floor wet woodland with a mixed canopy and a tall herb fen field layer, that abruptly gives way on its western margin to a moist oak-birch woodland.

Stand WW1 - W6a *Alnus glutinosa-Urtica dioica* Woodland, Typical Sub-Community

This stand is comparable to Stand WW24 – *Alnus glutinosa-Glechoma hederacea* woodland, surveyed in 2007.

Stand WW1 forms the lower part of Leiston Carr and occupies a narrow band alongside the Leiston Drain. The upper part of the stand may be influenced by local seepage from the free-draining Norwich Crag and overlying glacial sands and gravels and is clearly somewhat intermediate in its floristic composition between the mildly acid dry woodland that surrounds it, and true valley fen woodland.

Alnus glutinosa is the only constant canopy species and, sharing the canopy cover with *Betula pubescens* in limited areas of the stand, is patchily dominant. *Salix cinerea* occurs as an occasional shrub layer, but much of the stand has only a thin sub-canopy made up of *Populus tremula* and *Acer pseudoplatanus* saplings with the occasional hazel. *Rhododendron ponticum*

also occurs in some quantity along the upslope margin, but rarely penetrates far under the alder canopy.

The field layer represented by the samples shares a number of constants, particularly *Urtica dioica, Dryopteris dilatata, Poa trivialis* and *Juncus effusus*. In wetter ground, small patches of *Iris pseudacorus* and *Phragmites australis* occur. The bryoflora on the higher ground includes *Mnium hornum*, while *Kindbergia praelonga* is the sole moss on lower ground.

Stand WW1 is an example of wet woodland that has developed on the margins of the floodplain, but includes elements of both the dry woodland on its upslope side, and patches of true floodplain wet woodland in the lower hollows. The minimal seepage from very free-draining substrates upslope probably prevents the development of a woodland type more typical of valley sides, and the stand is best accommodated within the Typical sub-community of the *Alnus glutinosa-Urtica dioica* woodland (W6a).

Alnus-Urtica woodland is a widespread but local community throughout the lowlands, often on the remnants of undrained flood-plains and eutrophicated mires (Rodwell, 1991). It is amongst the more common types of wet woodland in Suffolk, but is restricted to low-lying valley sides and partly drained floodplains. In the driest and the wettest parts of the stand, other woodland types are apparent, but their extent is very local and confined to small topographical features.

Stand WW2 - W2a *Salix cinerea-Betula pubescens-Phragmites australis* Woodland, *Alnus glutinosa-Filipendula ulmaria* Sub-Community

This young woodland can more properly be regarded as mixed sallow scrub, as large areas of the developing canopy are composed of overstood *Salix cinerea*, with young uncut stems of *Alnus glutinosa* and *Betula pubescens*, with some *Fraxinus excelsior*.

There is no intact sub-canopy, though areas of the central and southern parts of the stand are clearly younger and the canopy here still permits free growth of the tall herb fen that preceded it. In these areas, the field layer is dominated by frequent *Phragmites australis, Angelica sylvestris* and sprawls of *Galium palustre* and *Lotus pedunculatus*. *Iris pseudacorus, Urtica dioica* and *Cirsium palustre* are locally frequent, with a wide range of associates occasionally occurring amidst a thin ground layer of *Agrostis stolonifera* with infrequent wefts of the moss *Brachythecium rutabulum*.

Elsewhere, the field layer is very thin, though of the same general species composition.

Stand WW2 is an example of carr woodland that has developed on only periodically saturated peat. It can be referred to the *Alnus glutinosa-Filipendula ulmaria* sub-community of the *Salix cinerea-Betula pubescens-Phragmites australis* woodland (W2a). This type of woodland is particularly distinctive of East Anglian floodplain, though fragments occur throughout lowland Britain. While this type of woodland is not uncommon in Suffolk, in the Sandlings it is restricted to small pockets of valley-floor wetland, where it has often developed from abandoned grazed areas and may quickly mature into alder woodland. It is not always considered a desirable community where it has replaced more floristically-rich tall-herb fens and fen meadows.

Stand WW3 - W5a *Alnus glutinosa-Carex paniculata* Woodland, *Phragmites australis* Sub Community

This stand is an extension of Stand WW23 – *Alnus glutinosa – Iris pseudacorus* woodland, surveyed in 2007. However, in contrast with the immature shrub-dominated areas found in

Stand WW23, this stand is wholly affiliated with the *Phragmites australis* sub-community of the *Alnus-Carex* woodland (W5a).

Five samples were recorded from this type of woodland in 2008, which occurs solely on what is likely to be deep peat amongst the fen meadow and reedbed communities. *Alnus glutinosa*, *Fraxinus excelsior* and *Quercus robur* are all present in the canopy over most of the stand, although in some parts the canopy is dominated by *Betula pubescens* and *Populus nigra* agg. The shrub layer is often patchy, and varies from being virtually absent to forming patches of sub-canopy in the absence of canopy species. *Salix cinerea* is the most frequent species, with some other shrub willows and *Crataegus monogyna*. Saplings of *Alnus glutinosa* are frequent, and those of *Fraxinus excelsior*, *Betula pubescens* and *Quercus robur* were also recorded.

The field and ground layers are most conspicuously characterised by species found in the surrounding wetlands. In particular, *Iris pseudacorus*, *Eupatorium cannabinum*, *Poa trivialis* and *Urtica dioica* are constant. Common associates are *Phragmites australis*, which is patchily dominant, and the thin straggling stems of *Galium aparine*. *Carex acutiformis*, *Mentha aquatica* and *Lycopus europaeus* are also locally frequent. On the ground, the bryoflora is largely made up of the common mosses *Kindbergia praelonga* and *Brachythecium rutabulum*. With the exception of the areas where thick stands of *Iris pseudacorus* dominate, the field and ground layers are composed of scattered plants.

This is the most commonly occurring form of this type of woodland, which is "a fairly local, though quite widespread, community throughout the English lowlands" (Rodwell1991). The sub-community has become infrequent in Suffolk river valleys, and is often restricted to peat bodies marking valleyside seepages. It is an immature example of this type of woodland, which is typically associated with wetter ground conditions than that found in Stand WW1.

Stand WW4 - W10d *Quercus robur-Pteridium aquilinum-Rubus fruticosus* Woodland, *Holcus lanatus* Sub-Community

The western fringe of Grimseys Wood is made up of moist oak-birch woodland that is clearly on the margins of the valley floor, in an area of very thin peat over sand. One over-turned root-plate shows the appearance of sand at a depth of only c.5 cm, beneath a thin layer of dry peat. Two samples were taken from this area, which emphasise the gap in age structure between the scatter of mature *Quercus robur, Fraxinus excelsior, Betula pubescens* and *B. pendula*, and the thin shrub layer composed of saplings and young trees of *Quercus, Fraxinus* and *Alnus glutinosa*, and widely scattered *Salix caprea* and *Corylus avellana*. Climbing stems of *Lonicera periclymenum* are patchily frequent on the trunks of some trees.

The field layer is dominated by a sward of *Holcus lanatus*, with occasional patches of *Urtica dioica, Juncus effusus* and *Molinia caerulea*, with *Dryopteris dilatata, Rumex sanguineus* and *Geranium robertianum*. Scattered in small hollows are little clumps of *Iris pseudacorus* with *Phragmites australis* and occasional *Solanum dulcamara*. This flora, however, is restricted to these wetter areas, and can be regarded as outliers of the adjacent W5 *Alnus-Carex* woodland.

Along the margins of this stand, the presence of clumps of *Molinia caerulea* and *Juncus effusus* form no more than a transition from wet woodland to a drier habitat. Much of this woodland stand can be referred to a moist form of the *Holcus lanatus* sub-community of the W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland. The community is "widely distributed and common over the lowlands of England and Wales" (Rodwell 1991), and the *Holcus lanatus* sub-community is most frequently recorded in southeast England. This type of woodland is common on the valley slopes and many plateaux of the Sandlings, though it is only locally found

on the margins of wetlands, where it tends to occur in narrow transitional zones on the valley footslope.

3.4 Goose Hill and Kenton Hills Woodland Rides Survey

The function of this survey was to supplement the group of samples taken from the parched, acid sections of the ride network on Goose Hill and the Kenton Hills, and to further delineate this area of vegetation. The survey focused only upon the the area where the highest potential for heathland restoration was identified during the 2007 survey (Stands RI34 and RI35).

An additional six samples were taken within Stand RI34, a short grassland sward, with *Agrostis capillaris* and *Polytrichum juniperinum* constant, which occurs in the most parched and somewhat trampled areas in the centre of rides in a limited area of Kenton Hills and over a more extensive part of Goose Hill. In both areas, the vegetation was recorded from the higher ground, where the presence of drought-tolerant annuals, pioneer mosses and elements of the nearby acid sand dune flora have combined to form an open grassland very similar to that found in heathland areas.

The remaining 13 samples were taken within Stand RI35, with *Agrostis capillaris* and *Kindbergia praelonga* constant. This mossy sward is found in the shadier rides where drought-tolerant annuals are mostly absent, and the sward is dominated by the character moss, and other species including *Rhytidiadelphus squarrosus* and *Scleropodium purum*. This stand was initially regarded as a homogeneous unit, but the additional samples revealed a division between a group of species associated with dry, acid and very infertile conditions, and a second group more commonly associated with recently stabilised, moderately fertile and only mildly acid soils.

The distribution of samples from these different vegetation stands has allowed an effective boundary to be drawn around the samples assigned to the supplemented Stand RI34 and around the variant of Stand RI35 associated with more strongly acid and less fertile conditions. The location of all woodland ride samples from both surveys is given in **Figure 3.3.**

The following accounts for these communities supercede those included in the 2007 survey, from which they are largely derived.

Stand RI34 – *Agrostis capillaris – Polytrichum juniperinum* Community

Fifteen samples were taken from this stand, which occurs in open rides on the high ground of Goose Hill and in limited areas of the Kenton Hills. *Agrostis capillaris*, *Polytrichum juniperinum*, *Scleropodium purum*, *Anthoxanthum odoratum* and *Rumex acetosella* are the constants and frequently dominant in a short, rather open and parched sward. The occurrence of the stand corresponds to high areas of strong sunlight within the plantation where there is moderate trampling. Bryophytes are particularly frequent and diverse in this community, and *Syntrichia ruraliformis*, *Hypnum cupressiforme* and *Campylopus pyriformis* are all common. A very thinly scattered lichen flora is also present in some areas of the stand, including *Cladonia foliacea*. The Nationally Scarce herb *Crassula tillaea* is occasionally present in open ground, often found growing with *Carex arenaria*.

The average number of plant species is 13.0 (range 7-18 species per sample).

Stand RI34 can be referred to the *Erodium cicutarium-Teesdalia nudicaulis* sub-community of the *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland (U1c), though it should be noted that the vegetation also has some characteristics of the *Anthoxanthum odoratum* sub-

community of the *Carex arenaria-Festuca ovina-Agrostis capillaris* dune grassland (SD12a). *Festuca-Agrostis-Rumex* grassland "occurs widely over suitable substrates throughout the warm and dry lowlands of England and Wales" (Rodwell 1992), though it is centred on East Anglia; the *Erodium-Teesdalia* sub-community typically occurs on parched, base-poor ground, and is uncommon outside of the East Anglian Breckland region. *Carex-Festuca-Agrostis* dune grassland occurs mainly on the east coast of Britain, and is notable for occurring inland on loose infertile sands. Stand RI34 is thus a notable community in Suffolk, and is largely restricted to Breckland and the Sandlings, where it is often found along rides in conifer forests that receive full sunlight in sheltered situations.

Stand RI35 – *Agrostis capillaris – Kindbergia praelonga* Community[18]

Thirty samples were taken from this stand, which occurs in somewhat shaded conditions, often in narrow rides and/or in very lightly trampled conditions. This vegetation occurs in the general vicinity of Stand RI34, but over a wider area. *Agrostis capillaris* and *Scleropodium purum* are still constants, with the perennial grasses *Holcus lanatus* and *Anthoxanthum odoratum*, but the suite of bryophytes is now dominated by *Kindbergia praelonga* and *Rhytidiadelphus squarrosus*. *Hypnum jutlandicum* and *Dicranella heteromalla* are also associates. *Poa annua* is much more frequent than in Stand RI34 and occupies the more trampled areas within the stand.

Two variants of this stand are now recognised.

Variant A shares all of its constant species with Variant B, but both *Pteridium aquilinum* and *Rubus fruticosus* agg. are much more common. The variant has a list of associates frequently found in dry, acid and infertile conditions, including the mosses *Hypnum jutlandicum*, *Dicranella heteromalla* and *Dicranum scoparium*. *Holcus mollis* and *Aira praecox* are also occasional associates.

The average number of plant species in variant A is 9.5.

Variant B shares all its constant species with Variant A, but *Cerastium fontanum*, *Stellaria pallida* and *Hypochaeris radicata* occur more commonly here. In addition, the variant has a long list of associate species restricted to it, including *Senecio jacobaea*, *Stellaria media*, *Carex arenaria* and *Dactylis glomerata*.

The average number of plant species is 12.1.

The influence of shade tolerant species that have been able to colonise the moist conditions on the ride provides an unusual floristic composition for a grassland community. It is apparent, however, that the reduction in droughting has shifted the sward away from the *Festuca-Agrostis-Rumex* community (U1) typical of inland acid stands, towards the *Festuca-Agrostis-Galium* grassland (U4) more commonly found in areas of higher rainfall and more humid conditions.

Stand RI35 is therefore referred to the *Holcus lanatus-Trifolium repens* sub-community of the *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland (U4b), with which it shares many similarities. The species composition of the two variants suggests that Variant A should be considered with reference to the *Anthoxanthum odoratum* sub-community of the *Pteridium aquilinum-Galium saxatile* community (U20a), while Variant B has some similarities with acid,

[18] The name of this stand is altered from that given in the 2007 report, to take account of the new scientific name accorded to members of the former *Eurhynchium* genus.

fixed sand dune, particularly the *Anthoxanthum odoratum* sub-community of the *Carex arenaria-Festuca ovina-Agrostis capillaris* dune grassland (SD12a).

Festuca-Agrostis-Galium grasslands (U4) are common throughout large areas of the British uplands, and the *Holcus-Trifolium* sub-community extends this type of vegetation into the lowlands on moist, often fertile sands that are drought-free. The *Pteridium-Galium* community (U20) is virtually ubiquitous on suitable soils throughout the British Isles, and the grassy *Anthoxanthum* sub-community is typically found in open areas of oak-birch woodland in the lowlands. *Carex-Festuca-Agrostis* dune grassland occurs mainly on the east coast of Britain, and is notable for occurring inland on loose infertile sands.

The distribution of this community in Suffolk is poorly known, but it has been recorded by the author in moist, rather acid but quite fertile sands on low floodplain terraces in the River Waveney and partially shaded sections of forest rides in the Sandlings conifer forests.

3.5 Coastal Embankment Habitats Survey

An initial survey of the vegetation mantling the coastal bunds in 2007 indicated that the communities were not sufficiently mature to be well represented within the NVC framework. The 2008 survey sought to provide sufficient information on the character of the constituent stands to make an effective record of this vegetation.

It was determined that all young plantations could not be related to the NVC. In part, this was due to the diverse nature of the tree planting stock, but it was also evident that extensive areas had been sown with a meadow mix. Notwithstanding, samples were taken of the embankment slope on the coastal side and along the narrow corridor of trampled grassland on the top of the embankment. In addition, patches of gorse scrub were also sampled, though these were often very small and the samples tend to reflect a proportion of 'edge species'. Open areas on the made slopes near the northern side of the power station were also sampled as a third community. This vegetation was a form of rabbit-grazed parched grassland, with many semi-natural characters.

As shown in **Figure 3.4**, three communities are identified and represented by sample location.

Stand CE1 – SD8 *Festuca rubra-Galium verum* Fixed Dune Grassland

Thirteen samples of this stand were taken from locations on the coastal side of the embankment, along the open grassland on the top of the embankment, and in the plantation areas within glades and rides. While a number of the recorded species may have originated as a sown mixture, the samples demonstrate a unity of species composition over large areas of the grassland. *Festuca rubra* is ubiquitous throughout, and is frequently the dominant sward-forming grass, forming a litter-rich mat over extensive areas. *Poa pratensis, Anthoxanthum odoratum* and *Holcus lanatus* are also locally abundant and these grasses are accompanied by *Plantago lanceolata* and *Vicia sativa*. Other constants include *Hypochaeris radicata* and *Elytrigia repens*. The distribution of the vegetation is patchy in some parts of the coastal side and top of the embankment, and the more open areas can be colonised by sheets of a diminutive form of *Bromus hordeaceus*.

The range of associated herbs is extensive and the samples recorded common *Vicia hirsuta, Senecio jacobaea* and *Leucanthemum vulgare*. Few forbs have spread to form extensive patches, though legumes such as *Medicago lupulina* and *Trifolium dubium* are locally abundant in small areas. Few bryophytes are present; with *Brachythecium rutabulum* being the only species found carpeting the ground.

The average number of plant species is 14.8 species and the range within the samples is 12-18 species.

The group of samples taken can be referred to the *Festuca rubra-Galium verum* fixed dune grassland community (SD8). This community is typical of shelly dunes that have been stabilised by grazed grassland; it occurs in suitable locations around the British coast. Its presence in this immature form on the coastal embankment is largely due to the slightly calcareous character of the substrate, though its species composition may reflect the composition of the seed mixes that were probably sown to stabilise the surface of the embankment. In Suffolk, extensive areas of this type of vegetation are uncommon, as the sands in most coastal situations are too acidic, and the embankment provides a long-term location for an unmanaged form of this community.

Although it is possible that this stand could be considered for CWS status under the 'Rarity' criterium (and similar habitats could fall under the Specific Habitat Criterium 4.2.1 'Unimproved/semi-improved, dry acid grassland or dry but non acid grassland associated with crag/sand and gravels in Suffolk) it is relatively small, fragmented, immature and likely to be transitory in nature. Stand CE1 is therefore considered to be of only local nature conservation value.

Stand CE2 – Parched Grassland

Ten samples of this rabbit grazed community were taken from a number of locations were it has developed. The vegetation is restricted to high sunlight areas of the made slopes on the northern side of the power station. Sward heights are typically just several centimetres and the grassland is maintained by rabbit grazing and by the strongly droughting substrate, which appears to have derived from crag sands.

The moss *Brachythecium rutabulum* is frequently dominant, forming a close carpet over the ground surface. *Carex arenaria, Holcus lanatus* and *Dactylis glomerata* form the constant sward constituents with sprawls of *Lotus corniculatus* and rosettes of *Leontodon hispidus*. The grasses *Vulpia bromoides, Festuca rubra* and *Poa pratensis* are also sward-forming in several areas, though the grassland is usually open with high bryophyte cover or patches of bare ground, which are colonised by a wide range of annual associates, including *Catapodium marinum, Centaureum erythraea, Trifolium striatum* and a number of diminutive acrocarpous mosses, such as *Pohlia nutans* and *Tortula ruralis ruraliformis*.

The average number of species in the samples is 16.8 (range: 12-21 species).

The sampled areas are seldom contiguous and this stand forms patches over an extensive area. The suite of grasses, annual forbs and mosses are indicative of extremely parched grassland, but the crag sands have imparted sufficient alkalinity to the young soil to make the vegetation impossible to classify within the NVC[19]. Within a coastal context, the community is very uncommon and is perhaps more likely to be encountered on exposed concrete surfaces, as on the Dunwich Cliffs (personal observation) or the floors of inland crag quarries (eg. Stone 2004), than on natural ground.

Although it is possible that this stand could be considered for CWS status under the 'Rarity' criterium (and similar habitats could fall under the Specific Habitat Criterium 4.2.1 'Unimproved/semi-improved, dry acid grassland or dry but non acid grassland associated with

[19] In European phytosociology, this vegetation would probably be classified as an immature form of open, dry grassland belonging to the Thero-Airion alliance.

crag/sand and gravels in Suffolk) it is relatively small, fragmented, immature and likely to be transitory in nature. Stand CE2 is therefore considered to be of only local nature conservation value.

Stand CE3 - W23 *Ulex europaeus-Rubus fruticosus* Scrub

Five samples were taken from the scattered patches of gorse scrub along the embankment. While gorse was dominant in each, the samples largely recorded grassland species that had become associated with scrub. *Prunus spinosa* and *Rubus fruticosus* agg. were both constant companions and the samples can be referred to the *Ulex europaeus-Rubus fruticosus* scrub, though the stand as a whole cannot be readily assigned to a particular sub-community. W23 is a common community in both a local and national context, with a widespread distribution on marginal land throughout.

This stand is considered to be of local nature conservation value.

4. Conclusions

In line with recommendations made in the 2007 report, four vegetation surveys have been carried out in an extended survey area around the proposed Sizewell work areas and access route.

4.1 Survey of the Dykes of Sizewell Marshes SSSI

The aquatic vegetation of the remaining Sizewell Marshes SSSI dykes was surveyed, and provides a coherent data set for the Assessment, so that sensitive areas can be identified and form a contribution to hydrological assessments.

The dyke vegetation survey took a wider compass than the area immediately surrounding the PWA, and presents a clear picture of aquatic communities found across Sizewell Marshes. In combination with the northern areas surveyed in 2007, the survey distinguishes between areas of greater conservation interest and drains/marginal areas, where the vegetation communities are common over much of lowland Britain and are composed of relatively species-poor combinations of common species.

The 2008 survey confirms the area and range of variability found amongst the aquatic vegetation assessed by the 2007 survey, and emphasises the significant conservation value of both dyke system survey areas in supporting distinct suites of aquatic vegetation types.

However, of particular interest, is the identification of a large area covering much of the fen meadows where Nationally Scarce aquatic species and uncommon aquatic plant communities form a contiguous network. Much of the dyke system's vegetation can be referred to the 'very local' A4 *Hydrocharis-Stratiotes* community (Rodwell 1995) and several variants can be distinguished in different parts of the Marsh. Following on from the 2007 survey, the area known to be occupied by the A6 *Ceratophyllum submersum* dyke community also has been extended to cover the whole of Goose Hill Marsh. These communities are restricted in Suffolk to limited areas, particularly near the coast and in situations where a peat substrate is irrigated by calcareous waters. As such they are particularly sensitive to hydrological and hydro-chemical perturbations, and are dependent upon calcareous conditions with no more than occasional brackish influences.

Assessment of the condition of the Sizewell Marshes dyke system forms an integral part of the management planning for the Marshes, and no routine management issues were apparent that might affect the condition of the dyke vegetation. The survey results will therefore remain valid for at least the next five years.

A summary of the conservation interest of the 2007 and 2008 aquatic vegetation communities is given in Table 4.1.

4.2 Survey of the Fens of the Sizewell Marshes SSSI

The remaining areas of fen meadow, reedbed and wet woodland (with the exception of two inaccessible areas) were surveyed to complete the data set developed during 2007 for BE's landholding. This provides an up to date assessment of the current fen communities, defining their condition, extent and location on the site. Such information will help to characterise the eco-hydrological sensitivities of the features.

The fen meadow survey characterised the diversity of rush-dominated stands present on Sizewell Marshes SSSI, and confirmed the continued presence of the suite of less common species identified in the 1993 survey. The current survey was also able to map the extent of the *Briza media-Trifolium* spp. sub-community of the *Juncus subnodulosus-Cirsium palustre* fen meadow (M22b) within the Marshes. Small areas of this vegetation have been repeatedly surveyed at permanent plots as part of the Fen Meadow Vegetation Monitoring Programme (see Section 5.2), and its general development within the Marshes has been recorded for the first time since 1993.

The variations in floristic composition found in different compartments within the Marshes emphasise the subtle influences of:

- Peat depth and quality;
- Hydrological regime and water chemistry; and
- Management type, timing and intensity.

that are operating on the species composition and physiognomy of the swards.

The fen meadows, in terms of their species composition and inter-stand variability are dependent not only on appropriate management but also are particularly sensitive to changes in hydrological and hydro-chemical conditions.

The survey results offer a fixed point from which to assess the influence of these factors on the fen meadow vegetation. It is confirmed, however, that vegetational changes have occurred since the 1993 survey, which broadly indicate a drift in species composition sufficient to re-classify rush pasture as fen meadow vegetation in some areas of the Marshes; this is a positive development, and one that reflects a combination of sustained and appropriate management with careful hydrological control. However, the Vegetation Monitoring Programme identifies marked changes in species composition amongst the monitoring plots that may indicate, as frequently noted in the survey reports (Parmenter 1996-2001; Stone 2003-2008), an underlying series of changes in the hydrological regime and water chemistry. Therefore, the survey results should remain valid for no more than five years.

While the reedbed survey confirms the occurrence of a range of tall-herb fen species in wetter parts of the Marshes that have developed into reedbed, it also marks the continued shift in

species composition of former areas of rush pasture. The affected areas have not increased in recent years, and the results of the 2007 and 2008 surveys of areas of reedbed should remain valid for at least the next five years. In the longer term, colonisation by sallow scrub is to be anticipated where stands are not managed.

The areas of wet woodland surveyed in 2008 confirmed that Sizewell Marshes contain a range of wet woodland types associated with fertile lowland peats and dry valley margins. It is possible that the western side of Grimsey's Wood, which supports moist oak-birch woodland, may contain remnants of wet acid woodland, but the distribution of indicator species such as *Molinia caerulea* and *Juncus effusus* is very limited. The survey results will therefore remain valid for at least the next five years, though it should be noted that Round Covert and Rookyard Wood have not been surveyed.

A summary of the conservation interest of the 2007 and 2008 fen vegetation communities is given in Table 4.1.

4.3 Kenton and Goose Hills Ride Vegetation Survey

The parched, acid sections of the ride network on Goose Hill and the Kenton Hills, identified by the 2007 survey, were revisited to take supplementary samples of the two constituent vegetation communities (Stands RI34 and RI35). The survey focused only on the area where the highest potential for heathland restoration had been identified during the previous survey. This has enabled the distribution of these vegetation types to be mapped within the dry woodland and the amalgamated sample data set gives a detailed account of their characters.

Stand RI34 is a short grassland sward that occurs in the most parched and somewhat trampled areas in the centre of rides in a limited area of Kenton Hills and over a more extensive part of Goose Hill. The presence of drought-tolerant annuals, pioneer mosses and elements of the nearby acid sand dune flora have combined to form an open grassland very similar to that found in heathland areas and these areas are identified as being of high suitability for potential heathland restoration (**Figure 3.3**).

Stand RI35 is a mossy sward found in the shadier rides where drought-tolerant annuals are mostly absent. The additional samples revealed a division between a group of species associated with dry, acid and very infertile conditions (likely to be of moderate suitability for potential heathland restoration), and a second group more commonly associated with recently stabilised, moderately fertile and only mildly acid soils (likely to be of low suitability for potential heathland restoration).

Forestry operations during the winter between the two surveys has disturbed or removed lengths of ride vegetation in this area, particularly of Stand RI34, but it is anticipated that the vegetation would recover its character in several years if undisturbed except by normal levels of trampling. Therefore, the survey results should remain valid for at least five years as a description of the general vegetation.

A summary of the conservation interest of the 2007 and 2008 ride vegetation communities is given in Table 4.1.

4.4 Completion of NVC Work In The PWA

Open-ground vegetation of the coastal embankment and associated slopes was sampled to complete the NVC work within the main construction area.

The survey of the coastal embankments found large areas of unmanaged grasslands that are clearly referable to fixed dune grassland, although it is not clear to what extent the sward owes its origin to sown seed. On parched soils an uncommon open sward of annuals and diverse perennial plants has developed on made ground with no firm correlation with any particular NVC community, but with some affinities to man-made coastal situations. The survey indicates that open habitats in the more disturbed or parched areas along the embankment are a valuable contribution to the diversity of this habitat, but require continued rabbit grazing and should not be shaded. The survey results will remain valid for at least the next five years, unless the rabbit population declines or further tree planting is undertaken.

4.5 Evaluation of Vegetation Types

Almost all of the 2007 and 2008 surveys (**Figures 1.2 and 1.3**) lie within statutory or non-statutory designated sites:

- The vegetated shingle and some dune grasslands stands lie entirely or patly within the minsmere to walberswick sac;
- All the surveyed fen meadows, aquatic dykes and reedbed vegetation lie entirely within SSSI units, as does much of the wet woodland;
- All of the dry woodland and rides, the remaining dune grasslands and wet woodland, form part of County Wildlife Sites, which encompass Goose Hill and Kenton Hills and also the beach in front of the power station; and
- The survey areas within the PWA do not lie within any designated site,

Table 4.1 sets out the nature conservation value of each of the various stands surveyed in both 2007 and 2008, including a brief summary of the reasoning.

Table 4.1 Nature Conservation Evaluation of all of the Habitats Lying Within the 2007 and 2008 Survey Areas, Sizewell (in order of importance)

Habitat type	Year(s) of survey	International	National	County	Parish	Local	Notes:
Dune grasslands	2007	✓					• Stands DG11-13 - occurring in CWS and SAC areas • Stand DG14 restricted to SAC area
Vegetated shingle	2007	✓					• Strandline and stand VS4 – occurring in CWS and SAC areas • Includes Nationally Scarce species
Reedbed	2008	✓					• Stand RB2 lies within SAC
Aquatic dyke vegetation	2007-2008		✓				• Stands DY25, 27-30; Stands DY1-7 • SSSI feature • Includes Nationally Scarce species
Fen meadow	2007-2008		✓				• Stands FM1-6; FM 17-18 • SSSI feature
Reedbed	2007-2008		✓				• Stands RB1; RB21-22
Wet woodland	2007-2008		✓				• Stands WW2-4; WW23
Dry woodland	2007			✓			• Stands DW31-33 and felled/ replanted areas • Restricted to CWS

Table 4.1 (continued) **Nature Conservation Evaluation of all of the Habitats Lying Within the 2007 and 2008 Survey Areas, Sizewell (in order of importance)**

Habitat type	Year(s) of survey	International	National	County	Parish	Local	Notes:
Dune grasslands	2007			✓			• Stands DG5-10 • Largely or wholly occurring within CWS
Ride vegetation	2007-2008			✓			• Stands 134-139 • Restricted to CWS • Includes Nationally Scarce species
Wet woodland	2008			✓			• Stand WW1 is restricted to CWS
Coastal embankment	2008					✓	• Stands CE1-3 • Restricted to PWA
PWA Made ground	2007					✓	• Stand YG1 • Restricted to PWA
Valleyslope grasslands	2008					✓	• Stand VG2
PWA Made ground	2007					✓	• Stands YG2-3 • Restricted to PWA
Valleyslope grasslands	2008					✓	• Stand VG1

5. Recommendations

5.1 Survey Coverage

In combination, the results of the 2007 and 2008 vegetation surveys provide a comprehensive survey of the semi-natural vegetation communities of the PWA and the dykes, fen meadows and other wetland habitats in the surrounding areas that are potentially susceptible to hydrological changes resulting from the construction phase. Additionally, the woodlands on the high ground to the north and west of Sizewell Marshes have been characterised according to the NVC, and are the primary habitat containing semi-natural features along the access route included within the boundary of the PWA.

Omissions in the coverage of the survey are:

Areas of arable land to the north of Kenton Woods, in the vicinity of the access route and construction area. Arable land may contain a suite of distinctive plants and bryophytes, a number of which are nationally scarce or rare (Wilson & King, 2000).

Areas of wet woodland within Sizewell Marshes, including Rookyard Wood and Round Covert, for which a means of physical access would need to be arranged. These long-established woodlands contain many semi-natural features and may be sensitive to changes consequent upon hydrological changes during and after construction.

It is recommended that consideration is given to the survey of these habitats in 2009, both for the reasons given above and in order to achieve comprehensive survey coverage, and to enable detailed characterisation of their constituent vegetation communities.

5.2 Analysis of Ecological Change

A frequent comment found in the annual reports of the Sizewell Marshes Fen Meadow Vegetation Monitoring Programme relates to the dynamic character of the sampled vegetation, and the factors that may have effected change to its character and composition.

Comparable surveys of the fen meadow vegetation undertaken on Sizewell Marshes in 1993 and 2007-8 provide a sufficiently robust data set to undertake a broad-scale analysis of the type, extent and nature of changes to this vegetation over this period, prior to the proposed Construction Phase. A similar assessment can be undertaken of dyke vegetation, and other biotic groups where distributional surveys have been undertaken.

The opportunity also exists to relate pre-Construction Phase changes of the semi-natural habitats and species features to changes in the management and hydrology of the Marshes, and to determine which communities and species may be sensitive to such changes.

Any statement of baseline conditions should include a statement of recent change. This is because any future change brought about by possible construction works needs to be separated from changes that might already be occurring as a result of other factors.

It is recommended that the results from the current survey programme are employed in a broad-scale assessment of the nature, extent and direction of ecological changes occurring prior to the proposed Construction Phase, in order to:

1. **Establish the existing dynamic character of the fen meadows and other habitats and species where appropriate data exists.**

2. **Identify communities, species and species-groups sensitive to changes in hydrology, hydro-chemistry and management, that may be used in predicting their sensitivities to potential impacts during and after the proposed Construction Phase. This is of particular relevance to the hydrological assessment, which requires a clear indication of the likely impacts on fen and aquatic vegetation, in particular, of changes to the hydrological regime and hydro-chemistry.**

The Fen Meadow Vegetation Monitoring Programme has developed a more detailed sequence of floristic changes in species-composition within the monitoring plots over the period 1997-2008. While in the earlier years of the programme, the data set was subject to limited between-year assessments of change, using similarity indices, no detailed analysis of the changes has been undertaken over the period of the programme. The anticipated Construction Phase provides a rationale for undertaking this analysis prior to the proposed works, and to integrate the results and conclusions into plans for the protection and maintenance of the SSSI conservation feature.

It is recommended that a detailed statistical analysis is undertaken of the annual results produced by the Fen Meadow Vegetation Monitoring Programme, with particular reference to trends and perturbations related to hydrological and management changes over the period 1997-2008. Results of the analysis should be used within the EcIA process to distinguish the type, range and intensity of changes in vegetation composition that have occurred prior to the anticipated Construction Phase and, in so doing, establish the existing trends to which the fen vegetation has been subject as recorded by the monitoring plots. In addition, the analysis would be used to define limits of acceptable change to the fen meadow vegetation in the development of a monitoring programme of potential impacts during and after the proposed Construction Phase

5.3 Preparation of Target Vegetation Community Accounts for Potentially Modified Areas within Goose Hill and Kenton Hills Woodlands

The term ‘heathland’ does not imply a solid block of heathers; the heaths characteristic of the Suffolk Sandlings are a mosaic of heather stands, woodlands, wood-pasture, scrub, acid grassland and bare ground. Restoration to heathland or heath-pasture habitat complexes after the Construction Phase could yield very high conservation gains and would be an important part of a mitigation strategy. The NVC surveys of the dry woodlands and ride vegetation of these areas has delineated a broad area of moderate to high suitability for restoration to habitats of dry, acid soils. This area already appears to have soil characters amenable to the development of heathland habitats (Jentch & Beyschlag 2003). The vegetation survey has provided a detailed account of existing communities in this area, and can be used to develop a suite of target vegetation types that are likely to develop in this area if it were modified during the Construction Phase.

It is recommended that the results from the NVC surveys of the dry woodlands and ride vegetation are used to produce accounts of target vegetation communities as a prelude to the development of a restoration plan for affected areas of Goose Hill and Kenton Hills. Each type of vegetation would be described in terms of its constituent species, typical physiognomy, required soil type and the main vectors of change. The target vegetation communities developed in this way would provide a series of potential targets for the restoration plan.

To provide a sound science and evidence base for the work we also suggest the following:

5.3.1 Undertake Soil Surveys.

This is important to (a) identify those areas of greatest potential for restoration and (b) identify preparatory works to ensure high likelihood of success. An example would be stripping of surface materials to reveal nutrient-poor sand. The method would be shallow soil coring and determination of soil properties, including limited testing such as pH and also nutrients which would require lab testing. We would allow for 50 sample stations.

5.3.2 Undertake Restoration Feasibility Study.

In showing the potential of parts of the survey area to support vegetation typical of the Sandlings heathlands, the development of the results of the NVC survey into target vegetation community accounts would provide clear guidelines and likely constraints for the development of a full restoration plan for affected areas of Goose Hill and Kenton Hills.

The NVC survey indicates that it is by no means certain that major soil reclamation would be necessary or desirable to restore affected areas to heathland habitats. In fact, the potential to impact on surrounding wetland habitats may restrict possible soil amelioration measures. Furthermore, arable land within and adjacent to the Preliminary Works Area may offer a more benign opportunity to create new habitat following the Construction Phase as it lacks the characteristic suite of heathland habitat species already found within the the survey area. In addition, local projects have created heathland habitats on arable land in the vicinity, particularly at Minsmere and that undertaken on the BE landholding, and have demonstrated the value of soil ameliorations in this context.

It is recommended that the feasibility is established of restoring affected areas of Goose Hill and Kenton Hills without substantial soil amelioration. The proposed study should also assess the potential for utilising the experience from the creation work undertaken elsewhere, particularly at Minsmere and that undertaken on the BE landholding, and identify the limitations and constraints of the target area, particularly its proximity to the adjacent wetland habitats.

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Reviewer:

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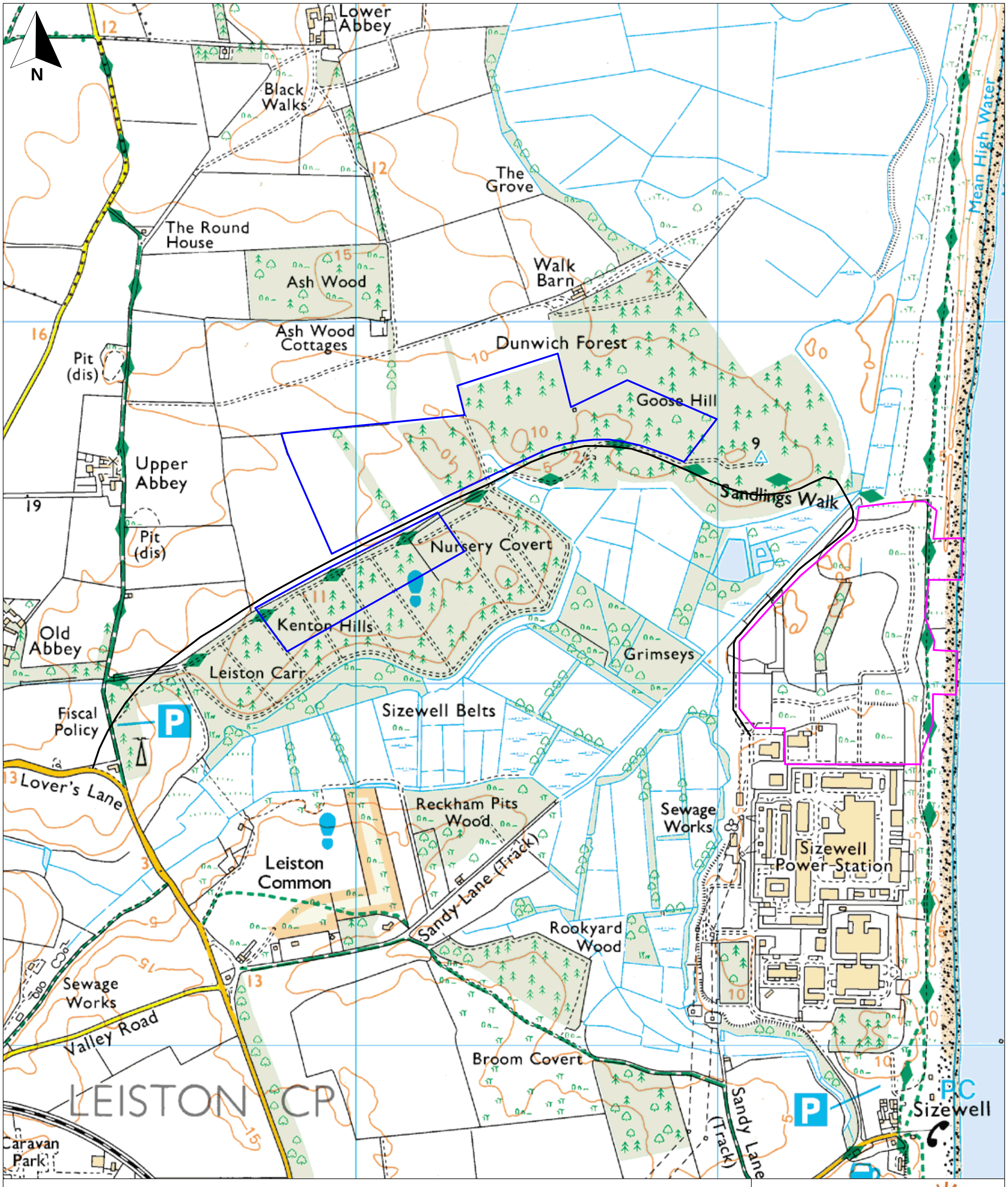


Key:

- Preliminary Works Area
- Indicative location of Construction Compounds
- Proposed Access Route

0 m — 500 m

British Energy

Sizewell NVC Report 2008

Figure 1.1
Preliminary Works Area

April 2009
19801-R276.WOR tugwc

Entec

Key:

- Preliminary Works Area
- Ramsar
- SPA
- SAC
- SSSI

0 m — 1000 m

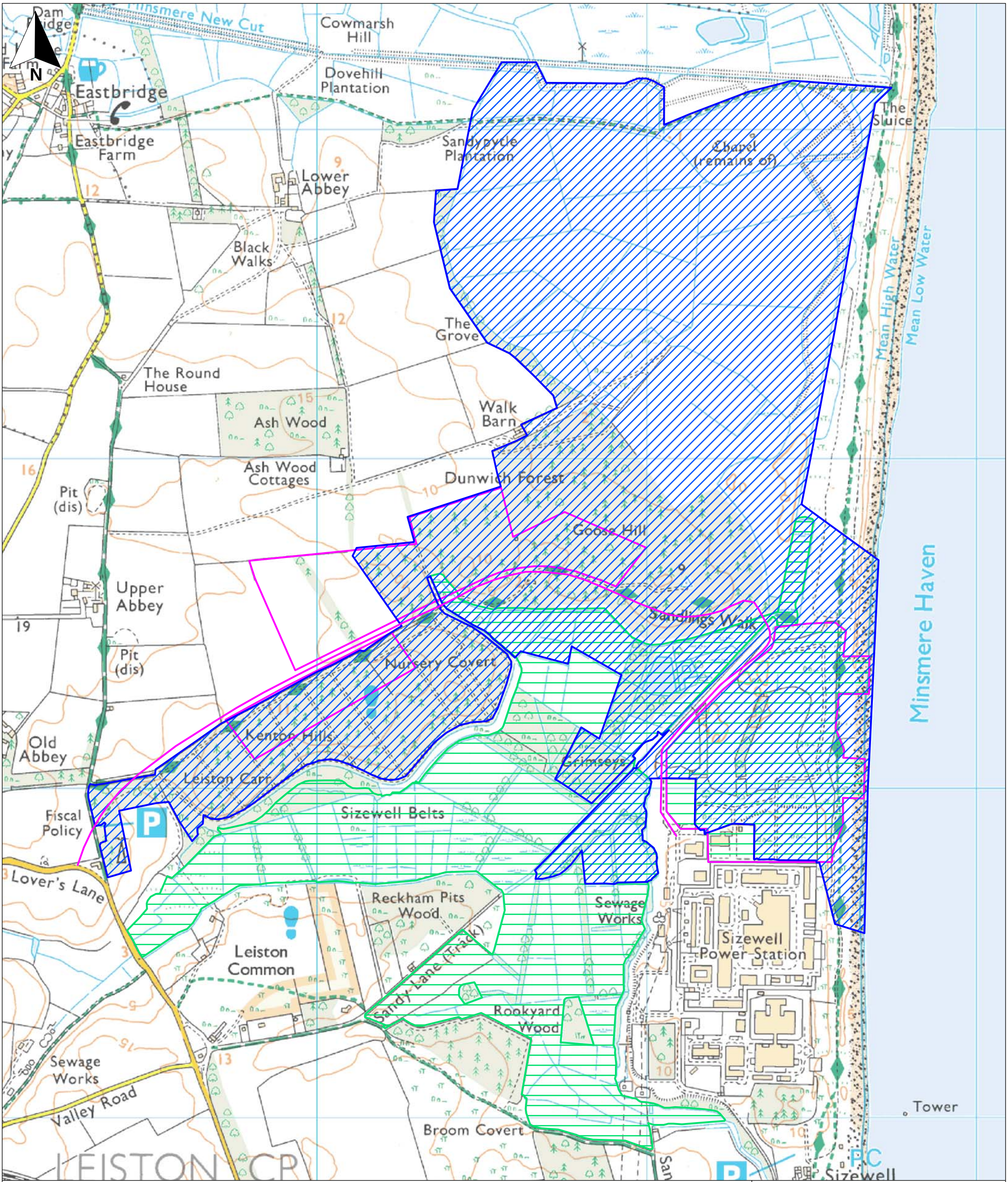
British Energy

Sizewell NVC Report 2008

Figure 1.2
Statutory nature conservation sites

April 2009
19801-R299.WOR tugwc

Entec



Key:

- Preliminary Works Area
- Survey Area 2007
- Survey Area 2008

0 m — 500 m

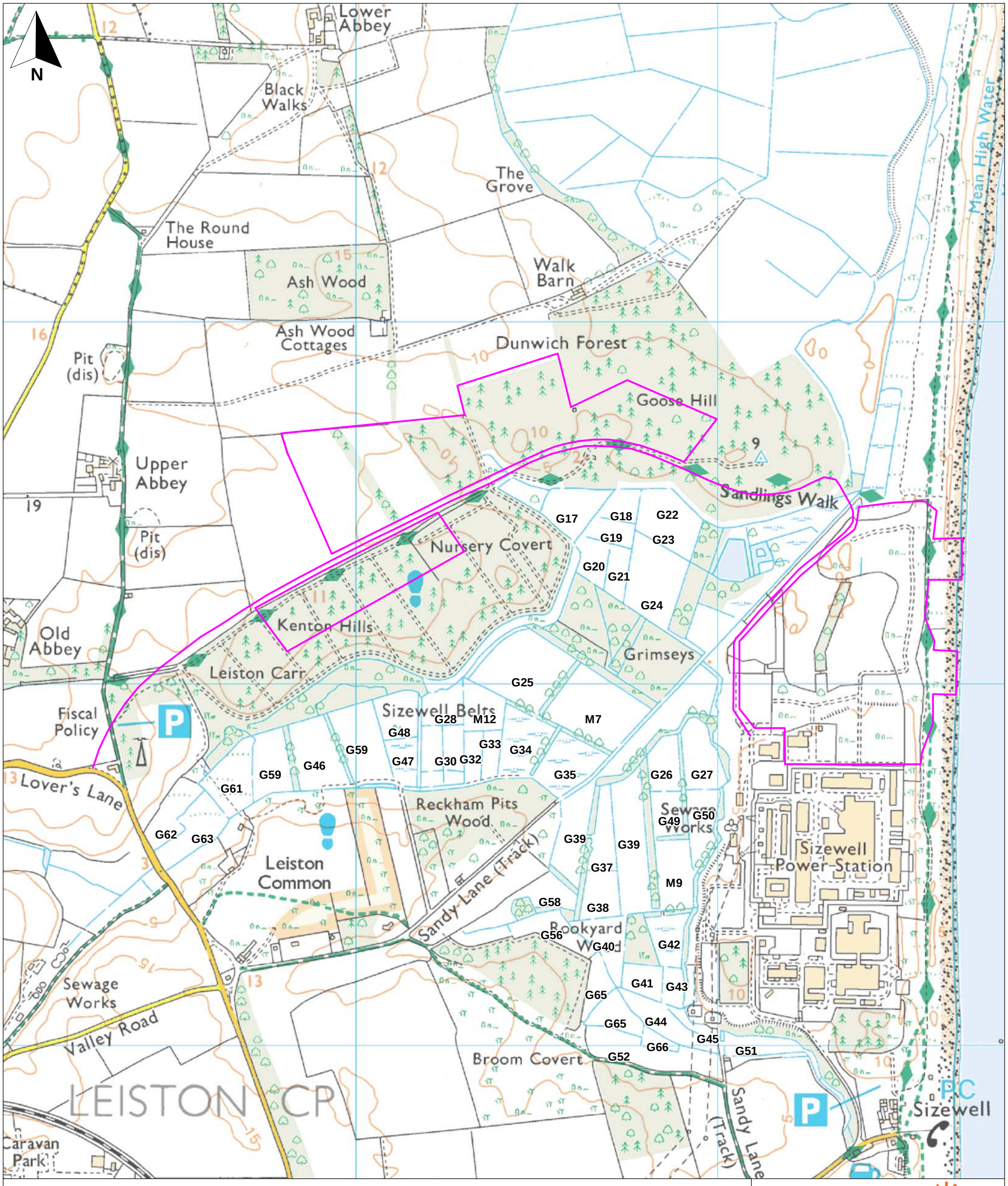
British Energy

Sizewell NVC Report 2008

Figure 1.3
Site plan showing survey area

April 2009
19801-R298.WOR tugwc

Entec



Key:

Preliminary Works Area

0 m 500 m

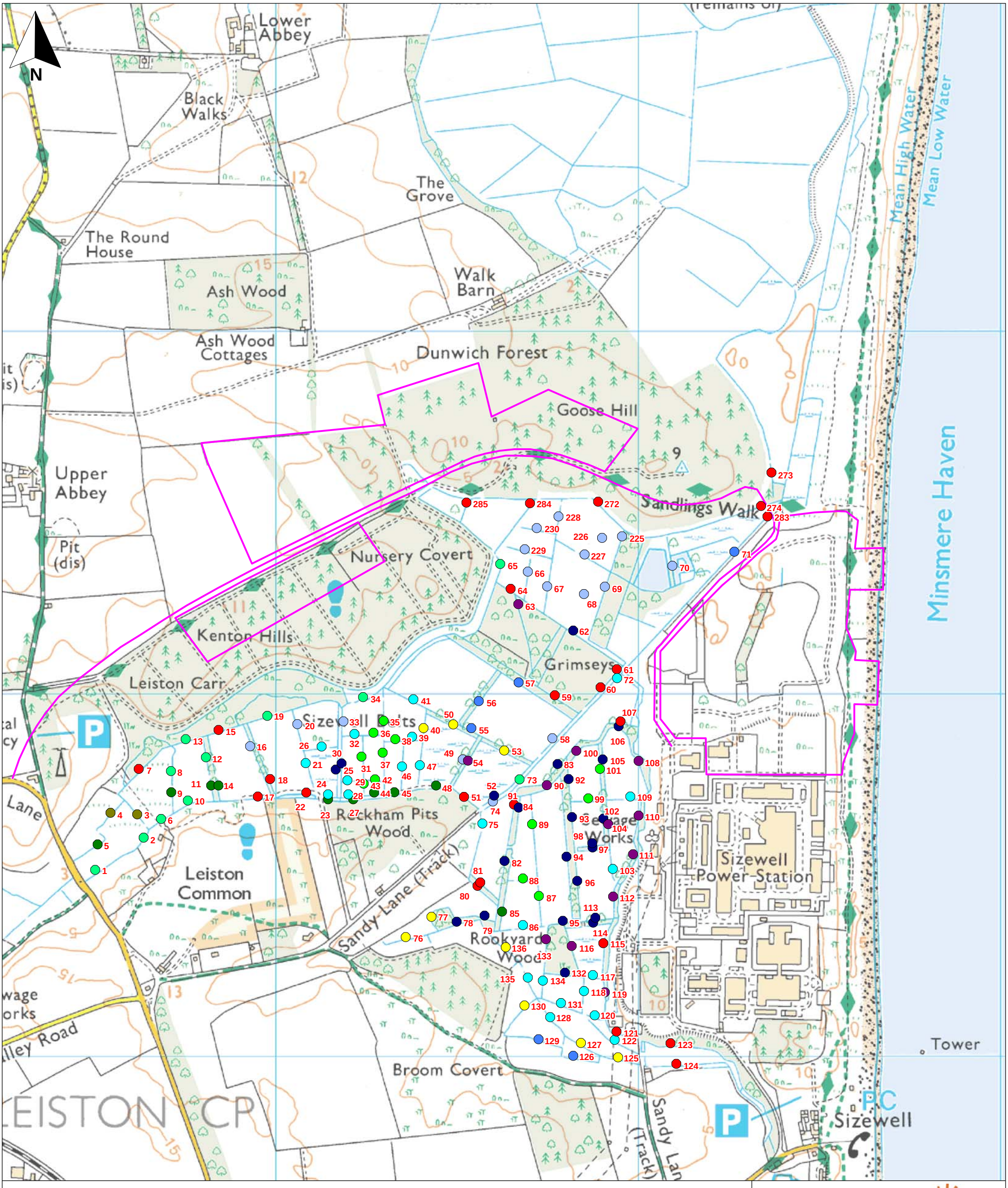
British Energy

Sizewell NVC Report 2008

Figure 2.1
Sizewell Marshes compartment numbers
(source Suffolk Wildlife Trust 1993)

April 2009
19801-R279.WOR tugwc

Entec



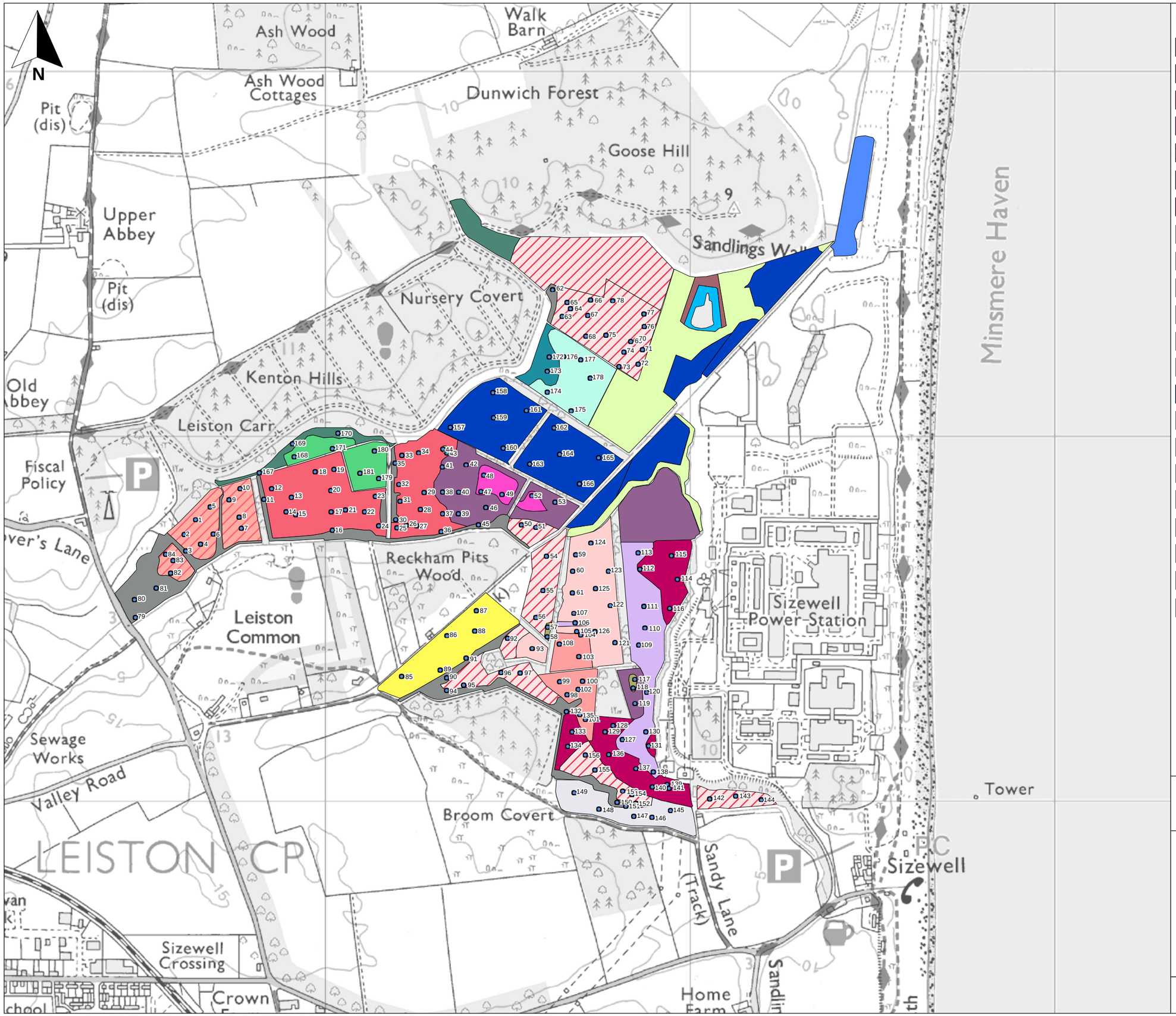
British Energy

Sizewell NVC Report 2008

Figure 3.1
Sizewell marshes dyke vegetation

April 2009
19801-R277.WOR tugwc

Entec



NVC Code (stand number)

- M22b (FM1a)
- M22b (FM1b)
- M22b - Persicaria amphibia variant (FM1c)
- M22b - Menyanthes trifoliata variant (FM1d)
- M22b (MG8) FM2
- M22b (MG12a) (FM3a)
- M22b (MG12a) (FM3b)
- M22b (MG12a) (FM3c)
- M22d (MG12a) FM4
- M22b / MG10a (FM5)
- MG10a (FM6)
- Holcus lanatus grassland (VG1)
- U1d (VG2)
- S26 RB1
- S26 [RB2) (2007)]
- S4a [RB21) (2007)]
- OV25 [RB22) (2007)]
- W6a WW1
- W2a (WW2)
- W5a (WW3)
- W5a [WW23) (2007)]
- W10d (WW4)
- Location of 2008 samples

0 km 5 km

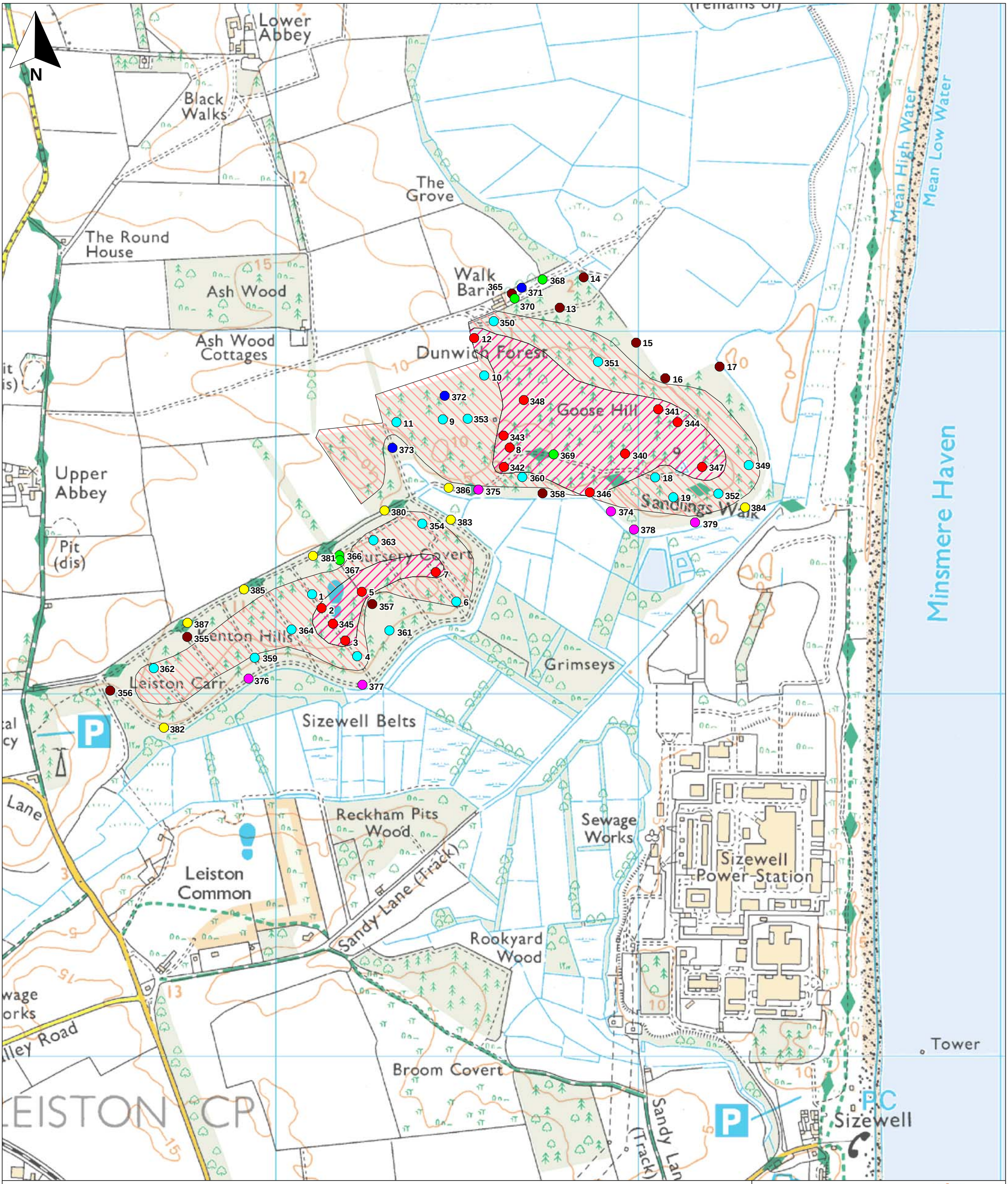
British Energy

Sizewell NVC Report 2008

Figure 3.2
Sizewell Marshes - Fen meadows

April 2009
19801-R280.WOR tugwc

Entec



Key:

- U1c (SD12a) - Community R134
- U4b (SD20a) - Community R135a
- U4b (SD12a) - Community R135b
- U1c - Community R136
- U20a - Community R137
- MG7e - Community R138
- OV23c - Community R139

Areas of high suitability for potential heathland restoration

Areas of moderate suitability for potential heathland restoration

0 m — 500 m

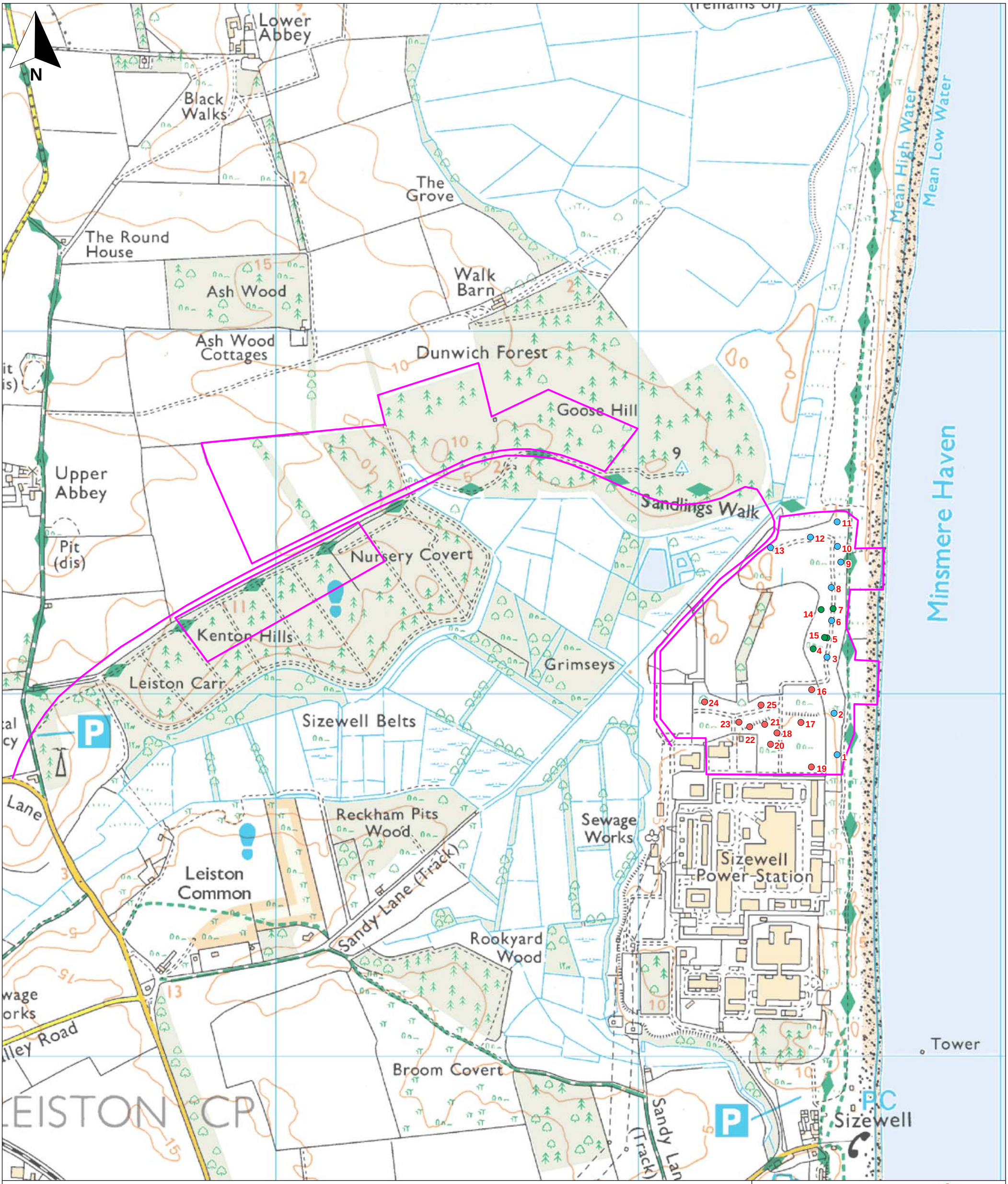
British Energy

Sizewell NVC Report 2008

Figure 3.3
Woodland rides

April 2009
19801-R281.WOR tugwc

Entec



Key:

- Preliminary Works Area
- SD8 (CE1)
- Parched grassland (CE2)
- W23 (CE3)

0 m — 500 m

British Energy

Sizewell NVC Report 2008

Figure 3.4
Sizewell Coastal embankment habitats stand distribution

April 2009
19801-R278.WOR tugwc

Entec

Appendix A
Data Tables for the Plant Communities

49 Pages

DY1a **A4 *Hydrocharis morsus-ranae* - *Stratiotes aloides* community - full sun variant**

sometimes accompanied by S4 *Phragmites australis* community

Sample number	21	24	26	28	29	32	39	41	46	47	72	75	86	103	109	117	118	120	122	128	131	134	135		
Floating																									
Lemna trisulca	5	4	4	7	4	4	7	3	6	6			10	8	5	5	5	4	6	9	7	2	7	V	(2-10)
Hydrocharis morsus-ranae		3		2	6	6	9	5	9	7		10	3	6	3	3	4	2	8	8	3	6	10	V	(2-10)
Lemna minor	3	3	3	7	4						4	6		9	9	3	3	2		3	3	10		IV	(2-10)
Persicaria amphibia						1															2			I	(1-2)
Spirodela polyrhiza														3										I	(3)
Drepanocladus fluitans													3											I	(3)
Submerged																									
Ceratophyllum demersum	8		9			3					2			1	9		2	8	1		6			III	(1-9)
Utricularia vulgaris	5		4										1				2		8					II	(1-8)
Myriophyllum verticillatum						8													2					I	(2-8)
Myriophyllum spicatum									1															I	(1)
Callitriche stagnalis			1																					I	(1)
Hottonia palustris									1															I	(1)
Elodea canadensis											1													I	(1)
Aquatic algae																									
Spirogyra sp.							4		3	2						8		2	3		8			II	(2-8)
Cladophora sp.					8																2			I	(2-8)
Oscillatoria spp.			3																					I	(3)
Enteromorpha sp.																					2			I	(2)
Marginal																									
Berula erecta	3	5		4	3	3	5	5	3	6			8	2		3	3	1	1	3	1	1	3	IV	(1-8)
Mentha aquatica	2					2		2									1			1			1	II	(1-2)
Agrostis stolonifera		5											2				1							I	(1-5)
Alisma plantago-aquatica									2				1								1			I	(1-2)
Swamp-fen																									
Phragmites australis		3	3	4		3	3	4	1	3		4			6	3			2	9		10	10	IV	(1-10)
Juncus subnodulosus	3	8										1	2	2			1		2		1			II	(1-8)
Rumex hydrolapathum	2			1	2		1						1			1				1			1	II	(1-2)
Iris pseudacorus	1	2	4	5		2	3																	II	(1-5)
Carex pseudocyperus		3											1	1			1				1			II	(1-3)
Sparganium erectum		1										5			1					1				I	(1-5)
Eleocharis palustris		3				3																		I	(3)
Oenanthe lachenalii							1		2															I	(1-2)
Galium palustre		4																						I	(4)
Typha latifolia																			3					I	(3)
Carex riparia										2														I	(2)
Shade (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
No. of aquatic species	4	3	6	3	4	5	3	2	5	3	3	2	4	5	4	4	5	5	6	3	8	3	2		Av. 4.0

DY1b **A4 *Hypocharis morsus-ranae - Stratiotes aloides* community - shade variants**

[Separated into light and heavy shade forms]

	Light shade																						Heavy shade													
Sample number	25	30	52	62	78	79	82	83	84	92	93	94	95	96	97	98	102	105	106	113	114	132	54	63	90	100	104	108	110	111	112	116	119	133		
Floating																																				
Lemna minor	2	3	9	5	4	8	10	6	10	3	4	4	6	2	10	3	2	7	8	8	6	4	5	7	8	10	9	8	6	8	9	7	8	7	V	(2-10)
Hydrocharis morsus-ranae	6	5	4		3	3	4	5		2	4	6	2	3	3		4	3	4	4	3	5	3		4	3		4	1	2	2	1		2	V	(1-6)
Lemna trisulca	6	5					2	3	1		2			3	4	3	3	6		7	4	3				1			2			2	3	4	III	(1-7)
Persicaria amphibia		1											2		2				1			1			1								2		II	(1-2)
Spirodela polyrhiza			4	3											3												5								I	(3-5)
Submerged																																				
Ceratophyllum demersum	8	8	8	2			8	9	7			8	9		8	1	9	7	4	10	1	10	8		7	1	1	3	1	3	5	9	4	9	V	(1-10)
Utricularia vulgaris						9	3			7	1	3	7				3	2	7		5	2			4	2		2				8		3	III	(1-9)
Elodea canadensis								1	3											1					1	1					1				I	(1-3)
Potamogeton berchtoldii									1			2													2	1					1				I	(1-2)
Myriophyllum aquaticum																3			2																I	(2-3)
Myriophyllum verticillatum							2									1																			I	(1-2)
Chara vulgaris																	5																		I	(5)
Callitriche obtusangula																															2				I	(2)
Chara globularis																2																			I	(2)
Ceratophyllum submersum				2																															I	(2)
Myriophyllum spicatum									1																										I	(1)
Aquatic algae																																				
Spirogyra sp.						2		2		6	1	2		7					8		2	4										2			II	(1-8)
Enteromorpha sp.					10			3		2	5			7																					I	(2-10)
Cladophora sp.								1								7	4	2																	I	(1-7)
Oscillatoria sp.		3																																	I	(3)
Microspora sp.	3																																		I	(3)
Marginal																																				
Berula erecta		4			2	1		7	6	1	1	3		3	1					2	2	2										1			III	(1-7)
Agrostis stolonifera						1		1		1		1										2			3		1		1	2	1	1	1	1	III	(1-3)
Mentha aquatica						1						1									1	1													I	(1)
Rorippa nasturtium-aquaticum					4	2															1														I	(1-4)
Lycopus europaeus					1	1																			2										I	(1-2)
Catabrosa aquatica					4																				2										I	(2-4)
Alisma plantago-aquatica												1																							I	(1)
Swamp-fen																																				
Phragmites australis	5	4	3		3	4	1			3	2	2			3	8	2	5			3	2			2			1							III	(1-8)
Carex riparia							4	3	3		2						3	2							3		1								II	(1-4)
Equisetum fluviatile							1					1					2			1												2	2		I	(1-2)
Juncus subnodulosus														3		2					3											1		1	I	(1-3)
Galium palustre													1								1	2										1		1	I	(1-2)
Typha latifolia	3						2	3									1																		I	(1-3)
Carex diandra							1	2					1															1							I	(1-2)
Rumex hydrolapathum					1	1			1											1															I	(1)
Iris pseudacorus				1					3																9										I	(1-9)
Sparganium erectum					1															3											1				I	(1-3)
Carex pseudocyperus									1						1																				I	(1)
Lythrum salicaria						1															1														I	(1)
Solanum dulcamara																									4										I	(4)
Eupatorium cannabinum																									1										I	(1)
Shade (%)	40	20	40	35	25	40	25	25	25	5	15	25	45	40	35	45	25	10	35	35	40	35	70	60	60	80	60	80	90	80	60	60	80	60		
No. of aquatic species	5	6	4	4	3	4	6	8	6	5	6	6	5	5	6	7	7	6	7	5	6	7	3	1	7	7	3	4	4	3	6	6	4	5		Av. 5.2

DY1c **A4 *Hydrocharis morsus-ranae - Stratiotes aloides* community - Stonewort variant**

Sample numbers	31	35	36	37	38	42	43	87	88	89	99	101		
Floating														
Hydrocharis morsus-ranae	6	5	6	5	6	5	6	3	2	3	1	2	V	(1-6)
Lemna trisulca	5	7	7	8	8	3	8	9			1		IV	(1-9)
Potamogeton coloratus						2						3	I	(2-3)
Persicaria amphibia	1		2										I	(1-2)
Drepanocladus fluitans								4					I	(4)
Lemna minor	2												I	(2)
Submerged														
Chara vulgaris	6	2	3	2	1	5	1	1	10	10	10	9	V	(1-10)
Myriophyllum verticillatum		4	7										I	(4-7)
Ceratophyllum demersum	3							4					I	(3-4)
Utricularia vulgaris								5				2	I	(2-5)
Hottonia palustris	1											1	I	(1)
Potamogeton berchtoldii		4											I	(4)
Aquatic algae														
Spirogyra sp.	5	3		5	6		3						III	(3-6)
Cladophora sp.												4	I	(4)
Oscillatoria spp.							3						I	(3)
Marginal														
Berula erecta	4	2	2	4	5	6	3	7					IV	(2-7)
Juncus bulbosus/kochii			5										I	(5)
Mentha aquatica						3							I	(3)
Drepanocladus aduncus						3							I	(3)
Caltha palustris				2									I	(2)
Alisma plantago-aquatica										1			I	(1)
Swamp-fen														
Phragmites australis		3		3	3				3	3	3	4	III	(3-4)
Juncus subnodulosus				3	2	4		3	2	2			III	(2-4)
Carex pseudocyperus		2				2	2	1	1				III	(1-2)
Rumex hydrolapathum	1		1	2						1			II	(1-2)
Iris pseudacorus			2	1	3								II	(1-3)
Equisetum fluviatile			1			1				1			II	(1)
Typha latifolia								2		5			I	(2-5)
Sparganium erectum			1		2								I	(1-2)
Eleocharis palustris						3							I	(3)
Bolboschoenus maritimus												3	I	(3)
Carex riparia												2	I	(2)
Carex diandra										1			I	(1)
Oenanthe lachenalii			1										I	(1)
Galium palustre								1					I	(1)
Shade (%)	0	0	0	0	0	0	0	0	0	0	0	0		
No. of aquatic species	8	6	5	4	4	4	5	6	2	2	3	6		Av. 4.6

DY1d **A4 *Hydrocharis morsus-ranae - Stratiotes aloides* community**

***Elodea canadensis* variant**

Sample number	40	50	53	76	77	125	127	130	136		
Floating											
Lemna trisulca	6	4	3	3	3		7	3	5	V	(3-7)
Hydrocharis morsus-ranae	8	4	6			10	6	6	2	IV	(2-10)
Lemna minor		5			3					II	(3-5)
Submerged											
Elodea canadensis	3	5	6	7	9	10	2	8	3	V	(2-10)
Utricularia vulgaris				3	2					II	(2-3)
Chara globularis									8	I	(8)
Ceratophyllum submersum									3	I	(3)
Ceratophyllum demersum			2							I	(2)
Callitriche obtusangula					2					I	(2)
Potamogeton pectinatus									2	I	(2)
Potamogeton berchtoldii					1					I	(1)
Aquatic algae											
Spirogyra sp.				7	10		8	10		III	(7-10)
Marginal											
Berula erecta	2	2	4	1	2	2	5	3	3	V	(1-5)
Agrostis stolonifera				2			2	1		II	(1-2)
Mentha aquatica				1	1			1		II	(1)
Rorippa nasturtium-aquaticum				2	5					II	(2-5)
Alisma plantago-aquatica				1				1		II	(1)
Veronica beccabunga				2						I	(2)
Swamp-fen											
Phragmites australis	8	1	3			6	4	2	1	IV	(1-8)
Sparganium erectum				3		2	1	2		III	(1-3)
Rumex hydrolapathum	1					1		2		II	(1-2)
Carex riparia	4	1								II	(1-4)
Carex pseudocyperus	3				1					II	(1-3)
Typha latifolia				4						I	(4)
Carex nigra								3		I	(3)
Equisetum fluviatile								2		I	(2)
Iris pseudacorus		2								I	(2)
Eleocharis palustris								2		I	(2)
Juncus effusus									1	I	(1)
Equisetum palustre						1				I	(1)
Shade (%)	0	20	20	0	20	0	0	0	5		
No. of aquatic species	3	4	4	4	7	2	4	4	6	Av. 4.2	

DY2 **A2 *Lemna minor* community, *Lemna trisulca* sub-community - over**

A6 *Ceratophyllum submersum*community

[Including samples tabulated in 2007 report]

	2007 samples						2008 samples												
Sample number	225	226	227	228	229	230	16	20	33	49	58	66	67	68	69	70	74		
Floating																			
Lemna minor	10	8		3	3		4	5	8	8	10	6	4		8	5	10	V	(3-10)
Lemna trisulca	3	4		3	2	4	4		5			4	2		4	2		IV	(2-5)
Hydrocharis morsus-ranae	2	2							2	3					3	5		II	(205)
Spirodela polyrhiza	4														3			I	(3-4)
Submerged																			
Ceratophyllum submersum	6	10	8	10	10	10	7	9	8	8	7	5	10	9	8	6	6	V	(5-10)
Chara vulgaris			3											2				I	(2-3)
Potamogeton berchtoldii																	5	I	(5)
Ceratophyllum demersum							3											I	(3)
Elodea canadensis																	3	I	(3)
Aquatic algae																			
Spirogyra sp.		8	8	9	7	4							4	6		1		III	(1-9)
Marginal																			
Berula erecta	4	2	1	2	1	1	4		4			1		2	3		2	IV	(1-4)
Mentha aquatica			2			2		2	3					1				II	(1-3)
Agrostis stolonifera	2			1	1							1			1			II	(1-2)
Swamp-fen																			
Phragmites australis			3				4	3			4		2	3		5	4	III	(2-5)
Juncus subnodulosus					2	1	3					2						II	(1-3)
Iris pseudacorus							2		4	2								I	(2-4)
Galium palustre												1	1					I	(1)
Rumex hydrolapathum												1	1					I	(1)
Carex pseudocyperus							1									1		I	(1)
Equisetum fluviatile									4									I	(4)
Sparganium erectum								1										I	(1)
Shade (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
No. of aquatic species	5	5	3	4	4	3	4	2	4	3	2	3	4	3	5	5	4		Av. 3.7

DY3 and DY4 **A2 *Lemna minor* community, Typical sub-community (or Riccia fluitans-Ricciocarpus sub-community) over A16 *Callitriche stagnalis* community, *Callitriche* spp. sub-community often accompanied by S23 Other water margin vegetation**

Sample number	1	2	6	8	10	12	13	19	34	65	73			3	4	
Floating																
Lemna minor	7	5	6	5	5	9	5	9	7	6	10	V	(5-10)	3	4	2
Lemna trisulca											1	I	(1)	3	2	2
Riccia fluitans														4	9	2
Submerged																
Callitriche stagnalis	5	4	6	4	2	2	4	6	6	7	9	V	(2-9)	4	1	2
Elodea canadensis								7	4	1	4	II	(1-7)			
Callitriche obtusangula					6		3					I	(3-6)			
Ceratophyllum demersum									4		3	I	(3-4)			
Potamogeton berchtoldii											1	I	(1)			
Callitriche platycarpa										2		I	(2)			
Aquatic algae																
Spirogyra sp.	4	4			3		6					II	(3-6)	3	2	2
Microspora spp.				4			3					I	(3-4)			
Cladophora sp.	4											I	(4)		4	1
Marginal																
Berula erecta			3		3	1	4	2		2		III	(1-4)	8	1	2
Rorippa nasturtium-aquaticum	4	2	3		2					7		III	(2-7)			
Catabrosa aquatica										2	3	I	(2-3)			
Myosotis scorpioides								2		1		I	(1-2)			
Agrostis stolonifera											2	I	(2)			
Drepanocladus aduncus						1						I	(1)			
Veronica beccabunga		2										I	(2)	3		1
Mentha aquatica														3	1	2
Swamp-fen																
Phragmites australis			3				2	4		2	3	III	(2-4)			
Iris pseudacorus							3		2			I	(2-3)			
Sparganium erectum					5							I	(5)		2	1
Equisetum fluviatile						2						I	(2)	5	1	2

Juncus effusus									2			I	(2)	4	4	2
Carex pseudocyperus										1		I	(1)			
Juncus articulatus														4	3	2
Juncus subnodulosus														4		1
Shade (%)	0	0	0	0	10	20	40	30	50	20	20			0	0	
No. of aquatic species	4	3	2	3	4	2	5	3	4	4	6		Av. 3.6	5	6	Av. 5.5

DY5 **A2 *Lemna minor* community - Typical sub-community, over**

S23 Other water margin vegetation

Sample number	5	9	11	14	23	27	44	45	48	85		
Floating												
Lemna minor	4	3	6	6	3	7	8	5	7	5	V	(3-8)
Lemna trisulca	1										I	(1)
Submerged												
Callitriche stagnalis			4	4	3						II	(3-4)
Elodea canadensis				1							I	(1)
Aquatic algae												
Spirogyra sp.				3							I	(3)
Microspora sp.				4							I	(4)
Marginal												
Berula erecta	9	10	6	4	8	8			4	1	IV	(1-10)
Rorippa nasturtium-aquaticum				5	7			10	8	9	III	(5-10)
Mentha aquatica	1	2	3	3			2				III	(1-3)
Veronica beccabunga	4	3	4	4							II	(3-4)
Agrostis stolonifera							6			2	I	(2-6)
Swamp-fen												
Iris pseudacorus		2		3			6	3	2		III	(2-6)
Glyceria maxima						5		3	4		II	(3-5)
Sparganium erectum			3				3				I	(3)
Phragmites australis			7							2	I	(2-7)
Juncus effusus	3	2									I	(2-3)
Equisetum fluviatile		2									I	(2)
Juncus subnodulosus										2	I	(2)
Galium palustre										1	I	(1)
Typha latifolia				2							I	(2)
Carex diandra										1	I	(1)
Rumex hydrolapathum							2				I	(2)
Shade (%)	10	0	40	20	50	70	20	40	30	50		
No. of aquatic species	2	1	2	5	2	1	1	1	1	1		Av. 1.7

DY6 **A2 Lemna minor community, Typical sub-community with**

S4 Phragmites australis community, Phragmites australis sub-community

[Also atypical samples, including S12 Potamogeton pectinatus community]

Sample number	55	56	57	79			126	129	
Floating									
Lemna minor	10	10	10	7	4	(7-10)			
Hydrocharis morsus-ranae				1	1	(1)			
Lemna trisulca				1	1	(1)			
Submerged									
Potamogeton pectinatus								8	1
Aquatic algae									
Marginal									
Berula erecta		2			1	(2)			
Agrostis stolonifera				1	1	(1)		1	1
Rorippa nasturtium-aquaticum								2	1
Mentha aquatica								1	1
Swamp-fen									
Phragmites australis	4	5	5	6	4	(4-6)	10	7	2
Rumex hydrolapathum				1	1	(1)			
Equisetum fluviatile							3		1
Carex riparia							1		1
Sparganium erectum								1	1
Shade (%)	60	50	60	20			0	0	
No. of aquatic species	1	1	1	3		Av. 1.8	0	1	

DY7 **A2 *Lemna minor* community, Typical sub-community**

[Including samples tabulated in 2007 report]

	2007 samples					2008 samples																		
Sample number	272	274	283	284	285	7	15	17	18	22	51	59	60	61	64	80	81	91	107	115	121	123	124		
Floating																									
Lemna minor	9	8	10	10	10	10	5	4	6	10	8	5	7	7	9	10	10	5	7	10	3	10	10	V	(3-10)
Hydrocharis morsus-ranae																				1	1			I	(1)
Lemna trisulca									3			2								3				I	(2-3)
Spirodela polyrhiza															4									I	(4)
Azolla filiculoides	5	8																						I	(5-8)
Submerged																									
Elodea canadensis																	1							I	(1)
Potamogeton berchtoldii			2							4									2					I	(2-4)
Myriophyllum aquaticum																			8					I	(8)
Potamogeton pectinatus					1																			I	(1)
Callitriche platycarpa					2																			I	(2)
Zannichellia palustris					1																			I	(1)
Aquatic algae																									
Spirogyra sp.							7																	I	(7)
Oscillatoria spp.									7															I	(7)
Marginal																									
Berula erecta							4		3					2										I	(2-4)
Agrostis stolonifera															1									I	(1)
Mentha aquatica																							1	I	(1)
Rorippa nasturtium-aquaticum	3			2																				I	(2-3)
Myosotis scorpioides																							1	I	(1)
Drepanocladus aduncus								2																I	(2)
Juncus kochii										7														I	(7)
Swamp-fen																									
Phragmites australis	3	2					5					3				4	3	3			1			II	(1-5)
Iris pseudacorus						2			2			2			1			1				2		II	(1-2)
Equisetum fluviatile																1				1	2			I	(1-2)

Sparganium erectum											4					4		4	1				I	(1-4)
Carex pseudocyperus									2								2						I	(2)
Glyceria maxima											8												I	(8)
Carex nigra																	1						I	(1)
Glyceria fluitans				1																			I	(1)
Shade (%)	0	80	60	0	60	50	60	20	70	40	80	70	90	90	70	70	60	80	60	50	70	90	70		
No. of aquatic species	2	2	2	1	4	1	2	1	3	2	1	2	1	1	2	1	2	1	3	3	2	1	1		Av. 1.8

FM1a **M22b *Juncus subnodulosus-Cirsium palustre* fen-meadow,**

***Briza media-Trifolium* spp. sub-community**

Sample number	43	44	59	60	61	105	107	121	122	123	124	125	126		
Juncus subnodulosus	5	4	1	5	2	10	10	2	10	10	7	10	9	V	(1-10)
Plantago lanceolata	3	3	3	3	2	2	1	3	3	3	2	3	3	V	(1-3)
Carex nigra	6	5	3		6	4	5	5	4	2	8	4	7	V	(2-8)
Festuca rubra	5	5	4	3	2	5		4	5	4	4	6	5	V	(2-6)
Juncus articulatus		3	9	4	5	2	3	7	2	3	3	1	2	V	(1-9)
Holcus lanatus	1	1	2	2	2		1	2	2	3	3	3	2	V	(1-3)
Ranunculus acris		1	2	3	3	2	3	2	3	1	1	2	1	V	(1-3)
Anthoxanthum odoratum	2	1	1	2	1	1	1	3	2		2	1	2	V	(1-3)
Calliergonella cuspidatum	5	1	5	9	9	9	10	10	7		7		6	V	(1-10)
Carex panicea	3	2	1	3	3	4	3	2			2	2	3	V	(1-4)
Agrostis stolonifera	2	5		3	2	5	3	1		3	3		4	IV	(1-5)
Trifolium pratense	1	2		1	1	2	2	3	2		2		3	IV	(1-3)
Anagallis tenella	4	1		6	5	2	3	1	1				3	IV	(1-6)
Briza media				3	1	3	2	1	3		2	3	2	IV	(1-3)
Cynosurus cristatus	3	1	1	1	1	2		2			3		1	IV	(1-3)
Carex disticha	5		6		3		5	6	5	4			3	IV	(1-6)
Valeriana dioica						3	3	2	3	2	3	4	1	IV	(1-4)
Phragmites australis	1	2		1				1	3	3	2	3		IV	(1-3)
Ranunculus repens	2	2				1	2			2	1	2	1	IV	(1-2)
Dactylorhiza fuchsii	1	1	1	1	1		1		2				1	IV	(1-2)
Lotus pedunculatus	1	2	1		1			1	1		4			III	(1-4)
Cardamine pratensis	2	2	3	2	1	2		2						III	(1-3)
Taraxacum officinale agg				2		1	1	2	3			2	2	III	(1-3)
Galium uliginosum	1	1		1		1		2			1		1	III	(1-2)
Succisa pratensis			2	4	2	2			3			1		III	(1-4)
Trifolium repens	2	3		1				2			1		2	III	(1-3)
Festuca arundinacea									2	1	3	3	1	II	(1-3)
Lychnis flos-cuculi	1	3		2	1			3						II	(1-3)
Cirsium palustre	1	1	2							1		1		II	(1-2)

Ranunculus flammula			1			1	1			2		1		II	(1-2)
Carex flacca	5	7		4	5									II	(4-7)
Brachythecium rutabulum	4	2	2			4								II	(2-4)
Juncus inflexus			4	2	4			2						II	(2-4)
Mentha aquatica					2		4			4		2		II	(2-4)
Festuca pratensis						2			1	1			2	II	(1-2)
Cerastium fontanum	1			1				1			1			II	(1)
Equisetum fluviatile					1		3			1				II	(1-3)
Rhinanthus minor				1		3	1							II	(1-3)
Hydrocotyle vulgaris					5	4								I	(4-5)
Cratoneuron filicinum	4	4												I	(4)
Eleocharis uniglumis				2			2							I	(2)
Galium palustre						2				2				I	(2)
Rumex acetosa	2	2												I	(2)
Rhytidiadelphus squarrosus			1	4										I	(1-4)
Isolepis setacea					1			3						I	(1-3)
Potentilla anserina				1				2						I	(1-2)
Eriophorum angustifolium					1	1								I	(1)
Juncus effusus	1		1											I	(1)
Quercus robur seedling			1					1						I	(1)
Vicia cracca	1								1					I	(1)
Menyanthes trifoliata					5									I	(5)
Carex pulicaris						1								I	(1)
Dactylorhiza praetermissa					1									I	(1)
Hypericum tetrapterum							1							I	(1)
Ophioglossum vulgatum		1												I	(1)
Poa pratensis		1												I	(1)
Potentilla erecta				1										I	(1)
Prunella vulgaris							1							I	(1)
Sward height (cm)	10	7	65	8	6	60	60	45	55	70	60	60	55		
Plant cover (%)	90	95	100	100	90	100	100	100	100	100	100	100	100		
Bryophyte cover (%)	20	10	20	95	90	90	90	100	40	0	40	0	30		
Litter cover (%)	45	20	20	10	5	10	5	5	30	70	30	70	40		

Bare ground (%)	10	45	30	5	5	0	0	0	0	0	0	0	0	
Water depth (cm)	0	0	0	0	0	0	0	0	0	0	0	0	0	
No. of species	29	29	23	30	30	28	25	29	22	19	22	19	24	Av. 25.3

FM1b **M22b *Juncus subnodulosus-Corsium palustre* fen meadow**

***Briza media-Trifolium* spp. sub-community**

Sample number	93	98	99	100	101	102	103	104	108	135		
Calliergonella cuspidatum	4	9	8	6	6	6	8	9	10	5	V	(4-10)
Agrostis stolonifera	4	7	5	6	8	5	3	3	2	10	V	(2-10)
Juncus articulatus	8	7	6	3	2	5	3	4	3	7	V	(2-8)
Carex disticha	6	5	5	7	4	3	2	2	4	3	V	(2-7)
Cardamine pratensis	3	4	2	3	3	3	3	2	1	4	V	(1-4)
Plantago lanceolata	3	1	2	2	2	2	3	3	2	1	V	(1-3)
Carex nigra	3	3	7	5	7	6	8	8	8		V	(3-8)
Festuca rubra	6	4		3	4	4	2	3	5	3	V	(2-6)
Ranunculus acris	2	3		2	2	3	3	2	2	2	V	(2-3)
Carex panicea	1	7	5	7	5	6	5	6	6		V	(1-7)
Trifolium repens	1		2	3	3	3	2	2	1	6	V	(1-6)
Cynosurus cristatus		3	2	3	1	3	2	2	1	3	V	(1-3)
Trifolium pratense	4		3	2	3	3	2	1		3	IV	(1-4)
Taraxacum officinale agg	3		1	3	2	3	3		1		IV	(1-3)
Rhytidiadelphus squarrosus	2		5	3		4	3		2		III	(2-5)
Lotus pedunculatus	2		5	1	2			1		3	III	(1-5)
Ranunculus repens	5	2			1	2				2	III	(1-5)
Holcus lanatus		3	2			1	1			3	III	(1-3)
Succisa pratensis				1	2		2	2	1		III	(1-2)
Dactylorhiza fuchsii				1		1	1	1	1		III	(1)
Ranunculus flammula		1	1		1		1	1			III	(1)
Rumex acetosa	2	3	2			2					II	(2-3)
Brachythecium rutabulum	2				2	3				1	II	(1-3)
Prunella vulgaris					1	2	3	2			II	(1-3)
Briza media				2	1		1	3			II	(1-3)
Juncus inflexus		2		3	1			1			II	(1-3)
Potentilla erecta				1			2	1	3		II	(1-3)
Anagallis tenella							3	3	3		II	(3)
Potentilla anserina	4		3			2					II	(2-4)
Cratoneuron filicinum	3	2			3						II	(2-3)
Danthonia decumbens							1	1	3		II	(1-3)
Festuca arundinacea		2		1						2	II	(1-2)
Anthoxanthum odoratum				1			1		1		II	(1)
Carex echinata								3	3		I	(3)
Valeriana dioica								2	4		I	(2-4)
Agrostis canina			3	2							I	(2-3)
Carex hirta		3					1				I	(1-3)
Carex pulicaris								2	1		I	(1-2)
Galium uliginosum	2				1						I	(1-2)
Cerastium fontanum	1	1									I	(1)
Cirsium dissectum			1		1						I	(1)
Juncus effusus	1						1				I	(1)
Triglochin palustris				1	1						I	(1)
Isolepis setacea		3									I	(3)
Phragmites australis									3		I	(3)
Carex viridula brachyrrhyncha									2		I	(2)
Eleocharis uniglumis				2							I	(2)
Eriophorum angustifolium								2			I	(2)
Festuca pratensis				2							I	(2)
Bellis perennis								1			I	(1)

Equisetum fluviatile	1										I	(1)
Glyceria fluitans										1	I	(1)
Mentha aquatica								1			I	(1)
Pedicularis palustris									1		I	(1)
Quercus robur seedling									1		I	(1)
Vicia cracca							1				I	(1)
Sward height (cm)	14	9	13	8	7	14	12	14	15	8		
Plant cover (%)	100	90	95	95	95	90	100	95	100	100		
Bryophyte cover (%)	6	85	90	30	30	35	70	85	90	20		
Litter cover (%)	60	0	0	5	5	10	5	5	5	30		
Bare ground (%)	10	10	5	40	40	35	5	0	0	20		
Water depth (cm)	0	0	0	0	0	0	0	0	0	0		
No. of species	24	21	20	27	26	22	28	29	27	17	Av. 24.1	

FM1c **M22b *Juncus subnodulosus-Cirsium palustre* Fen Meadow**

***Briza media-Trifolium* spp. Sub-Community - *Persicaria amphibia* Variant**

Sample number	12	13	14	15	17	18	19	20	21	22	23	24	25	26	27	28	29	31	32	33	34	37		
Juncus subnodulosus	8	7	5	3	7	6	6	7	8	10	9	4	6	5	5	10	10	8	8	6	6	4	V	(3-10)
Holcus lanatus	4	4	4	6	3	5	3	4	4	4	5	4	5	8	6	5	4	3	4	6	6	5	V	(3-8)
Plantago lanceolata	1	1	2	3	2	4	4	3	3	3	4	4	1	3	3	3	1	3	3	3	2	4	V	(1-4)
Lotus pedunculatus	4	5	5	3	3	4	3		3	5	4	3	4	4	3	2	4	3	2	3	3	3	V	(2-5)
Ranunculus repens	3	3	4	5	3	3	5	5	3	3	3	3	4	3	3	2	2	3		2	4	4	V	(2-5)
Trifolium pratense	2		1	4	2	2	2	2	3	2	4	2	2	4	3	3	4	2	2	2	1	3	V	(1-4)
Anthoxanthum odoratum	3	3	3	4	2	3	3	2	3	1	2	4		1	2	2		2	3	3	3	3	V	(1-4)
Persicaria amphiibia	2	2	1	1	3			2	4	4	4	4	4	3	3	3	4	3	2	3	2		V	(1-4)
Cardamine pratensis	2	3	3	2	3	5	4	3	2	2			2	3		1	2	2	3	2		3	V	(1-5)
Carex disticha		3	3	2				2	5	5	5	6		5	5	4	5	6	6	7	4	6	IV	(2-7)
Brachythecium rutabulum	2	2		2	3	1		1		5	4	2	2	3	2	2	2			4	2	3	IV	(1-5)
Festuca rubra		5			2	2	2	3	2	7	7	8			4	6	2	3	3		7	6	IV	(2-8)
Poa trivialis	3	4	2	4	3	3	2	3	3	4	3	4		5		3	2	2					IV	(2-5)
Festuca pratensis	3	2		1				1	1	2	3	2	3	3	2	2		1	2		1	2	IV	(1-3)
Juncus articulatus	7	8	9	7	8	7	8	6	5			8		3	5		2	5				4	IV	(2-9)
Rumex acetosa				2		2	1		2		3	4	3	3	2	2	2		2	3	3	3	IV	(1-4)
Potentilla anserina	2	4	3	3	3	3	1	1	2	1				1	1	2		3	1				IV	(1-4)
Equisetum palustre				1	1				2	2	3	3	2	1	1	1	1	3	3	1		2	IV	(1-3)
Cerastium fontanum	1	1		1	1	2	1			2	3	1				1		1	2	1	1	1	IV	(1-3)
Calliergonella cuspidatum	5			1	4	6	8	2	5	1							2	8	10	4		2	III	(1-10)
Carex nigra	4	2	2		1		3		3	3	2						1	4	6			4	III	(1-6)
Taraxacum officinale agg		1	2	2	3		2	1		2	3	3	1					1			1		III	(1-3)
Cynosurus cristatus	2	1	1	2	1	2	2	1	3			2						1				3	III	(1-3)
Ranunculus acris					1	1	2			1	2					2	2	2	1	2	3	2	III	(1-3)

Agrostis stolonifera			3		3			6		3	2		6	5	6	2	5					6	III	(2-6)
Dactylorhiza fuchsii		1	1	1						1	2	2				1	1		2		1	1	III	(1-2)
Trifolium repens	3			2	3		2	2			2							1	3			2	III	(1-3)
Vicia cracca						1				1	3			1		1	2	1	2			2	III	(1-3)
Carex hirta			1	2	3				2			1	3	3	3								II	(1-3)
Stellaria graminea		1	1			1						1	1		1					1	2		II	(1-2)
Lathyrus pratensis										3			2		1	3				1	3	2	II	(1-3)
Galium uliginosum							1			1						1		1	2	2		2	II	(1-2)
Ranunculus flammula	1		1				2			1						1	1	1					II	(1-2)
Festuca arundinacea												1		2	2	1	2		1				II	(1-2)
Lychnis flos-cuculi						1	2											1	2	1		2	II	(1-2)
Carex panicea						4	5	3								1		5					II	(1-5)
Eleocharis palustris	2		3	4								2					1						II	(1-4)
Juncus inflexus				1									4	2			1	2					II	(1-4)
Carex acutiformis												3		2	3			4					I	(2-4)
Equisetum fluviatile																	3	1	2	3			I	(1-3)
Poa pratensis					1				1			1	1										I	(1)
Arrhenatherum elatius																2	2				2		I	(2)
Galium palustre																	1	2	1				I	(1-2)
Rumex conglomeratus												1			1		1						I	(1)
Rhytidiadelphus squarrosus	4					4																	I	(4)
Phragmites australis																2					5		I	(2-5)
Eleocharis uniglumis					3			1															I	(1-3)
Cirsium palustre																		1		2			I	(1-2)
Phleum bertolonii						1			1														I	(1)
Potentilla erecta																			1	1			I	(1)
Valeriana dioica																		6					I	(6)

Juncus effusus																				4			I	(4)
Mentha aquatica																	3						I	(3)
Glyceria declinata													2										I	(2)
Hypericum tetrapterum																				2			I	(2)
Iris pseudacorus		2																					I	(2)
Vicia hirsuta				2																			I	(2)
Scleropodium purum						1																	I	(1)
Angelica sylvestris																1							I	(1)
Bryum sp.								1															I	(1)
Centaurea nigra																				1			I	(1)
Dactylorhiza praetermissa																		1					I	(1)
Fraxinus excelsior seedling		1																					I	(1)
Luzula multiflora																			1				I	(1)
Glyceria fluitans																	1						I	(1)
Lolium perenne								1															I	(1)
Prunella vulgaris																			1				I	(1)
Quercus robur seedling										1													I	(1)
Succisa pratensis																						1	I	(1)
Sward height (cm)	55	55	45	40	35	30	35	20	30	75	70	40	20	12	12	75	75	55	45	40	55	35		
Plant cover (%)	100	100	100	100	100	95	95	95	100	100	100	100	85	95	90	100	100	100	100	90	95	95		
Bryophyte cover (%)	15	2	0	2	5	20	70	2	20	25	5	2	2	3	3	2	3	60	95	10	2	3		
Litter cover (%)	40	30	50	40	15	10	10	15	20	60	55	40	20	30	50	20	20	10	10	70	75	65		
Bare ground (%)	10	40	20	30	55	40	30	55	40	0	10	30	65	40	30	50	50	40	5	5	0	10		
Water depth (cm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
No. of species	22	23	22	27	26	25	24	24	23	28	23	27	20	23	23	30	31	35	29	26	21	28	Av. 25.4	

FM1d **M22b *Juncus subnodulosus-Cirsium palustre* fen meadow**

***Briza media-Trifolium* spp. sub-community - *Menyanthes trifoliata* variant**

	47	48	49	52		
Menyanthes trifoliata	9	8	9	6	4	(6-9)
Juncus articulatus	5	9	7	8	4	(5-9)
Carex disticha	9	5	6	6	4	(5-9)
Calliergonella cuspidatum	4	5	9	5	4	(4-9)
Festuca rubra	4	4	5	6	4	(4-6)
Agrostis stolonifera	4	2	6	3	4	(2-6)
Galium palustre	6	2	2	2	4	(2-6)
Carex nigra	2	4	5	3	4	(2-5)
Equisetum fluviatile	5	3	3	2	4	(2-5)
Holcus lanatus	2	2	2	3	4	(2-3)
Carex panicea	2	3	3	1	4	(1-3)
Rhinanthus minor	3	3	2		3	(2-3)
Lotus pedunculatus	3	2		2	3	(2-3)
Poa trivialis	3		2	2	3	(2-3)
Anthoxanthum odoratum		2	2	2	3	(2)
Plantago lanceolata		1	1	3	3	(1-3)
Carex flacca		1	2	2	3	(1-2)
Trifolium pratense		1	2	2	3	(1-2)
Lychnis flos-cuculi	1		2	1	3	(1-2)
Cerastium fontanum		1	1	1	3	(1)
Iris pseudacorus	1	1	1		3	(1)
Vicia cracca		1	1	1	3	(1)
Juncus subnodulosus		2		4	2	(2-4)
Briza media			2	2	2	(2)
Lathyrus pratensis		2	2		2	(2)
Rhytidiadelphus squarrosus			2	1	2	(1-2)
Trifolium repens			1	2	2	(1-2)
Cardamine pratensis			1	2	2	(1-2)
Dactylorhiza praetermissa			1	2	2	(1-2)
Ranunculus acris			1	2	2	(1-2)
Dactylorhiza fuchsii		1		1	2	(1)
Festuca arundinacea	1			1	2	(1)
Rumex acetosa			1	1	2	(1)
Climacium dendroides			3		1	(3)
Glyceria fluitans	3				1	(3)
Succisa pratensis				3	1	(3)
Cynosurus cristatus			2		1	(2)
Festuca pratensis			2		1	(2)
Ranunculus flammula	2				1	(2)
Ranunculus repens				2	1	(2)
Taraxacum officinale agg				2	1	(2)
Valeriana dioica				2	1	(2)
Amblystegium riparium	1				1	(1)
Cratoneuron filicinum				1	1	(1)
Equisetum palustre		1			1	(1)
Sward height (cm)	35	30	40	40		
Plant cover (%)	100	95	95	100		
Bryophyte cover (%)	5	80	15	15		
Litter cover (%)	20	25	25	40		
Bare ground (%)	50	20	40	30		

Water depth (cm)	0	0	2	0	
No. of species	20	32	35	24	Av. 27.8

FM2 **M22b *Juncus subnodulosus-Cirsium palustre* fen-meadow, *Briza media-Trifolium* spp. sub-community with reference to MG8 *Cynosurus cristatus-Caltha palustris* grassland**

	50	51	54	55	56	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	91	92	95	96	97	##	##	##	##	##	##	##		
Agrostis stolonifera	5	3	2	3	3	2	6	5	3	2	2	3	7		6	4	3	3	4	3	4	5	5	6	7	4	8	8	5	5	5	3	2	V	(2-8)
Juncus articulatus	9	7	9	9	10	10	10	7	10	9	10	10	2		5	2	10	10	5	10	10	9	9	7	10	10	4	7		6	7	7	4	V	(2-10)
Lotus pedunculatus		1	4	5	4	6	5	2	7	4	2	6	1	2	1		6	4	5	4	3	4	5	4	2	3	8	10	2	1	5	4	4	V	(1-10)
Holcus lanatus	6	4	4	5	4	4	7	4	3	4	2	3		4	2	8	3	3		3	5	4	6	5	4	3	4	4	8	2	1	2	1	V	(1-8)
Juncus effusus	4	6	6	5	4				1		1			9	8	8	1	1	2		1		2	4			6	4	5	2	2	4	4	IV	(1-9)
Festuca rubra		3				4	3	8	6	6		7	2	3		3	5	4			5			5	4	4	6	3		2		5	2	IV	(2-8)
Anthoxanthum odoratum	2	2	2	3	2	3	3	2	2	2	3	3	2				1	4		2				1	3	3					1	1		IV	(1-4)
Plantago lanceolata	2	1				2	3	3	2	4	3	3	4			1	2	3	2	3	2			1			1				1	2	2	IV	(1-4)
Ranunculus repens	3	2		1	2	1	2	2	2		1					2						2	2	4	3	2	1		3	2	1	2	2	IV	(1-4)
Carex disticha	2	3	5		4		4	7		7		2	3				4	3	4			5		6	3	5					10	9	10	10	IV	(2-10)
Trifolium pratense		2	1		1	1		4		1			4				3		1	4	1	1		2	1							2	1	III	(1-4)
Rumex acetosa	2	1	2		1		3				1					3		3		3	3	3		3	3		3				2	2		III	(1-3)
Brachythecium rutabulum						4	3	2		3		3		4	2			1			2	4		2		2		1			3		2	III	(1-4)
Cardamine pratensis	2	1			1		2		1	1			2					1	1		1	3		3	3			1			2			III	(1-3)
Ranunculus acris	1	2		1	2					2			2								1	3		3	3		1			1		1	1	III	(1-3)
Festuca pratensis							2	2	2	2	1	2								2	2	3		3		1				1	1			II	(1-3)
Taraxacum officinale agg		1					2	3	1	3		2	1				3	1			1						1					2	1	II	(1-3)
Trifolium repens	2	3				3		1		2			6						5			4		3	2									II	(106)
Potentilla anserina					2													2					5		3	3				5	4	4	3	II	(2-5)
Carex nigra						2		1			1		8				6		8												2	1		II	(1-8)
Equisetum fluviatile					3	1	3																				1			3	3	1	2	II	(1-3)
Rumex conglomeratus	1	1	1								1				2	3		1					1											II	(1-3)
Cynosurus cristatus	2	1			1	2		1		2							2			1														II	(1-2)
Calliergonella cuspidatum										4		2	10	4			8		10	4														II	(2-10)
Lathyrus pratensis									1	2	1	3					3			2	2													II	(1-3)
Ranunculus flammula					1	2									1		1						1		2									I	(1-2)
Vicia cracca											1	2					1	1		1					1									I	(1-2)
Cerastium fontanum	1												1			1													1		1	1		I	(1)
Festuca arundinacea			2		2														1							3	2							I	(1-3)
Iris pseudacorus	4		1											1	1	1																		I	(1-4)
Lolium perenne						1			4													3			2									I	(1-4)
Carex hirta																						2	2		2	2								I	(2)
Cirsium palustre													1			2								1	1									I	(1-2)
Eriophorum angustifolium															5		4		3															I	(3-5)
Eurhynchium praelongum								5						2	4																			I	(2-5)
Galium uliginosum													2						2		2													I	(2)
Persicaria amphibia																											4		8	1				I	(1-8)
Galium palustre															2				1														2	I	(1-2)
Glyceria fluitans	5	4																																I	(4-5)
Alopecurus geniculatus	2	1																																I	(1-2)
Epilobium parviflorum																														2			1	I	(1-2)
Carex riparia														4																				I	(4)
Equisetum palustre			3																															I	(3)
Mentha aquatica																																	3	I	(3)
Phalaris arundinacea																													3					I	(3)

Bryum sp.																														2				I	(2)
Dactylorhiza fuchsii																																	2	I	(2)
Festulolium loliaceum																														2				I	(2)
Juncus bufonius																														2				I	(2)
Poa trivialis		2																																I	(2)
Stellaria palustris																														2				I	(2)
Alopecurus pratensis				1																														I	(1)
Betula pubescens seedling															1																			I	(1)
Calystegia sepium			1																															I	(1)
Carex ovalis										1																								I	(1)
Carex panicea																																1		I	(1)
Deschampsia cespitosa				1																														I	(1)
Epilobium palustre																		1																I	(1)
Juncus inflexus																										1								I	(1)
Juncus subnodulosus		1																																I	(1)
Phragmites australis																1																		I	(1)
Quercus robur seedling												1																						I	(1)
Urtica dioica																													1					I	(1)
Sward height (cm)	35	50	##	90	75	45	40	15	50	40	65	60	3	95	85	80	55	60	7	55	50	10	11	12	24	28	##	##	##	55	45	40	45		
Plant cover (%)	95	90	##	##	##	##	##	##	##	##	##	##	80	90	90	90	##	##	85	##	##	##	##	95	##	##	##	##	##	##	##	##	##		
Bryophyte cover (%)	0	0	0	0	0	5	3	20	0	6	0	4	90	10	5	0	60	1	90	5	2	5	0	2	0	2	0	1	0	1	3	0	2		
Litter cover (%)	55	30	70	70	70	10	15	15	15	20	40	40	5	70	55	20	5	20	5	40	20	40	70	50	60	50	70	50	60	10	10	20	50		
Bare ground (%)	20	50	0	0	0	55	50	35	55	45	30	30	0	0	20	60	5	50	0	30	50	25	0	25	10	20	0	20	10	60	60	50	20		
Water depth (cm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
No. of species	18	22	14	10	17	16	15	17	14	19	14	15	17	9	13	13	18	17	15	13	16	15	10	18	19	14	14	8	9	18	17	15	19	Av. 15.1	

FM3a **M22b *Juncus subnodulosus-Cirsium palustre* fen-meadow**

Briza media-Trifolium spp. sub-community, with reference to

MG12a *Festuca arundinacea* grassland, *Lolium perenne-Holcus lanatus* sub-community

	106	109	110	111	113	120	127	130	138		
Juncus subnodulosus	2	2	2	4	1	5	2	1	7	V	(1-7)
Carex disticha		9	6	7	4	4	9	2	3	V	(2-9)
Festuca arundinacea		3	2	2	2	2	3	2	3	V	(2-3)
Juncus inflexus	3	2	4	6	4	1	4		2	V	(1-6)
Agrostis stolonifera	9	5	4	5	8		3		8	IV	(3-9)
Lotus pedunculatus	7	3	3	4		8		2	5	IV	(2-8)
Festuca rubra	5	5	2			5	4	3	2	IV	(2-5)
Holcus lanatus	5	2		2	1	4	2		3	IV	(1-5)
Carex nigra		3	8	8	4	4		7		IV	(3-8)
Juncus articulatus		2	3	4		8	3	5		IV	(2-8)
Galium palustre		3	3	3		2	1		3	IV	(1-3)
Plantago lanceolata	2			1	2	3		2	1	IV	(1-3)
Calliergonella cuspidatum		9	10	10			4	9		III	(4-10)
Potentilla anserina			2			3	3	2	3	III	(2-3)
Trifolium pratense	6			1			3	1	1	III	(1-6)
Mentha aquatica			3	3				3	6	III	(3-6)
Brachythecium rutabulum	4				2	3	2			III	(2-4)
Carex panicea			3	2		1		5		III	(1-5)
Persicaria maculosa	2	1					5	3		III	(1-5)
Ranunculus acris	3			2			1	2		III	(1-3)
Ranunculus flammula		1	2	2				2		III	(1-2)
Trifolium repens			1	1			2	1		III	(1-2)
Cardamine pratensis			1				1	1	1	III	(1)
Equisetum fluviatile							3	3	3	II	(3)
Ranunculus repens	4					1			2	II	(1-4)
Lychnis flos-cuculi		1		1				1		II	(1)
Juncus gerardii		5	4							II	(4-5)
Hydrocotyle vulgaris		3			3					II	(3)
Phragmites australis	3				3					II	(3)
Anthoxanthum odoratum	2								2	II	(2)
Anagallis tenella			3	1						II	(1-3)
Juncus effusus							1		2	II	(1-2)
Vicia cracca	2						1			II	(1-2)
Festuca pratensis						1	1			II	(1)
Triglochin palustris			1					1		II	(1)
Rumex acetosa	4									I	(4)
Taraxacum officinale agg	3									I	(3)
Dactylorhiza fuchsii								2		I	(2)
Equisetum palustre						2				I	(2)
Poa trivialis							2			I	(2)
Cerastium fontanum							1			I	(1)
Epilobium parviflorum			1							I	(1)
Glyceria fluitans			1							I	(1)
Myosotis laxa caespitosa			1							I	(1)
Oenanthe lachenalii					1					I	(1)
Rumex conglomeratus									1	I	(1)
Rumex crispus							1			I	(1)
Vicia hirsuta	1									I	(1)
Sward height (cm)	70	60	55	65	75	60	75	30	70		
Plant cover (%)	100	100	90	100	100	100	100	85	100		
Bryophyte cover (%)	4	90	100	100	2	3	10	100	0		

Litter cover (%)	70	5	5	5	60	70	20	0	60	
Bare ground (%)	0	0	0	0	10	0	40	0	10	
Water depth (cm)	0	0	0	0	0	0	0	0	0	
No. of species	18	17	23	20	12	17	24	22	19	Av. 19.1

FM3b **M22b *Juncus subnodulosus-Cirsium palustre* fen meadow**

***Briza media-Trifolium* spp. sub-community, with reference to**

MG12a Festuca arundinacea grassland, Lolium perenne-Holcus lanatus sub-community

Sample number	112	114	115	116	128	129	131	133	134	136	137	139	140	141		
Agrostis stolonifera	8	8	7	8	2	2	3	5	8	9	9	8	7	8	V	(2-9)
Juncus articulatus	3	2	5	7	6	7	7	5	4	4	4	4	6	4	V	(2-7)
Juncus inflexus	6	5	6	3	4	4		9	9	5	4	2	4	4	V	(2-9)
Carex disticha		8	7	8	7	7	3	3	3	4	2	2	3	3	V	(2-8)
Potentilla anserina	2		3	2	3	4	2	2	3	3	2	6	3		V	(2-6)
Lotus pedunculatus	3	2	3	5	4	3	3			4	2	4	2	2	V	(2-5)
Calliergonella cuspidatum	2	6	4	7	9	4	9	4		4	7		4	1	V	(1-9)
Holcus lanatus		2	2	4	2	3	2	1	2		2	5	2	3	V	(1-5)
Festuca rubra		2		3	2	2	3		2	4	2		3	6	IV	(2-6)
Festuca arundinacea	3		2	3	3	2	1	3		2	1	3			IV	(1-3)
Carex nigra	5	4			7	4	8	2					7	5	III	(2-8)
Carex panicea		1		1	2		3			3	2		3	2	III	(1-5)
Trifolium repens						3	1		1	3	3		2	3	III	(1-3)
Plantago lanceolata	3	2	2	2						1		1	1		III	(1-3)
Ranunculus acris					1		1	1	1	2	3			2	III	(1-3)
Anthoxanthum odoratum	1			2				1	1		2	1	2		III	(1-2)
Equisetum fluviatile					1	1	4			2	2	3			III	(1-4)
Ranunculus repens		2		1				1			2	4		1	III	(1-4)
Ranunculus flammula		1		1			1	1			2		3		III	(1-3)
Trifolium pratense				2	2				2	2			1	2	III	(1-2)
Juncus effusus					2	4				1	4	5		5	II	(1-5)
Galium palustre		2		3			2	2					1		II	(1-3)
Brachythecium rutabulum			2			1				2			2	2	II	(1-2)
Cardamine pratensis				2						2			2	3	II	(2-3)
Mentha aquatica		2	2				4				1				II	(1-4)
Persicaria maculosa					2	2	4								II	(2-4)
Rumex acetosa									1			3		2	II	(1-3)
Cynosurus cristatus					1	2				2					II	(1-2)
Equisetum palustre					2	2						1			II	(1-2)
Isolepis setacea											1		2	2	II	(1-2)

Cerastium fontanum											2		1	1	II	(1-2)
Glyceria fluitans									1			1	2		II	(1-2)
Phragmites australis		1	1	2											II	(1-2)
Carex hirta									1	1				1	II	(1)
Vicia cracca	1		1	1											II	(1)
Hydrocotyle vulgaris	3	3													I	(3)
Alnus glutinosa sapling			4	1											I	(1-4)
Triglochin palustris							1			2					I	(1-2)
Taraxacum officinale agg	1													1	I	(1)
Eleocharis uniglumis											2				I	(2)
Epilobium parviflorum											2				I	(2)
Caltha palustris													1		I	(1)
Calystegia sepium	1														I	(1)
Cirsium palustre		1													I	(1)
Dactylorhiza fuchsii							1								I	(1)
Epilobium palustre													1		I	(1)
Juncus bufonius													1		I	(1)
Lychnis flos-cuculi		1													I	(1)
Plantago major											1				I	(1)
Rumex conglomeratus												1			I	(1)
Sward height (cm)	80	50	85	35	45	45	40	65	65	13	65	75	70	70		
Plant cover (%)	100	100	100	95	90	100	85	100	100	100	95	100	95	95		
Bryophyte cover (%)	2	30	5	55	80	10	100	5	0	5	40	0	5	2		
Litter cover (%)	60	20	50	0	10	40	0	20	30	20	10	30	10	15		
Bare ground (%)	10	20	20	20	0	20	0	45	40	45	20	40	55	60		
Water depth (cm)	0	0	0	4	0	0	0	0	0	0	0	0	0	0		
No. of species	14	19	15	21	19	18	20	14	14	21	24	17	25	22		Av. 18.8

FM3c **M22b *Juncus subnodulosus-Cirsium palustre* fen-meadow**

***Briza media-Trifolium* spp. sub-community, with reference to**

MG12a *Festuca arundinacea* grassland, *Lolium perenne-Holcus lanatus* sub-community

	57	58	117	118		
Equisetum fluviatile	10	10	8	8	4	(8-10)
Juncus articulatus	9	9	4	2	4	(2-9)
Agrostis stolonifera		5	8	8	3	(5-8)
Rumex conglomeratus	2	1	1		3	(1-2)
Ranunculus flammula	1		1	1	3	(1)
Drepanocladus cossonii			7	5	2	(5-7)
Holcus lanatus	4	4			2	(4)
Eleocharis uniglumis			4	4	2	(4)
Juncus effusus	4	4			2	(4)
Carex disticha		4	3		2	(3-4)
Oenanthe lachenalii			3	3	2	(3)
Ranunculus repens	3	3			2	(3)
Galium palustre			3	2	2	(2-3)
Persicaria maculosa			2	3	2	(2-3)
Calliergonella cuspidatum			5		1	(5)
Hippurus vulgaris				3	1	(3)
Carex otrubae	2				1	(2)
Epilobium palustre	2				1	(2)
Triglochin palustris			2		1	(2)
Epilobium parviflorum	1				1	(1)
Glyceria fluitans				1	1	(1)
Iris pseudacorus	1				1	(1)
Juncus inflexus			1		1	(1)
Mentha aquatica			1		1	(1)
Sward height (cm)	85	80	35	45		
Plant cover (%)	100	100	95	90		
Bryophyte cover (%)	0	0	45	20		
Litter cover (%)	65	70	5	60		
Bare ground (%)	5	0	25	0		
Water depth (cm)	0	0	4	2		
No. of species	11	8	15	11		Av. 11.3

FM4 **M22d Juncus subnodulosus-Cirsium palustre community, Iris pseudacorus sub-community with reference to**

MG12a Festuca arundinacea grassland, Lolium perenne-Holcus lanatus sub-community

	30	35	38	39	40	41	42	46	53	119		
Juncus subnodulosus	8	5	8	7	9	10	10	4	7	2	V	(2-10)
Lotus pedunculatus	3	8	4	3	6	5	3	2	4	3	V	(2-8)
Holcus lanatus	4	6	3	4	3	4	3	2	2	2	V	(2-6)
Iris pseudacorus	3	7	3		2	2	3	1	1		IV	(1-7)
Vicia cracca		2	2	1	2	3	1	3	2		IV	(1-3)
Carex disticha			7	6		7	4	6	6	5	IV	(4-7)
Festuca rubra			4	6	5	4	7	4	2		IV	(2-7)
Agrostis stolonifera		2	2	6	3		3	5		6	IV	(2-6)
Trifolium pratense	2		1	1	1	2	2	2			IV	(1-2)
Ranunculus repens	1		2	1	1	1	1		2		IV	(1-2)
Equisetum fluviatile		6	4			5	4	3		3	III	(3-6)
Juncus articulatus			8	2			1	7	4	5	III	(1-8)
Galium palustre			4	2	2	2		2		2	III	(2-4)
Poa trivialis	3			2	3	2	2		3		III	(2-3)
Carex nigra			1	2	4	3		2		5	III	(1-5)
Calliergonella cuspidatum			2	2	4	1		2		5	III	(1-5)
Festuca arundinacea				2	2	3	1		2	2	III	(1-3)
Plantago lanceolata			1	2	3	1	2		1		III	(1-3)
Brachythecium rutabulum			1	2	1	3	1	1			III	(1-3)
Anthoxanthum odoratum	2				1		1	3	2		III	(1-3)
Equisetum palustre	2			2	1	1		1			III	(1-2)
Ranunculus acris				1	2		1	2	1		III	(1-2)
Carex acutiformis	7			7				6	8		II	(6-8)
Mentha aquatica		3				2			2	5	II	(2-5)
Persicaria maculosa	3		3					1		2	II	(1-3)
Lathyrus pratensis		1			3		3	1			II	(1-3)
Potentilla anserina			2			1	3			2	II	(1-3)
Festuca pratensis			1		1		2	3			II	(1-3)
Rumex acetosa				1		1	3	1			II	(1-3)
Cerastium fontanum	1			2			2	1			II	(1-2)
Dactylorhiza praetermissa			1	1	2	1					II	(1-2)
Trifolium repens			1	1		1	1				II	(1)
Cynosurus cristatus				3	1			2			II	(1-3)
Phragmites australis							3		1	2	II	(1-3)
Cardamine pratensis					1	1		3			II	(1-3)
Rumex conglomeratus	1	3				1					II	(1-3)
Arrhenatherum elatius		4					3				I	(3-4)
Eleocharis palustris	3		3								I	(3)
Juncus effusus	1	4									I	(1-4)
Juncus inflexus							1			2	I	(1-2)
Ranunculus flammula								1		2	I	(1-2)
Carex panicea					1					1	I	(1)

Epilobium parviflorum			1			1					I	(1)
Galium uliginosum			1	1							I	(1)
Lychnis flos-cuculi						1				1	I	(1)
Lysimachia vulgaris					5						I	(5)
Caltha palustris			3								I	(3)
Eleocharis uniglumis										3	I	(3)
Juncus gerardii										3	I	(3)
Hydrocotyle vulgaris										2	I	(2)
Cirsium palustre						1					I	(1)
Cratoneuron filicinum								1			I	(1)
Dactylorhiza fuchsii				1							I	(1)
Oenanthe lachenalii										1	I	(1)
Poa pratensis								1			I	(1)
Rhinanthus minor				1							I	(1)
Taraxacum officinale agg					1						I	(1)
Sward height (cm)	110	120	75	70	75	70	65	90	110	60		
Plant cover (%)	100	95	100	100	100	100	100	90	100	100		
Bryophyte cover (%)	0	0	2	3	5	3	1	2	0	20		
Litter cover (%)	70	35	40	50	60	40	70	35	10	50		
Bare ground (%)	0	40	30	20	5	30	0	45	60	0		
Water depth (cm)	0	0	0	0	0	0	0	0	0	0		
No. of species	15	12	26	28	27	28	27	29	17	20	Av. 22.9	

FM5 **M22b *Juncus subnodulosus-Cirsium palustre* fen-meadow,**

Briza media-Trifolium spp. sub-community intermediate with

MG10a *Holcus lanatus-Juncus effusus* rush-pasture, Typical sub-community

	1	2	4	5	7	8	9	10	82	83	84		
Juncus articulatus	10	9	9	10	8	8	8	10	4	7	8	V	(4-10)
Poa trivialis	8	9	9	3	8	9	3	3	8	8	7	V	(3-9)
Holcus lanatus	5	6	4	3	6	4	3	6	6	4	5	V	(3-6)
Trifolium pratense	2	1	3	1	4	4		4	6	6	5	V	(1-6)
Lolium perenne	3	3	3	2	6	2		2	3	2	1	V	(1-6)
Cerastium fontanum	1	2	1	1	2	1		1	2	2	1	V	(1-2)
Potentilla anserina	6	5	5	4		2	1	4		4	5	V	(1-6)
Ranunculus repens	3	2	3	3	3	5	1	4			1	V	(1-4)
Agrostis stolonifera	3	3	2		3	2			7	5	6	IV	(2-7)
Lotus pedunculatus	1	4	3			3		3		5	6	IV	(1-6)
Rumex acetosa	2	4	3	3	3	3		2				IV	(2-4)
Stellaria graminea	2	1		1		1		1	1			III	(1-2)
Trifolium repens		3			5	3			5		3	III	(3-5)
Carex hirta		3		1	4	3			4			III	(1-4)
Brachythecium rutabulum	3	3		2		1		1				III	(1-3)
Cardamine pratensis	2		1	2		2		3				III	(1-3)
Taraxacum officinale agg	1		1	1					3	1		III	(1-3)
Plantago lanceolata	1		1					1	1		1	III	(1)
Festuca rubra			2						3	6	6	II	(2-6)
Equisetum arvense			2	2	2							II	(2)
Rumex conglomeratus		2	2	2								II	(2)
Juncus effusus							7		1			I	(1-7)
Alopecurus geniculatus			1				2					I	(1-2)
Rumex crispus									1	1		I	(1)
Ranunculus flammula							6					I	(6)
Glyceria declinata							4					I	(4)
Equisetum palustre									2			I	(2)
Persicaria maculosa				2								I	(2)
Arrhenatherum elatius	1											I	(1)
Bromus hordeaceus hordeaceus					1							I	(1)
Cirsium palustre				1								I	(1)
Eurhynchium praelongum							1					I	(1)
Festulolium loliaceum		1										I	(1)
Lythrum salicaria				1								I	(1)
Sward height (cm)	75	45	40	70	15	30	80	55	45	40	45		
Plant cover (%)	100	95	100	100	100	100	90	100	100	100	100		
Bryophyte cover (%)	3	3	0	2	0	1	1	1	0	0	0		
Litter cover (%)	20	10	10	10	20	20	10	15	30	40	40		
Bare ground (%)	50	60	60	60	50	50	65	55	40	30	30		
Water depth (cm)	0	0	0	0	0	0	0	0	0	0	0		
No. of species	17	17	18	19	13	16	10	14	16	12	13	Av. 15.0	

FM6 **MG10a *Holcus lanatus-Juncus effusus* rush-pasture, Typical sub-community**

	2007		2008																	
Sample number	133	134	3	6	11	16	36	45	62	79	80	81	90	94	132	150	151	152		
Ranunculus repens	5	6	6	3	5	3	4	4	6	6	6	4	4	6	2	3	2	3	V	(2-6)
Agrostis stolonifera	8	7	4	7	8	3	4	5		8	7	7	9	9	8	5	5	7	V	(3-9)
Holcus lanatus	2	4	4	5	4	5	3	1	3	9	7	8	6		4	5	6	7	V	(1-9)
Poa trivialis	4	5	8	7	4	6	4	2	4		3	4	7	6	8	2		2	V	(2-8)
Lolium perenne	4	7	4	6	4	8		8	9	3	3	3	4	5		3		3	V	(3-9)
Carex hirta			4	3	3	3			2	3	5	4	3	3	3	8	8	2	IV	(2-8)
Trifolium repens	6	2	3	6	1	8			7		8	3	2	4	6	8	8		IV	(1-8)
Rumex conglomeratus			1		2	2		1	3	1	2	1	1						III	(1-3)
Cerastium fontanum			1	1	1	1				1		1		1					II	(1)
Juncus articulatus						1		3	2			1		3	2				II	(1-3)
Cirsium arvense									2	2	2				2	2			II	(2)
Equisetum palustre											3					4	5	4	II	(3-5)
Potentilla anserina						3								1	3			7	II	(1-7)
Juncus effusus					4		1					1	2						II	(1-4)
Trifolium pratense									1	1	4	2							II	(1-4)
Alopecurus geniculatus					3		2	3										1	II	(1-3)
Taraxacum officinale agg		1						1	2			2							II	(1-2)
Glyceria declinata							5	3					2						I	(2-5)
Festuca rubra											2	4		4					I	(2-4)
Rumex crispus											2	1						4	I	(1-4)
Rumex acetosa								1						3	3				I	(1-3)
Dactylis glomerata	3						1	2											I	(1-3)
Brachythecium rutabulum							3	1						1					I	(1-3)

Plantago lanceolata		1				1			2										I	(1-2)
Iris pseudacorus					2				2										I	(2)
Plantago major		1											1						I	(1)
Cardamine pratensis														3					I	(3)
Equisetum arvense			3																I	(3)
Juncus inflexus															3				I	(3)
Phalaris arundinacea					3														I	(3)
Agrostis capillaris		2																	I	(2)
Festuca pratensis	2																		I	(2)
Anthoxanthum odoratum															1				I	(1)
Equisetum fluviatile																		1	I	(1)
Eurhynchium praelongum		1																	I	(1)
Hypericum tetrapterum					1														I	(1)
Ranunculus acris														1					I	(1)
Sward height (cm)	65	65	6	5	6	5	6	5	8	4	3	6	6	4	4	30	30	30		
Plant cover (%)	100	100	90	90	90	100	50	90	90	95	95	100	95	95	100	100	100	100		
Bryophyte cover (%)	5	0	0	0	0	0	2	1	0	0	0	0	0	1	0	0	0	0		
Litter cover (%)	20	30	10	15	30	20	5	10	5	35	35	50	30	10	30	15	10	10		
Bare ground (%)	45	40	70	65	40	50	60	70	80	40	40	20	40	60	40	55	60	60		
Water depth (cm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
No. of species	8	11	10	8	14	12	9	13	13	9	13	15	11	14	12	9	6	11	Av. 11.0	

VG1 **Parched grassland**

	145	146	147	148	149		
Holcus lanatus	7	8	9	10	9	V	(7-9)
Agrostis stolonifera	4	5	8		5	IV	(4-8)
Festuca rubra	4	6		4	4	IV	(4-6)
Cerastium fontanum	3	1		1	1	IV	(1-3)
Agrostis capillaris	7		4	4		III	(4-7)
Urtica dioica		4	3		4	III	(3-4)
Veronica chamaedrys			4	3	4	III	(3-4)
Bromus hordeaceus hordeaceus	3	3	2			III	(2-3)
Cirsium arvense	2			2	2	III	(2)
Lolium perenne	3					I	(3)
Senecio jacobaea		1				I	(1)
Ranunculus repens	1					I	(1)
Sward height (cm)	45	40	40	8	35		
Plant cover (%)	100	100	90	95	100		
Bryophyte cover (%)	0	0	0	0	0		
Litter cover (%)	10	5	0	10	15		
Bare ground (%)	60	65	80	65	55		
No. of species	9	7	6	6	7		Av. 7.0

VG2 **U1d *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland, *Anthoxanthum odoratum-Lotus corniculatus* sub-community**

Sample number	85	86	87	88	89		
Holcus lanatus	10	9	4	10	4	V	(4-10)
Agrostis capillaris	2	4	10	1	7	V	(1-10)
Plantago lanceolata	2	3	2	3	4	V	(2-4)
Hypochaeris radicata	3	4	3	3	2	V	(2-3)
Senecio jacobaea	3	2	3	2	2	V	(2-3)
Trifolium repens	2	1	1	5	2	V	(1-5)
Cerastium fontanum	3	2	3	3	1	V	(1-3)
Vulpia bromoides	3	2		3	4	IV	(2-4)
Dactylis glomerata		3	2	3	4	IV	(2-4)
Brachythecium albicans	1	2	1		5	IV	(1-5)
Ornithopus perpusillus	3	3	1		1	IV	(1-3)
Rumex acetosella	2		2		2	III	(2)
Trifolium dubium	2	1	3			III	(1-3)
Filago vulgaris	3				2	II	(2-3)
Aira praecox	1				3	II	(1-3)
Trifolium glomeratum			2		2	II	(2)
Aira caryophyllea			1		2	II	(1-2)
Crepis capillaris			1	2		II	(1-2)
Spergularia rubra	1		2			II	(1-2)
Rhytidiadelphus squarrosus					6	I	(6)
Arenaria serpyllifolia				3		I	(3)
Anthoxanthum odoratum				2		I	(2)
Scleropodium purum					2	I	(2)
Festuca ovina	1					I	(1)
Vicia sativa nigra				1		I	(1)
Trifolium campestre				1		I	(1)
Hypochaeris glabra			1			I	(1)
Veronica arvensis	1					I	(1)
Erodium cicutarium	1					I	(1)
Rubus fruticosus agg	1					I	(1)
Sward height (cm)	9	9	3	18	5		
Plant cover (%)	95	95	100	100	85		
Bryophyte cover (%)	1	2	1	0	40		
Litter cover (%)	10	5	30	20	10		
Bare ground (%)	65	70	40	50	40		
No. of species	19	12	17	14	18		Av. 16.0

RB1 **S26 *Phragmites australis-Urtica dioica* tall-herb fen**

	157	158	159	160	161	162	163	164	165	166		
Phragmites australis	10	7	7	8	10	10	10	10	9	10	V	(7-10)
Urtica dioica	4	5	7	3	2	1	4	4	2	2	V	(1-7)
Galium aparine	2	2			1	1	1		2	1	IV	(1-2)
Angelica sylvestris	1	1	1	2	2	1	1				IV	(1-2)
Juncus articulatus	4	4	4	7	5	2					III	(2-7)
Vicia cracca	2	3	2	2	1	2					III	(1-3)
Galium palustre					3	2	2	2	1	1	III	(1-3)
Carex acutiformis	1				1		3	2	2	1	III	(1-3)
Lotus pedunculatus	2	2	2	1	2	1					III	(1-2)
Iris pseudacorus	1	2	1	2	1		1				III	(1-2)
Arrhenatherum elatius	2	8	6	2			1				III	(1-8)
Rumex acetosa			1	2	1	2	1				III	(1-2)
Agrostis stolonifera			5	3	4	5					II	(3-5)
Epilobium hirsutum						2	2		1	2	II	(1-2)
Carex disticha			1	1	2	2					II	(1-2)
Cirsium palustre			2	1	1	2					II	(1-2)
Calystegia sepium								1	3	2	II	(1-3)
Equisetum palustre				2	1	2					II	(1-2)
Solanum dulcamara						2	1	1			II	(1-2)
Juncus effusus					1	1			1		II	(1)
Festuca arundinacea				1	1	1					II	(1)
Lathyrus pratensis		1	1	1							II	(1)
Phalaris arundinacea									4	2	I	(2-4)
Holcus lanatus				3	2						I	(2-3)
Poa trivialis								2	2		I	(2)
Galium uliginosum					2	2					I	(2)
Ranunculus repens					1	2					I	(1-2)
Cirsium vulgare	1						1				I	(1)
Rubus fruticosus agg		2									I	(2)
Epilobium ciliatum							1				I	(1)
Lythrum salicaria										1	I	(1)
Juncus inflexus										1	I	(1)
Mentha aquatica						1					I	(1)
Sward height (cm)	220	100	105	125	200	210	220	280	220	215		
Plant cover (%)	100	100	100	100	100	100	100	100	100	100		
Bryophyte cover (%)	0	0	0	0	0	0	0	0	0	0		
Litter cover (%)	70	70	70	70	70	70	70	70	70	70		
Bare ground (%)	0	0	0	0	0	0	0	0	0	0		
Water depth (cm)	0	0	0	0	0	0	0	0	0	0		
No. of species	11	11	13	16	20	20	13	7	10	10	Av. 13.1	

WW1 **W6a *Alnus glutinosa-Urtica dioica* woodland, Typical sub-community**

WW2 **W2a *Salix cinerea-Betula pubescens-Phragmites australis* woodland, *Alnus glutinosa-Filipendula ulmaria* sub-community**

WW3 **W5a *Alnus glutinosa-Carex paniculata* woodland, *Phragmites australis* sub-community**

WW4 **W10d *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, *Holcus lanatus* sub-community**

	W6a							W2a				W5a							W10d			
Sample number	167	168	169	170	171			179	180	181		174	175	176	177	178			172	173		
Alnus glutinosa	10	9	8	10	10	V	(8-10)	5	2	7	3	10	9	9	8	6	V	(6-10)	4	4	2	(4)
Fraxinus excelsior	1	4				II	(1-4)	2		5	2			4	5	8	III	(4-8)	4	5	2	(4-5)
Betula pubescens			5			I	(5)	4	1	2	3			1		4	II	(1-4)	4	7	2	(4-7)
Ilex aquifolium	1					I	(1)															
Quercus robur													4			4	II	(4)	6	1	2	(1-6)
Populus tremula															3		I	(3)				
Salix cinerea		2	5	3		III	(2-5)	8	10	7	3		2	3	2		III	(2-3)				
Alnus glutinosa sapling	1	1		1		III	(1)			2	1	3	2				II	(2-3)		4	1	(4)
Sambucus nigra	1			1		II	(1)								1		I	(1)				
Crataegus monogyna	1					I	(1)		1		1			1		1	II	(1)	1		1	(1)
Fraxinus excelsior sapling		2				I	(2)			1	1					2	I	(2)		4	1	(4)
Betula pubescens sapling				1		I	(1)												1	1	2	(1)
Rosa canina agg									1		1				1	1	II	(1)				
Corylus avellana																			2		1	(2)
Acer pseudoplatanus sapling																			1		1	(1)
Quercus robur sapling																			1		1	(1)
Salix caprea																				1	1	(1)
Ilex aquifolium shrub																			1		1	(1)
Eurhynchium praelongum	8	5	3	5	6	V	(3-8)		5		1	6	5	7	7	8	V	(5-8)	4	4	2	(4)
Poa trivialis	3	3	2	5	3	V	(2-5)	2	3		2		4	5			II	(4-5)				
Urtica dioica	4	4	3	2	3	V	(2-4)	1	2		2	2		1	2		III	(1-2)	1	1	2	(1)

Phragmites australis		2	3	2	2	IV	(2-3)	5	3	6	3	3	4	4			III	(3-4)		3	1	(3)
Glechoma hederacea	2	1		3	2	IV	(1-3)							1			I	(1)	3		1	(3)
Dryopteris dilatata	2		3	2		III	(2-3)							2	2	3	III	(2-3)	3	1	2	(1-3)
Galium aparine	2	3			1	III	(1-3)		2		1	1			2		I	(1-2)				
Rubus fruticosus agg	2		1		1	III	(1-2)		3	1	2			3	2	2	III	(2-3)	2	1	2	(1-2)
Mnium hornum			4	4		II	(4)							5	4	2	III	(2-5)	2		1	(2)
Carex acutiformis	3	3				II	(3)	3	2	2	3		3		4	4	III	(3-4)				
Iris pseudacorus			2	3		II	(2-3)		1	3	2	1	2			4	III	(1-4)		2	1	(2)
Juncus effusus			1	4		II	(1-4)									1	I	(1)	1	2	2	(1-2)
Brachythecium rutabulum	2	2				II	(2)	3	8	3	3	3	1		1	2	IV	(1-3)				
Lophocolea bidentata sl			2	2		II	(2)															
Mentha aquatica	1	2				II	(1-2)	1		2	2	1				1	II	(1)				
Rumex sanguineus	2			1		II	(1-2)							1			I	(1)	1	1	2	(1)
Holcus lanatus				6		I	(6)							3			I	(3)	9	8	2	(8-9)
Pteridium aquilinum			3			I	(3)												2		1	(2)
Apium nodiflorum				3		I	(3)															
Lonicera periclymenum				2		I	(2)							1	1		II	(1)	2	4	2	(2-4)
Angelica sylvestris		2				I	(2)	2	1	2	3	1	1				II	(1)				
Ranunculus repens		2				I	(2)	2			1				2		I	(2)	1		1	(1)
Geranium robertianum	2					I	(2)							1			I	(1)	1	1	2	(1)
Cardamine pratensis				2		I	(2)					2					I	(1)				
Eupatorium cannabinum		1				I	(1)		1	2	2	3	3			3	III	(3)				
Cirsium palustre		1				I	(1)	2		2	2	2	2			1	III	(1-2)	1	1	2	(1)
Solanum dulcamara	1					I	(1)	1			1		2	1		2	III	(1-2)		2	1	(2)
Filipendula ulmaria		1				I	(1)		1	2	2	2	1				II	(1-2)				
Corylus avellana	1					I	(1)								1		I	(1)	2	2	2	(2)
Plagiothecium denticulatum	1					I	(1)								1		I	(1)				
Lysimachia vulgaris		1				I	(1)															
Ribes rubrum				1		I	(1)															
Silene dioica	1					I	(1)															
Cardamine flexuosa	1					I	(1)															

Betula pubescens seedling			1			I	(1)															
Ceratocapnos claviculata				1		I	(1)															
Galium palustre								1	1	3	3		1				I	(1)				
Agrostis stolonifera								4		3	2			2			I	(2)				
Equisetum palustre									2	1	2											
Lotus pedunculatus								1		1	2									2	1	(2)
Juncus articulatus										3	1											
Plagiomnium undulatum									2		1											
Vicia cracca										2	1											
Epilobium hirsutum								1			1		2				I	(2)				
Rumex acetosa										1	1									1	1	(1)
Valeriana officinalis										1	1	1					I	(1)				
Salix cinerea sapling												3	2			1	III	(1-3)				
Fraxinus excelsior seedling															2		I	(2)		1	1	(1)
Hedera helix																2	I	(2)				
Carex remota														2			I	(2)				
Lycopus europaeus													1				I	(1)		2	1	(2)
Lophocolea heterophylla													1				I	(1)				
Ajuga reptans																1	I	(1)				
Berula erecta													1				I	(1)				
Crataegus monogyna seedling														1			I	(1)				
Molinia caerulea																			2		1	(2)
Atrichum undulatum																			2		1	(2)
Betula pendula sapling																			2		1	(2)
Sparganium erectum																				2	1	(2)
Alnus glutinosa seedling																				1	1	(1)
Canopy height (m)	30	30	25	30	30			12	10	12		20	20	25	25	30			25	20		
Canopy cover (%)	95	90	90	80	90			90	100	80		95	90	95	90	90			75	80		
Bryophyte cover (%)	70	20	10	25	30			3	80	3		30	20	60	50	65			10	5		
Litter cover (%)	10	40	50	40	40			70	5	70		5	10	0	10	0			45	45		
Bare ground (%)	0	20	20	10	5			0	0	0		40	45	15	10	10			20	25		

Open water (%)	0	0	0	0	0		0	0	0		0	0	0	0	0		0	0		
Water depth (cm)	0	0	0	0	0		0	0	0		0	0	0	0	0		0	0		
No. of species	23	20	15	22	8	Av. 17.6	18	20	24	Av. 20.67	16	21	22	19	22	Av. 20.00	28	28	Av. 28	

RI134 **U1c *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland, *Erodium cicutarium-Teesdalia nudicaulis* sub-community, with reference to SD12a*Carex arenaria-Festuca ovina-Agrostis capillaris* dune grassland, *Anthoxanthum odoratum* sub-community**

	2007									2008							
Sample number	340	341	342	343	344	345	346	347	348	2	3	5	7	8	12		
Agrostis capillaris	5	5	6	7	5	8	7	7	7	7	7	7	8	8	7	V	(5-8)
Rumex acetosella	5	5	6	5	5	3	2	5	2	3	2	2	4	2	3	V	(2-6)
Polytrichum juniperinum	8	8	8	6	6	5	5	3	2	5	1	5	2	1	2	V	(1-8)
Scleropodium purum		2	3		1	4		4	2	3	4		4	1	3	IV	(1-4)
Anthoxanthum odoratum		1	3	2				3	2	1	4	2	2	3	2	IV	(1-4)
Hypnum jutlandicum		4			2	4		4	5	6		3	5	2		III	(2-6)
Poa annua	3	1	3						2	2	2	2		5	3	III	(1-5)
Aira praecox	3	1		3				1		2	2	3	3		2	III	(1-3)
Hypnum cupressiforme		2		1	1				3	2	2	5	2			III	(1-5)
Carex arenaria	2		2		3		3	2		3						II	(2-3)
Eurhynchium praelongum						3			8		9			6	3	II	(3-9)
Campylopus pyriformis	4	4		7	2								5			II	(2-7)
Holcus lanatus			3	2		4			2				3			II	(2-4)
Rhytidiadelphus squarrosus									4	5	4	3				II	(3-5)
Aphanes australis	2									3		2		3		II	(2-3)
Pteridium aquilinum		3				1		1	1							II	(1-3)
Ornithopus perpusillus			2							2		2	1			II	(1-2)
Hypochaeris radicata		1		1						1			1			II	(1)
Dicranum scoparium		1			7			6								I	(1-7)
Syntrichia ruraliformis		4		3	1											I	(1-4)
Luzula campestris									3		3			1		I	(1-3)
Sagina procumbens			2	1										3		I	(1-3)
Festuca ovina					1			3				1				I	(1-3)

Crassula tillaea			1				3					1				I	(1-3)
Pinus nigra seedling				1									1		1	I	(1)
Galium saxatile			3						3							I	(3)
Brachythecium albicans							1								5	I	(1-5)
Cladonia foliacea				2	3											I	(2-3)
Vulpia bromoides	1								3							I	(1-3)
Stellaria pallida										2					2	I	(2)
Cladonia coniocraea					2										2	I	(2)
Cladonia furcata				3	1											I	(1-3)
Ulex europaeus seedling						1									1	I	(1)
Rubus fruticosus agg						4										I	(4)
Ptilidium ciliare									3							I	(3)
Spergularia rubra							3									I	(3)
Holcus mollis		2														I	(2)
Dicranella heteromalla								2								I	(2)
Poa pratensis			2													I	(2)
Lonicera periclymenum															2	I	(2)
Bryum sp.			2													I	(2)
Acer campestre seedling														2		I	(2)
Lophocolea bidentata sl															1	I	(1)
Cerastium fontanum									1							I	(1)
Hypochaeris glabra												1				I	(1)
Dryopteris dilatata									1							I	(1)
Cladonia impexa					1											I	(1)
Plantago major														1		I	(1)
Sward height (cm)	2	4	4	3	1	2	4	2	4	1	1	4	3	1	3		
Sward cover (%)	40	25	50	45	35	70	45	65	55	45	50	40	70	80	45		
Bryophyte/lichen cover (%)	60	80	60	60	80	50	20	50	90	70	90	35	40	30	20		
Plant litter cover (%)	1	3	2	3	3	10	10	5	15	3	5	3	15	20	5		

Bare ground (%)	25	15	30	20	15	10	30	10	20	20	10	60	50	40	45		
No. of species	9	15	14	14	15	10	7	12	18	15	11	14	13	13	15		Av. 13.0

RI135 **U4b *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland, *Holcus lanatus-Trifolium repens* sub-community with reference to U20 Pteridium aquilinum-Galium saxatile dune grassland - Variant A**

SD12a *Carex arenaria-Festuca ovina-Agrostis capillaris* dune grassland, *Anthoxanthum odoratum* sub-community - Variant B

	Variant a																						Variant b											
	2007												2008										2007					2008						
Sample Number	349	350	351	352	353	354	359	360	361	362	363	364	1	4	6	9	10	11	18	19			355	356	357	358	365	13	14	15	16	14		
Agrostis capillaris	9	10	8	9	9	9	8	7	8	8	9	7	9	9	6	9	7	10	5	6	V	(5-10)	7	8	6	4	8	6	9	9	7	7	V	(4-9)
Eurhynchium praelongum	6	2	9	4	7	4	4	6	3	7	9			9	9	2			4	7	IV	(2-9)	5	2	3	1	5	6	5	4	9	8	V	(1-9)
Holcus lanatus	3	2		1		4	3	2	3	3		3		1	5	6	4	3	2	4	IV	(1-6)	2		3	4	1					4	III	(1-4)
Poa annua	3		2			2	5	5	4		2	3	4	4	4						III	(2-5)	5	4		7			3	4	5	5	IV	(3-7)
Anthoxanthum odoratum	2	3		2	5	2	4	3	4		3	4	2	3	5	5	7	4			IV	(2-7)	3		6					2		4	II	(2-6)
Rumex acetosella				3		3			1	2	5	4			2	5	1	4	3		III	(1-5)		2	4		6	3	3	3			III	(2-6)
Rhytidiadelphus squarrosus	5	8	3			2	7	5	4	4	4	8	9	5							III	(2-9)	3		6		8	5	6				III	(3-8)
Scleropodium purum	3		3	8	5	4		6		2	4					2	2	1	1		III	(1-8)	2		6		2		3	4			III	(2-6)
Rubus fruticosus agg									1		1	2	1	1		1	2	2	2	2	III	(1-2)	1					2	1				II	(1-2)
Pteridium aquilinum	1			1	1						2				2	2	1	1		2	III	(1-2)			3								I	(3)
Cerastium fontanum										3	1							1			I	(1-3)	3	1	2					1	1	2	III	(1-3)
Luzula campestris			2									3	3	2		3		2			II	(2-3)			5					1			I	(1-5)
Hypochaeris radicata															2						I	(2)							2	2	2	1	II	(1-2)
Stellaria pallida																		2			I	(2)							2	3	1		II	(1-3)
Sagina procumbens										1											I	(1)	3	2							1		II	(1-3)
Galium saxatile			3	1												4					I	(1-4)		1					3				I	(1-3)
Ornithopus perpusillus											1				1						I	(1)			3								I	(3)
Ceratocapnos claviculata																				1	I	(1)						2					I	(2)
Betula pendula seedling									1	1											I	(1)			1								I	(1)
Pinus nigra seedling																			2		I	(2)			1								I	(1)
Hypnum jutlandicum		2	6			8	2			4					4		1			6	II	(1-8)												
Dicranella heteromalla	4	1	2	2		1												1			II	(1-4)												
Holcus mollis	2							4			2									6	I	(2-6)												
Dicranum scoparium			1				3		2	1											I	(1-3)												
Ptilidium ciliare	2	3			2																I	(2-3)												
Aira praecox			1													1		1			I	(1)												
Lophocolea bidentata sl							1						2								I	(1-2)												
Hypnum cupressiforme						2															I	(2)												
Agrostis vinealis																		2			I	(2)												
Ulex europaeus seedling															1						I	(1)												
Hyacinthoides non-scripta																1					I	(1)												
Acer pseudoplatanus seedling														1							I	(1)												
Senecio jacobaea																											1		2	2	1		II	(1-2)
Stellaria media																							1					1			1	2	II	(1-2)
Aphanes australis																							3	3			1						II	(1-3)
Vulpia bromoides																								3			1			1			II	(1-3)
Carex arenaria																										3	3						I	(3)
Dactylis glomerata																															3	3	I	(3)

Festuca rubra																														2	4	I	(2-4)
Plantago lanceolata																														2	2	I	(2)
Glechoma hederacea																	1		3													I	(1-3)
Veronica arvensis																								2	1			I	(1-2)
Taraxacum officinale agg																				1							2	I	(1-2)
Claytonia perfoliata																							1	2				I	(1-2)
Poa pratensis																	3											I	(3)
Fissidens taxifolius																						3						I	(3)
Trifolium repens																		3										I	(3)
Cerastium semidecandrum																							2					I	(2)
Festuca ovina																							1					I	(1)
Brachythecium albicans																								1				I	(1)
Plantago major																							1					I	(1)
Geranium molle																		1										I	(1)
Lolium perenne																				1								I	(1)
Urtica dioica																				1								I	(1)
Rumex obtusifolius																	1											I	(1)
Sward height (cm)	8	3	3	11	9	9	5	6	5	1	4	5	3	4	6	4	8	5	1	14		1	1	5	5	4	5	1	1	2	8			
Vegetation cover (%)	85	90	80	90	80	90	80	80	80	50	95	70	90	90	70	95	85	95	20	65		70	80	80	50	75	30	85	90	60	75			
Bryophyte/lichen cover (%)	85	80	90	80	80	95	60	60	20	50	95	70	80	95	85	4	2	2	5	70		40	0	50	1	70	50	50	15	80	65			
Plant litter cover (%)	2	30	10	20	5	20	20	3	15	5	5	10	5	5	20	35	30	25	5	0		2	5	10	3	5	10	10	5	0	15			
Bare ground (%)	10	40	6	10	0	5	5	25	10	5	0	10	15	5	5	1	10	5	70	20		5	15	5	50	10	40	2	5	5	2			
No. of species	11	8	11	9	6	11	9	8	10	11	12	8	7	9	11	12	8	13	7	8	Av. 9.5	15	11	14	8	10	8	16	16	11	12	Av. 10.3		

CE1 **SD8 *Festuca rubra-Galium verum* fixed dune grassland**

Sample number	1	2	3	6	8	9	10	11	12	13		
Festuca rubra	9	4	9	8	10	9	9	8	7	6	V	(4-10)
Plantago lanceolata	3	4	5	4	1	2	3	2	2	4	V	(1-5)
Vicia sativa nigra	5	2	3	3	3	3	1	3	2	3	V	(1-5)
Poa pratensis	4	6		3	2	4	4	3	7	4	V	(2-7)
Anthoxanthum odoratum			4	4	3	7	6	5	6	8	IV	(3-8)
Hypochaeris radicata	2	1	1	2	2	1	1		2		IV	(1-2)
Elytrigia repens	3	4	4	4			4	4		4	IV	(3-4)
Holcus lanatus	1	8	2			4	3	2	4		IV	(1-8)
Vicia hirsuta	2	1				2	5	2	4	3	IV	(1-5)
Trifolium dubium				2		1	2	2	3	5	III	(1-5)
Senecio jacobaea	3	4		2	1				3	3	III	(1-4)
Leucanthemum vulgare				2		3	4	4	2		III	(2-4)
Crepis capillaris		3	2	3					3	3	III	(2-3)
Taraxacum officinale agg	2	3	3		1				2		III	(1-3)
Lotus corniculatus		2			1			1	2	2	III	(1-2)
Brachythecium rutabulum	8	6		4						4	II	(4-8)
Ononis repens	3	2	4		3						II	(2-4)
Agrostis stolonifera					2	2		1		3	II	(1-3)
Dactylis glomerata				1	1			2			II	(1-2)
Galium verum	4	4									I	(4)
Elytrigia juncea		1		2							I	(1-2)
Trifolium campestre							1	2			I	(1-2)
Daucus carota carota						1	1				I	(1)
Medicago lupulina									7		I	(7)
Anisantha sterilis										4	I	(4)
Eurhynchium praelongum	4										I	(4)
Vulpia bromoides							2				I	(2)
Carex arenaria			2								I	(2)
Trifolium repens									2		I	(2)
Achillea millefolium							2				I	(2)
Potentilla reptans			2								I	(2)
Pohlia nutans							1				I	(1)
Bromus hordeaceus hordeaceus									1		I	(1)
Festuca rubra glauca										1	I	(1)
Cirsium vulgare		1									I	(1)
Rumex crispus								1			I	(1)
Anchusa arvensis									1		I	(1)
Centaurea nigra								1			I	(1)
Pilosella officinarum		1									I	(1)
Rubus fruticosus agg					1						I	(1)
Sward height (cm)	24	16	22	28	21	22	17	28	16	15		
Sward herb cover (%)	90	85	95	95	90	90	90	90	90	90		
Bryophyte cover (%)	70	30	0	10	0	0	1	0	0	5		
Litter cover (%)	40	50	50	40	60	70	60	70	25	35		
Bare ground (%)	0	10	20	30	10	5	15	10	55	35		
No. of samples	14	18	12	14	13	12	16	16	18	15	Av. 14.8	

CE2 **Parched grassland**

Sample number	16	17	18	19	20	21	22	23	24	25		
Brachythecium rutabulum	5	6	7	6	9	2	4	4	10	5	V	(2-10)
Lotus corniculatus	6	2	5	7	1	2	3	6	5	6	V	(1-7)
Leontodon hispidus	5	5	4		4	4	3	3	5	2	V	(2-5)
Holcus lanatus	4	1	4	5	5	1		2	3	3	IV	(1-5)
Carex arenaria		2	2	2	3	1	5	3		2	IV	(1-5)
Vulpia bromoides		3	6	9	3	3		2	3		IV	(2-9)
Dactylis glomerata			1	4		3	5	4	3	5	IV	(1-5)
Vicia sativa nigra	2		2		1		3	3	3	2	IV	(1-3)
Trifolium repens		1	2		3		4		2	5	III	(2-4)
Festuca rubra	4					1	7	5	4	6	III	(1-7)
Plantago lanceolata			3	1	1		3	2		1	III	(1-3)
Catapodium marinum		3	2		3	3		3			III	(2-3)
Crepis capillaris				3			2	2	1	1	III	(1-3)
Taraxacum officinale agg	1	1	1		1				2		III	(1-2)
Leucanthemum vulgare			2	2	3				4		II	(2-4)
Poa pratensis	4					1	7	4			II	(1-7)
Trifolium dubium							2	1	2	2	II	(1-2)
Medicago lupulina			1		1	1			1		II	(1)
Trifolium arvense					3	3	2				II	(2-3)
Anisantha sterilis	2	3	3								II	(2-3)
Pohlia nutans		5				1			1		II	(1-5)
Centaurium erythraea						2	2	1			II	(1-2)
Hypochaeris radicata		2				2		1			II	(1-2)
Bromus hordeaceus hordeaceus		1	1		1						II	(1)
Senecio jacobaea				2		2					I	(2)
Brachythecium albicans						9		1			I	(1-9)
Tortula ruralis ruraliformis		1						4			I	(1-4)
Eurhynchium praelongum	1			4							I	(1-4)
Achillea millefolium				2	1						I	(1-2)
Festuca ovina						1		1			I	(1)
Veronica arvensis		1				1					I	(1)
Agrostis stolonifera	1								1		I	(1)
Lolium perenne						1			1		I	(1)
Hypnum cupressiforme							6				I	(6)
Cynosurus cristatus	6										I	(6)
Polytrichum juniperinum							2				I	(2)
Anthoxanthum odoratum	2										I	(2)
Poa annua	2										I	(2)
Agrostis capillaris					1						I	(1)
Scleropodium purum					1						I	(1)
Trifolium striatum		1									I	(1)
Myosotis ramosissima						1					I	(1)
Festuca rubra glauca			1								I	(1)
Anthyllis vulneraria			1								I	(1)
Ononis repens			1								I	(1)
Daucus carota carota								1			I	(1)
Bryum sp.								1			I	(1)
Carex flacca							1				I	(1)
Quercus robur seedling					1						I	(1)

Sward height (cm)	4	5	7	7	9	4	25	6	4	26	
Sward herb cover (%)	60	40	50	90	35	20	90	45	40	60	
Bryophyte cover (%)	30	55	50	45	90	90	35	25	95	10	
Litter cover (%)	5	2	5	5	1	1	40	5	1	50	
Bare ground (%)	50	15	20	20	10	10	20	45	1	30	
No. of samples	14	16	19	12	19	21	17	21	17	12	Av. 16.8

CE3 **W23 *Ulex europaeus* scrub**

Sample number	4	5	7	14	15		
Pinus sylvestris				5		I	(5)
Acer pseudoplatanus				4		I	(4)
Quercus ilex				4		I	(4)
Ulex europaeus	9	8	9	8	9	V	(8-9)
Prunus spinosa		5	4		6	III	(4-6)
Festuca rubra	5	5	4	5	6	V	(4-6)
Anthoxanthum odoratum	4	3	2	5	2	V	(2-5)
Vicia sativa nigra	1	1	1	2	2	V	(1-2)
Elytrigia repens	7	8	5	4		IV	(4-8)
Rubus fruticosus agg		1	2	2	1	IV	(1-2)
Holcus lanatus	3			4		II	(3-4)
Dactylis glomerata				1	2	II	(1-2)
Galium aparine			2	1		II	(1-2)
Veronica hederifolia			3			I	(3)
Achillea millefolium				2		I	(2)
Senecio jacobaea			1			I	(1)
Poa trivialis			1			I	(1)
Sward height (cm)	130	150	210	250	240		
Sward herb cover (%)	100	95	95	100	90		
Bryophyte cover (%)	0	0	0	0	0		
Litter cover (%)	40	20	30	50	50		
Bare ground (%)	30	50	50	20	20		
No. of samples	6	7	11	13	7		Av. 8.8

Appendix B
Photos

X Pages

To be added