Alkaline Fen & Transition Mire Survey of the North York Moors National Park & Bishop Monkton Ings

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Report to:

Natural England

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1. INTRODUCTION

The purpose of this Project was to survey sites thought to support the EC Habitats Directive Annex 1 habitats 'Alkaline Fen' and to a lesser extent 'Transition Mire / Quaking Bog', predominantly in the North York Moors National Park area (but including one outlying site, Bishop Monkton Ings, in the Vale of York near Boroughbridge), where current site information was lacking, where existing survey data were over 20 years old, or where significant change is thought have occurred.

Sites selected for survey were those where current evidence suggested that Alkaline Fen and/or Transition Mire could be present, but the precise location was not known, nor was NVC information available.

Areas targeted for survey included the following Sites of Special Scientific Interest (SSSIs):

- Biller Howe Dale;
- Bishops Monkton Ings;
- Castlebeck & Scar Woods;
- Cawthorn Moor;
- Hole of Horcum;
- Longstone Meadow;
- Low Pasture;
- Newtondale;
- Noddle End;
- spring and seepage areas in Jugger Howe Dale and Low Moor, within the North York Moors SSSI;
- Snaper Farm Meadows (see Figure 1).

In addition, a number of non-SSSI sites were also targeted for survey:

- Scarth Wood Moor and Stony Moor Sike (near Osmotherley in the north-east of the National Park);
- Arden Moor, Dunsforth's Hill and Kepwick Moor (near the eastern edge of the Park);
- Hasty Bank Farm (near Helmsley);
- Riverhead Farm (near the eastern side of the National Park);
- several sites within Dalby Forest: Deepdale, Jenny Thrush Spring; sections outwith Ellers Wood & Sand Dale SSSI, and Troutsdale & Rosekirk Dale SSSI.

The information collected during the site surveys has been used to assess the number, area, and geographic spread of mires that support Alkaline Fen and Transition Mire / Quaking Bog vegetation in the North York Moors National Park, beyond previously well-documented sites. Discussion is also made of the 'goodness of fit' of the surveyed plant communities with the NVC dataset and the Annex 1 habitat descriptions, possible limitations or constraints of the dataset, information gaps, and possibilities for further work.

Figure 1. Sites surveyed for Alkaline Fen or Transition Mire / Quaking Bog in the North York Moors National Park & Boroughbridge area.

2. METHODOLOGY

Preliminary work involved finalising the site survey list with the Project Officer; gathering available site information from Natural England, with supplementary site data accessed from the FenBase database held by Dr Bryan Wheeler; and producing vegetation survey forms, site maps and aerial photos for use in the field.

A programme of site visits was developed by the survey team (Phil Eades & Ros Tratt), and prior to each site survey direct contact was first made with the relevant landowners to determine a suitable time for survey visits. Regular verbal updates were given to the Project Officer of survey progress and any problems encountered.

Surveys were undertaken between mid-August and early October. Despite the fairly late start date of the project, prior experience of the survey team has shown that the vegetation of fen sites such as these can be adequately surveyed up until early to mid-October, although it must be accepted that certain key species, such as orchids, could not be identified to species level at this time of year.

Surveys involved an initial 'walkover' assessment aimed at identifying the presence of target vegetation types, followed by detailed mapping and quadrat surveys of the relevant plant communities of the EC Habitats Directive Annex 1 Alkaline Fen and Transition Mire / Quaking Bog habitats. Where target wetland vegetation types were present, and where time permitted, one representative quadrat with DOMIN cover values for all plant species present was recorded in each stand, plus a full plant species list with DAFOR abundance values for the entire stand. GPS coordinates of all quadrat locations were recorded using a hand-held device, spot measurements of pH and electrical conductivity (EC) of springs, seepages and / or soil water were made, where possible, using a hand-held Hanna Instruments Combo meter (HI 98129), and representative digital photographs were taken. Target notes were made regarding site or feature condition, water supply features, and adjacent vegetation types. At some sites a soil auger was used to investigate the characteristics of the substrata underlying the wetland vegetation. In some situations, particularly where there was a long walk-in to access the site, non-target fen vegetation was sampled if it was considered valuable to do so for more general conservation management purposes.

Once surveys were completed, survey data were input onto Excel spreadsheets, and the data analysed in order to identify the National Vegetation Classification (NVC) communities (see Rodwell, 1991, *et seq.*; also Wheeler, Shaw & Tanner, 2009) that are present at each site. Quadrat data were initially classified using MATCH (Malloch, 1992) (see Annex 2). The resulting coefficients of 'fit' with various NVC plant communities were examined in the light of the written community descriptions provided in the published accounts (Rodwell 1991, *et seq.*; Wheeler, Shaw & Tanner, 2009), and through internal discussions, with the aim of assessing which NVC type was considered to be the most likely. It should be noted that the chosen plant (sub-) community was not always that given the highest MATCH coefficient. Where unusual vegetation types were encountered that could not be easily assigned to a single NVC community, these have been described as intermediate between two or more types.

3. RESULTS

Outputs from this project consist of the following:

- A brief description of each mire site surveyed, the target NVC plant communities found there, other fen communities, possible water supply characteristics and notes about site management (see Annex 1, Section 8 of this report).
- General discussion of the 'goodness of fit' of the surveyed plant communities with the NVC dataset and the Habitats Directive Annex 1 habitat descriptions (see Section 4.2).
- Results of the vegetation analysis and NVC matching process (see Annex 2).
- An Excel spreadsheet for each site that contains a species list with Domin scores for all quadrats recorded, and DAFOR values for each stand, and the NVC community attributed to the quadrat (reproduced with each site account in Section 8; also supplied as a separate file: 'North York Moors Alk Fen Survey 2011 site quad data 20-06-12').
- An Excel spreadsheet that combines all quadrat details, including species present with Domin values, pH & EC, and GPS co-ordinates (supplied as a separate file: 'North York Moors Alk Fen Survey 2011 all quad data 20-06-12').
- Maps illustrating the location and extent of NVC communities for each site visited, with clear identification of site name and code (reproduced with each site account in Annex 1). All maps are based on recent aerial photos (derived from aerial photography © Get Mapping plc.), and are oriented with grid north at the top of the figure. Maps of target plant communities have also been digitised as part of a separate GIS inventory project.
- Separate documents detailing ecohydrological observations at Bishop Monkton Ings SSSI (Annex 3; see 'NYM Annex 3 (BMI) Final 20-06-12'), and observations concerning the hydrogeological context of the mires of the North York Moors area (Annex 4; see 'NYM Annex 4 (Hydrogeology) Final 20-06-12').
- Representative digital site photographs provided on a separate DVD.

The suite of Alkaline Fen and Transition Mire / Quaking Bog (TMQB) plant communities considered to be relevant to these surveys is shown in Table 1. Note that recent discussions between Natural England staff, Dr Bryan Wheeler and Dr Ros Tratt have resulted in the provisional revision of the UK NVC plant communities thought to correspond to TMQB, and consequently TMQB has been divided into six types in order to facilitate the future use of the TMQB category (for a detailed explanation of the listed M9 subdivisions, refer to Wheeler, 1980).

Table 1. Selected NVC fen communities & their relationship to Habitats Directive Annex 1 Alkaline Fen & Transition Mire / Quaking Bog habitats.

NVC plant communities of Alkaline Fen:
M9 *Carex rostrata–Calliergon cuspidatum* mire (includes M9 *Schoenetosum* & M9 *Juncetosum*)
M10 *Carex dioica–Pinguicula vulgaris* mire
M10a *Carex demissa–Juncus bulbosus/kochii* sub-community
M10ai *Eleocharis quinqueflora* variant
M10aii *Carex hostiana–Ctenidium molluscum* variant
M10aiii *Schoenus nigricans* variant
M10b *Briza media–Primula farinosa* sub-community
M10bi *Cirsium palustre* variant
M10bii *Molinia caerulea–Eriophorum latifolium* variant
M11 *Carex demissa–Saxifraga aizoides* mire
M11a *Eleocharis quinqueflora–Cratoneuron commutatum* sub-community
M13 *Schoenus nigricans–Juncus subnodulosus* mire
M13a *Festuca rubra–Juncus acutiflorus* sub-community

M13b *Briza media–Pinguicula vulgaris* sub-community M13c *Caltha palustris–Galium uliginosum* sub-community	
NVC plant communities of Transition Mire / Quaking Bog:	**TMQB categories: 1, 1s, 2, 3, 4 & 5**
M1 *Sphagnum auriculatum* bog pool	TMQB (4) – not where it occurs on blanket or raised bog
M2 *Sphagnum cusupidatum/recurvum* bog pool	TMQB (4) – not where it occurs on blanket or raised bog
M4 *Carex rostrata–Sphagnum recurvum* mire	TMQB (3) – topogenous base-poor fen
M5 *Carex rostrata–Sphagnum squarrosum* mire	TMQB (3) – topogenous base-poor fen
M8 *Carex rostrata–Sphagnum warnstorfii* mire	TMQB (1s) – topogenous base-rich fen with *Sphagnum* development
M9 *Carex rostrata–Calliergon cuspidatum / giganteum* mire: M9 soakway sub-community	TMQB (2) – water flow track
M9 *Sphagnetosum*	TMQB (1s) – topogenous base-rich fen with *Sphagnum* development
M9 species-poor variant	TMQB (1) – topogenous base-rich fen: often recorded as M9b, merges with S27
M14 *Schoenus nigricans–Narthecium ossifragum* mire	TMQB (2) – water flow track
M18 *Erica tetralix–Sphagnum papillosum* raised & blanket mire	TMQB (4) – buoyant bog (not TMQB where it occurs in ombrogenous bogs)
M21 *Narthecium ossifragum–Sphagnum papillosum* valley mire	TMQB (5) – soligenous or rheo-topogenous, oligotrophic base-poor mire
M29 *Hypericum elodes–Potamogeton polygonifolius* soakway	TMQB (2) – water flow track
M30 related vegetation of seasonally inundated habitats	TMQB (2) – water flow track
S27 *Carex rostrata–Potentilla palustris* tall-herb fen	TMQB (1) – topogenous base-rich fen
W3 *Salix pentandra–Carex rostrata* woodland: W3 with *Sphagnum*	TMQB (1) – topogenous base-rich fen
W4 *Betula pubescens–Molinia caerulea* woodland	TMQB (3) – topogenous base-poor fen

Taxonomic revisions have occurred since the NVC accounts were published, and this has affected bryophyte nomenclature in particular (Smith, 2004). Several moss names occur in the titles of NVC communities; where used, these have been retained in order to maintain consistency with Rodwell (1991 *et seq*.). Old species names have been revised in the text. The species affected are, old name (new name): *Calliergon cuspidatum (Calliergonella cuspidata); Cratoneuron commutatum (Palustriella commutata;* var *falcatum* becomes *P. falcatum); Drepanocladus revolvens (Scorpidium revolvens); Eurhynchium praelongum (Kindbergia praelonga); Sphagnum auriculatum* var *auriculatum (Sphagnum denticulatum); Sphagnum auriculatum* var *inundatum (Sphagnum inundatum)* and *Sphagnum recurvum (Sphagnum fallax*).

The information and data gathered for each site are summarised in Annex 1 (Sections 8.1 to 8.37); these site accounts consist of a general site description, detailed stand descriptions and their assigned NVC communities, notes about wetland substrata and water supply, and notes regarding site management. Each site account is supplemented with a site map and a tabulated record of the sample data. A site-by-site summary of the fen plant communities that were identified during this project is given below in Table 2. Note that examples of M37 and M38 have in general not been considered to fall within the definition of Alkaline Fen except where they occur in conjunction with other Alkaline Fen plant communities (in particular, M10).

Table 2. Summary of sites & the Annex 1 habitats & NVC communities sampled there.

SSSI	Site name	10K	Central grid reference	Alkaline Fen	No. of samples	Transition Mire / Quaking Bog	No. of samples	Other fen vegetation	No. of samples	Total no. samples
Biller Howe Dale	Biller Howe Dale	NZ90	N Z91670 01800	M10, M10a, M10ai	6	M4, M29, S27a	3	M4, S9	2	11
Bishop Monkton Ings	Bishop Monkton Ings	SE36	SE 34530 65900	M13	1			M22a, M22b	4	5
Castlebeck & Scar Woods	Castlebeck Woods Fen	SE99	SE 94830 98090					M22b	1	1
Cawthorn Moor	Cawthorn Moor	SE79	SE 78310 92320	M10	1	M14	1	M22	1	3
Eller's Wood & Sand Dale	Sand Dale	SE88	SE 86000 84940	M13	2					2
Hole of Horcum	Hole of Horcum	SE89	SE 84630 93800	M10, M37	5					5
Low Pasture	Low Pasture	SE58	SE 53976 89338	M10	1			M24	1	2
Newtondale	Carter's House (ND)	SE89	SE 84008 95979					M15a	1	1
Newtondale	Chalybeate Spring (ND)	SE88	SE 82587 88976					M24	1	1
Newtondale	Crab Apple Fields (ND)	SE88	SE 82493 89351	M13c	1					1
Newtondale	Fen Bogs (ND)	SE89	SE 85270 97660	M10	1	M9a, M14, M21	4			5
Newtondale	Fen House (ND)	SE89	SE 84820 97270	M10b	2					2
Newtondale	Hagg Wood Marsh (ND)	SE88	SE 83126 88856					M22a, M22b	1	1
Newtondale	Havern Beck (ND)	SE89	SE 84660 94870	M10	6			M23a	1	7
Newtondale	Kidstye Farm (ND)	SE89	SE 83100 94720			S27a	1			1
Newtondale	Levisham Bottoms (ND)	SE89	SE 82840 93590	M10a (M15a)	3					3
Newtondale	Ness Head (ND)	SE88	SE 82843 88488	M9	1					1
Newtondale	North Dale (ND)	SE89	SE 84270 96090	M10, M13c, M9/M22	8	M9/S27a, S27a	2	M37	1	11
Newtondale	Northdale Scar (ND)	SE89	SE 83840 97150	M9	1	S27a	1			2
Newtondale	Raindale Beck (ND)	SE89	SE 80220 92620					no samples		
Newtondale	Raygate Slack (ND)	SE89	SE 81180 91370					no samples		
Newtondale	Rhumbard Snout (ND)	SE89	SE 81880 91180	M10a, M10aiii	2					2
Noddle End	Noddle End	SE58	SE 52890 88780					M22a, M22b	9	9
North York Moors	Arden Moor (Thorodale)	SE49	SE 49940 91620	M10	7					7

SSSI	Site name	10K	Central grid reference	Alkaline Fen	No. of samples	Transition Mire / Quaking Bog	No. of samples	Other fen vegetation	No. of samples	Total no. samples
North York Moors	Jugger Howe Beck	SE99	SE 93960 98960	M10, M13, M13b, M13c	4	M14, M21, M29	8			12
North York Moors	Kepwick Moor (White Gill)	SE49	SE 48580 92570	M37 / M38	1					1
North York Moors	Low Moor	NZ90	NZ 91265 02690	M9, M10	2					2
North York Moors	Scarth Wood Moor	SE49	SE 46730 99510	M10	5	M4, M9a, M29	4	M6a	1	10
Snaper Farm Meadows	Snaper Farm Meadows	SE59	SE 59710 91250	M10	2					2
Troutsdale & Rosekirk Dale	Troutsdale & Rosekirk Dale	SE98	SE 90090 87510	M13b	3			M22	1	4
Non-SSSI	Deepdale Meadow	SE99	SE 91224 90410	M13c	2					2
Non-SSSI	Dunsforth's Hill	SE49	SE 48560 91940	M10, M37	3			M22b	1	4
Non-SSSI	Hasty Bank Farm	SE68	SE 62602 88415	M10a	4					4
Non-SSSI	Jenny Thrush Spring	SE98	SE 92200 87600					no samples		
Non-SSSI	Longstone Meadow	NZ71	NZ 78640 12852	M13 / M22	1					1
Non-SSSI	Riverhead Farm	SE99	SE 92880 96860	M10a	2	M14, M21	4	M15a, M15b	2	8
Non-SSSI	Stony Moor Sike	SE59	SE 50880 97040	M9/M13, M10b	3	M29	1	M6a, M22b,	2	6
			Total	**Alkaline Fen**	**80**	**Transition Mire / Quaking Bog**	**29**	**Other fen vegetation**	**30**	**139**

4. CONCLUSIONS & DISCUSSION

4.1 SUMMARY OF SURVEYED MIRE TYPES

Of the 37 sites visited during this survey, 29 sites supported examples of Alkaline Fen and Transition Mire / Quaking Bog communities (see Table 3). Of the 139 fen samples recorded, a total of 80 samples were taken from Alkaline Fen communities, 29 samples were taken in Transition Mire / Quaking Bog communities, and 30 samples were taken in vegetation stands that, through analysis and internal discussions, were determined not to be either of these target fen types. Some of these latter types were sampled to provide site context. Although not a target of this survey, some of these are of conservation significance, and their sampling is considered to have been a useful data-gathering exercise that may be of further use to Natural England local area teams.

Alkaline Fen communities that were sampled consisted of the following NVC communities:

M9 *Carex rostrata–Calliergon cuspidatum* mire
M10 *Carex dioica–Pinguicula vulgaris* mire, including M10a *Carex demissa– Juncus bulbosus/kochii* sub-community, M10aiii *Schoenus nigricans* variant, M10b *Briza media–Primula farinosa* sub-community, and M10bii *Molinia caerulea–Eriophorum latifolium* var.
M13 *Schoenus nigricans–Juncus subnodulosus* mire, including M13b *Briza media–Pinguicula vulgaris* sub-community, & M13c *Caltha palustris–Galium uliginosum* sub-community
M37 *Cratoneuron commutatum–Festuca rubra* spring (where associated with M10 or M13)

Transition Mire / Quaking Bog communities consisted of:

M4 *Carex rostrata–Sphagnum recurvum* mire
M9a *Carex rostrata–Calliergon cuspidatum* mire, *Scorpidium scorpioides* sub-com. in soakways
M14 *Schoenus nigricans–Narthecium ossifragum* mire
M21 *Narthecium ossifragum–Sphagnum papillosum* valley mire
M29 *Hypericum elodes–Potamogeton polygonifolius* soakway
S27a *Carex rostrata–Potentilla palustris* tall-herb fen, *C. rostrata–Equisetum fluviatile* sub-com.

Non-target wetland communities that were sampled consisted of:

M6a *Carex echinata–Sphagnum recurvum/auriculatum* mire, *Carex echinata* sub-community
M15a *Scirpus cespitosus–Erica tetralix* wet heath, *Carex panicea* sub-community
M22 *Juncus subnodulosus–Cirsium palustre* fen-meadow, including M22a typical sub-community, and M22b *Briza media–Trifolium* spp. sub-community
M23a *Juncus effusus/acutiflorus–Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community
M24 *Molinia caerulea–Cirsium dissectum* fen-meadow
S9 *Carex rostrata* swamp.

It is particularly notable that, despite the large number of sites and samples (including target-noted examples that were not surveyed), the overall area of both Alkaline Fen and Transition Mire communities was extremely small. Alkaline Fen stands covered approximately 2.35 ha in total (although this does not include areas already known to Natural England such as M13 stands in Seive Dale SSSI, or M10 sites such as Blaiskey Banks Springs SSSI, which may not have been recently surveyed), and Transition Mire stands covered approximately 1.44 ha in total. In many cases, particularly with examples of M9 and M10 communities, individual stands covered as little as 10 m^2, and even at sites that supported large numbers of these seepages and flushes (e.g. Havern Beck), the composite area was often less than 1000 m^2 (equivalent to less than 0.1 ha). This is a particularly important result when considering the fact that the minimum resolution for GIS mapping purposes is usually 0.25 ha.

M13 vegetation is nationally scarce and in many places it is under threat for a variety of reasons. Consequently, sites found to support M13 vegetation during this survey are considered to be nationally important, and have been highlighted in bold in Table 3. See Section 4.3 for further discussion. In addition, Newtondale SSSI is considered to be a very important area for the presence and abundance

of so many plant communities of AF and TM / QB. These plant communities should be noted as interest features for the SSSI, if they are not already.

Table 3. A summary of target mire types surveyed.

Notes: Sites in bold are considered to be of national importance for the fen vegetation that they support. Areas are approximate, and not all of the known AF or TMQB sites were surveyed as part of this project. AF = Alkaline Fen; TMQB = Transition Mire / Quaking Bog.

SSSI	Site name	Grid reference	Interest feature	No. of samples	Feature area (ha)
Biller Howe Dale	Biller Howe Dale	NZ9167001800	M10a (AF) M4 M29 S27a (TMQB)	6 3	0.06 0.08
Bishop Monkton Ings	**Bishop Monkton Ings**	SE3453065900	M13c (AF)	1	0.002
Cawthorn Moor	Cawthorn Moor	SE7831092320	M10 (AF) M14 (TMQB)	1 1	0.06 0.07
Eller's Wood and Sand Dale	**Sand Dale [ex-forestry]**	SE8602784940	M13 (AF)	2	0.1
Hole of Horcum	Hole of Horcum	SE8463093800	M10 M37 (AF)	5	0.03
Low Pasture	Low Pasture	SE5397689338	M10 (AF)	1	0.001
Newtondale	**Crab Apple Fields**	SE8249389351	M13c (AF)	1	0.05
	Fen Bogs	SE8527097660	M10 (AF) M9a, M14 M21 (TMQB)	1 4	0.03 0.16
	Fen House	SE8482097270	M10b (AF)	2	0.1
	Havern Beck	SE8466094870	M10 (AF)	6	0.08
	Kidstye Farm	SE8310094720	S27a (TMQB)	1	0.01
	Levisham Bottom	SE8284093590	M10a (AF)	3	0.11
	Ness Head	SE8284388488	M9 (AF)	1	0.01
	North Dale	SE8427096090	M9/M22 M10 M13c (AF) M9/S27a S27a (TMQB)	8 2	0.15 0.07
	Northdale Scar	SE8384097150	M9 (AF) S27a (TMQB)	1 1	0.003 0.04
	Rhumbard Snout	SE8188091180	M10a (AF)	2	0.035
North York Moors	Arden Moor (Thorodale)	SE4994091620	M10 (AF)	7	0.23
	Jugger Howe Beck	SE9396098960	M13b M13c M10 (AF) M14 M21 M29 (TMQB)	4 8	0.35 0.9
	Kepwick Moor	SE4858092570	M37/M38 (AF)	1	0.0001
	Low Moor	NZ9126502690	M10 M9 (AF)	2	0.07
	Scarth Wood Moor	SE4673099510	M10 (AF) M4 M9a M29 (TMQB)	5 4	0.07 0.08
Snaper Farm Meadow	Snaper Farm Meadows	SE5971091250	M10 (AF)	2	0.06
Troutsdale & Rosekirk Dale Fens	**Troutsdale & Rosekirk Dale Fens**	SE9009087510	M13b (AF)	3	0.09
Non-SSSI	**Deepdale Meadow**	SE9122490410	M13c (AF)	2	0.21
	Dunsforth's Hill	SE4856091940	M10 M37 (AF)	3	0.09
	Hasty Bank Farm	SE6260288415	M10a (AF)	4	0.04
	Longstone Meadow	NZ7864012852	M13 / M22 (AF)	1	0.05
	Riverhead Farm	SE9288096860	M10a (AF) M14 M21 (TMQB)	2 4	0.01 0.03
	Stony Moor Sike	SE5088097040	M9/M13, M10b (AF) M29 (TMQB)	3 1	0.26 0.001
		Total	**Alkaline Fen** **Transition Mire**	**80** **29**	**2.35 ha** **1.44 ha**

4.2 'GOODNESS OF FIT' OF SAMPLED COMMUNITIES WITH THE NVC

It should be noted that there are a large number of vegetation types that have been recognised as not 'fitting' well within the NVC framework as it currently stands; these have been collated in a recent document published by JNCC (2011), and include those described by Rodwell *et al.* (2000). With this in mind, a number of general points can be made with regard to the mire communities sampled during this survey and how they 'fit' within the NVC scheme.

4.2.1 M9: Carex rostrata–Calliergon cuspidatum mire

Examples of M9 vegetation were found in a few locations during this survey. Whilst these samples could usually be quite clearly assigned to M9 in its broadest sense, there are recognised issues concerning the limitations of this plant community as currently described in the NVC (see Wheeler, Shaw & Tanner, 2009). The *Campylium stellatum–Scorpidium scorpioides* sub-community (M9a) has a distinctive form that is often particularly associated with base-rich soakways and water tracks, sometimes embedded within more base-poor vegetation, in which situations it can be considered as somewhat analogous to M14 vegetation. This is more specifically the case with the modified sub-community (M9-1) that has been proposed by Wheeler, Shaw & Tanner (2009). Consequently, in some cases samples from this survey of M9 and M9a have been categorised as Alkaline Fen, while in others they have been described as Transition Mire / Quaking Bog (see Section 4.4, below).

4.2.2 M10: Pinguicula vulgaris–Carex dioica mire

MATCH analyses of many of the base-rich, bryophyte and sedge-rich mires that were sampled during this survey fit well with the *Carex demissa–Juncus bulbosus/kochii* sub-community (M10a), with coefficients usually much greater than for the *Briza media–Primula farinosa* sub-community (M10b). When these were compiled into a constancy table and re-analysed, M10a remained the highest co-efficient. A smaller number of samples, when analysed individually, gave M10b as the highest co-efficient of fit. However, when compiled into a constancy table and reanalysed, they could just as confidently be assigned to the M10 community, rather than M10b sub-community. This result helped to confirm the surveyors conclusions made in the field, which was that most examples of these kind of mires either appeared to be clearly a form of M10a, or (in a fairly large number of cases) seemed to lack any defining character of either the M10a or M10b communities. On only a few occasions was a site found that clearly supported M10b (e.g. Fen House, Stony Moor Sike). Hence, in many cases these communities have been assigned just to the community level.

In a number of other cases, vegetation was sampled from seepages and soakways that appeared to have a broad affinity to M10, but with generally low MATCH coefficients (i.e. Burn Howe Dale (see Jugger Howe), Low Moor, and parts of Hole of Horcum and Scarth Wood Moor; coefficients range from 27.8% to 36.3%). For these samples it is not clear whether the ambiguity is a result of the narrow nature of the stands heightening the 'edge effect' and increasing the likelihood of plant species from adjacent communities establishing themselves in the mire samples, thereby blurring the 'character' of the mire community; or alternatively whether these stands represent a form of M10 that is not adequately described by the NVC.

4.2.3 M11: Carex demissa–Saxifraga aizoides mire

Many of the sampled M10 stands are from open, stony, steep seepages & flushes, and as a consequence there is sometimes a fairly strong affinity with M11. However, as discussed by Wheeler & Shaw (1995), M11 was apparently introduced by Rodwell (1991) to describe open, strongly flushed, and mainly high altitude vegetation of northern latitudes; however, similar vegetation, lacking the northern species such as *Saxifraga aizoides*, is also found in more southern and lowland sites (but not recognised by the NVC), and the component species are usually intimately associated with adjacent M10 stands. As a consequence it is often difficult to split the two communities floristically, and as

such it is considered here that M11 may not be a useful community distinction to use, particularly at these sites.

4.2.4 M13: Schoenus nigricans–Juncus subnodulosus mire

In most cases where examples of M13 vegetation were sampled as part of this project, it was quite apparent from field observations that they would be best assigned to that plant community. However, there were one or two instances where this was less obvious in the field, namely stands without *Schoenus nigricans* such as those at Crab Apple Fields, North Dale, Sand Dale, and Longstone Meadow. However, despite visual differences, floristically they all appear characteristic of M13 vegetation (although Longstone Meadow is somewhat intermediate between M13 and M22).

4.2.5 M14: Schoenus nigricans–Narthecium ossifragum mire

M14 often develops in zones between base-rich soakways and base-poor or ombrotrophic plant communities. However, it is likely to have been inconsistently recorded in vegetation surveys because it is described in the NVC account (Rodwell, 1991) as being largely confined to south-west England, and no examples from northern England are apparently included. Despite this, data collected from Cumbria and North Yorkshire clearly place many distinctive soakway plant communities within M14 (Wheeler, Shaw & Tanner, 2009).

Of the samples surveyed during this project that were assigned to M14, MATCH analysis often produced a higher coefficient for M10a or M15a than for M14. This may well be caused by a combination of factors: the NVC sample set for M14 is very small (15 samples: Rodwell, 1991), and these were exclusively from the south and south-east of England; M14 can be associated with both base-rich and base-poor influences, hence it may have affinities to vegetation of both base-rich conditions (e.g. M10) and base-poor conditions (e.g. wet heath vegetation such as M15a). Some seepage versions of M14 do have strong floristic affinities to some soligenous forms of M15a (and to some types of M10). However, M10 and M14 are generally associated with strong input of telluric, relatively base-rich, water, whereas M15a is associated with areas of endotelmic water flow within a mire (i.e. they are not fed by groundwater outflow), and these flow-paths can be marked out by patches of *Schoenus nigricans* or *Pinguicula vulgaris*, but lack basiphilous bryophytes.

The syntaxonomic status of M14 and its relationship to other community types (such as M9-1(M9a), and M15a) requires re-examination using data additional to those available to Rodwell (1991) (see Rodwell *et al.*, 2000; Wheeler, Shaw & Tanner, 2009).

4.2.6 S27: Carex rostrata–Potentilla palustris tall herb fen

As noted in Wheeler, Shaw & Tanner (2009), there is considerable floristic overlap between S27 and M9 (particularly M9b / M9-2), and consequently it can be difficult to assign samples to either one or the other community. This is exacerbated by the fact that S27 is in general distinguished from M9-2 by the absence of particular species, which means that a variety of different, but species-poor, stands, will often by default be classified as S27 (Wheeler, Shaw & Tanner, 2009). Of the five stands of S27 that were sampled during this survey, at least one appeared intermediate between S27 and M9 (North Dale stand 7).

4.3 REGIONAL & NATIONAL CONTEXT

4.3.1 M9: Carex rostrata–Calliergon cuspidatum mire

Examples of M9 *sensu lato* are found throughout much of the UK, but particularly from East Anglia, Wales, Cumbria, the Scottish Borders, and central, western and north-eastern Scotland (Rodwell, 1991; Wheeler & Shaw, 1995; Wheeler, Shaw & Tanner, 2009). Very few examples were found during this survey, and consequently the North York Moors region does not appear to be a very important area for this plant community.

4.3.2 M10: Pinguicula vulgaris–Carex dioica mire

M10 is a widespread plant community that is found throughout the UK, particularly in the north and west, and in upland areas of the country (Rodwell, 1991; Wheeler & Shaw, 1995; Wheeler, Shaw & Tanner, 2009). A number of examples have already been documented from the North York Moors region, and at least one statutory site in that area (Blaiskey Bank Springs SSSI) has been designated because of base-rich seepages that support a fine and extensive example of M10 vegetation. The M10 mires that have been sampled as part of this project are individually less extensive than that site, but collectively they comprise an important resource that is clearly a typical feature of many groundwater-fed wetlands in this area.

4.3.3 M13: Schoenus nigricans–Juncus subnodulosus mire

M13 vegetation is quite widespread, but of rare occurrence, in southern Britain, and its main centres are in East Anglia and Anglesey (Rodwell, 1991; Wheeler & Shaw, 1995; Wheeler, Shaw & Tanner, 2009). There are a few important outliers elsewhere, North Yorkshire being one of those. Several large examples are already known from the North York Moors region, particularly the Dalby Forest sites (e.g. Seive Dale Fen SSSI; Eller's Wood & Sand Dale SSSI; Troutsdale & Rosekirk Dale Fens SSSI). This project has highlighted extensions to existing sites (Sand Dale), new sites within Dalby Forest (Deepdale Meadow), and a number of other sites beyond Dalby Forest. The most extensive of these is in Jugger Howe Dale, but there are also examples at south and north Newtondale, Longstone Meadow, and Bishop Monkton Ings. This part of the country is clearly an important locus for M13 vegetation, and it is likely that further investigation may highlight other examples (see Section 5.1 for further discussion).

4.3.4 M14: Schoenus nigricans–Narthecium ossifragum mire

Documented examples of this plant community in the published NVC accounts are very scarce, and are generally confined to southern England and East Anglia (Rodwell, 1991). However, M14 is geographically more widespread than suggested by the NVC, and examples of similar vegetation are known from Yorkshire (Fen Bogs), Cumbria and west Scotland (Wheeler & Shaw, 1995; Wheeler, Shaw & Tanner, 2009). This project sampled mires supporting this type of vegetation from three additional sites: Cawthorn Moor, Riverhead Farm, and Jugger Howe Dale. The latter site supports a large number of extensive stands that can be attributed to M14 and, combined with the presence of large M13 stands there, Jugger Howe Dale can be considered one of the most important examples in England of mixed Alkaline Fen and Transition Mire (B.D. Wheeler, pers. comm.). Clearly, therefore, the North York Moors region is also an important locus for M14 vegetation.

4.4 LINKING NVC COMMUNITIES TO EC HABITAT CATEGORIES

4.4.1 H7230 Alkaline Fen

H7230 Alkaline Fen habitat in Britain is associated with wetlands irrigated by base-rich, but not always alkaline, water (pH > 6) from springs and seepages, often on hill-slopes (soligenous[1]). Tufa deposition sometimes creates large spring mounds. This category also includes some vegetation in topogenous situations (where water is retained due to impeded drainage) fed by groundwater outflow (percolation).

These habitats are often very small in extent (sometimes only a few square metres), but they are typically species-rich, and support many rare species.

The NVC plant communities that are considered to qualify as Alkaline Fen are M9 (but usually M9b (M9-2[2])), M10, M11 and M13. In this project mainly M10 and M13 plant communities were recorded, with a few stands that could be attributed to M9.

M37 springs were also sampled where they were found in combination with any of the above plant communities.

Fen meadow and rush pasture vegetation is often strongly associated with springs and seepages (mainly NVC communities M22 and M24). Many stands of M22 vegetation, often forming more extensive stands fringing the very localised patches of 'alkaline' fen, were sampled as part of this project. M22 is a widespread and extensive vegetation type in England, and can be very variable in structure and composition. In some cases stands are intermediate between M13 and M22 (e.g. Longstone Meadow), and as such are regarded here as Alkaline Fen habitat.

4.4.2 H7140 Transition Mire and Quaking Bog.

The NVC vegetation types considered to qualify as Transition Mire and Quaking Bog (TM / QB) are M4, M5, M8, M9, (and M14, M21, M29, and S27 in some situations). The habitat is described in the interpretation manual as 'presenting a large range of plant communities' (European Commission, 2007), but is mainly described as occurring in topogenous situations, basins, pools, fringing open water and on floodplains, and the occurrence of vegetation rafts is highlighted as an important feature in many sites.

It is rather unclear exactly what vegetation types, or wetland habitats, are encompassed within the CORINE definition and interpretation of TM / QB (see discussion of concepts in Wheeler & Shaw 1995a & b). Essentially the most widely accepted concept of transition mire is related to the development of a whole wetland system, rather than being specifically associated with particular plant communities. Applying this concept would mean that in some cases whole sites, supporting a range of plant communities, would be regarded as 'Transition Mire', e.g. Fen Bogs in Newtondale (see Prosser & Wallace, 2010, for a more detailed discussion of this site). However, under the definitions provided in the interpretation manual (European Commission, 2007) and in the JNCC guidance for this habitat (JNCC 2007, 2012), large parts of Fen Bogs do not qualify as Annex 1 habitat because they support 'bog' vegetation (NVC communities: M18 *Erica tetralix– Sphagnum papillosum* bog and M21 *Narthecium ossifragum–Sphagnum papillosum* valley mire), which peat stratigraphical studies show has developed relatively recently (over the last 200 years or so). These 'bog' vegetation types are listed as the Annex 1 habitats 'Active raised bogs'; 'Blanket bogs' (M18); and 'Rhynchosporion' (interpreted as some types of vegetation classified as the NVC community M21). However, the Fen Bogs site is clearly not a raised or blanket bog, and the extensive areas of M21 vegetation do not represent Rhynchosporion vegetation. M21 is explicitly excluded from the current JNCC definition of TM / QB (2012), and few examples of M21 can be considered as examples of Rhynchosporion

[1] Terminology follows Wheeler, Shaw & Tanner (2009)

[2] See Wheeler, Shaw & Tanner (2009) for explanation of M9 sub-divisions

vegetation. However, it is a vegetation type of national and European Union importance, and it does support some of the characteristic species listed in the interpretation manual under the Transition Mire and Quaking Bog heading, particularly in the M21a sub-community (e.g. *Rhynchospora alba* and *Carex lasiocarpa*).

Because of the ambiguity of the available definitions, it can be difficult to decide when stands representing target NVC communities qualify as TM / QB habitat. Many plant communities listed as qualifying TM / QB habitat are widespread in wetlands in Britain and are often associated with other wetland habitats, so they cannot always be regarded as TM / QB (e.g. M2 is often associated with pools in raised bogs; M4 is often found as acidic flushes in upland heaths and blanket mires; S27 is a widespread swamp community; M29 often occurs in water flow tracks forming an axial stream in valley wetlands).

In this project M4, M9a (M9-1), M14, M21, M29 and S27a were recorded. Following recent discussions between Natural England staff, Dr Bryan Wheeler and Dr Ros Tratt, which resulted in the provisional revision of the UK NVC plant communities thought to correspond to TM / QB, many of these samples are here regarded as TM / QB.

4.5 HYDRO-GEOLOGICAL CONTEXT & POSSIBLE WATER SUPPLY MECHANISMS

Figure 2 and Table 4 provide a very brief overview of most of the geological strata present in the area of the present North York Moors mire surveys, while Table 5 indicates which mire sites may be associated with which strata, and suggests *possible* water supply mechanisms (WETMECs[3]). The possible relationship of these mires with the geological strata have been summarised from the accompanying hydro-geological account (Annex 4), which has attempted to relate the surveyed mires to the underlying geological strata. In many cases this has been an approximate procedure, because of the inherent cartographic inaccuracies when trying to locate often very small sites using a 1:50,000 scale geology map. Consequently, any conclusions that are drawn here should be viewed as provisional in nature. Suggested water supply mechanisms are also based on limited investigations, and should not be considered definitive.

Bearing in mind the above caveats, it appears that many of the mires that were surveyed here may be irrigated by water sourced from the following rock strata: the Corallian Formation; the Lower Calcareous Grit Formation; the Cornbrash Formation and the Osgodby Formation; the Long Nab Member of the Scalby Formation; Brandsby Roadstone of the Scarborough Formation; and the Cloughton Formation.

The nature of these strata is quite varied, but in broad terms they are all either sandstones, siltstones, mudstones, or limestones. The different sandstones and limestones are likely to have varying water-bearing properties depending upon the thickness of the individual layers, the degree of fracturing and / or intergranular porosity, and the presence or absence of an aquitard layer (e.g. the Oxford Clay Formation), which if present could serve to restrict water recharge to any underlying aquifer. Perhaps as a consequence of this variability, some mire sites are characterised by very vigorous springs and seepages sourced from strata that are recognised as having high water-bearing capacity (e.g. Deepdale Meadow is apparently sourced by the Lower Calcareous Grit, which is likely to be in hydraulic continuity with overlying limestone strata of the Coralline Oolite Formation), while other sites have very gentle seepages that appear to be related to very thin layers of limestone, e.g. Havern Beck. In contrast, elsewhere there are sites found on siltstones and mudstones that are practically impervious (e.g. Riverhead Farm, situated on the Long Nab Member), but which may be fed from thin water-bearing sandstone layers (that are not marked on the geological maps), or from fracture flow through otherwise impervious rocks.

[3] See Wheeler, Shaw and Tanner (2009) for explanation of WETMECs.

Most of the mires sampled here were at least moderately base-rich (measured range: pH 5.0–8.1), with the exception of some of the Transition Mire communities (measured range: pH 3.8–6.3). However, even where irrigating water may have been sourced from siliceous sandstones, a moderate degree of base-enrichment could perhaps result from contact with underlying calcareous mudstones.

Most of the Alkaline Fen communities that were sampled were found on sloping ground, and many samples, particularly of M10 mires, were found on very steep ground (e.g. Havern Beck, Fen House, Northdale). Typically, therefore, most of the sampled Alkaline Fen communities are soligenous, and their water supply mechanisms may perhaps combine WETMEC 10 Permanent seepage slopes (either or both WETMEC 10a Localised strong seepages and 10b Diffuse seepages) with WETMEC 17a Groundwater-flushed slopes (or WETMEC 17b Weakly groundwater-flushed slopes), and WETMEC 17d Groundwater-flushed flow-tracks. Flushes are mostly found where groundwater from seepages flows over an underlying aquitard (e.g. Oxford Clay beneath strata of the Corallian Group, at the Arden Moor mires).

In a very few cases fen communities were situated on more-or-less flat ground, or in small basins (i.e. topogenous or rheo-topogenous mires). These examples were generally Transition Mires at the edge of topogenous basins or troughs, for example, part of Scarth Wood Moor has a small basin which is probably an example of WETMEC 14 Seepage percolation trough with WETMEC 15a Topogenous seepage flow tracks.

However, further survey and more information is needed to be able to determine the WETMECs and their contribution to the wetland habitat at individual sites, particularly in determining the relative contributions of WETMEC 10 (spring/seepage) and WETMEC 17 (flush).

Figure 2. Surveyed North York Moors National Park mires in relation to broad geological strata.

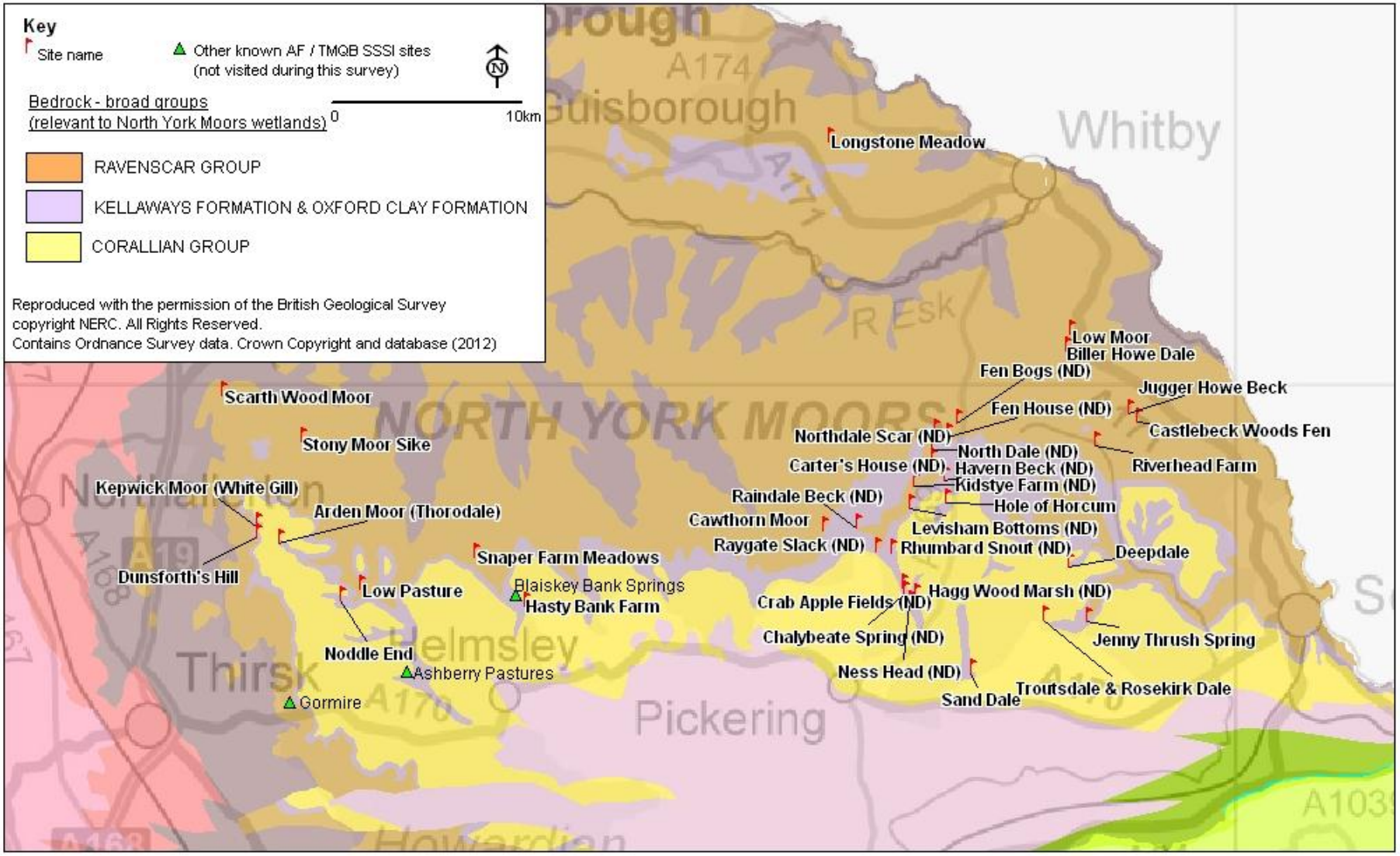


Table 4. Summary characteristics of the geological strata present in the North York Moors survey area (youngest to oldest).

Summarised from the accompanying hydro-geological account (Annex 4).

Geological strata		**General description**	**Significance as a groundwater source**	**Relevant to this survey?**
Group	**Formation & Members**			
Corallian Group	*Coralline Oolite Formation*:			
	Upper Calcareous Grit	Calcareous sandstone	General hydraulic continuity of all members makes this group act as a significant aquifer	
	Malton Oolite and Coral Rag	Oolitic limestone and ragstone		
	Middle Calcareous Grit	Calcareous sandstone		
	Hambleton Oolite	Oolitic limestone with sand		√
	Yedmandale Member	Limestone and calcareous sandstone		√
	Lower Calcareous Grit Formation			
	Lower Calcareous Grit	Calcareous sandstone with limestone		√
Ancholme Group	*Oxford Clay Formation*	Mudstone	Aquitard	√
	Osgodby Formation (Kellaways Rock)			
	Hackness Rock	Siltstone and limestones	Locally important	
	Langdale Member	Sandstone with clay partings		
	Redcliffe Rock	Calcareous sandstone		√
Great Oolite Group	*Cornbrash Formation*	Sandy limestone & silty mudstone	Limited – local supply	√
Ravenscar Group	*Scalby Formation*			
	Long Nab Member	Mudstones & siltstones (some sandstones)	Aquitard / local supply	√
	Moor Grit Member	Sandstone (some mudstones & siltstones)	Moderate	√
	Scarborough Formation			
	Crinoid Grit Member	Sandstone (some siltstone, mudstone & limestone	Moderate	
	Brandsby Roadstone	Limestone (some calcareous mudstone)	Limited – local supply	√ ?
	Cloughton Formation	Laminated mudstones & siltstones with cross-stratified sandstones, & oolitic limestones	Moderate	√

Table 5. Summary of geological strata that may irrigate surveyed mires, & *possible* water supply mechanisms (WETMECs).

Note the highly provisional nature of this summary, particularly with regard to cartographic difficulties in assessing the actual location of springs or seepages in relation to geological strata (see also Annex 4). Further surveys would be required to determine the existence and relative contributions of different WETMECs. Sites are ordered by geological Formation (ND = Newtondale).

Mire site	Geological strata	General strata description	*Possible* WETMECs*
Arden Moor	Lower Calcareous Grit (& Osgodby Formation?)	Calcareous sandstone with limestone	10a, 10b, 17a, 17b
Deepdale Meadow	Lower Calcareous Grit	Calcareous sandstone with limestone	10a, 17a, 17d
Hasty Bank Springs	Lower Calcareous Grit	Calcareous sandstone with limestone	10a, 10b, 17a, 17d
Noddle End	Lower Calcareous Grit (& Osgodby Formation?)	Calcareous sandstone with limestone	10b, 17b
Sand Dale	Lower Calcareous Grit	Calcareous sandstone with limestone	10a, 10b, 17a, 17d
Troutsdale	Lower Calcareous Grit	Calcareous sandstone with limestone	10a, 10b, 17a, 17d
Hole of Horcum	Lower Calcareous Grit	Calcareous sandstone with limestone	10b, 17d
Hagg Wood Marsh (ND)	Osgodby Formation	Calcareous sandstone, siltstone & limestone	10b, 16 ?
Dunsforth's Hill	Osgodby Formation (& some Long Nab?)	Calcareous sandstone, siltstone & limestone	10a, 10b, 17a, 17d
Cawthorn Moor	Cornbrash / Osgodby Formation	Sandy limestone & silty mudstone / calcareous sandstone	10a, 10b, 17a, 17d
Fen House (ND)	Cornbrash / Osgodby Formation	Sandy limestone & silty mudstone / calcareous sandstone	10a, 17a, 17d
Northdale Scar (ND)	Cornbrash / Osgodby Formation	Sandy limestone & silty mudstone / calcareous sandstone	10b, 17a, 17d
Northdale (ND)	Cornbrash / Osgodby Formation	Sandy limestone & silty mudstone / calcareous sandstone	10a, 10b, 16b?, 17a, 17b, 17d
Havern Beck (ND)	Cornbrash	Sandy limestone & silty mudstone	10a, 17a, 17b, 17d
Levisham Bottom (ND)	Cornbrash / Osgodby Formation (or Long Nab?)	Sandy limestone & silty mudstone / calcareous sandstone	10a, 10b, 17a, 17d
Rhumbard Snout (ND)	Cornbrash	Sandy limestone & silty mudstone	10b, 17a
Biller Howe Dale	Long Nab	Mudstones & siltstones (some sandstones)	3?, 10a, 10b, 17d

Mire site	Geological strata	General strata description	*Possible* WETMECs*
Low Moor	Long Nab	Mudstones & siltstones (some sandstones)	10b, 17b
Riverhead Farm	Long Nab	Mudstones & siltstones (some sandstones)	10a, 10b, 17a, 17b, 17d
Fen Bogs (ND)	Long Nab	Mudstones & siltstones (some sandstones)	(1?), 2, 3, 10a, 10b, 15a, 17a, 17b, 17d
Low Pasture	Long Nab (or Osgodby Formation?)	Mudstones & siltstones (some sandstones)	10b, 17a
Jugger Howe Beck	Long Nab & Scarborough Formation	Mudstones & siltstones; sandstone & limestone	10a, 10b, 17a, 17b, 17d
Longstone Meadow	Scarborough Formation?	Sandstone & limestone	10b? / 11?
Snaper Farm Meadows	Brandsby Roadstone	Limestone	10a, 10b, 17a, 17d
Scarth Wood Moor	Cloughton Formation (& Moor Grit & Scarborough Formation?)	Mudstone, siltstone, sandstone & limestone	10a, 10b, 14?, 15a?, 17b, 17d
Stony Moor Sike	Brandsby Roadstone & Gristhorpe Member?	Limestone; & mudstone, siltstone & sandstone	10a, 10b, 17a, 17b, 17d

* WETMEC 3: Buoyant, weakly minerotrophic surfaces (transition bogs).

WETMEC 10: Permanent seepage slopes; 10a: Localised strong seepages; 10b: Diffuse seepage.

WETMEC 11: Intermittent & part-drained seepages.

WETMEC 14: Seepage percolation trough.

WETMEC 15: Seepage flow tracks; 15a: Topogenous seepage flow tracks.

WETMEC 16: Groundwater-flushed bottoms; 16b: Groundwater-flushed bottom + watercourse inputs.

WETMEC 17a: Groundwater-flushed slopes; 17b: Weakly groundwater-flushed slopes; 17d: Groundwater-flushed flow-tracks.

4.6 MANAGEMENT ISSUES

A number of management issues were noted at various sites during the course of these surveys, and these have been summarised in Table 6, below. It is hoped that this will be of use to Natural England Conservation Advisors in the local team(s) when planning conservation management of these sites.

Table 6. Summary of management issues

Site name	Current Management	Management History	Management Issues	Recommendations (priorities marked*)
Arden Moor (North York Moors SSSI)	Sheep grazed as part of extensive moorland unit.		Valley-bottom bridleway, a popular mountain biking route, crosses species-rich flushes.	* Consider flushes as SSSI interest feature, monitor in summer. Check use of bridleway is not causing rutting (install small section of boardwalk?). Carry-out ISA monitoring during summer.
Bishop Monkton Ings SSSI	Some mowing. No livestock grazing. Keepered (pheasants).	Deepening of central watercourse (the Holbeck). Drainage of spring mounds.	Invasion of *Phragmites australis* into species-rich M22 area. Invasion of nettles and *Impatiens glandulifera* in inundation zone near the Holbeck. Peripheral ditches.	* Prevent dominance of *Phragmites* and build up of *Juncus* litter by mowing as much of unit 2 as possible, particularly the extensive low spring mound with the *Schoenus* patch, and remove cuttings annually, or as often as practical.
Cawthorn Moor SSSI	Hydraulic ram pumping spring water. Managed for pheasant shooting as part of an extensive area. No grazing.		Storage of fuel (and leakage).	* Clean up current spill. * Fuel should not be stored where it can leak on the SSSI interest features.
Crab Apple Fields (Newtondale SSSI)	Light cattle grazing.		Quad bike damage.	Monitor recovery from damage including adjacent fen meadow.
Deepdale (non SSSI)	Deepdale meadow ditched and mown. Active hydraulic ram at head of site in SW. In NE, no management.		Dereliction of M13 area due to lack of management.	* Strim M13 areas on NE side of track, and remove cuttings. Consider blocking ditches on SW side of track.
Fen Bogs (Newtondale SSSI)	Light sheep grazing, as part of adjacent moorland unit. YWT Reserve.	Drainage, agricultural use of south-western area, burning, creation of railway.	*Myrica gale* abundance? Reed invasion? Impact of railway (drainage, accidental fires).	Map stands of *Phragmites australis* so that any expansion can be monitored. *Myrica gale* may be an issue in terms of ISA, but it is not clear if it is getting any more abundant. In the past it may have been kept in check by burning.
Hasty Bank (non SSSI)	Sheep grazed.		Water abstraction, gravel dumped & physical barrier constructed.	Remove earth barrier & dumped gravel; consider removal of water abstraction point. Consider extending Blaiskey Bank Springs SSSI to include this site?

Site name	Current Management	Management History	Management Issues	Recommendations (priorities marked*)
Jugger Howe Beck (North York Moors SSSI)	Sheep grazed as part of extensive moorland unit.	Stone extraction? ('Pits' marked on 19th century maps).	Dereliction – build up of tussocks and vegetation litter.	Manage the M13 vegetation by mowing or by increasing summer grazing pressure (maybe try hardy cattle or ponies – if available?) Consider the wetland complex as a discrete unit and prescribe and monitor management separately to the adjoining moorland. Carry-out ISA monitoring during summer.
Longstone Meadow (non SSSI)	Currently ungrazed.	Previously cattle grazed.	Dereliction due to lack of vegetation management.	* Vegetation management – re-instate cattle grazing?
Ness Head (Newtondale SSSI)	Grazed by cattle.		Quad bike damage.	Monitor recovery of vegetation including adjacent fen meadow.
Rhumbard Snout (Newtondale SSSI)	Grazed by cattle. Water abstraction.		Water abstraction.	Consider removal of water abstraction equipment.
Riverhead Farm (non SSSI)	Spring mounds are cattle grazed as part of improved pasture fields.		Ditching, pasture improvement & heavy grazing around spring mounds	Monitor possible effects of pasture improvement and grazing. Ensure no new drains are dug near wetland features.
Rosekirk dale (SSSI)	HLS?	Forestry plantation, cleared in late 1980s.	Lack of vegetation management leading to build up of litter and tussocky vegetation.	* Base-line survey (if not already done). * Vegetation management (e.g. spring / summer cattle grazing) through HLS. Monitor impact of vegetation management as part of HLS agreement.
Sand Dale (SSSI, SAC)	West of fence (main M13 area): Light grazing. East of fence and non-SSSI: Heavier grazing (cattle).	Management for SAC interest feature, the snail *Vertigo geyeri.*	Eastern part of SSSI unit 2 was very close cropped in September.	Review grazing management of SSSI unit 2. Consider fencing eastern section from adjacent improved pasture to reduce grazing pressure.
Sand Dale non-SSSI area	Cattle grazing.	Forestry plantation, cleared recently.		* Vegetation management (e.g. spring / summer cattle grazing) through HLS? Monitor impact of vegetation management.
Snaper Farm Meadows (SSSI)	Sheep grazing.		Partial shading of Stand 1, which lies just outside SSSI boundary.	Considering altering site boundary to include Stand 1. Consider trimming overhanging scrub to reduce shading.
Troutsdale (SSSI)	HLS. Cattle grazed in the summer as part of wider grazing unit.	Water supply from pump house.	Possible nutrient enrichment of some groundwater outflows (mainly in non-SSSI areas).	Consider whether there are catchment management issues (e.g. fertiliser application near a sink hole).

4.7 RESTORATION OPPORTUNITIES

The main opportunities for restoration of Alkaline Fen, Transition Mire / Quaking Bog, and related rich-fen communities at the sites visited during this project, are listed below in Table 7.

Table 7. Main opportunities for restoration of sites supporting Alkaline Fen, Transition Mire / Quaking Bog vegetation, and related rich-fen communties.

Site	Restoration Options
Deepdale Meadow	Block ditches in the fen meadow area south-west of the track. Mow areas of M13 vegetation annually and remove cuttings.
Sand Dale	Fence eastern section of Unit 2 and manage that in conjunction with deforested area with light cattle grazing.
Rosekirk Dale	Introduce cattle grazing or mowing, and control scrub.
Hasty Bank Farm	Remove or relocate water abstraction structure, remove earth bank that blocks route of water track, remove deposited gravel at top of slope.
Longstone Meadow	Re-instate light cattle grazing.
Chalybeate Spring (Newtondale)	Reinstate management (light grazing or mowing) and cut back scrub.
Rhumbard Snout	Remove water abstraction equipment.
Crab Apple Fields	Prevent further quad-bike damage and monitor recovery.
Dunsforths' Hill	Consider negotiating the temporary closure of one or more abstraction points and monitor effect upon associated Alkaline Fen vegetation.
Stoney Moor Sike	Consider blocking small drains at upper edge of seepage line.

5. RECOMMENDATIONS

5.1 FURTHER SURVEYS

Further surveys of a number of sites would be beneficial:

5.1.1 Jugger Howe Dale

This is one of the best examples of mixed Alkaline Fen and Transition Mire in England. Due to time constraints of the current survey there are several areas of fen that were not fully surveyed, plus other parts of the dale were not visited.

5.1.2 Fen Bogs SAC (Newtondale SSSI)

It would be useful to undertake a 'WETMEC' survey of Fen Bogs, in order to supplement the existing vegetation survey data and try to elucidate further the reasons for the vegetation patterning seen at the site. This may assist in setting or modifying relevant Conservation Objectives for the site.

5.1.3 Dalby Forest M13 sites (Seive Dale, Sand Dale, Rosekirk Dale, Troutsdale)

These are an important series of M13 sites. Our survey was very limited at these sites, mainly focussing on areas at the margins or adjacent to the SSSI boundaries. Some vegetation samples were recorded in 1990 by Wanda Fojt, but it is not clear whether full NVC surveys have been made since, or whether the full extent of M13 vegetation has been mapped. It is particularly important to have a baseline survey of Rosekirk Dale because the site conditions have changed markedly following the removal of an area of conifer plantation.

Sand Dale is designated as an SAC site because it supports a good population of the Habitats Directive Annex II snail species *Vertigo geyeri* (Abrehart, 2010). However Alkaline Fen is not listed as a qualifying habitat at Sand Dale (although 'Petrifying springs with tufa formation' are). Optimal habitat for *Vertigo geyeri* consists of 'flushed fen grassland with sedge/moss lawns 10–25cm tall, containing species such as *Carex viridula, C. hostiana, C. dioica, Blysmus compressus, Pinguicula vulgaris, Briza media, Equisetum palustre, Eleocharis quinqueflora, Eriophorum* spp., *Juncus articulatus, Primula farinosa,* and the mosses *Drepanocladus* spp., *Campylium stellatum*, with tussocks of *Schoenus nigricans* no greater than 80 cm tall, and the water table between 0–5cm of the soil surface, but not above ground level' (Killeen, 2010). This description encompasses both M10 and M13 plant communities, so *Vertigo geyeri* sites are all likely to support M10 or M13 vegetation. *Vertigo geyeri* has also been recorded from Jugger Howe Dale, but was not re-recorded in the most recent survey (Abrehart, 2010), although the large spring mound surveyed by us in 2011 (Stand 1) was not sampled by the invertebrate specialists. Presumably *Vertigo geyeri* may be present at other M13 sites in Dalby Forest (Seive Dale and Troutsdale) where vegetation representing 'optimal' habitat is relatively extensive.

In addition, several rare plant species have been recorded from these sites in the past (e.g. *Drosera longifolia* (=*anglica*)) at Seive Dale, *Dactylorhiza traunsteineri* at all Dalby SSSI sites). The occurrence and extent of populations of rare and threatened species such as these should be monitored on a regular basis (e.g. during ISA visits if undertaken at a suitable time of the year).

5.1.4 Other springs and seepages in the North York Moors SSSI

Several target notes regarding base-rich seepages are listed in a report collated in 2001 (English Nature, 2001). Some were followed up as part of this survey (e.g. Scarth Wood Moor, Stoney Moor Sike, Arden Moor) but many more target notes were listed, and these should be visited where they have not been surveyed recently. Many other extensive SSSI site units may have fen as an interest feature alongside moorland habitats. Flushes with *Pinguicula vulgaris* are often particularly rich in invertebrates (Godfrey, 2005), so despite their small size, they add much biodiversity value to many upland areas.

5.1.5 Caydale SSSI

Caydale is another site that apparently supports M13 vegetation, although it is not clear how old the survey data are, nor to what level of detail the fen vegetation was sampled (e.g. were quadrat data collected, or was it a walkover with target notes?). All M13 sites should have recent detailed baseline NVC survey data available.

5.1.6 Beck Hole SSSI

Beck Hole was not visited during this survey because access was not permitted due to shooting. Several areas of base-rich seepages are noted in previous surveys, and these should be re-visited to assess their importance.

5.1.7 Mar Field Fen SSSI & other wetland in the Vale of York

These sites are situated near to Bishop Monkton Ings in the Vale of York. They were not visited as part of the current survey and we are not aware that any detailed survey information exists.

The citation for Mar Field Fen (near Masham) lists M13 vegetation as an interest feature, so it requires a baseline survey to establish the composition, extent and condition of this nationally important vegetation type. Mar Field Fen is located in an area where there has been extensive mineral extraction, and where more is planned. This makes a full investigation of the current status of the site particularly important, because M13 vegetation is likely to be particularly vulnerable to activities affecting water supply.

Other SSSI sites supporting M13 vegetation in the Ripon area (Cow Myers and Ripon Parks) have been the subject of various surveys and ecological investigations.

Another small wetland site, Sharow Mires (non SSSI) is also located in the Ripon area (SE 330 708). This site supports *Cladium mariscus* and *Carex elata* and there are old records for *Schoenus nigricans*. Tufa mounds are also marked on the geology map at Burton Leonard and Copgrove, just south of Bishop Monkton Ings and north of Farnham Mires SSSI, and these support a good example of species-rich M22 vegetation. The HLS agreement (AG00234178) includes management of species-rich grassland associated with streams (Ian Bowes, pers. comm.). Farnham Mires SSSI also supports M22 vegetation.

This series of sites may not all support Alkaline Fen habitat but they appear to represent an important ‘hotspot’ of base-rich wetland vegetation in the Vale of York, that is not consistently recognised on the national fen inventory. It is arguable that all examples of important species-rich fen meadow communities (particularly M22, M24 and M26) should be included in the national fen inventory.

5.1.8 Other notes

Tranmire SSSI was not visited because the vegetation there is not regarded as being Transition Mire.

5.1.9 Higher Level Stewardship

All sites recorded in this survey are of conservation importance and, although often small in area, should be prioritised for conservation management by seeking management agreements under the Higher Level Stewardship scheme, or other agri-environment schemes.

5.2 TIMING OF SITE SURVEY AND MONITORING

Wetland vegetation is best monitored during the summer months (i.e. July – September). Many orchids are in flower in June or July, so this can be the best time to check identification. *Dactylorhiza traunsteineri* flowers much earlier (in May), so for maximum visibility and confirmation of identification, a visit would need to be made then. However, during a June or July visit when other species are in flower, it would be possible to assume that specimens that had already flowered were *Dactylorhiza traunsteineri*.

Consequently, moorland units with wetland interest should sometimes have a summer monitoring visit, rather than a winter visit as is often the case. This particularly applies to some units of Newtondale, and the North York Moors SSSI. Where there is significant and extensive wetland interest, e.g. Jugger Howe Dale and Arden Moor (Thorodale), the main wetland area should be assigned to a separate SSSI site unit, with the wetland interest forming the SSSI unit level 1 Interest Feature.

6. REFERENCES

Abrehart, T.N. (2010). *Article 17 reporting cycle on* Vertigo geyeri *at Eller's Wood & Sand Dale SSSI/SAC & Jugger Howe Moor (North York Moors SSSI).* Unpublished report, Natural England.

Atherden, M.A. (1976). Late Quaternary vegetational history of the North York Moors. III. Fen Bogs. *Journal of Biogeography*, **3**, 115–124.

European Commission (2007). *Interpretation manual of European Union habitats* EUR 27.

Fojt, W. (1990). *Comparative survey of rich-fens of the North York Moors.* EN Research Report 128

Godfrey, A. (2005). *Survey and characterisation of Alkaline Fens in the Peak District Dales cSAC: Invertbrate Survey*. Report to English Nature (RES8855).

English Nature (2001). *Resource survey of base-rich upland seepages*. English Nature Research Report 427. English Nature, Peterborough.

JNCC (2007). *Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006*. JNCC, Peterborough. Available from: www.jncc.gov.uk/article17

JNCC (2011). *A compilation of proposed additions and revisions to vegetation types in the National Vegetation Classification*. JNCC, Peterborough.

JNCC (2012). Habitat Account – H7140 Transition Mire and Quaking Bog. http://jncc.defra.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H7140

JNCC (2012). Habitat Account – H7230 Alkaline Fen. http://jncc.defra.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H7230

Killeen, I.J. (2010). *A condition assessment of* Vertigo geyeri *in Sunbiggin Tarn & Moors, Cumbria*. Natural England.

Malloch, A.J.C. (1992). *MATCH – a computer programme to aid the assignment of vegetation data to the communities and subcommunities of the National Vegetation Classification.* University of Lancaster, Lancaster.

Preston C.D., Pearman D. & Dines T. (2002). *New Atlas of the British & Irish Flora.* Oxford University Press, Oxford.

Prosser, M. & Wallace, H. (2010). *NVC Survey: Fen Bog SAC*. Unpublished report for Yorkshire Wildlife Trust.

Rodwell, J. (ed.) (1991). *British Plant Communities, Volume 2. Mires & Heaths.* Cambridge University Press, Cambridge.

Rodwell, J. (ed.) (1992). *British Plant Communities, Volume 3. Grasslands and Montane Communities*. Cambridge University Press, Cambridge.

Rodwell, J.S., Dring, J.C., Averis, A.B.G., Proctor, M.C.F., Malloch, A.J.C., Schaminée, J.N.J., & Dargie T.C.D. (2000). *Review of coverage of the National Vegetation Classification*. JNCC Report No. 302. Joint Nature Conservation Committee, Peterborough.

Smith, A.J.E. (2004). *The Moss Flora of Britain and Ireland*. 2nd Ed., Cambridge Univ. Press, Cambridge.

Wheeler B.D. (1980). Plant communites of rich-fen systems in England and Wales. II. Communities of calcareous mires. *Journal of Ecology*, **68**, 405-420.

Wheeler B.D & Shaw S.C. (1995a). *Fen Habitats and the EC Habitats and Species Directive. Part 1 Concept and compass of selected fen habitat categories*. JNCC, Peterborough.

Wheeler B.D & Shaw S.C. (1995b). *Fen Habitats and the EC Habitats and Species Directive. Part 2. Distribution and status of selected fen habitats in Britain*. JNCC, Peterborough.

Wheeler B.D., Shaw S.C. & Tanner K. (2009). *A wetland framework for impact assessment at statutory sites in England and Wales*. Environment Agency, Bristol.

7. ELECTRONIC OUTPUTS

The following electronic outputs have been provided on a dvd:

- This Final Report, in pdf form ('NYM Alk Tran Fen Final Report 20-06-12').
- Separate pdf files for Annex 3 ('NYM Annex 3 (BMI) Final 20-06-12') and Annex 4 ('NYM Annex 4 (Hydrogeology) Final 20-06-12').
- Excel master spreadsheet ('North York Moors Alk Fen Survey 2011 all quad data 20-06-12').
- Excel spreadsheet split by sites ('North York Moors Alk Fen Survey site quad data 20-06-12').
- Photographs: electronic images labelled by site and stand number, and separated into folders labelled by site name.

8. ANNEX 1: SITE ACCOUNTS

8.1 ARDEN MOOR (THORODALE) (NORTH YORK MOORS SSSI)

Vegetation stands and target notes are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.1.1 Site Description

Thorodale drains from Arden Moor south-eastwards to Hawnby. In the upper (western) section of the dale several strong springs and seepages emerge from steep slopes covered with bracken and heath merging into flushes down the valleyside, overall creating several patches of species-rich wetland vegetation which together form an important feature of this unit of the North York Moors SSSI (site unit 12).

The springs emerging high on the valleysides are dominated by bryophytes, mainly *Palustriella commutata* and *Palustriella falcata*, with *Bryum pseudotriquetum, Calliergon cuspidatum* and *Philonotis calcarea* also prominent. Vascular plants, including *Chrysosplenium oppositifolium, Carex panicea, Festuca rubra* and *Ranunculus repens*, form a rather sparse component of the vegetation. This vegetation can be assigned to NVC community M37 *Cratoneuron commutatum–Festuca rubra* spring. Water flow is often directed down broad water-tracks and soakways, also supporting M37 vegetation (TNs 1–3).

Lower down the valleyside, the soakways flow through and spread into a mosaic of flushes and runnels over the more gentle convex slopes adjacent to the valley stream (see Stands 1-6 & TNs 4-9). These flushes support short vegetation with abundant mixed sedges (including *Carex dioica, C. echinata, C. flacca, C. panicea, C. pulicaris, C. hostiana, C. nigra, Eriophorum angustifolium* and *Eriophorum latifolium*), and a characteristic suite of bryophytes, including *Aneura pinguis, Campylium stellatum, Ctenidium molluscum, Fissidens adianthoides, Palustriella commutata, P. falcata, Riccardia pinguis, Scorpidium cossonii* and *S. revolvens*. Vascular associates include frequent *Anagallis tenella, Euphrasia nemorosa, Pinguicula vulgaris* and *Valeriana dioica*. *Eleocharis quinqueflora* is abundant in runnels where the substratum is more skeletal and stony. Mosses are often encrusted with tufa and marl, particularly in the runnels. The liverwort *Preissia quadrata* is found in these areas on damp rocks and amongst the vegetation adjacent to runnels.

Towards the valley bottom *Caltha palustris, Hydrocotyle vulgaris, Lotus uliginosus* and *Mentha aquatica* are found within the flushed vegetation. The vegetation is often slightly taller and coarser in these areas.

There is a small tufa mound feature in one area (TN9 on accompanying site map) which supports short sedges and scattered *Parnassia palustris* and *Pinguicula vulgaris*.

8.1.2 Stand Descriptions

Stand 1 (SE48592 92523; Quadrats 277001 and 277002)

M10 *Carex dioica–Pinguicula vulgaris* mire

Stands 1–3 have been assigned to M10 (MATCH coefficients of 38.8%–47.1% fit) and categorised as Alkaline Fen.

Stony runnels with *Pinguicula vulgaris*, marl-encrusted bryophytes (including *Aneura pinguis, Campylium stellatum, Fissidens adianthoides, Palustriella commutata, P. falcata, Scorpidium cossonii*) and very short sedges including abundant *Carex dioica* and *Eleocharis quinqueflora*, flanked by an open, sedge-rich sward (with much *Carex hostiana*) over a carpet of brown mosses with thin soils. *Juncus inflexus* occurs in patches at the margins.

Stand 2 (SE49724 91684; Quadrat 277003)

M10 *Carex dioica–Pinguicula vulgaris* mire

Vegetation with a sward of abundant sedges, particularly *Carex hostiana, C. flacca* and *C. viridula* subsp. *brachyrrhyncha* over a bryophyte lawn dominated by *Palustriella commutata*. *Carex dioica* is frequent in mossy runnels. *Anagallis tenella, Equisetum palustre, Hydrocotyle vulgaris* and *Valeriana dioica* are frequent throughout. Low ridges with heathy vegetation (including *Sphagnum subnitens, Calluna vulgaris* and *Vaccinium myrtillus*) separate base-rich flushed areas. *Juncus inflexus* occurs in patches at the edges of the flushed areas and adjacent to *Palustriella commutata* dominated springs and soakways (M37; TNs 1-3) higher up the slope and adjacent.

Stand 3 (SE49967 91549; Quadrat 277004)

M10 *Carex dioica–Pinguicula vulgaris* mire (affinities to M11)

Abundant *Eleocharis quinqueflora* and mixed sedges (*Carex dioica, C. flacca, C. panicea, C. viridula* ssp. *brachyrrhyncha*) in a stony runnel with patchy *Palustriella commutata* and *Scorpidium cossonii / revolvens*. *Eriophorum angustifolium* is abundant in a small area adjacent, between the runnel and the surrounding heath. The liverwort *Preissia quadrata* occurs on a small rock at the head of the runnel.

Stands 4 & 5 (SE 50021 91477 & SE 50088 91518; Quadrats 277005 & 6)

M10 *Carex dioica–Pinguicula vulgaris* mire

(MATCH coefficients of 47.0% & 49.8% fit)

South-east of Stand 3 the hillside supports a strip of flushed ground running downslope from a small seepage area, with a narrow soakway on the western edge of the flush. Much of the flush is quite diverse rush pasture (unsampled), but at its upper edge there is a more open, bryophyte and sedge-rich area (Stand 4, *c.* 15x4 m in extent) with species such as *Anagallis tenella, Aneura pinguis, Briza media, Campylium stellatum, Carex dioica, C. flacca, C. hostiana, C. panicea, C. viridula* subsp. *oedocarpa, Fissidens adianthoides, Selaginella selaginoides,* and *Valeriana dioica.* Lower down the same slope is a similar seepage area (Stand 5, *c.* 2x7 m in extent) that supports a similar range of species, plus *Carex viridula* subsp. *brachyrrhyncha, Eleocharis quinqueflora, Pinguicula vulgaris,* and *Scorpidium revolvens.* Both of these stands can be clearly assigned to M10 and categorised as Alkaline Fen.

Further seepage areas were noted to the south-east of Stand 4, but these were not visited due to time constraints.

Stand 6 (SE 50111 91676; Quadrat 277007 & TNs 5-7)

M10 *Carex dioica–Pinguicula vulgaris* mire

(MATCH coefficient of 39.1% fit)

On the opposite (north-eastern) side of the valley there is a quite large area of low-growing sedge- and bryophyte-rich vegetation, embedded within dense bracken and heather. This apparent seepage has a series of small soakways that flow downslope into a larger stand of species-rich rush pasture (not sampled), where they become indistinct. The seepage area(s) support an abundance of *Carex hostiana, C. flacca,* and *Eleocharis quinqueflora* plus a wide variety of other plants, including *Anagallis tenella, Briza media, Bryum pseudotriquetrum, Campylium stellatum, Carex dioica, C. panicea, C. viridula* subsp. *brachyrrhyncha, Fissidens adianthoides, Juncus articulatus, Palustriella commutata, Philonotis calcarea, Scorpidium revolvens, Selaginella selaginoides,* and *Valeriana dioica.* This stand can be best considered as M10 and categorised as Alkaline Fen.

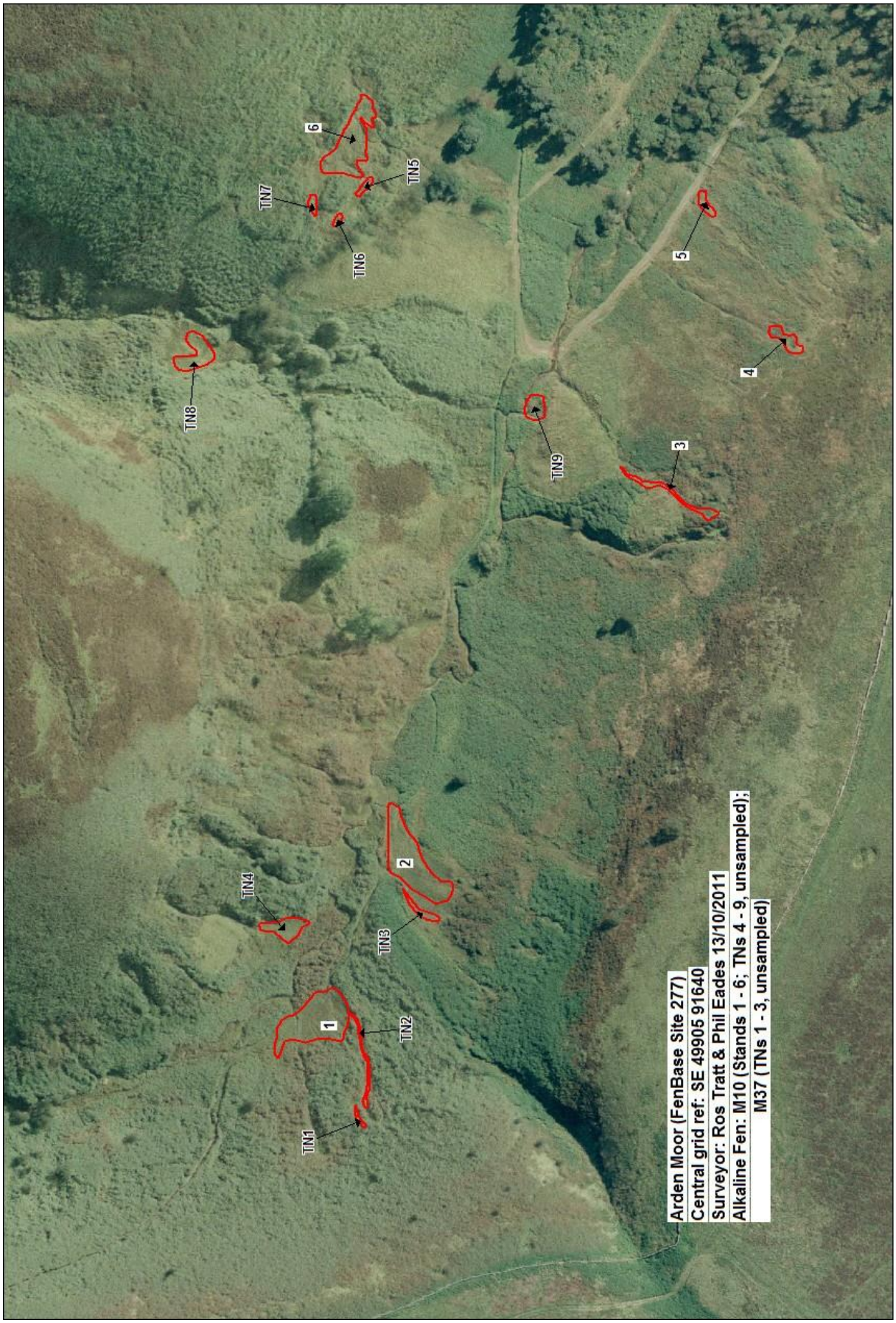
To the north-west, on the far side of a small side-valley, is a further large seepage area (TN8) that supports more low-growing base-rich vegetation (unsampled).

8.1.3 Wetland Substrata & Water Supply

Soils here are generally thin or skeletal, with frequent areas of bare stony mineral ground. The water supply is base-rich with pH values 6.6–7.6 and EC 226–337 μS cm^{-1}. There are localised tufa deposits and mosses are sometimes encrusted with marl and tufa (particularly in the runnels and skeletal flushes).

8.1.4 Site Management

The site is grazed by sheep. The vegetation is short and open, with no development of woody species, or build up of litter. The flushes are surrounded by a mosaic of bracken and heath. A bridleway passes along the valley bottom cutting across Stand 1 and this is a popular mountain-biking route. However, there was little visible damage associated with this at the time of survey – just a small amount of rutting, confined to the lowest areas of the flush. This should be monitored to ensure that disturbance does not become too extensive.


Arden Moor (FenBase Site 277)
Central grid ref: SE 49905 91640
Surveyor: Ros Tratt & Phil Eades 13/10/2011
Alkaline Fen: M10 (Stands 1 - 6; TNs 4 - 9, unsampled);
M37 (TNs 1 - 3, unsampled)
TN1
TN2
TN3
TN4
TN5
TN6
TN7
TN8
TN9
1
2
3
4
5
6

North York Moors		Site name	Arden Moor (Thorodale)	Arden Moor (Thorodale)		Arden Moor (Thorodale)		Arden Moor (Thorodale)		Arden Moor (Thorodale)		Arden Moor (Thorodale)		Arden Moor (Thorodale)	
Alkaline Fen &		Site ref	277	277		277		277		277		277		277	
Transition Mire / Quaking Bog		Quadrat ID	277001	277002		277003		277004		277005		277006		277007	
Survey 2011		Stand ref	Stand 1	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5		Stand 6	
		NGR	SE	SE		SE		SE		SE		SE		SE	
Domin scores for all quadrats		Easting	412256	412099		449791		449967		450022		450088		450112	
DAFOR scores for stands		Northing	486285	486606		491650		491549		491477		491518		491677	
		Date	13/10/2011	13/10/2011		13/10/2011		13/10/2011		13/10/2011		13/10/2011		13/10/2011	
PE	Phil Eades	Recorder name	RT	RT		RT		RT		PE		PE		PE	
RT	Ros Tratt	NVC community	M10	M10bii		M10		M10		M10		M10		M10	
		Notes	Runnel in spp-rich flush	sedgy area adjacent to runnel		Spp-rich flush		Spp-rich flush		Steep spp-rich soakway		Lower end of a 2nd steep soakway		Series of spp-rich seepages	
		Quadrat size	2x2m	2x2m		2x2m		2x2m		1x4m		2x2m		2x2m	
		pH	270			7.5		7.63		7.5		6.6		7.3	
		EC (µS cm-1)				226		337		290		280		270	
		Photo?								Y		Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)
122	Agrostis stolonifera					1	R								
163	Anagallis tenella		2	3	F	3	A	2	O	2	O	3	F	3	F
2256	Aneura pinguis		3	2	F	2	O	3	F	1	R	2	O		
251	Briza media		0	1	R	2	O			3	F	3	F	3	F
1546	Bryum pseudotriquetrum									0	R			1	R
1571	Campylium stellatum		3	3	F	2	O			2	O	3	F	3	F
315	Carex dioica		2	3	F	3	F	2	O	3	F	3	F	3	F
319	Carex echinata													0	R
323	Carex flacca		3	4	A	4	A	3	F	5	A	2	O	4	A
325	Carex hostiana		1	3	F	2	O			2	O	3	F	6	A
333	Carex nigra		1	0	R										
339	Carex panicea		2	2	F			3	F	3	F	5	A	3	F
329	Carex viridula ssp brachyrrhyncha		3	2	F	4	A	3	F			5	A	1	R
312	Carex viridula ssp oedocarpa									4	A	1	R		
418	Cirsium palustre					1	R	0	R	2	O	2	O	0	R
1593	Climacium dendroides													0	R
1596	Cratoneuron commutatum	Palustriella commutata	0	0	R	7	A	4	A	4	A	3	F	0	R
4340	Cratoneuron commutatum	Palustriella falcata	4	0	A					3	F	2	O	4	A
1600	Ctenidium molluscum		2	4	A	1	R	0	R	3	F	4	A	2	O
1249	Danthonia decumbens		0	1	O										
1658	Drepanocladus revolvens	Scorpidium revolvens	1		O	3	F	5	A			2	O	3	F
3266	Drepanocladus revolvens v	Scorpidium cossonnii	2	2	F	3	F								
510	Eleocharis quinqueflora		4	3	A	2	O	4	A			4	A	5	A
532	Equisetum arvense		0	1	O					1	R	2	O	2	O
535	Equisetum palustre					4	A								
546	Eriophorum angustifolium		2	3	F			0	R	2	O	3	F	3	F
547	Eriophorum latifolium		1	3	F										
2776	Euphrasia nemorosa		2	3	F					2	O			0	R
574	Festuca ovina		1	0	O					2	O				
576	Festuca rubra		1	0	O	2	O								
1683	Fissidens adianthoides		2	2	O			1	R	2	O	3	F	1	R
612	Galium uliginosum					1	R			0	R				
680	Holcus lanatus													0	R
690	Hydrocotyle vulgaris		0	1	O	3	F							3	F
722	Juncus articulatus			2	O	2	O	2	O	4	A	3	F	3	F
726	Juncus bulbosus			0	R										
729	Juncus conglomeratus													2	O
730	Juncus effusus		0	0	R							1	R		
733	Juncus inflexus		0	0	R									0	R
876	Molinia caerulea									3	F	3	F		
900	Nardus stricta											1	R		
1845	Philonotis calcarea		0		R			0	R					3	F
970	Pinguicula vulgaris		3	0	F							3	F		
1046	Potentilla erecta		0	1	O										
2243	Preissia quadrata		1		R			0	R						
2254	Riccardia multifida		1		O										
1235	Selaginella selaginoides		2	1	O					2	F	3	F		
1354	Triglochin palustre		0	1	O										
1380	Valeriana dioica		1	3	F	3	F	1	R	4	A	3	F	0	R

8.2 BILLER HOWE DALE SSSI

Vegetation stands and target notes are identified in the images following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.2.1 Site Description

Biller Howe Dale is a steep-sided valley, incised into the gentler slopes of Fylingdales Moor. It originates as two main streams, one which flows in from the west, and the other that flows south from the vicinity of Foulsike Farm. The combined streams of Biller Howe Dale flow south-east and are joined by a small side-valley stream flowing in from the north-east from below Pond Farm. They then contribute first to the Brown Rigg Beck and thence the Jugger Howe Beck, the west-south-west–flowing Lownorth Beck and the south-flowing River Derwent.

The wetland areas examined during this survey fell into four main groups:

Area 1) The head of the Pond Farm side-valley, immediately below the A171, which comprises a valleyhead trough with some peripheral seepages (Stands 1–5).

Area 2) The main western arm of Biller Howe Dale, which supports a series of seepages and stony runnels developed on quite steep slopes (Stands 7–9).

Area 3) The valley bottom near the southern end of the Foulsike Farm valley arm, where a small disused and partially drained reservoir is flanked by several small seepages (Stands 6 & 10).

Area 4) The head of the Foulsike Farm valley arm, which consists of a valleyhead trough with soakways (Stand 11).

In most of these areas the wetlands consist of a variety of vegetation types, of which only those sections with affinities to either Alkaline Fen or Transition Mire were sampled.

8.2.2 Stand Descriptions

Area 1

Stand 1 (NZ 92123 01550; Quadrat 188001)

S27a *Carex rostrata–Potentilla palustris* tall-herb fen,
Carex rostrata–Equisetum fluviatile sub-community

Stand 2 (NZ 92126 01548; Quadrat 188002)

M10 *Carex dioica–Pinguicula vulgaris* mire

The Pond Farm side-valley (Area 1) supports a broad central strip of mire along its axis that includes, amongst other plant communities, a band of swamp vegetation that is dominated by *Carex rostrata*, with a scattering of grasses, rushes, forbs and bryophytes (Stand 1; S27a (38.1% MATCH coefficient of fit)). Along the south-eastern periphery of this *Carex rostrata*-dominated vegetation are several small seepages that flow down shallow soakways into the axial mire (Stand 2). These seepages and soakways are quite diverse, supporting a mixture of small sedges, 'brown mosses', grasses and rushes, including: *Aneura pinguis, Bryum pseudotriquetrum, Carex dioica, C. echinata, C. panicea, C. rostrata, C. viridula* subsp. *oedocarpa, Drosera rotundifolia, Eleocharis quinqueflora, Eriophorum angustifolium, Juncus bulbosus, Narthecium ossifragum, Palustriella falcata, Potamogeton polygonifolius, Scorpidium cossonii, Sphagnum denticulatum,* and *Triglochin palustre.* These seepage areas can probably be best assigned to M10 mire (Alkaline Fen), although the coefficient of fit is not strong (34.9%), and there are affinities to Transition Mire communities such as *Hypericum elodes–Potamogeton polygonifolius* soakway (M29) and *Narthecium ossifragum–Sphagnum papillosum* mire (M21).

Stand 3 (NZ 92116 01494; Quadrat 188003)

M4 *Carex rostrata–Sphagnum recurvum* mire

To the south there is a less species-rich stand of *Carex rostrata* with much *Sphagnum fallax* and *S. palustre*, plus plants such as *Drosera rotundifolia, Equisetum fluviatile, Molinia caerulea, Myrica gale* and *Vaccinium oxycoccos* (Stand 3). This stand has some affinity with M4 (34.6% fit), and is considered to represent a form of Transition Mire / Quaking Bog.

Stand 4 (NZ 92155 01643; Quadrat 188004)

S9 *Carex rostrata* swamp

Stand 5 (NZ 92157 01661; Quadrat 188005)

M10ai *Carex dioica–Pinguicula vulgaris* mire,
Juncus bulbosus/kochii sub-community, *Eleocharis quinqueflora* variant

Near the northern end of the Pond Farm side-valley, adjacent to the A171 road, there is a vigorous seepage and water track (Stand 4) that flows into a drain that has been cut along the central axis of the valley. The seepage and water track are strongly ferrugineous, with much shallow open water, and are dominated by *Carex rostrata* and *Potamogeton polygonifolius,* with small quantities of *Equisetum fluviatile* and *Juncus acutiflorus*. This stand can be best assigned to the S9 swamp community (52.1% fit), which is a non-target community.

The fringes of the main seepage area (Stand 5) are much more botanically diverse, supporting a variety of low-growing sedges, grasses, rushes and bryophytes, including an abundance of *Eleocharis quinqueflora,* plus *Aneura pinguis, Bryum pseudotriquetrum, Campylium stellatum, Carex echinata, C. panicea, C. rostrata, C. viridula* subsp. *oedocarpa, Drosera rotundifolia, Juncus bulbosus, Molinia caerulea, Pinguicula vulgaris, Potamogeton polygonifolius,* and *Scorpidium revolvens.* This stand has strong affinities to the Alkaline Fen M10ai sub-community (45.2% fit).

These stands are embedded within a mix of sedge-rich wet grassland and wet heath, grading upslope into dry grassland.

Area 2

Stands 7–9 (respectively NZ91064 01814; NZ 1164 01838; NZ91218 01792; Quadrats 188007–9)

M10a *Carex dioica–Pinguicula vulgaris* mire,
Juncus bulbosus/kochii sub-community

(MATCH coefficients of 46.3–52.2%)

At the western end of the main west side-valley of Biller Howe Dale, the south-western valleyside supports open, species-rich *Molinia*-dominated grassland, with patches of bracken and gorse, and at least five areas of open seepage mire of varying sizes and shapes (three of which, Stands 7–9, were sampled, two others being target noted (TN 1 & 2). Several of these (e.g. Stands 8 & 9) comprise open seepages that flow down fairly bare, stony runnels on quite steep slopes, whilst other patches (e.g. Stand 7) are found on gentler slopes and are less distinct, grading out into the surrounding damp grassland.

The vegetation of these stands is consistently species-rich, supporting a wide variety of low-growing sedges, rushes, grasses, forbs and bryophytes, including *Aneura pinguis, Briza media, Bryum pseudotriquetrum, Campylium stellatum, Carex echinata, C. flacca, C. hostiana, C. panicea, C. pulicaris, C. viridula* subsp. *oedocarpa, Cirsium palustre, Ctenidium molluscum, Danthonia decumbens, Drosera rotundifolia, Eleocharis quinqueflora, Eriophorum angustifolium, Fissidens adianthoides, Juncus bulbosus, Molinia caerulea, Narthecium ossifragum, Palustriella falcata, Pedicularis palustris, Philonotis fontana, Pinguicula vulgaris, Riccardia multifida, Scorpidium cossonii, S. revolvens,* and *S. scorpioides*. These seepage mires can be quite clearly assigned to M10a (Alkaline Fen).

Area 3

The valley bottom near the southern end of the Foulsike Farm valley arm holds a small, derelict, shallow and partially drained reservoir that has now become totally revegetated with a mixture of *Carex rostrata* swamp and *Sparganium erectum* swamp, which in places have developed as a quaking raft. This vegetation grades outwards into species-poor *Molinia* grassland, then into heather and bracken on the valley sides. To the north the valley bottom is dominated by *Myrica–Erica tetralix* wet heath vegetation.

Stand 6 (NZ 91646 01764; Quadrat 188006)

M10a *Carex dioica–Pinguicula vulgaris* mire,
Juncus bulbosus/kochii sub-community

(MATCH coefficient of 43.0%)

At the south-eastern and south-western margins of the reservoir there is a series of four small permanent seepages (Stand 6 & TN 3-5) that support an abundance of low-growing sedges, rushes, grasses, forbs and bryophytes, including *Aneura pinguis, Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Carex echinata, C. flacca, C. panicea, C. viridula* subsp. *oedocarpa, Drosera rotundifolia, Eleocharis quinqueflora, E. multicaulis, Eriophorum angustifolium, Juncus bulbosus, J. acutiflorus, J. articulatus, Molinia caerulea, Narthecium ossifragum, Potamogeton polygonifolius, Pedicularis palustris, Ranunculus flammula, Scorpidium revolvens, Sphagnum denticulatum,* and *Triglochin palustre.* These seepage mires have been assigned to M10a and are classified as Alkaline Fen.

Stand 10 (NZ 91633 01800; Quadrat 188010)

M4 *Carex rostrata–Sphagnum recurvum* mire

(MATCH coefficient of 49.4%)

On the east side of the disused reservoir, between the flanking *Molinia* grassland and the central zone of *Sparganium erectum* and *Carex rostrata* swamp, there is a band of vegetation on quaking ground that is dominated by a mixture of *Carex rostrata* and *Sphagnum fallax*, with much *Polytrichum commune*, and a scattering of *Agrostis canina, Deschampsia flexuosa, Hydrocotyle vulgaris, Juncus effusus* and *J. acutiflorus*. This area is considered to be a form of the M4 community, and is considered to be Transition Mire / Quaking Bog. It has developed as a semi-floating raft over a terrestrialised basin (the disused reservoir), and as a consequence the vegetation may be transitional between minerotrophic and ombrotrophic.

Area 4

Stand 11 (NZ 91480 02328; Quadrat 188011)

M29 *Hypericum elodes–Potamogeton polygonifolius* soakway

The head of the Foulsike Farm valley arm consists of a valleyhead trough with a number of soakways. The vegetation in this area is generally acidic, with much wet heath and a few areas of bog vegetation, including a small patch of *Rhynchospora alba*. At one location the soakways, whilst dominated by *Comarum palustre, Eriophorum angustifolium* and *Potamogeton polygonifolius,* also show some slight indication of base-enrichment by way of a scattering of species such as *Aneura pinguis*, *Bryum pseudotriquetrum* and *Palustriella falcata*. This vegetation is clearly attributable to the M29 soakway community, and as such is considered to be Transition Mire / Quaking Bog.

8.2.3 Wetland Substrata & Water Supply

Area 1

In the Pond Farm side-valley, the small soakways of Stand 2 were associated with water of pH 5.7 and exceedingly high EC (> 1500 µS cm^{-1}). At the lower end of the soakway that was examined, there was

a deep deposit of peat more than 100 cm in depth. Stand 5 was associated with water of pH 6.0 and, despite obvious iron-deposition, much lower EC of 390 µS cm^{-1}. Here there was a deposit of 45 cm of peat with silt layers, over grey sand.

The main areas of mire interest in the Pond Farm side-valley appear to be sourced by permanent groundwater seepages that flow down into an axial stream that has been deepened and straightened by way of a large ditch. Toward the downstream end of this the ditch has been occluded by an accumulation of swamp vegetation.

Area 2

The three stands of M10 vegetation that were sampled in the western side-valley were all associated with fairly base-rich water (pH 6.1–7.1; EC 220–410 µS cm^{-1}), and varying soil types and depths, from bare gravel in Stand 9, to 45 cm of silty peat over sand in Stand 8. All of these mires appear to be primarily dependent on permanent seepage outflow for their summer wetness.

Area 3

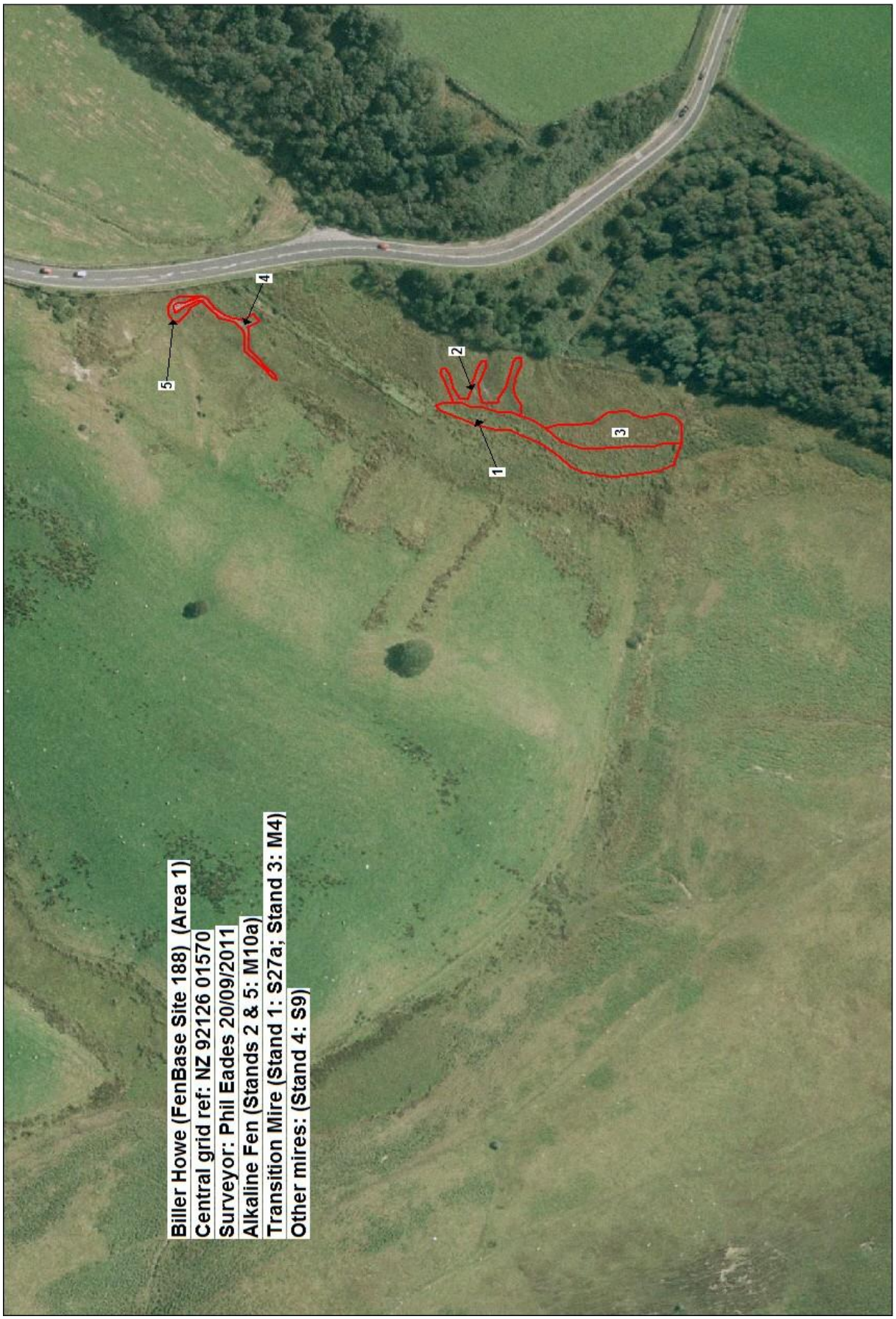
The areas of mire that were examined in the valley bottom near the southern end of the Foulsike Farm valley appeared to be associated with quite different situations and water supplies. Water samples from the small mires peripheral to the disused reservoir were moderately base-poor (pH 5.3 and EC 170 µS cm^{-1}), with shallow peat (up to 40 cm depth) over sand and gravel, and these appear to be dependent upon permanent groundwater seepages. The *Carex rostrata–Sphagnum fallax* mire zone within the derelict reservoir is more acidic (pH 3.8, EC 130 µS cm^{-1}), and appears to be more dependent upon an impeded water flow for maintaining wet conditions; the semi-floating nature of the reservoir infill may help to keep the *Sphagnum*-rich surface somewhat elevated above the influence of groundwater or surface water inflows.

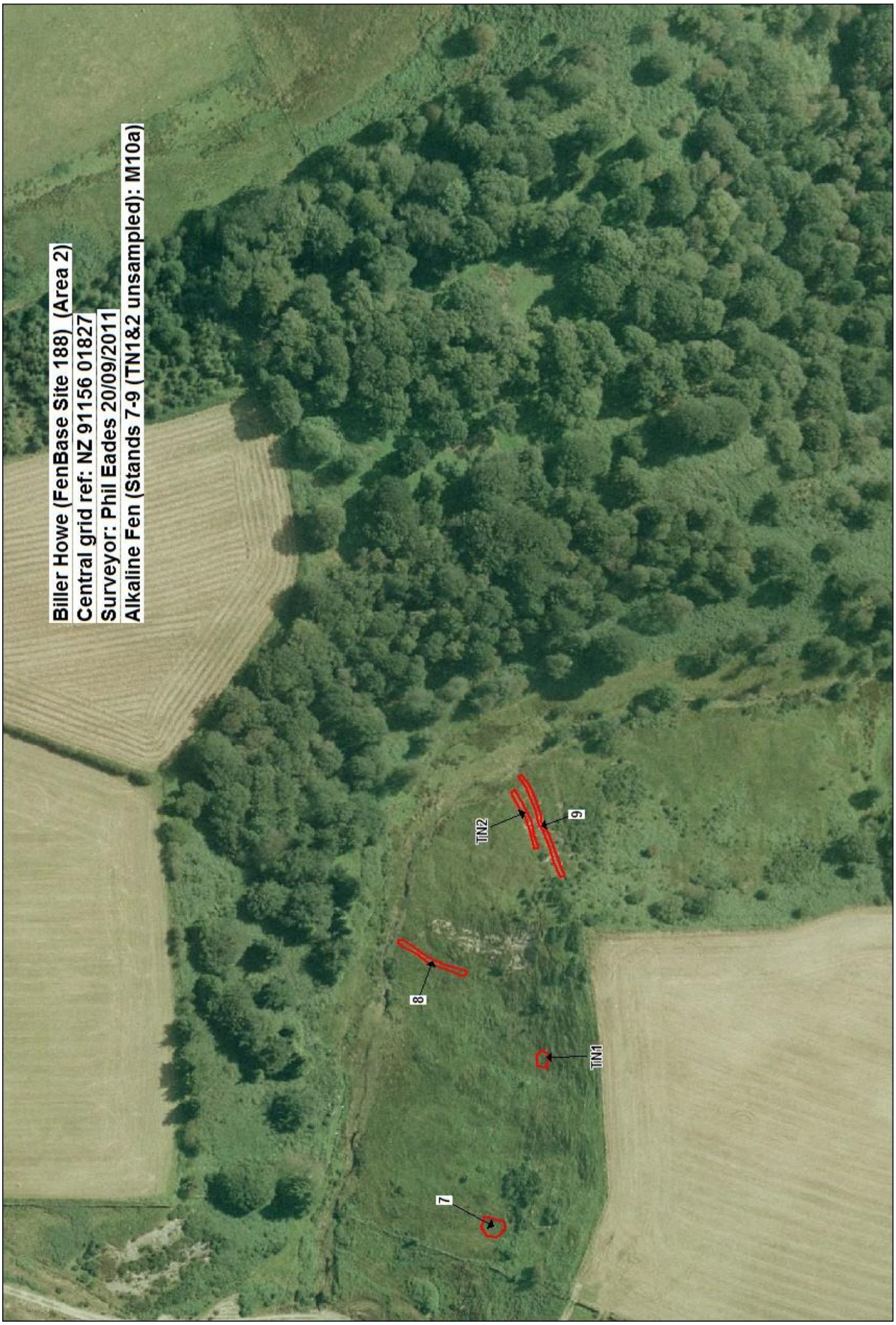
Area 4

The mires situated in deep peat along the valley trough of the upper Foulsike Farm valley arm appear to be reliant upon the topographic situation for retaining water on the valley floor, and it is likely that rain-generated run-off is the main component of the water supply for this area. However, it is possible that there may be some slight groundwater influence in the area of Stand 11, although no direct evidence of this was observed.

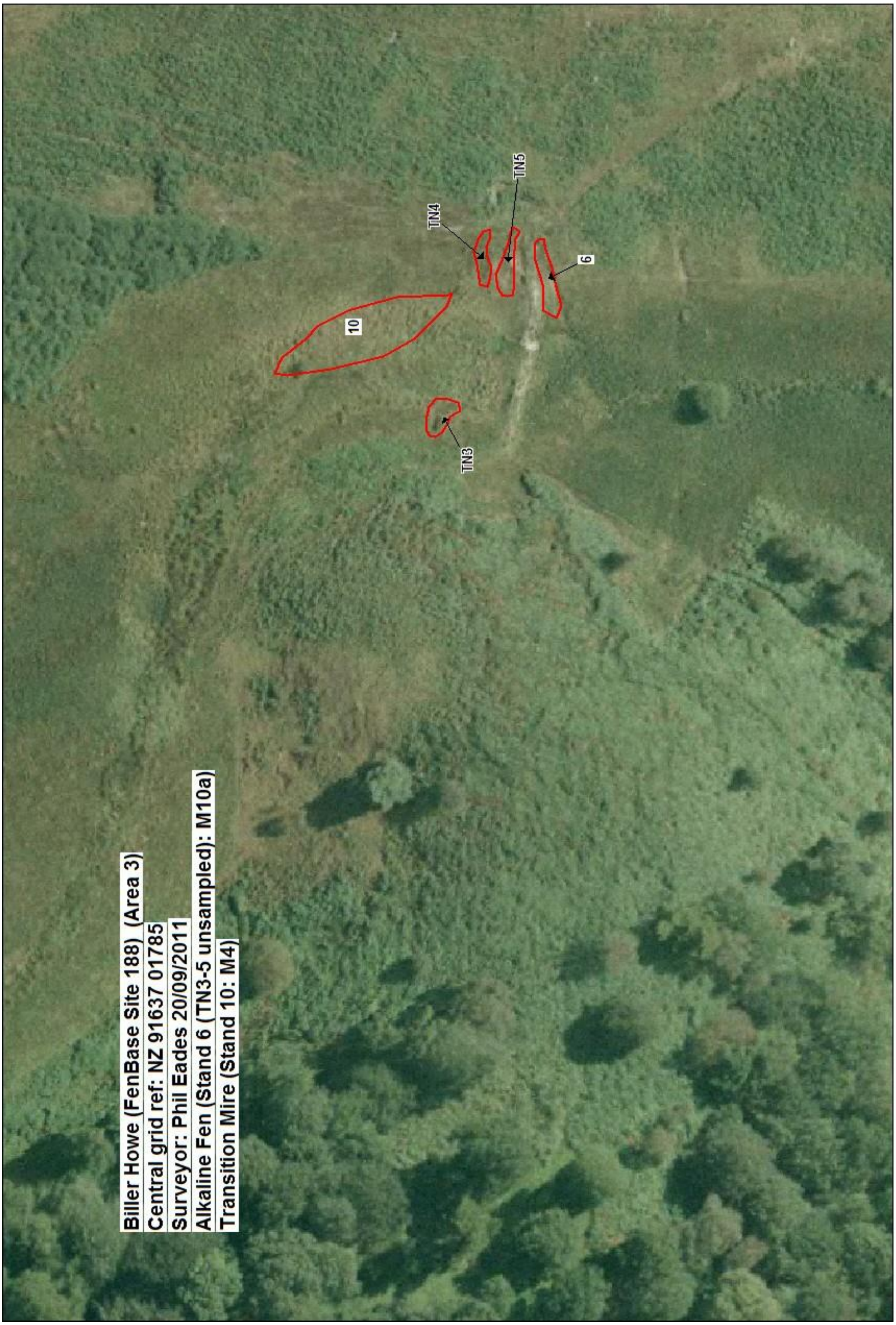
8.2.4 Site Management

The entire site appears to receive moderate grazing primarily by sheep, although there may also be some cattle grazing in places. Grazing appears sufficient to prevent scrub encroachment, and not too heavy to cause excessive poaching. Although there has been some past drainage, particularly in the Pond Farm side-valley, this does not currently appear to threaten the areas of interest, although at that site, future drainage maintenance operations should aim to avoid causing damage to the northern section (Stands 4 & 5), as they are situated very close to the ditch.


Biller Howe (FenBase Site 188) (Area 1)
Central grid ref: NZ 92126 01570
Surveyor: Phil Eades 20/09/2011
Alkaline Fen (Stands 2 & 5: M10a)
Transition Mire (Stand 1: S27a; Stand 3: M4)
Other mires: (Stand 4: S9)
1
2
3
4
5



Biller Howe (FenBase Site 188) (Area 2)
Central grid ref: NZ 91156 01827
Surveyor: Phil Eades 20/09/2011
Alkaline Fen (Stands 7-9 (TN1&2 unsampled): M10a)
TN2
9
8
TN1
7


Biller Howe (FenBase Site 188) (Area 3)
Central grid ref: NZ 91637 01785
Surveyor: Phil Eades 20/09/2011
Alkaline Fen (Stand 6 (TN3-5 unsampled): M10a)
Transition Mire (Stand 10: M4)
TN4
TN5
6
10
TN3


Biller Howe (FenBase Site 188) (Area 4)
Central grid ref: NZ 91484 02343
Surveyor: Phil Eades 20/09/2011
Transition Mire: (Stand 11: M29)
11

North York Moors		Site name	Biller Howe Dale		Biller Howe Dale		Biller Howe Dale		Biller Howe Dale		Biller Howe Dale		Biller Howe Dale		Biller Howe Dale		Biller Howe Dale		Biller Howe Dale		Biller Howe Dale		Biller Howe Dale	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	18		18		18		18		18		18		18		18		18		18		18	
		Quadrat ID	18001		18002		18003		18004		18005		18006		18007		18008		18009		18010		18011	
		Stand ref	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5		Stand 6		Stand 7		Stand 8		Stand 9		Stand 10		Stand 11	
		NGR	NZ		NZ		NZ		NZ		NZ		NZ		NZ		NZ		NZ		NZ		NZ	
Domin scores for all quadrats		Easting	492123		492126		492116		492155		492157		491646		491064		491164		491218		491633		491480	
DAFOR scores for stands		Northing	501550		501548		501494		501643		501661		501764		501814		501838		501792		501800		502328	
		Date	20/09/2011		20/09/2011		20/09/2011		20/09/2011		20/09/2011		20/09/2011		20/09/2011		20/09/2011		20/09/2011		07/10/2011		07/10/2011	
PE	Phil Eades	Recorder name	PE		PE		PE		PE		PE		PE		PE		PE		PE		PE		PE	
RT	Ros Tratt	NVC community	S27a		M10		M4		S9		M10ai		M10a		M10a		M10a		M10a		M4		M29	
		Notes	Carex rostrata swamp		base-rich soakways		Carex rostrata & Sphagnum fallax		C.rostrata & Pot.poly soakway		vegn fringing soakway		small sedge soakways		steep runnel with Pinguicula		steep runnel with Pinguicula		steep runnel with Pinguicula		Carex rostrata & Sphagnum fallax		soakways with Comarum pal	
		Quadrat size	2x2m		1x4m		2x2m		2x2m		1x4m		1x4m		0.x8m		0.x8m		0.x8m		2x8m		2x8m	
		pH	6.3		5.7		5.3		6.2		6.0		5.3		6.1		6.6		7.1		3.8		4.5	
		EC (µS cm-1)	1200		1500		1300		260		390		170		300		220		410		130		260	
		Photo?	Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)
120	Agrostis canina		4	A	1	R	2	O													3	F	2	O
2256	Aneura pinguis				2	O					2	O	3	F	1	R	3	F	1	R			2	O
171	Anthoxanthum odoratum												0	R										
1482	Aulacomnium palustre						1	R																
251	Briza media														2	O								
1546	Bryum pseudotriquetrum				2	O					3	F	0	R									1	R
1445	Calliergon cuspidatum	Calliergonella cuspidata	3	F									1	R			3	F						
1448	Calliergon stramineum	Straminergon stramineu					1	R																
1571	Campylium stellatum										3	F	4	A	6	A	5	A	4	A				
295	Cardamine pratensis																						2	O
315	Carex dioica				3	F																		
319	Carex echinata				2	O					1	R	3	F	4	A	3	F			1	R		
323	Carex flacca												1	R			1	R	1	R				
325	Carex hostiana														2	F	2	O	2	O				
339	Carex panicea				3	F					3	F	4	A	3	F	5	A						
347	Carex pulicaris														3	F	3	F	3	F				
352	Carex rostrata		9	D	5	A	9	D	7	D	4	A									8	D		
312	Carex viridula ssp oedocarpa				3	F					1	R	5	A			1	R	3	F			1	R
418	Cirsium palustre						1	R							1	R	1	R						
4340	Cratoneuron commutatum	Palustriella falcata			2	F																	2	O
1598	Cratoneuron filicinum		1	O									0	R									6	A
1600	Ctenidium molluscum																		1	R				
1249	Danthonia decumbens																		2	O				
478	Deschampsia flexuosa																				2	O		
1658	Drepanocladus revolvens	Scorpidium revolvens									2	O	3	F			2	O						
3266	Drepanocladus revolvens v	Scorpidium cossonnii			3	F	1	R			3	F												
494	Drosera rotundifolia				2	F	3	F			1	R	3	F	3	F	3	F	3	F				
508	Eleocharis multicaulis												3	F									2	O
510	Eleocharis quinqueflora				4	A					7	D	0	R			1	R	4	A				
525	Epilobium palustre		3	F																			1	F
533	Equisetum fluviatile		0	R	1	R	1	R	3	F	1	R	0	R										
542	Erica tetralix						2	O					0	R					3	F				
546	Eriophorum angustifolium				3	F	0	R					3	F	1	O							4	A
2776	Euphrasia nemorosa														3	F								
576	Festuca rubra																3	F						
1683	Fissidens adianthoides																		1	R				
609	Galium palustre																						1	R
680	Holcus lanatus		3	F									0	R										
690	Hydrocotyle vulgaris																				4	A	2	O
719	Juncus acutiflorus		3	F	1	O			1	R	1	R	2	O	1	R	4	F			2	O		
722	Juncus articulatus										1	R	2	O					0	R				
726	Juncus bulbosus				3	F			3	F	3	F	4	F	2	F	3	F					1	O
730	Juncus effusus																				3	F		
862	Menyanthes trifoliata		1	R																				
876	Molinia caerulea				2	O	3	F			1	R	1	R	3	F	3	F						
893	Myrica gale		1	R	1	R	4	F																
901	Narthecium ossifragum				3	F									8	A	4	F	3	F				
946	Pedicularis palustris												3	F					1	R				
970	Pinguicula vulgaris										4	F			3	F	1	R	3	F				
994	Polygala serpyllifolia						0	R																
1891	Polytrichum commune																				6	A		
1037	Potamogeton polygonifolius		1	R	5	A			7	D	3	F	5	A									7	D
1046	Potentilla erecta														1	R								
1049	Potentilla palustris	Comarum palustre																			0	R	8	D
1089	Ranunculus flammula		3	F									2	O									3	F
2254	Riccardia multifida														1	R								
1947	Scorpidium scorpioides																		1	R				
2700	Sphagnum auriculatum va	Sphagnum denticulatum			4	F							3	F										
1971	Sphagnum palustre						5	A							3	F								
1976	Sphagnum recurvum	Sphagnum fallax					5	A													7	D		
1973	Sphagnum subnitens														3	F			3	F				
1295	Stellaria alsine		2	O																				
1305	Succisa pratensis		2	O	1	R					1	R			3	F	3	F						
1354	Triglochin palustre				0	R							3	F										
1376	Vaccinium oxycoccos		2	O	1	R	3	F															2	O

8.3 BISHOP MONKTON INGS SSSI

Vegetation stands and target notes are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.3.1 Site Description

Bishop Monkton Ings is a quite large (38.8 ha) SSSI containing wetland, wet grassland and woodland, and located at about 17 m aOD on either side of the lower reaches of the valley of the Holbeck, a short distance above (*c.* 1 km south of) its confluence with the River Ure.

West of the Holbeck (SSSI unit 1), herbaceous wetland vegetation is represented mainly by forms of fen meadow vegetation. The vegetation of the valley bottom appears mostly to be dominated by *Carex acutiformis* (and has affinities with M22 *Juncus subnodulosus–Cirsium palustre* fen-meadow). The *C. acutiformis*-meadow spreads up the western slope from the alluvial bottom to merge with a community containing *Juncus subnodulosus* and which is unquestionably referable to M22, probably mostly in the form of the relatively impoverished M22a. This community, and *Juncus subnodulosus* in particular, is especially well-developed on and near the two hanging spring mounds towards the top of the seepage slope (Stand 5).

On the east side of the Holbeck (SSSI unit 2), the pattern of herbaceous wetland vegetation appears to be determined partly by past and present management regimes. Some stands of species-poor *Carex acutiformis*-dominated vegetation occur, but these are much less extensive than west of the beck. However, in unmanaged land towards the beck there are some extensive areas with much *Phragmites australis* and *C. acutiformis* which are probably a reed-invaded version of relatively summer-'dry' *C. acutiformis* meadow, developed as a result of dereliction. Much of the rest of the area appears to be referable to a form of fen M22, in places grading out into rushy-grassland or even, and sometimes quite abruptly, into a form of drier grassland.

Juncus subnodulosus-dominated forms of M22, often with *Carex disticha* and frequent *Oenanthe lachenalii*, are widespread, though variable. At least some of these stands may be referable to the *Briza media–Trifolium* spp. sub-community (M22b). Patches of lower-growing, more species rich vegetation occur embedded within the fen meadow, most if not all of them associated with occluded drains across the several spring mounds (Stands 1, 2, and TN1 & TN2). They range from tiny patches with *Pedicularis palustris*, which are probably best regarded as a rather rich and low-growing form of M22b, to strips and patches of vegetation that can be referred to M13 (Alkaline Fen).

The best example seen of this latter community was located in an occluded drain across the largest spring mound (Stand 4), and was distinguished by a few plants of *Schoenus nigricans, Epipactis palustris, Carex dioica* and *Scorpidium cossonii*, along with some other bryophytes including *Bryum pseudotriquetrum, Campylium stellatum* and *Fissidens adianthoides.* This vegetation was flanked by a fairly coarse example of M22 (Stand 3 and TN2), with some *Molinia caerulea* and *Succisa pratensis* and some locally-prominent invasional *Phragmites*. *Scorpidium cossonii* was also prominent in a somewhat flushed area on a spring mound (Stand 2), in a location that was less obviously the site of an old drain (and less obviously referable to M13).

8.3.2 Stand Descriptions

Stand 1 (SE 34730 65840; quadrat 38001; SSSI unit 2 – east of the Holbeck)

M22 *Juncus subnodulosus–Cirsium palustre* fen-meadow

(M22 MATCH coefficient: 53.0%)

This is a spring mound with very variable vegetation, mainly *Juncus subnodulosus* accompanied by a mixture of sedges (*Carex acutiformis, C. disticha, C. panicea, Eriophorum angustifolium*) and grasses (*Agrostis stolonifera, Festuca arundinacea, Festuca rubra, Holcus lanatus* and *Molinia caerulea*).

Angelica sylvestris, Achillea ptarmica, Filipendula ulmaria, Lotus uliginosus, and *Valeriana dioica* are frequent throughout. *Caltha palustris, Hypericum tetrapterum, Oenanthe lachenalii, Pedicularis palustris* and *Triglochin palustris* occur in wetter hollows and shallow ditches, sometimes with *Chara* sp. Mosses are rather sparse with just a few patches of *Calliergonella cuspidata*.

Stand 2 (SE 34667 65870; quadrat 38002; SSSI unit 2 – east of the Holbeck)

M22 *Juncus subnodulosus–Cirsium palustre* fen-meadow

A smaller spring mound supporting similar vegetation to Stand 1 but with very localised patches of *Scorpidium cossonii* (M22 MATCH coefficient: 50.1%).

Stand 3 (SE 34780 65770; quadrat 38003; SSSI unit 2 – east of the Holbeck)

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

This stand comprises the vegetation of a large, but low, spring mound surrounding a very small M13 patch (see Stand 4), and is similar to Stands 1 and 2 in composition. Old ditch lines here support *Campylium stellatum* and *Plagiomnium rostratum* as well as *Calliergonella cuspidata*. (M22 MATCH coefficient: 53.8%).

Stand 4 (SE 34809 65752; quadrat 38004; SSSI unit 2 – east of the Holbeck)

M13 *Schoenus nigricans–Juncus subnodulosus* mire

Stand 4 covers a very small area (approx 20 m^2), occupying shallow ditch-lines in an extensive spring mound, and marked by five tussocks of *Schoenus nigricans*. The vegetation here is similar to the surrounding fen meadow but includes a suite of distinctive species characteristic of M13 vegetation (MATCH coefficient 48.1%). These include *Bryum pseudotriquetum, Campylium stellatum, Carex dioica, Epipactis palustris, Pedicularis palustris, Schoenus nigricans* and *Scorpidium cossonii*. M13 vegetation is one of the most scarce types of Alkaline Fen.

Stand 5 (SE 34360 65980; quadrat 38005; SSSI unit 1 – west of the Holbeck)

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

Two 'hanging' spring mounds at the western edge of the SSSI, dominated by tall, often 'lodged', *Juncus subnodulosus* (M22a MATCH coefficient: 49.8%).

8.3.3 Wetland Substrata & Water Supply

See Annex 3 for detailed descriptions of WETMECs (Wetland water supply mechanisms) at Bishop Monkton Ings.

pH and EC are generally high at Bishop Monkton Ings: pH 6.9–7.1; EC 2050–2750 µS cm^{-1}. The substratum in SSSI unit 1 (west) was a silty peat, while in SSSI unit 2 (east) the substratum of the spring mounds was an organic peat.

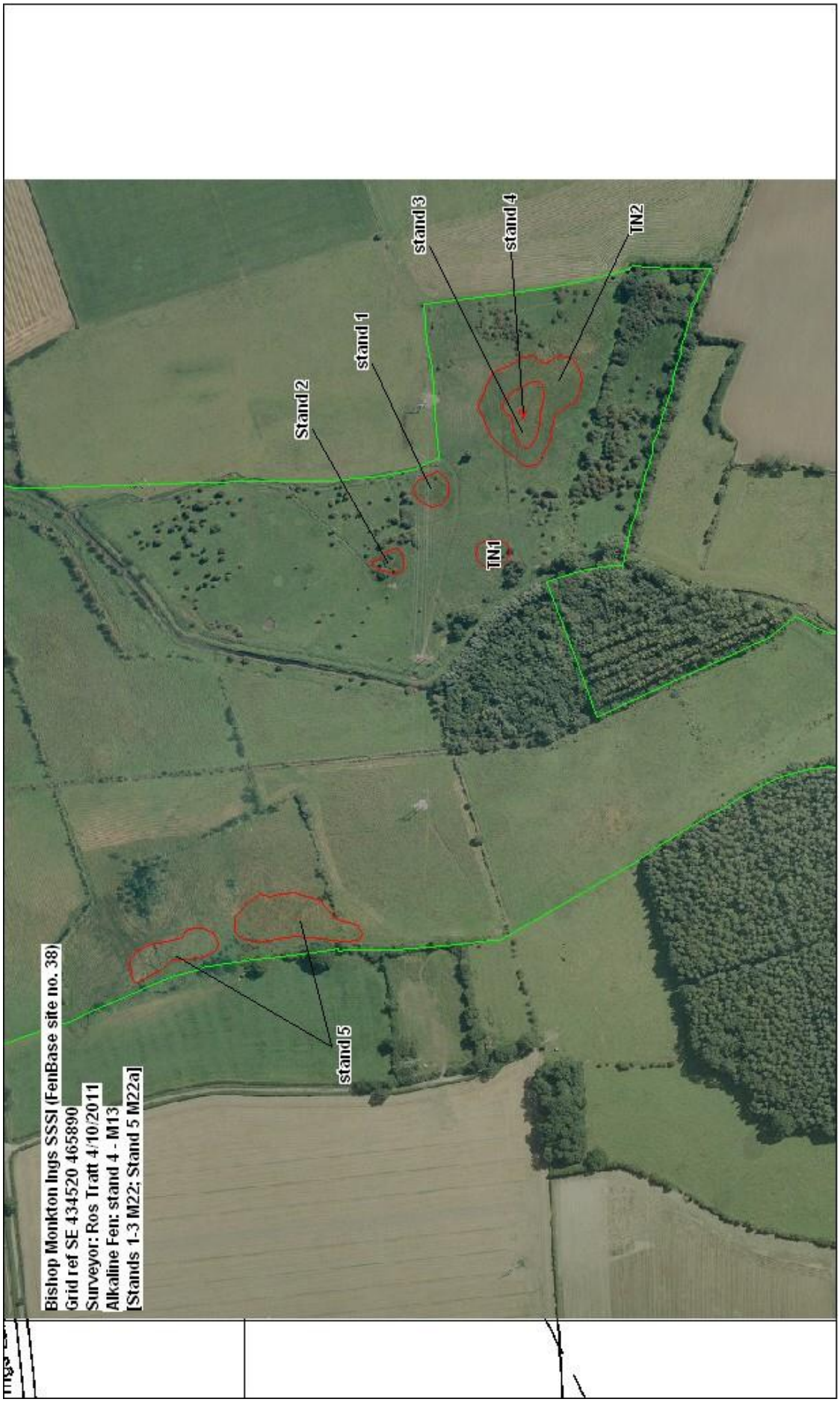
8.3.4 Site Management

The western part of the site is grazed by a small herd of cattle.

The eastern part of the site has been mown in the past, but it is often too wet for mowing machinery to access safely (according to the land-owner Mr Hutchinson). Some rutting was visible on the middle spring mound in SSSI unit 2. Livestock are fenced out.

There is some *Phragmites* invasion, which mowing should keep in check and the *Juncus subnodulosus* is robust and likely to become more dominant in the absence of vegetation management; summer mowing will prevent a build-up of litter (if the cut material is removed).

In some areas of unit 2 (east) nearest the Holbeck there is abundant *Impatiens glandulifera* amongst rather tall, robust vegetation with abundant *Phragmites australis* and *Urtica dioica*. This vegetation may mark out enriched areas that are frequently inundated by the Holbeck.


Bishop Monkton Ings SSSI (FenBase site no. 38)
Grid ref SE 434520 465890
Surveyor: Ros Tratt 4/10/2011
Alkaline Fen: stand 4 - M13
[Stands 1-3 M22; Stand 5 M22a]
stand 5
Stand 2
stand 1
stand 3
stand 4
TN1
TN2

North York Moors	Site name	Bishop Monkton Ings		Bishop Monkton Ings		Bishop Monkton Ings		Bishop Monkton Ings		Bishop Monkton Ings	
Alkaline Fen &	Site ref	38		38		38		38		38	
Transition Mire / Quaking Bog	Quadrat ID	38001		38002		38003		38004		38005	
Survey 2011	Stand ref	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5	
	NGR	SE		SE		SE		SE		SE	
Domin scores for all quadrats	Easting	434719		434667		434790		434795		434309	
DAFOR scores for stands	Northing	465835		465870		465750		465757		466087	
	Date	04/10/2011		04/10/2011		04/10/2011		04/10/2011		04/10/2011	
PE Phil Eades	Recorder name	RT		RT		RT		RT		RT	
RT Ros Tratt	NVC community	M22		M22		M22		M13c		M22a	
	Notes	spring mound		with Scorpidium cossonnii		ditch with Campylium stellatum		tiny area of M13		Juncus subnod dominant	
	Quadrat size	2x2m		2x2m		2x2m		2x2m		2x2m	
	pH	7.0		6.9				6.9		7.0	
	EC (µS cm^{-1})	2540		2802				2560		1066	
	Photo?	Y		Y		Y		Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)	Domin score (Quadrat)	DAFOR (stand)
105	Achillea ptarmica		1	R			0	R				
122	Agrostis stolonifera		2	O	1	R	2	O				
127	Ajuga reptans										0	R
167	Angelica sylvestris		3	F	0	R	3	F	1	O	3	F
251	Briza media				1	R	0	R				
1546	Bryum pseudotriquetrum								2	O		
1445	Calliergon cuspidatum	Calliergonella cuspidata	4	A	6	A	6	A	5	A	3	F
279	Caltha palustris		0	R			2	O				
1571	Campylium stellatum						1	R	2	O		
292	Cardamine flexuosa										0	R
295	Cardamine pratensis										0	R
302	Carex acutiformis		4	A	0	R	2	F			7	D
315	Carex dioica								0	O		
317	Carex disticha		3	F	2	O	3	F	3	F		
323	Carex flacca		0	R	4	F	4	F	3	F		
339	Carex panicea		2	O	2	O	2	O	3	F		
2730	Chara sp		0	O								
418	Cirsium palustre		2	O			1	O	0	O	2	O
3266	Drepanocladus revolvens v	Scorpidium cossonnii			3	F			2	O		
525	Epilobium palustre										0	R
526	Epilobium parviflorum										0	R
531	Epipactis palustris								0	R		
535	Equisetum palustre		0	R	2	O			0	O	0	R
546	Eriophorum angustifolium		3	F	3	F	3	F	2	O		
558	Eupatorium cannabinum										2	O
572	Festuca arundinacea		3	F	0	R	3	F				
576	Festuca rubra		5	A	2	O	3	F	2	O		
583	Filipendula ulmaria		3	F	0	R	0	O	0	R		
612	Galium uliginosum				1	R	0	R			1	R
680	Holcus lanatus		2	O	2	O	2	O			2	O
690	Hydrocotyle vulgaris										2	O
703	Hypericum tetrapterum		0	R			1	R				
708	Impatiens glandulifera				0	R						
715	Iris pseudacorus										0	R
2732	Juncus subnodulosus		5	A	2	F	5	A	3	F	8	D
758	Lathyrus pratensis		2	O	0	R	0	O				
2167	Lophocolea bidentata								1	R		
802	Lotus pedunculatus		3	F	3	F	3	F	0	R	0	R
813	Lychnis flos-cuculi								1	R		
830	Lysimachia vulgaris						0	R				
855	Mentha aquatica						3	F			3	F
876	Molinia caerulea		3	F	2	O	3	F	2	O		
886	Myosotis laxa caespitosa	Myosotis laxa									0	R
911	Oenanthe lachenalii		3	F	2	O	2	O	1	O	1	R
946	Pedicularis palustris		3	F	2	O	3	F	4	A		
961	Phragmites australis		1	O	1	O	2	O	2	O	2	O
1795	Plagiomnium rostratum						0	R				
1046	Potentilla erecta						0	R				
1142	Rumex conglomeratus										1	R
1190	Sanguisorba officinalis						0	R				
1207	Schoenus nigricans								2	F		
1305	Succisa pratensis		0	O	4	A	4	A	5	A		
1350	Trifolium repens		0	O								
1354	Triglochin palustre		3	F	0	R			3	F		
1380	Valeriana dioica		3	F	4	A	4	A	3	F	2	O
1411	Vicia cracca		3	F	1	O	0	R				

8.4 CASTLEBECK WOODS FEN

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.4.1 Site Description

The wetland area examined is situated within Castlebeck and Scar Woods SSSI, at the southern end of Jugger Howe Dale. It comprises a small (c. 25 x 5 metres) unmanaged strip of fen vegetation situated on a gentle slope above a footpath that runs alongside the lower end of Jugger Howe Beck, hemmed in by dense bracken and gorse, with a stand of oak woodland higher upslope.

8.4.2 Stand Description

Stand 1 (SE 94827 98096; Quadrat 298001)

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

The vegetation is dominated by a dense thatch of *Juncus acutiflorus*, with abundant *Carex panicea, Filipendula ulmaria, Galium uliginosum, Holcus lanatus, Hydrocotyle vulgaris* and *Valeriana dioica*, with a variety of other grasses, forbs and occasional bryophytes. It was notable for the presence of a few plants of *Parnassia palustris*. The stand can be best assigned to the M22b fen-meadow community (MATCH coefficient 47.1%), which was not a target of this project.

8.4.3 Wetland Substrata & Water Supply

Immediately above the fen is a thin broken line of sandstone blocks. There was no obvious water outflow at the time of survey, but it is possible that there is a diffuse seepage issuing from the base of the sandstone outcrop.

8.4.4 Site Management

This site appears to be currently unmanaged, and could well benefit from light grazing or mowing to open up the dense sward of rushes.


Castlebeck Woods Fen (FenBase Site 298)
Central grid ref: SE 94827 98096
Surveyor: Phil Eades 17/09/2011
Other fen (Stand 1: M22b)

North York Moors		Site name	Castlebeck Woods Fen	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	298	
		Quadrat ID	298001	
		Stand ref	Stand 1	
		NGR	SE	
Domin scores for all quadrats		Easting	494827	
DAFOR scores for stands		Northing	498096	
		Date	17/09/2011	
PE	Phil Eades	Recorder name	PE	
RT	Ros Tratt	NVC community	M22b	
		Notes	Spp-rich rush pasture with Parnassia	
		Quadrat size	2x2m	
		pH		
		EC (µS cm-^{1})		
		Photo?	Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (stand)
105	Achillea ptarmica		3	F
122	Agrostis stolonifera		3	F
167	Angelica sylvestris		3	F
251	Briza media		0	O
1445	Calliergon cuspidatum	Calliergonella cuspidata	3	F
339	Carex panicea		4	A
371	Centaurea nigra		0	O
418	Cirsium palustre		1	O
535	Equisetum palustre		3	F
576	Festuca rubra		0	O
583	Filipendula ulmaria		4	F
612	Galium uliginosum		5	A
680	Holcus lanatus		4	A
690	Hydrocotyle vulgaris		5	A
719	Juncus acutiflorus		8	D
769	Leontodon hispidus		0	O
855	Mentha aquatica		5	A
876	Molinia caerulea		3	F
944	Parnassia palustris		2	R
1804	Plagiomnium elatum		2	O
973	Plantago lanceolata		3	F
1066	Pteridium aquilinum		0	R
1069	Pulicaria dysenterica		0	R
1089	Ranunculus flammula		3	F
1305	Succisa pratensis		3	F
1380	Valeriana dioica		4	A

8.5 CAWTHORN MOOR SSSI

Vegetation stands and target notes are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.5.1 Site Description

The main area of wetland vegetation at Cawthorn Moor occurs in association with a series of strong springs (sometimes strongly ochreous) emerging from the steep slopes to the east of Coldkeld Beck, within scattered woodland, grassland, bracken and heath. Water from the springs flows down the hillside through stony runnels (with *Pinguicula vulgaris, Potamogeton polygonifolius* and patches of bryophytes typically found in base-rich wetlands, including *Aneura pinguis, Campylium stellatum, Palustriella commutata, Selaginella selaginoides*), spreading into more extensive flushes where the slope eases. Runnels are often flanked by *Schoenus nigricans* and *Erica tetralix*. *Schoenus nigricans* is also a prominent component of the more extensive flushed areas.

The springs are connected to a hydraulic ram system which was operational at the time of survey.

Two further areas were visited during the survey:

∗ A small patch of *Schoenus nigricans* on the eastern bank of Coldkeld Beck, south of the main area of springs at SE 78147 91988. Two tussocks of *Schoenus nigricans* are accompanied by a few plants of *Carex viridula* subsp. *brachyrrhyncha* and *C. pulicaris, Erica tetralix, Juncus acutiflorus, Molinia caerulea* and *Succisa pratensis*. *Myrica gale* is dominant in the general area.

∗ A broad soakway, leading from a drain on the western slopes above Coldkeld Beck and feeding into a duck pond which has been created by damming the flow of the beck at SE78304 92394. This broad drain / soakway supports vegetation characteristic of base-poor wetlands with a sparse sward of *Carex echinata, Eriophorum angustifolium, Juncus acutiflorus, Molinia caerulea* and *Narthecium ossifragum* over abundant *Sphagnum denticulatum* and *S. fallax*.

Neither of these areas represents Alkaline Fen or Transition Mire & Quaking Bog habitat, and consequently they were not sampled.

8.5.2 Stand Descriptions

Stand 1 (SE 78321 92343; quadrat 49001)

M14 *Schoenus nigricans –Narthecium ossifragum* mire

(MATCH coefficient 38.6%)

This is an ochreous spring and runnel system with *Pinguicula vulgaris, Potamogeton polygonifolius* and *Scorpidium scorpioides* marking out flow tracks, leading to a more extensive flush with frequent *Schoenus nigricans*. Supports a suite of species typical of base-poor habitats (*Erica tetralix, Narthecium ossifragum, Sphagnum subnitens, Aulacomnium palustre* and *Drosera rotundifolia*) occurring in an intricate mosaic with species typical of base-rich conditions, e.g. *Aneura pinguis, Campylium stellatum, Palustriella commutata, Philonotis calcarea, Riccardia multifida*. This area can be assigned to the M14 *Schoenus nigrican –Narthecium ossifragum* mire community, a form of Transition Mire / Quaking Bog.

Stand 2 (SE 47318 492277; quadrat 49002)

M10 *Carex dioica–Pinguicula vulgaris* mire

(MATCH coefficient: 46.1%)

This broad flush to the south of Stand 1 is characterised by mixed sedges including *Carex dioica, Carex pulicaris,* and *Eriophorum latifolium* over abundant brown mosses. *Schoenus nigricans* occurs in patches within this area, but is rather localised. In addition, a small stand of M10 (TN1) is found

approximately 10 m to the north of Stand 1, associated with a small seepage and runnel system. This vegetation can be classified as Alkaline Fen.

Stand 3 (SE478327 492260; quadrat 49003)

M22 *Juncus subnodulosus–Cirsium palustre* fen-meadow

(MATCH coefficient: 36.4%)

Stand 3 comprises a small patch of sedge-rich, rushy vegetation near the hydraulic ram system. *Carex viridula* subsp. *brachyrrhyncha* is abundant here, accompanied by *Carex echinata, C. flacca and C. panicea*. *Equisetum palustre* and *Hydrocotyle vulgaris* are both very distinctive components of the vegetation. *Juncus inflexus* is patchy but found throughout. *Palustriella commutata* and *Philonotis calcarea* occur as scattered clumps beneath the sward.

8.5.3 Wetland Substrata & Water Supply

Interstitial water is base-rich in all samples: pH 6.7–8.0; EC 250–450 µS cm^{-1}. Some of the springs are iron-rich. The substratum is often rather stony and skeletal, covered with thin peaty soil on the gentler slopes.

8.5.4 Site Management

The springs are connected to a hydraulic ram system, which pumps water up from the springs.

A container of diesel was found near one of the hydraulic ram chambers, and this had spilled into the flush below. The site is used as a game shooting area, and is actively keepered.


Cawthorn Moor SSSI (FenBase Site 49)
Grid ref SE783923
Surveyor: Ros Tratt & Phil Eades 23/09/2011
Alkaline Fen (stand 2)
Transition Mire and quaking bog (stand 1)
TN1 spring and runnel M10
Stand 1 M14
Stand 2 M10
Stand 3 M22b

North York Moors		Site name	Cawthorn Moor		Cawthorn Moor		Cawthorn Moor	
Alkaline Fen &		Site ref	49		49		49	
Transition Mire / Quaking Bog		Quadrat ID	49001		49002		49003	
Survey 2011		Stand ref	Stand 1		Stand 2		Stand 3	
		NGR	SE		SE		SE	
Domin scores for all quadrats		Easting	478331		478318		478327	
DAFOR scores for stands		Northing	492337		492277		492260	
		Date	23/09/2011		23/09/2011		23/09/2011	
PE	Phil Eades	Recorder name	RT & PE		RT & PE		RT & PE	
RT	Ros Tratt	NVC community	M14		M10		M22b	
		Notes	tomato soup spring sample		sedges with Philonotis calcarea		grasse & sedge-rich	
		Quadrat size	1x4m		1x4m		2x2m	
		pH	6.7		7.1			
		EC (µS cm-1)	250		470			
		Photo?	Y		Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
122	Agrostis stolonifera						2	O
2256	Aneura pinguis		3	F	2	O		
1482	Aulacomnium palustre		1	R				
251	Briza media						2	O
1546	Bryum pseudotriquetrum				2	O		
1445	Calliergon cuspidatum	Calliergonella cuspidata	0	O	1	R	1	O
1571	Campylium stellatum		4	A	4	A		
315	Carex dioica		0	O	3	F		
319	Carex echinata				2	F	2	O
323	Carex flacca				2	F	4	A
325	Carex hostiana				3	F		
339	Carex panicea		2	O	3	F	2	F
329	Carex viridula ssp brachyrrhyncha		0	O	3	F	5	A
1596	Cratoneuron commutatum	Palustriella commutata	3	F	3	F	4	A
4340	Cratoneuron commutatum falcatum	Palustriella falcata			1	R		
1600	Ctenidium molluscum				2	R		
466	Dactylorhiza fuchsii		1	R				
3192	Dactylorhiza sp.		1	R				
1658	Drepanocladus revolvens	Scorpidium revolvens	3	F				
3266	Drepanocladus revolvens var. intermedius	Scorpidium cossonnii	1	O				
494	Drosera rotundifolia		2	O				
535	Equisetum palustre		3	F	3	F	5	A
542	Erica tetralix		3	F				
546	Eriophorum angustifolium		0	O	1	O	2	O
547	Eriophorum latifolium		2	O	2	O		
576	Festuca rubra						1	O
1683	Fissidens adianthoides		1	R	2	O		
612	Galium uliginosum						1	O
680	Holcus lanatus						1	O
690	Hydrocotyle vulgaris						5	A
719	Juncus acutiflorus		2	O	2	O	3	F
722	Juncus articulatus				2	O	1	O
726	Juncus bulbosus		1	O				
729	Juncus conglomeratus		1	O				
730	Juncus effusus				1	R		
733	Juncus inflexus						1	O
862	Menyanthes trifoliata						3	F
876	Molinia caerulea		5	A			3	F
893	Myrica gale		4	A	4	A	1	O
901	Narthecium ossifragum		0	O				
1845	Philonotis calcarea		0	O	2	O	2	O
970	Pinguicula vulgaris		3	F				
1037	Potamogeton polygonifolius		2	O				
2254	Riccardia multifida		3	F	3	F		
1207	Schoenus nigricans		7	A	0	O		
1947	Scorpidium scorpioides				1	O		
1235	Selaginella selaginoides		2	F				
1960	Sphagnum capillifolium		0	O				
1973	Sphagnum subnitens		2	F				
1305	Succisa pratensis				1	O	2	O
1354	Triglochin palustre				2	O		
1380	Valeriana dioica				2	O	3	F

8.6 DEEPDALE MEADOW (DALBY FOREST)

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.6.1 Site Description

This site is located alongside the upper reaches of the White Beck in Upper Deepdale, on the north-eastern side of Dalby Forest. The wetland vegetation occurs as localised areas associated with springs either side of the track which crosses the beck. The site slopes gently down to the north-east, and is un-managed except for one patch of rushy vegetation immediately upstream (south-west) of the track, which is managed by summer mowing. The springs here have been extensively modified by ditching and the creation of pools, and by capture of spring water by hydraulic rams. The Alkaline Fen interest feature occurs downstream of the track, where there is a broad expanse (*c*. 2100 m^2) of very wet ground with a dense network of tufa-rich water tracks, beneath a 'lodged' thatch of *Juncus subnodulosus* and a variety of other fen plants, and flanked by wet *Alnus glutinosa* and *Salix cinerea* woodland.

8.6.2 Stand Descriptions

Stands 1 & 2 (SE 91253 90504; SE 91223 90410; Quadrats 274001 & 2)

M13c *Schoenus nigricans–Juncus subnodulosus* mire,
Caltha palustris–Galium uliginosum sub-community

(MATCH coefficients 47.2% and 44.1% respectively)

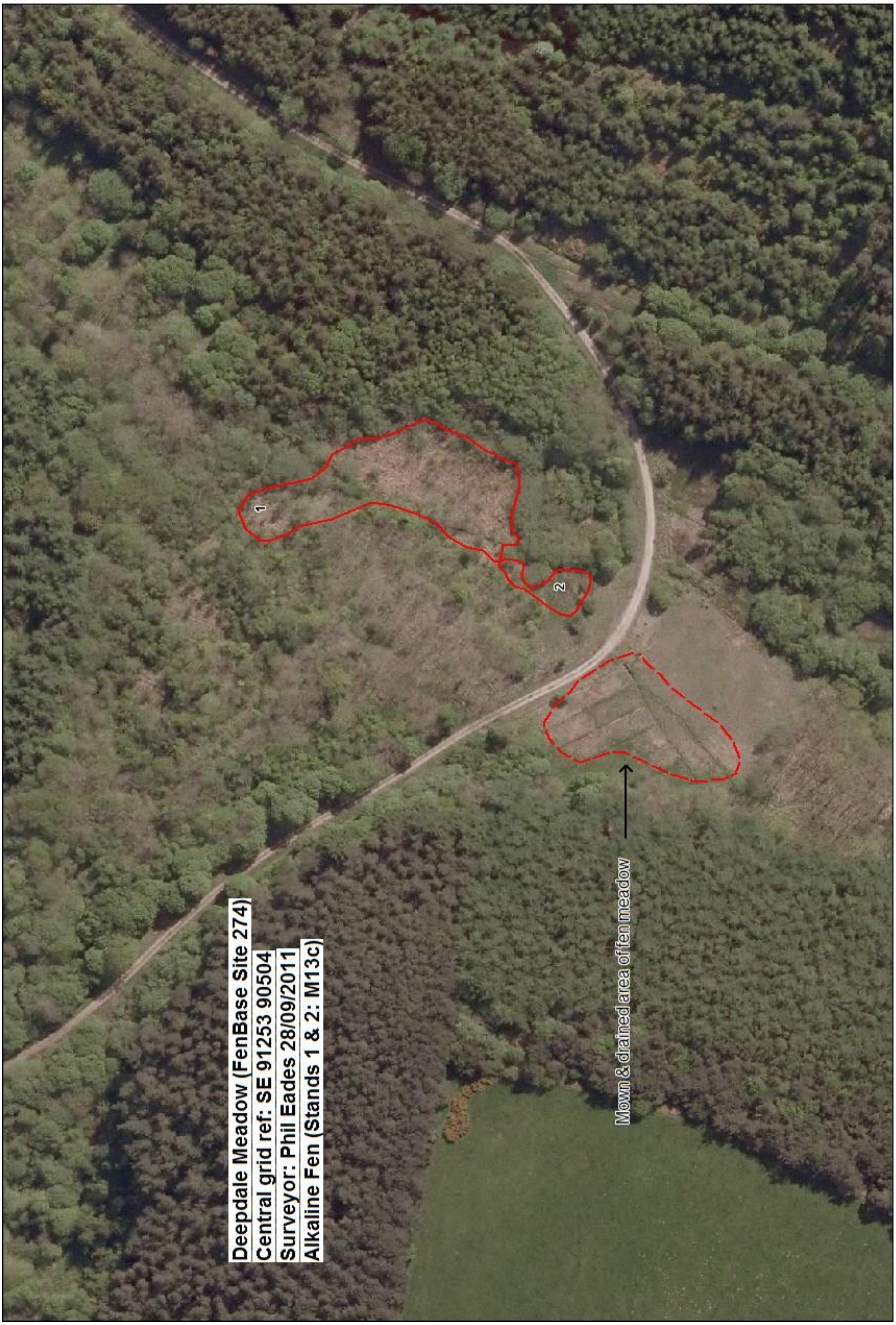
Stands 1 & 2 support M13c mire vegetation (Alkaline Fen), interspersed with young scrub of *Alnus glutinosa* and *Salix cinerea*. Stand 2 is situated where springs emerge immediately downstream of the track, with occasional clumps of *Schoenus nigricans, Juncus subnodulosus*, and a variety of low-growing fen species such as *Carex flacca, C. panicea, Ctenidium molluscum, Fissidens adianthoides, Palustriella commutata, Pellia endiviifolia* and *Plagiomnium elatum*, plus scattered *Briza media, Centaurea nigra, Filipendula ulmaria* and *Succisa pratensis*. Much of the remaining rich-fen vegetation to the south of the track (Stand 1) is visually dominated by a dense thatch of *Juncus subnodulosus*, and though generally lacking *Schoenus*, supports a wide variety of fen species at low cover. Within the M13 vegetation there is an abundance of water-filled soakways and water tracks, some of which are quite open and bryophyte-rich. These are dominated by *Palustriella commutata*, with smaller quantities of *Calliergonella cuspidata, Campylium stellatum, Pellia endiviifolia, Rhizomnium punctatum*, and occasional *Carex flacca*.

8.6.3 Wetland Substrata & Water Supply

The site is supplied by base-rich water (pH 7.4–8.1, EC 590–610 µS cm^{-1}) and augering found soft tufa-rich peat to more than 100 cm deep in places, over sandy clay with stones. Vigorous springs and seepages are apparent throughout the site, although often obscured by the dense vegetation.

8.6.4 Site Management

This site is unmanaged, except where mown to the south-west of the track. That area may have been of more interest before ditches were cut, but at present the Alkaline Fen interest is found to the north-east of the track. This area is totally derelict, and would benefit greatly from mowing or light grazing, and clearance of encroaching willow and alder scrub. There may also be an opportunity for restoration of species-rich fen meadow in the ditched area, if it is possible to block some of the ditches and raise water levels there.


Deepdale Meadow (FenBase Site 274)
Central grid ref: SE 91253 90504
Surveyor: Phil Eades 28/09/2011
Alkaline Fen (Stands 1 & 2: M13c)
Mown & drained area of fen meadow
1
2

North York Moors		Site name	Deepdale Meadow		Deepdale Meadow	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	274		274	
		Quadrat ID	274001		274002	
		Stand ref	Stand 1		Stand 2	
		NGR	SE		SE	
Domin scores for all quadrats		Easting	491253		491223	
DAFOR scores for stands		Northing	490504		490410	
		Date	28/09/2011		28/09/2011	
PE	Phil Eades	Recorder name	PE		PE	
RT	Ros Tratt	NVC community	M13		M13c	
		Notes	Derelict rich fen, dens J. subnod		Derelict rich-fen, with Schoenus & J.subnod	
		Quadrat size	4x4m		2x2m	
		pH	7.4		8.1	
		EC (µS cm-^{1})	585		611	
		Photo?	Y		Y	
Species code	**MATCH species name**	**Modern synonym (where changed)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**
122	Agrostis stolonifera		2	O		
167	Angelica sylvestris		2	O	0	O
251	Briza media				2	O
1445	Calliergon cuspidatum	Calliergonella cuspidata	4	A	3	F
1571	Campylium stellatum		0	R	2	F
323	Carex flacca		3	F	5	A
339	Carex panicea				3	F
329	Carex viridula ssp brachyrrhyncha		2	F		
371	Centaurea nigra		1	O	3	F
2103	Chiloscyphus pallescens				0	O
2761	Chiloscyphus sp				0	O
418	Cirsium palustre		1	O		
1596	Cratoneuron commutatum	Palustriella commutata	0	O	5	A
1600	Ctenidium molluscum				3	F
466	Dactylorhiza fuchsii		0	O		
535	Equisetum palustre		3	F	2	O
558	Eupatorium cannabinum		4	A	2	F
576	Festuca rubra		3	F	2	F
583	Filipendula ulmaria		3	F	2	F
1683	Fissidens adianthoides				1	O
612	Galium uliginosum		3	F		
690	Hydrocotyle vulgaris		3	F		
1761	Hylocomium splendens		4	F		
2732	Juncus subnodulosus		9	D	3	F
2167	Lophocolea bidentata		0	R		
876	Molinia caerulea		3	F	6	A
2222	Pellia endiviifolia				1	O
1804	Plagiomnium elatum				2	O
1807	Plagiomnium undulatum				1	O
1046	Potentilla erecta		3	F		
1914	Pseudoscleropodium purum		5	A		
1941	Rhytidiadelphus triquetrus				1	O
1207	Schoenus nigricans				2	O
1305	Succisa pratensis				2	O
1380	Valeriana dioica		3	F		

8.7 DUNSFORTH'S HILL

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.7.1 Site Description

Dunsforth's Hill is situated on the steep western slopes of Arden Great Moor, approximately 1.5 km to the north-east of the village of Kepwick, and immediately adjacent to Unit 3 of the North York Moors SSSI. The Dunsforth's Hill mires are developed in a small embayment below steeper scarp slopes. The embayment is drained by two main streams, which originate well upslope of the mires at about 300 m aOD. One of the streams drains through a small patch of Tufa, which has apparently been dug for marl. The two streams draining down into the embayment are supplemented by outflows in the vicinity of the mires, converging below these to form the Marl Pits Beck (marked by a line of *Alnus glutinosa* scrub) that flows west through Warren Wood and Kepwick, to join the Sorrow Beck, and ultimately joining the River Swale near Topcliffe.

There are two main spring lines at Dunsforth's Hill. The uppermost source some of the main west-flowing streams, but mires were not recorded in their vicinity. Springs and seepages are more numerous lower down the scarp slope, on a shelving bench below the steeper slopes, and here there are a number of small mires. The springs here appear to have an important water-supply function, and a large number of collectors have been installed to intercept their outflow.

8.7.2 Stand Descriptions

Stand 1: mosaic of mire types (SE 48524 91887; Quadrats 279001–4)

M10 *Carex dioica–Pinguicula vulgaris* mire (c. 15%)

M22b *Juncus subnodulosus–Cirsium palustre* fen-meadow,
Briza media–Trifolium spp. sub-community (c. 30%)

M37 *Cratoneuron commutatum–Festuca rubra* spring (c. 5%)

Wet heath (c. 50%)

The mires at Dunsforth's Hill comprise a complex mosaic of vegetation types, with areas of very wet, low-growing sedges, rushes, grasses, forbs and bryophytes interspersed with drier ground that supports a mixture of quite diverse rush-dominated patches, and large tracts of wet heath (unsampled) that were dominated by *Erica tetralix, Sphagnum subnitens, S. palustre* and *S. capillifolium*. The mire complex is embedded within dense bracken stands, with occasional patches of scrub.

The seepage areas and soakways are marked by a diverse mix of species, including *Anagallis tenella, Aneura pinguis, Briza media, Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Carex dioica, C. echinata, C. flacca, C. nigra, C. panicea, C. viridula* subsp. *brachyrrhyncha, Cirsium palustre, Ctenidium molluscum, Eriophorum angustifolium, Hydrocotyle vulgaris, Juncus articulatus, J. bulbosus, Palustriella commutata, P. falcata, Pedicularis sylvatica, Philonotis calcarea, Pinguicula vulgaris, Scorpidium cossonii, S. revolvens, Selaginella selaginoides, Succisa pratensis, Triglochin palustris,* and *Valeriana dioica.* These areas can be best assigned to M10 (MATCH coefficients: 40.0–41.6%), and can be classified as Alkaline Fen.

The upper parts of many of the main seepage areas are marked by mounds of *Palustriella commutata*, with a scattering of *Cardamine pratensis, Carex flacca, C. viridula* subsp. *brachyrrhyncha, Chrysosplenium oppositifolium, Cirsium palustre, Equisetum palustre,* and *Selaginella selaginoides*; these can probably be best considered as a form of M37 spring, although the MATCH coefficient is not particularly high (31.6% fit). Because these springs occur in combination with M10 vegetation, they are considered to be Alkaline Fen.

On slightly drier ground between the main seepages and soakways are found stands of moderately diverse rush vegetation, generally dominated by a mixture of *Juncus acutiflorus, J. inflexus*, *Cirsium palustre* and *Lotus pedunculatus*, but with a range of other herbs and bryophytes including *Aulacomnium palustre, Carex flacca, Erica tetralix, Equisetum palustre, Galium uliginosum, Hydrocotyle vulgaris, Potentilla erecta, Prunella vulgaris, Pseudoscleropodium purum, Thuidium tamariscinum* and *Valeriana dioica*. Whilst these stands were not sampled in detail, they have some affinity with the M22 fen-meadow community (MATCH coefficient: 30.0%), and have provisionally been assigned to M22b.

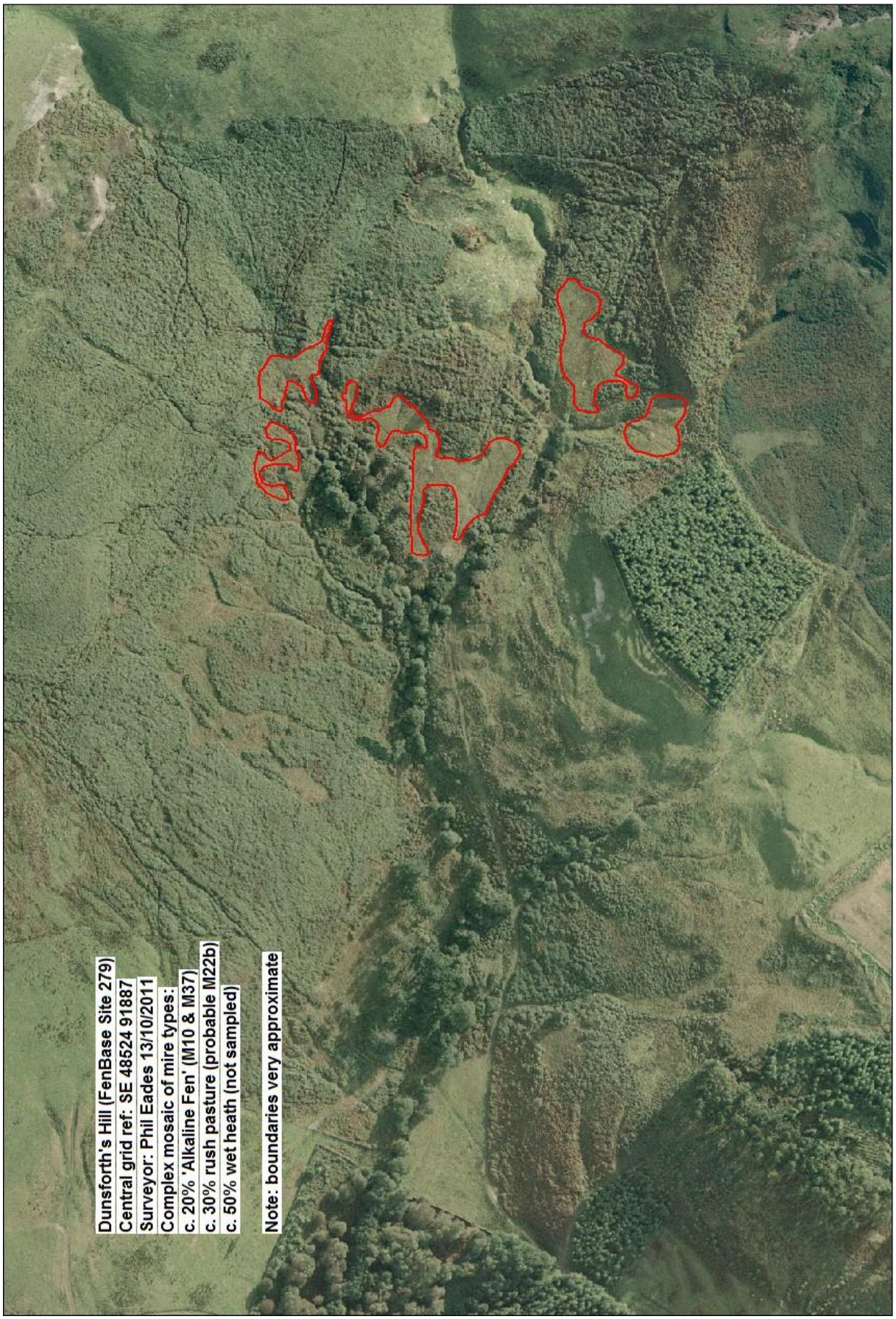
8.7.3 Wetland Substrata & Water Supply

Water samples taken in the wettest seepage areas were quite base-rich (pH 7.3; EC 290–420 µS cm^{-1}). The large number of seepages and water abstraction structures at this site indicate that these mires are maintained by permanent, strong groundwater outflow.

8.7.4 Site Management

The site experiences moderate grazing by sheep, at a level that appears suitable for preventing scrub invasion. As noted above, there are a large number of water abstraction structures throughout the mires; however, in the absence of any baseline vegetation data for the site, it is not clear whether the interception of spring outflows has had any negative impact on the wetland vegetation.

It would be interesting to negotiate the temporary closing of one or a small group of these abstraction points, and to monitor the effect upon ground water levels and wetland vegetation composition.


Dunsforth's Hill (FenBase Site 279)
Central grid ref: SE 48524 91887
Surveyor: Phil Eades 13/10/2011
Complex mosaic of mire types:
c. 20% 'Alkaline Fen' (M10 & M37)
c. 30% rush pasture (probable M22b)
c. 50% wet heath (not sampled)
Note: boundaries very approximate

North York Moors	Site name	Dunsforth's Hill		Dunsforth's Hill		Dunsforth's Hill		Dunsforth's Hill	
Alkaline Fen &	Site ref	279		279		279		279	
Transition Mire / Quaking Bog	Quadrat ID	279001		279002		279003		279004	
Survey 2011	Stand ref	n/a		n/a		n/a		n/a	
	NGR	SE		SE		SE		SE	
Domin scores for all quadrats	Easting	448587		448552		448515		448536	
DAFOR scores for stands	Northing	492020		492017		492016		491891	
	Date	13/10/2011		13/10/2011		13/10/2011		13/10/2011	
PE Phil Eades	Recorder name	PE		PE		PE		PE	
RT Ros Tratt	NVC community	M10		M37		M22b		M10	
	Notes	Base-rich seepage & soakway		Mossy seepage head		Diverse rush pasture stands		Base-rich seepage & soakway	
	Quadrat size	2x2m		2x2m		2x2m		1x4m	
	pH	7.3						7.3	
	EC (µS cm^{-1})	290						420	
	Photo?	Y		Y		Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
163	Anagallis tenella		3	F						
2256	Aneura pinguis		0	O					1	O
1482	Aulacomnium palustre						1	O		
251	Briza media								3	F
1546	Bryum pseudotriquetrum		0	O						
1445	Calliergon cuspidatum	Calliergonella cuspidata	3	F					2	F
1571	Campylium stellatum		0	O					3	F
295	Cardamine pratensis		3	F	3	F				
315	Carex dioica		3	F					3	F
319	Carex echinata		0	O						
323	Carex flacca		4	A	3	F	3	F		
333	Carex nigra								4	A
339	Carex panicea								4	A
329	Carex viridula ssp brachyrrhyncha				3	F			5	A
408	Chrysosplenium oppositifolium		0	O	3	F				
418	Cirsium palustre		3	F	2	O	3	F	0	O
1596	Cratoneuron commutatum	Palustriella commutata	6	A	9	D			6	A
4340	Cratoneuron commutatum	Palustriella falcata	1	O						
1600	Ctenidium molluscum		3	F						
1658	Drepanocladus revolvens	Scorpidium revolvens							2	O
3266	Drepanocladus revolvens v	Scorpidium cossonnii	4	A						
535	Equisetum palustre		0	O	1	O	3	F	3	F
542	Erica tetralix		0	O			2	O		
546	Eriophorum angustifolium		3	F					2	O
2776	Euphrasia nemorosa		0	O						
574	Festuca ovina						3	F		
612	Galium uliginosum						3	F		
680	Holcus lanatus						4	A		
690	Hydrocotyle vulgaris		3	F			3	F		
719	Juncus acutiflorus		0	O			4	A		
722	Juncus articulatus		4	A						
726	Juncus bulbosus		3	F						
733	Juncus inflexus		1	O			5	A		
802	Lotus pedunculatus						4	A		
876	Molinia caerulea						3	F		
885	Myosotis stolonifera		1	R						
947	Pedicularis sylvatica		0	O						
2222	Pellia endiviifolia		0	O						
1845	Philonotis calcarea		3	F						
970	Pinguicula vulgaris		0	R						
1046	Potentilla erecta						3	F		
1059	Prunella vulgaris						3	F		
1914	Pseudoscleropodium purum						1	O		
1235	Selaginella selaginoides		2	O	1	O			1	R
1305	Succisa pratensis		0	O						
2003	Thuidium tamariscinum						2	F		
1354	Triglochin palustre								1	R
1380	Valeriana dioica		3	F	1	O	2	F	2	O

8.8 HASTY BANK FARM

Vegetation stands and target notes are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.8.1 Site Description

Hasty Bank Farm is located on moderate slopes on the eastern side of Riccal Dale, roughly 2 km north of Pockley. The fen area at Hasty Bank Farm is situated at the foot of steeper slopes clad with deciduous woodland, and is flanked by a mixture of bracken, gorse scrub, and rough, semi-improved neutral grassland. Spring water from the fen flows beneath a farm track and down through pasture to the River Riccal on the valley floor. Approximately 200 m to the north-west of the site is Blaiskey Bank Springs SSSI, which itself supports a large area of M10 mire vegetation (not sampled for this project). The wetland site that was examined at Hasty Bank Farm is much smaller than Blaiskey Bank Springs, but is of considerable interest for the excellent example of spring-fed alkaline fen vegetation that it supports.

8.8.2 Stand Descriptions

Stand 1 (SE 62605 88415; Quadrats 271001–4)

M10a *Carex dioica–Pinguicula vulgaris* mire,
Carex demissa–Juncus bulbosus/kochii sub-community

(MATCH coefficient 36.8–39.8%)

This wetland has formed in association with a system of base-rich springs, seepages, runnels and soakways, and covers approximately 400 m^2. Water from a series of small seepages and springs flows down small skeletal runnels, which are predominantly bare with little vegetation except scattered bryophytes. The adjacent wet ground supports a diversity of small sedges, bryophytes, grasses, rushes and forbs, including *Anagallis tenella, Aneura pinguis, Briza media, Bryum pseudotriquetrum, Campylium stellatum, Carex dioica, C. echinata, C. hostiana, C. panicea, C. viridula* subsp. *brachyrrhyncha, Danthonia decumbens, Eleocharis quinqueflora, Eriophorum angustifolium, Fissidens adianthoides, Juncus articulatus, J. inflexus, Molinia caerulea, Palustriella commutata, P. falcatum, Pinguicula vulgaris, Ranunculus flammula, Succisa pratensis, Scorpidium revolvens, Triglochin palustre* and *Valeriana dioica*. Most of the site can clearly be assigned to the M10a mire sub-community, and is categorised as Alkaline Fen. However, the south-eastern corner of the fen appears to be influenced by a water abstraction structure, and here the vegetation is grassier. It cannot be adequately classified using the NVC, and is perhaps best considered to be a dry form of M10.

8.8.3 Wetland Substrata & Water Supply

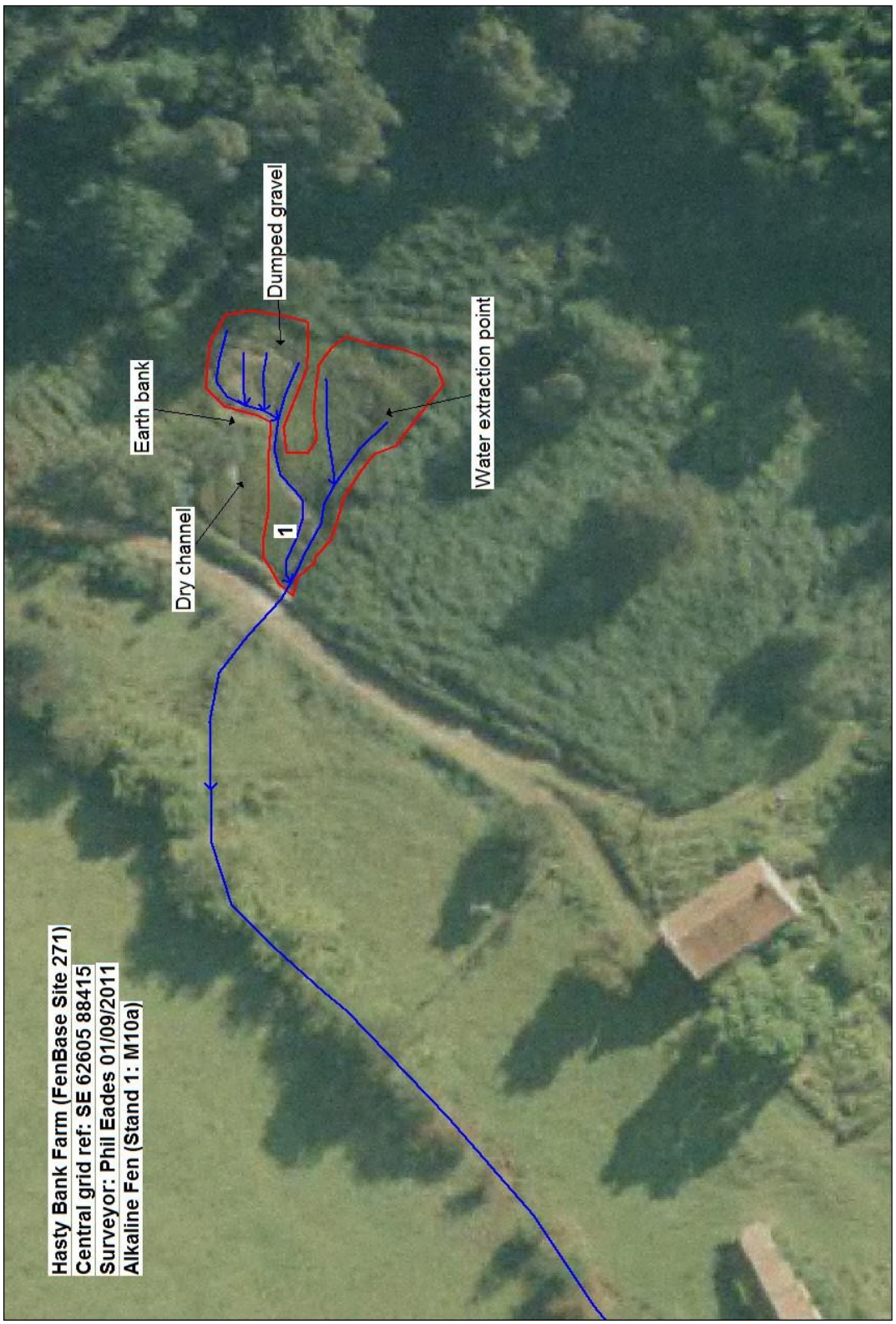
Base-rich water (pH 7.9; EC 380 µS $cm^{-}1$) flows from a series of seepages and springs at the head of the fen, downslope along several small skeletal runnels (with up to 10 cm of tufa-encrusted peat over gravel). Water from these seepages also appears to flush downslope through slightly deeper peat that flanks the runnels (with 20–35 cm peat over gravel). Upslope of the fen the ground is dry and supports a mixture of bracken and scrub.

8.8.4 Site Management

The fen area is moderately grazed, probably by sheep. There have been a number of modifications made to the site: the extraction of drinking water for the nearby farm (marked by a concrete structure and manhole cover), which may have led to some drying out of part of the fen; the deposition of gravel in part of the seepage zone at the head of the site, which has probably covered over a small amount of

fen vegetation; and the construction of an earth bank on the north side of the fen, which has diverted water from a runnel that is now visible as a dry channel downslope of the bank. It seems likely that this has considerably reduced the area that now supports M10 vegetation.

It is suggested that the gravel strip and the earth bank could be removed fairly easily, and the latter action might well allow the M10 vegetation to expand to its (presumed) former extent. Ideally the spring water extraction point should also be removed or relocated, perhaps to immediately below the fen, but just above the track.



North York Moors	Site name	Hasty Bank Farm	Hasty Bank Farm	Hasty Bank Farm	Hasty Bank Farm	
Alkaline Fen &	Site ref	271	271	271	271	
Transition Mire / Quaking Bog	Quadrat ID	271001	271002	271003	271004	
Survey 2011	Stand ref	Stand 1	Stand 1	Stand 1	Stand 1	
	NGR	SE	SE	SE	SE	
Domin scores for all quadrats	Easting	462594	462608	462606	462590	
DAFOR scores for stands	Northing	488414	488419	488411	488416	
	Date	01/09/2011	01/09/2011	01/09/2011	01/09/2011	
PE Phil Eades	Recorder name	PE	PE	PE	PE	
RT Ros Tratt	NVC community	M10a	M10	M10?	M10a	
	Notes	Large seepage & runnel system near farm	Open skeletal soils, very diverse	Grassier area near abstraction point	Very wet edge of spring-flush system	
	Quadrat size	0.5x8m	2x2m	2x2m	1x4m	
	pH	7.9				
	EC (µS cm-1)	380				
	Photo?	Y	Y	Y	Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	Domin score (Quadrat)	Domin score (Quadrat)	Domin score (Quadrat)	DAFOR (Stand)
127	Ajuga reptans				1		R
163	Anagallis tenella		2	3		3	F
2256	Aneura pinguis			3			O
251	Briza media		1	1	3		F
1546	Bryum pseudotriquetrum			1			O
1445	Calliergon cuspidatum	Calliergonella cuspidata			4	3	F
1571	Campylium stellatum		1		1	3	F
315	Carex dioica			4			O
319	Carex echinata				5	1	F
325	Carex hostiana					0	R
339	Carex panicea		3	3	6		A
329	Carex viridula ssp brachyrrhyncha		4	3	3	3	A
418	Cirsium palustre		1		2		O
1596	Cratoneuron commutatum	Palustriella commutata	7	6		7	A
4340	Cratoneuron commutatum	Palustriella falcata	1	4		3	F
1600	Ctenidium molluscum			2	3	3	F
1249	Danthonia decumbens				0		R
1658	Drepanocladus revolvens	Scorpidium revolvens		1			R
510	Eleocharis quinqueflora		3	3		6	F
532	Equisetum arvense		3		1		O
546	Eriophorum angustifolium		3	4	3	3	F
2776	Euphrasia nemorosa				1		R
574	Festuca ovina		1				R
1683	Fissidens adianthoides			0		1	R
680	Holcus lanatus			1	1		R
690	Hydrocotyle vulgaris					1	R
722	Juncus articulatus		4		3	3	F
733	Juncus inflexus				4	1	F
769	Leontodon hispidus			2	4		F
855	Mentha aquatica				1		R
876	Molinia caerulea		3	3	5		F
970	Pinguicula vulgaris		1	3		3	F
1804	Plagiomnium elatum					1	R
1089	Ranunculus flammula				1		R
1940	Rhytidiadelphus squarrosus			1	2		O
1305	Succisa pratensis			1	3		F
1354	Triglochin palustre		2			4	OLA
1380	Valeriana dioica			2	3		F

8.9 HOLE OF HORCUM SSSI

Vegetation stands and target notes are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.9.1 Site Description

The wetland interest at the Hole of Horcum SSSI consists of a series of seepages (all at *c*. 180m aOD) and flushes associated with small spring-mounds, or springheads in gullies emerging at the base of steep bracken and heather covered slopes. Wetland vegetation is confined to small soakways stretching 10–30 m downslope of seepages, on gentle slopes and in small gullies that feed into Levisham Beck, which then flows south. At the time of survey there was no visible water flow in the soakways, but the ground was water-logged.

The seepages, spring-mounds and soakways typically support very short vegetation, and are generally dominated by a mixture of sedges, such as *Carex dioica, C. flacca* and *C. panicea*, and bryophytes, e.g. *Palustriella commutata* and *Palustriella falcata*, frequently accompanied by *Bryum pseudotriquetum, Philonotis calcarea* and *Philonotis fontana*. The list of associated species is long, but vascular plants tend to be a rather sparse component of the vegetation; typically there are a few shoots of *Agrostis stolonifera, Briza media, Galium uliginosum, Juncus articulatus*, and *Valeriana dioica*.

On the north-eastern slopes, at the base of woodland, there are several rushy flushes (non-target vegetation; not sampled).

Although they are very small and localised, the wetland areas at the Hole of Horcum support some notable plant species, including *Myosotis stolonifera*.

8.9.2 Stand Descriptions

Stands 1 & 2 (SE84732 93821 & SE 84687 93857; Quadrats 272001 & 2)

M37 *Cratoneuron commutatum–Festuca rubra* spring

Two very localised springs or seepages supporting very variable vegetation that is mainly characterised by abundant bryophytes (*Palustriella commutata, P. falcata, Philonotis calcarea* and *P. fontana*) with very variable and rather scattered associates. Stand 1 is a very small, closely-grazed mound within wet heath. Stand 2 emerges in a 'nick point' at the base of a steep bracken-covered slope and forms a soakway through a shallow gully to a summer-dry, broad grassy gully which eventually meets Levisham Beck. A third similar stand (TN3) was not sampled.

This vegetation can be assigned to M37 *Cratoneuron commutatum–Festuca rubra* spring, although the MATCH coefficients are rather low due to the very variable list of associates (coefficients < 28%). MATCH also often ranks M38 above M37, but these two communities are very closely related with many overlapping associate species. M37 is regarded as a lower altitude version of M38, so the stands have been assigned to M37 on the basis of altitude. It is arguable whether these should be considered to be Alkaline Fen, as they are not intimately associated the M10 communities.

Stands 3–5 (SE84732 93821 & SE 84687 93857; Quadrats 272003 - 5)

M10 *Carex dioica–Pinguicula vulgaris* mire

(coefficients range from 27.8% to 36.4%)

These three stands, and two nearby unsampled areas, are characterised either by small spring-mounds and associated soakways (Stand 3 & TN1), or just soakways below small seepages (Stands 4 & 5, and TN2). All stands typically support a close-grazed sward of small sedges (including some or all of *Carex dioica, C. echinata, C. flacca, C. panicea, C. nigra, C. viridula* subsp. *brachyrrhyncha,* and *Eriophorum angustifolium*); bryophytes such as *Bryum pseudotriquetrum, Palustriella falcata,*

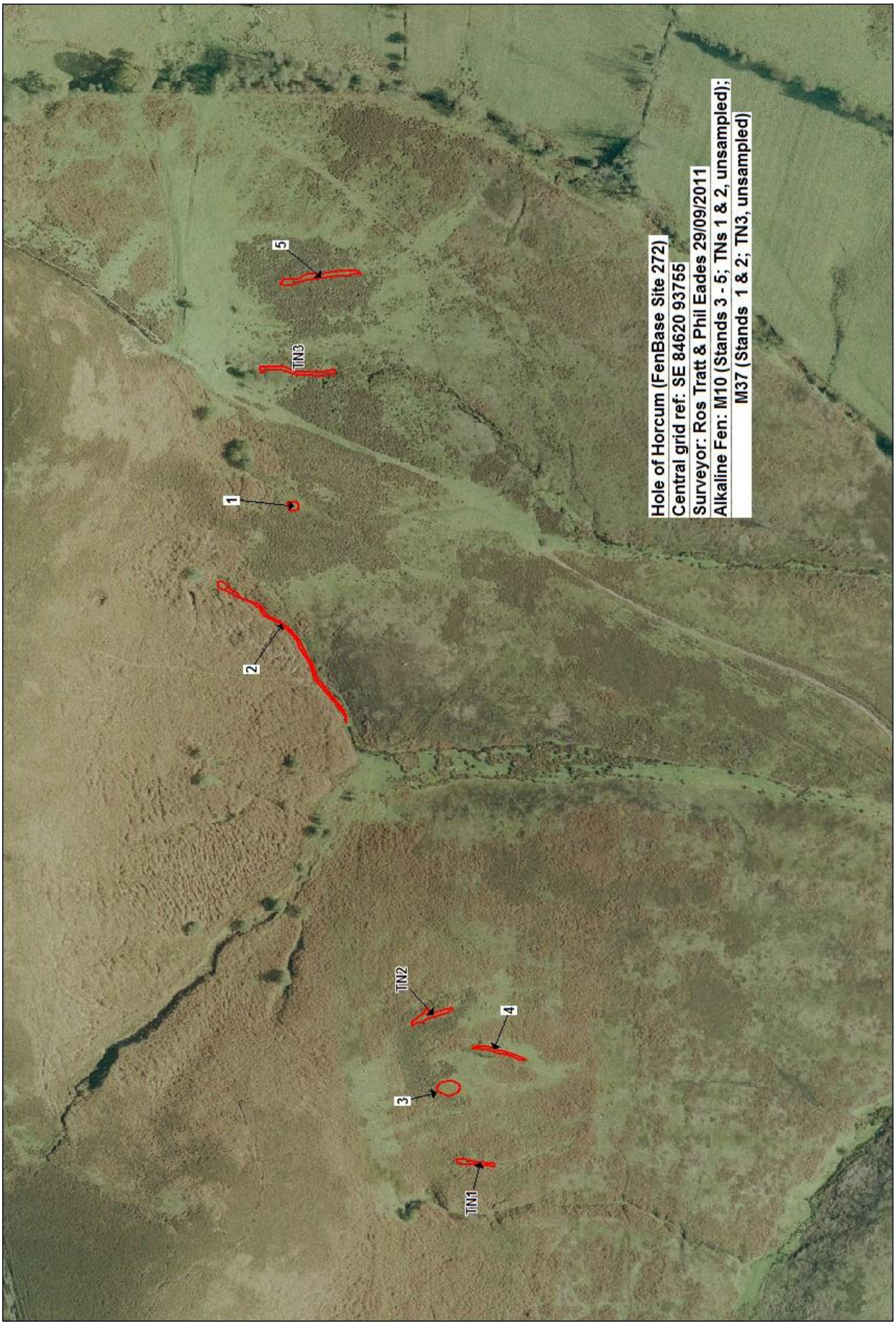
Philonotis calcarea, P. fontana, and *Scorpidium cossonii*; and a variety of other plants such as *Agrostis stolonifera*, *Anagallis tenella*, *Galium uliginosum*, *Hydrocotyle vulgaris*, and *Juncus articulatus*. Despite the low MATCH coefficients, these stands are probably best assigned to M10, and categorised as Alkaline Fen.

8.9.3 Wetland Substrata & Water Supply

The wetland vegetation appears to be irrigated by fairly weak, groundwater-fed seepages that are quite base-rich (measured pH ranged from 6.4–7.4; EC 350–420 µS cm^{-1}), the water then percolating a short distance downslope along narrow soakways, within the more generally base-poor heathy vegetation of the extensive, leached moorland soils. Where examined (Stand 3), the wetland soil comprised *c.* 70 cm of peat over a sandy clay.

8.9.4 Site Management

The extensive moorland at the Hole of Horcum is quite heavily grazed by sheep, although wetland stands were not excessively poached or trampled. The slopes are grazed as part of a large moorland unit and sheep probably preferentially graze the 'Hole' area because it offers more shelter than the higher moorland.


Hole of Horcum (FenBase Site 272)
Central grid ref: SE 84620 93755
Surveyor: Ros Tratt & Phil Eades 29/09/2011
Alkaline Fen: M10 (Stands 3 - 5; TNs 1 & 2, unsampled);
M37 (Stands 1 & 2; TN3, unsampled)
5
TN3
1
2
TN2
4
3
TN1

North York Moors	Site name	Hole of Horcum		Hole of Horcum		Hole of Horcum		Hole of Horcum		Hole of Horcum	
Alkaline Fen &	Site ref	272		272		272		272		272	
Transition Mire / Quaking Bog	Quadrat ID	272001		272002		272003		272004		272005	
Survey 2011	Stand ref	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5	
	NGR	SE		SE		SE		SE		SE	
Domin scores for all quadrats	Easting	484732		484687		484417		484440		484845	
DAFOR scores for stands	Northing	493821		493857		493739		493727		493818	
	Date	29/09/2011		29/09/2011		29/09/2011		29/09/2011		29/09/2011	
PE Phil Eades	Recorder name	RT		RT		PE		PE		PE	
RT Ros Tratt	NVC community	aff M37		M37		M10		M10		M10	
	Notes	Spring mound		Spring leading to runnel		Spring-mound & soakway		Seepage & soakway		Base-rich soakway	
	Quadrat size	2x2m		1x4m		0.5x8m		0.5x8m		0.5x8m	
	pH	7.2		7.2				6.4		7.4	
	EC (µS cm-1)	456		393				350		420	
	Photo?					Y		Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
122	Agrostis stolonifera				2	O	0	O			4	A
127	Ajuga reptans						0	O				
163	Anagallis tenella		1	O	0	R	3	F	3	F		
2256	Aneura pinguis								0	O		
1482	Aulacomnium palustre		0	O								
251	Briza media						0	O	1	O	2	O
1546	Bryum pseudotriquetrum		0	O	0	O	4	A			2	O
1445	Calliergon cuspidatum	Calliergonella cuspidata	2	O	2	O	0	O				
1571	Campylium stellatum						1	O				
295	Cardamine pratensis		2	O	4	F						
315	Carex dioica						5	A	3	F		
319	Carex echinata				0	O	0	O	0	O	2	O
323	Carex flacca		3	F	2	O	0	O	4	A	4	A
333	Carex nigra		2	F					5	A		
339	Carex panicea		2	F	1	O	3	F	4	A	4	A
329	Carex viridula ssp brachyrrhyncha						5	A	4	A		
312	Carex viridula ssp oedocarpa				0	O					4	A
384	Cerastium fontanum		2	F								
408	Chrysosplenium oppositifolium				2	R						
418	Cirsium palustre		1	O	1	O	0	O				
1593	Climacium dendroides		3	F								
1596	Cratoneuron commutatum	Palustriella commutata			7	A	0	O				
4340	Cratoneuron commutatum	Palustriella falcata			0	O	3	F				
1598	Cratoneuron filicinum		2	O					0	O		
1600	Ctenidium molluscum						0	O				
460	Cynosurus cristatus		2	O								
478	Deschampsia flexuosa						2	O	1	O		
3266	Drepanocladus revolvens v	Scorpidium cossonnii					3	F	7	A	5	A
510	Eleocharis quinqueflora								0	O	3	F
526	Epilobium parviflorum								1	O		
532	Equisetum arvense						0	O				
542	Erica tetralix				4	F					2	O
546	Eriophorum angustifolium		0	R			4	A			4	F
576	Festuca rubra				3	F					3	F
1683	Fissidens adianthoides						1	O				
609	Galium palustre		1	R	0	O						
612	Galium uliginosum		1	R			3	F	1	O	3	F
680	Holcus lanatus		3	F								
690	Hydrocotyle vulgaris				3	F	0	O	2	O	3	F
703	Hypericum tetrapterum				0	R						
719	Juncus acutiflorus				0	O	0	O			3	F
722	Juncus articulatus						2	F	3	F		
726	Juncus bulbosus		3	F	0	O			3	F		
730	Juncus effusus		1	R	3	F	0	O			1	O
733	Juncus inflexus						0	O	1	O		
802	Lotus pedunculatus		2	O	2	O					3	F
825	Lysimachia nemorum				0	R	0	O				
855	Mentha aquatica		0	O	5	A						
876	Molinia caerulea		3	F								
885	Myosotis stolonifera				0	R						
1845	Philonotis calcarea				6	A	4	A	0	O		
1847	Philonotis fontana		8	A	0	O	0	O	4	A		
4388	Plagiomnium sp								0	R		
995	Polygala vulgaris		2	O			1	O				
1046	Potentilla erecta						3	F				
1059	Prunella vulgaris				0	R	0	O				
1081	Ranunculus acris						2	F				
1089	Ranunculus flammula		1	O					3	F		
1139	Rumex acetosa				3	F						
1179	Salix repens agg.		0	R								
1971	Sphagnum palustre		0	O								
1305	Succisa pratensis						3	F			3	F
1350	Trifolium repens		1	R								
1354	Triglochin palustre						0	R				
1380	Valeriana dioica								3	F	3	F

8.10 JENNY THRUSH SPRING (DALBY FOREST)

8.10.1 Site Description

This is a large, destroyed tufa mound, within a dense forestry plantation. There is no existing wetand vegetation, just a few shaded ditches with *Chrysosplenium oppositiofolium* and *Cratoneuron filicinum*. No samples were recorded here.

8.10.2 Stand Descriptions

N/A

8.10.3 Wetland Substrata & Water Supply

N/A

8.10.4 Site Management

Dense forestry plantation on steep slopes.

8.11 JUGGER HOWE BECK (NORTH YORK MOORS SSSI)

Vegetation stands and target notes are identified in the images following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.11.1 Site Description

Situated within Unit 91 of the North York Moors SSSI, the wetland vegetation at Jugger Howe Beck is most extensive where an area of rather dense and often tussocky *Schoenus nigricans* and *Juncus subnodulosus* has developed over a 'mound' between the steep slopes at the edge of the moors and the course of Jugger Howe Beck. *Epipactis palustris* is abundant in part of this area occurring with a suite of species which are diagnostic of M13 vegetation. Fringing this area and extending either side along the beck there are numerous springs, seepages and flushes supporting an intricate mosaic of soakways and pools with calcicolous bryophytes, short sedges and *Pinguicula vulgaris*, with mounds of *Sphagnum* (*S. magellanicum, S. papillosum, S. subnitens*) and heathy vegetation in between. *Schoenus nigricans* is prominent throughout this vegetation, and it can clearly be assigned to the M14 mire community. Elsewhere iron-rich springs form sparsely vegetated runnels and pools supporting M10-like vegetation.

A small spring in upper Burn Howe Dale supports M10-like vegetation, draining down into a valley bottom that has varied valley mire vegetation including a patchy mosaic of *Molinia, Narthecium ossifragum* and *Sphagnum* vegetation (M21) mingled with soakways that are in places dominated by a mixture of small sedges and *Potamogeton polygonifolius* (M29). Near the lower end of the valley there is a large area of species-poor acidic seepages (TN7, unsampled).

Due to time constraints, the valleyside vegetation of Jugger Howe Beck immediately to the south-east of the confluence with Burn Howe Beck was only partially sampled during this survey, but further sampling here and on the southern side of Jugger Howe Beck would be beneficial to establish the full extent of the wetland vegetation in this area.

The wetland vegetation at Jugger Howe Beck includes an extensive area of M13 and M14 vegetation. This type of 'mixed mire' vegetation is of rare and localised occurrence in the UK, and this site is considered by the authors as being of national importance.

8.11.2 Stand Descriptions

Stands 1, 2 & 5 (SE 93965 98954, SE 93977 98960, SE 93900 99068; Quadrats 133001, 2 & 7; TN6)

M13c *Schoenus nigricans–Juncus subnodulosus* mire,
Caltha palustris–Galium uliginosum sub-community

M13b *Schoenus nigricans–Juncus subnodulosus* mire,
Briza media–Pinguicula vulgaris sub-community

M13 *Schoenus nigricans–Juncus subnodulosus* mire

(MATCH coefficients of 44.5% - 21.5%)

Stands 1 & 2 form an extensive spring mound dominated by *Juncus subnodulosus* and *Schoenus nigricans*, while Stand 5 & TN6 are smaller outliers of M13 on sloping ground to the north-west and south-east respectively.

In Stand 1, nearest to Jugger Howe Beck, the *Schoenus–Juncus* sward is even and dense with much dead litter over a patchy bryophyte layer with *Aneura pinguis*, *Campylium stellatum*, *Fissidens adianthoides*, *Scorpidium cossonii* and *Palustriella commutata*. Herbs include frequent, sometimes abundant, *Epipactis palustris*, with *Anagallis tenella, Equisetum palustre, Succisa pratensis* and *Valeriana dioica* occasional to frequent throughout, and scattered *Dactylorhiza* spp. (including

probable *D. incarnata* and *D. traunsteineri* but not in flower at time of survey; identification will need to be confirmed). Some small soakways adjacent to the mound support abundant brown mosses (mainly *Palustriella commutata* and *Scorpidium cossonii*) with *Briza media*, *Eriophorum latifolium*, *Pedicularis palustris* and *Pinguicula vulgaris*. This stand has a MATCH coefficient of 44.5% for M13c.

The adjacent Stand 2 is an area dominated by *Schoenus nigricans* with abundant *Molinia caerulea*, together forming a stand characterised by large, tall tussocks. Between the tussocks the substratum is very wet. Much of this area is rather species poor and impoverished with only a short list of associates, including *Cirsium palustre*, *Succisa pratensis* and *Valeriana dioica*; however there are occasional patches with scattered brown mosses and characteristic wetland plants including *Menyanthes trifoliata*. Despite its low MATCH coefficient, this stand should probably be considered as a species-poor form of M13 (MATCH coefficient of 21.5%).

Stand 5 occupies a sloping seepage-fed 'bench' to the north-west of Stand 1, below a line of *Alnus glutinosa* that is situated at the base of the steep, dry heather- and bracken- covered valleyside. *Schoenus nigricans* is abundant, although *Juncus subnodulosus* is replaced by *Juncus acutiflorus*. Accompanying these is a wide variety of bryophytes and herbs, including *Briza media, Carex flacca, C. hostiana, Cirsium palustre, Ctenidium molluscum, Erica tetralix, Equisetum arvense, Hydrocotyle vulgaris, Molinia caerulea, Pinguicula vulgaris, Succisa pratensis, Triglochin palustris* and *Valeriana dioica*. This vegetation fits well with M13b (44.0% fit).

All stands of M13 vegetation can be categorised as Alkaline Fen.

Stands 3, 4 & 6 (SE 94009 98920; SE 93512 99275; SE 93596 99130; Quadrats 133003, 4, 5, 6 & 8; TN 1–5)

M14 *Schoenus nigricans–Narthecium ossifragum* mire
(in intricate mosaic with M21 mounds and ridges)

(MATCH coefficients range from 38.1% to 47.9%)

These stands extend along the gentle slopes of the valley side to the south-east and north-west of the main spring mound. To the north-east of the mound the ground rises over a series of irregular 'steps' up to the moorland plateau. Iron-rich springs (with vivid deposits of rust-coloured iron-oxide) emerge near the top of this slope and form pools and runnels supporting a suite of species associated with M10 vegetation (*Anagallis tenella, Bryum pseudotriquetum, Carex flacca, Carex panicea, Campylium stellatum, Eleocharis quinqueflora, Pinguicula vulgaris, Schoenus nigricans*), in a mosaic with heath and bracken, and eventually merging downslope with Stand 3 on the gentler slopes towards the beck. Elsewhere (Stands 4 & 6, and TNs 1–4) small springs or seepages emerge at the base of the steep valley slope, again forming pools and soakways that wind down to the beck.

These stands are predominantly areas of hollows and soakways, divided by mounds of heathy vegetation with abundant *Sphagnum* spp. When sampled separately, the heathy areas, characterised by *Erica tetralix, Molinia caerulea, Narthecium ossifragum, Sphagnum papillosum* and *Sphagnum magellanicum* with patchy *Schoenus nigricans,* correspond to M21 *Erica tetralix–Sphagnum papillosum* mire vegetation, however these mounds and ridges are often closely juxtaposed with vegetation characterised by mixtures of *Anagallis tenella, Carex dioica, Drosera rotundifolia, Eleocharis multicaulis, Eleocharis quinqueflora, Eriophorum angustifolium, Pinguicula vulgaris, Potamogeton polygonifolius, Schoenus nigricans,* and bryophytes including *Aneura pinguis, Campylium stellatum, Scorpidium cossonii, Scorpidium revolvens, Sphagnum inundatum*. The club moss *Selaginella selaginoides* also occurs in this vegetation. This type of vegetation represents an extensive example of M14 mire vegetation, and can be classed as Transition Mire / Quaking Bog.

Stand 7 (NZ 94268 00282; Quadrat 133009)

M10 *Carex dioica–Pinguicula vulgaris* mire

(MATCH coefficient: 35.8%)

At the upper end of Burn Howe Dale, a side valley of Jugger Howe Beck, there is a small seepage (c. 2x2 m in extent) that supports a mixture of small sedges and 'brown' mosses, including *Aneura*

pinguis, Carex panicea, C. pulicaris, C. viridula subsp. *oedocarpa, Cratoneuron filicinum, Eleocharis quinqueflora, Juncus bulbosus, Narthecium ossifragum Scorpidium cossonii,* and *S. revolvens.* MATCH coefficients are low, but this stand can probably be best assigned to the M10 community and classified as Alkaline Fen.

Stand 8 (NZ 94224 00310; Quadrat 133010)

M21b *Narthecium ossifragum–Sphagnum papillosum* valley mire,
Rhynchospora alba–Sphagnum auriculatum sub-community

(MATCH coefficient: 63.4%)

Stand 8 drops down a short slope to the valley floor, much of which is taken up by a broad soakway that is dominated by *Potamogeton polygonifolius,* with *Narthecium ossifragum, Molinia caerulea, Drosera rotundifolia,* and mounds of *Sphagnum capillifolium, S. palustre* and *S. subnitens.* This area can clearly be assigned to M21b valley mire, which is a form of Transition Mire / Quaking Bog.

Stands 9 & 10 (NZ 93876 00040; Quadrats 133011 & 12)

Mosaic of M21 *Narthecium ossifragum–Sphagnum papillosum* valley mire, and
M29 *Hypericum elodes–Potamogeton polygonifolius* soakway

(MATCH coefficient for M29: 43.0%)

Further downstream, the soakway / water track continues along the broad valley floor, with a patchy discontinuous stand of M21 *Narthecium ossifragum* soakway, mingled with more diverse sedge-rich variants of M21, and species-poor areas dominated by *Potamogeton polygonifolius,* which can be assigned to the M29 soakway community; both of these communities are considered to be Transition Mire / Quaking Bog.

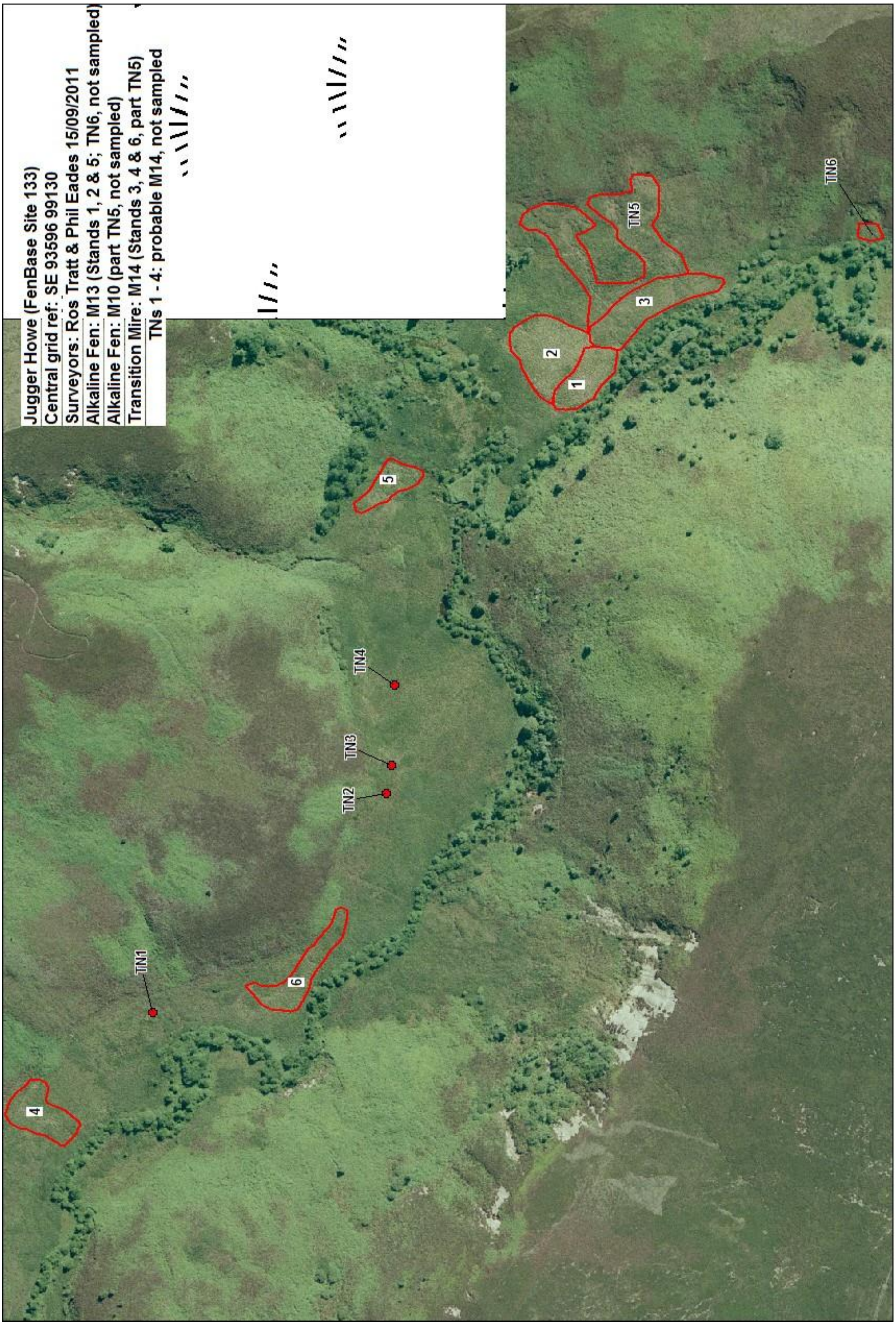
8.11.3 Wetland Substrata & Water Supply

Stand 1 appears to be the most base-rich (pH 7.25; EC 597 μS cm^{-1}), over deep black peat to more than 120 cm depth in the centre of the spring mound. The remaining stands of both M13 and M14 are associated with moderately base-rich springs and seepages (pH 5.8–6.6; EC 159–400 μS cm^{-1}) on peat from 60 cm to more than 120 cm depth, over sandy clay. In places upslope of the main seepages there are base-rich ochreous (iron-rich) springs (pH 6.3–6.9; EC 121–205 μS cm^{-1}). These Alkaline Fen and Transition Mire stands all appear to be strongly groundwater fed.

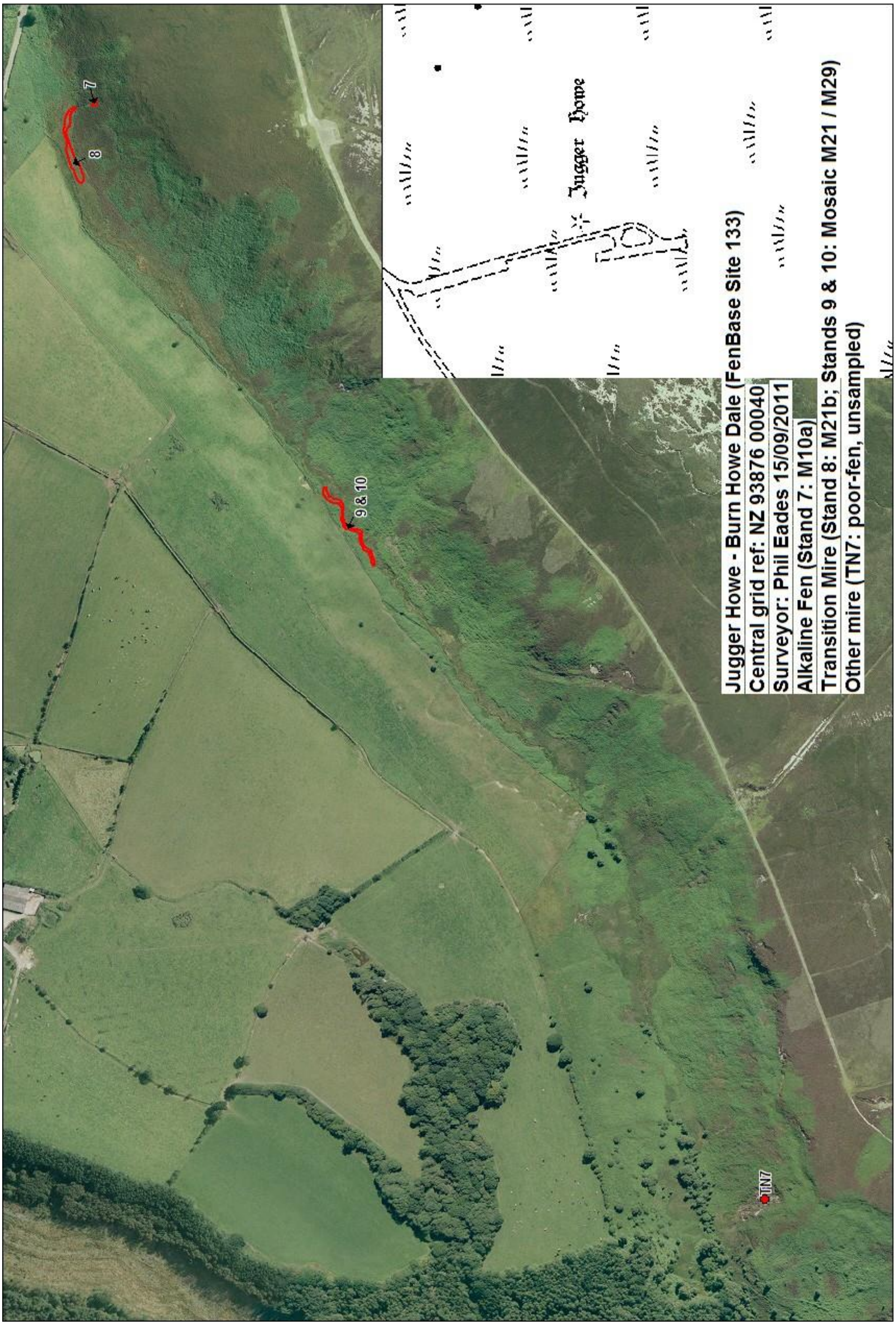
8.11.4 Site Management

The vegetation is part of an extensive moorland management unit that appears to be lightly grazed by sheep and deer. There were no obvious signs of grazing during the survey. The vegetation in the main spring mound area was rather rank, with a dense thatch of *Schoenus nigricans* and *Juncus subnodulosus* litter. There is some birch and rowan colonisation on the surrounding heathy areas, indicating low grazing pressure in the area. The current level of grazing may not be adequate to sustain the wetland interest, particularly the M13 areas, and associated invertebrate interest (SAC species: *Vertigo geyeri* – a snail (Abrehart, 2010)).

This important wetland area is currently subsumed into a large heathland unit of the North York Moors SSSI (site unit 91). It should be regarded as a separate site unit, so that the wetland interest can be assessed as a main interest feature.



Jugger Howe (FenBase Site 133)
Central grid ref: SE 93596 99130
Surveyors: Ros Tratt & Phil Eades 15/09/2011
Alkaline Fen: M13 (Stands 1, 2 & 5; TN6, not sampled)
Alkaline Fen: M10 (part TN5, not sampled)
Transition Mire: M14 (Stands 3, 4 & 6, part TN5)
TNs 1 - 4: probable M14, not sampled
TN1
TN2
TN3
TN4
TN5
TN6
1
2
3
4
5
6


Jugger Howe - Burn Howe Dale (FenBase Site 133)
Central grid ref: NZ 93876 00040
Surveyor: Phil Eades 15/09/2011
Alkaline Fen (Stand 7: M10a)
Transition Mire (Stand 8: M21b; Stands 9 & 10: Mosaic M21 / M29)
Other mire (TN7: poor-fen, unsampled)
7
8
9 & 10
TN7
Jugger Howe

North York Moors	Site name	Jugger Howe Beck		Jugger Howe Beck		Jugger Howe Beck	Jugger Howe Beck	Jugger Howe Beck		Jugger Howe Beck	
Alkaline Fen &	Site ref	133		133		133	133	133		133	
Transition Mire / Quaking Bog	Quadrat ID	133001		133002		133003	133004	133005		133006	
Survey 2011	Stand ref	Stand 1		Stand 2		Stand 3	Stand 3	Stand 3		Stand 4	
	NGR	SE		SE		SE	SE	SE		SE	
Domin scores for all quadrats	Easting	493955		493976		493988	493988	494017		493512	
DAFOR scores for stands	Northing	498954		498959		498940	498940	498900		499275	
	Date	15/09/2011		15/09/2011		15/09/2011	15/09/2011	15/09/2011		15/09/2011	
PE Phil Eades	Recorder name	RT		RT		RT	RT	RT		PE	
RT Ros Tratt	NVC community	M13		M13		M14	M21	M14		M14	
	Notes	Epipactis area		spp-poor tussocky schoenus		soakway with adjacent wet heath	wet heathy vegn	mosaic of hummock and pools		Wet hollow with J.subnod & Schoenus	
	Quadrat size	2x2m		2x2m		1x4m	2x2m	2x2m		2x2m	
	pH	7.3		7.4		5.9		6.3		5.8	
	EC (µS cm-^{1})	597		596		159		210		180	
	Photo?	Y		Y						Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	Domin score (Quadrat)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
122	Agrostis stolonifera		1	O								
163	Anagallis tenella								1	O	1	O
2256	Aneura pinguis		2	F			3		3	F	2	F
278	Calluna vulgaris							4	1	F		
1571	Campylium stellatum		1	O			1		4	O	2	F
315	Carex dioica								1	O		
319	Carex echinata						1	0	1	O		
323	Carex flacca		0	O								
325	Carex hostiana										2	O
339	Carex panicea		2	F			3		2	O	3	F
352	Carex rostrata						3		3	F		
329	Carex viridula ssp brachyrrhyncha								2	F		
312	Carex viridula ssp oedocarpa						3			O	0	O
418	Cirsium palustre		3	F	2	O						
1596	Cratoneuron commutatum	Palustriella commutata	3	F								
1600	Ctenidium molluscum		2	F					2	R	1	O
467	Dactylorhiza incarnata		1	O								
3192	Dactylorhiza sp.		1	O								
1658	Drepanocladus revolvens	Scorpidium revolvens	3	F			4		4	F		
3266	Drepanocladus revolvens v	Scorpidium cossonnii							1	O	0	O
494	Drosera rotundifolia						3	0	3	F	2	F
508	Eleocharis multicaulis								0	O		
531	Epipactis palustris		3	F								
533	Equisetum fluviatile				1	O						
535	Equisetum palustre		2	F			2	2		O	1	O
542	Erica tetralix				1	O	1	4	3	F	2	F
546	Eriophorum angustifolium						1		1	O		
1683	Fissidens adianthoides		3	F							1	O
719	Juncus acutiflorus						3	4	1	F	0	O
726	Juncus bulbosus								1	O		
2732	Juncus subnodulosus		6	A							8	A
876	Molinia caerulea		5	A	8	A	2	5	3	A	3	F
893	Myrica gale						3	4	2	F	3	F
901	Narthecium ossifragum						2		4	F		
970	Pinguicula vulgaris						2		2	F	3	F
1037	Potamogeton polygonifolius						4		4	F	1	O
1046	Potentilla erecta							0		R	1	O
2254	Riccardia multifida		1	O								
1207	Schoenus nigricans		5	A	6	A	3	4	5	A	5	A
1947	Scorpidium scorpioides										0	O
1235	Selaginella selaginoides								1	O	0	O
2700	Sphagnum auriculatum va	Sphagnum denticulatum									0	O
2972	Sphagnum auriculatum va	Sphagnum inundatum					1			R		
1960	Sphagnum capillifolium							4		F		
1969	Sphagnum magellanicum								3	F	0	O
1972	Sphagnum papillosum							5	2	A		
1973	Sphagnum subnitens										3	F
1305	Succisa pratensis		3	F	2	O	1	3	3	F	2	F
1380	Valeriana dioica		2	F	0	O						

North York Moors		Site name	Jugger Howe Beck		Jugger Howe Beck		Jugger Howe Beck		Jugger Howe Beck		Jugger Howe		Jugger Howe Beck	
Alkaline Fen &		Site ref	133		133		133		133		133		133	
Transition Mire / Quaking Bog		Quadrat ID	133007		133008		133009		133010		133011		133012	
Survey 2011		Stand ref	Stand 5		Stand 6		Stand 7		Stand 8		Stand 9		Stand 10	
		NGR	SE		SE		NZ		NZ		NZ		NZ	
Domin scores for all quadrats		Easting	493900		493596		494268		494268		493876		493876	
DAFOR scores for stands		Northing	499068		499130		500282		500282		500040		500040	
		Date	15/09/2011		15/09/2011		15/09/2011		15/09/2011		15/09/2011		15/09/2011	
PE	Phil Eades	Recorder name	PE		PE		PE		PE		PE		PE	
RT	Ros Tratt	NVC community	M13b		M14		M10		M21b		M29		M29	
		Notes	Seepage with Schoenus & brown mosses		Seepage with Schoenus, J.subnod		Seepage with sedges & 'brown' mosses		Sphagnum-rich valley mire		Pot.poly soakway		Spp-rich margin of Pot.poly soakway	
		Quadrat size	2x2m		2x2m		1x1m		1x4m		0.5x4m		0.5x4m	
		pH	6.3		5.9		5.5				4.8		4.9	
		EC (µS cm-1)	400		245		440				100		430	
		Photo?	Y		Y		Y		Y		Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score	DAFOR (Stand)	Domin score	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
120	Agrostis canina												1	O
122	Agrostis stolonifera		1	O					3	F				
163	Anagallis tenella										2	O	4	A
2256	Aneura pinguis				0	O	3	F						
171	Anthoxanthum odoratum												3	F
251	Briza media		2	O									1	O
1546	Bryum pseudotriquetrum												2	O
1445	Calliergon cuspidatum	Calliergonella cuspidata	3	F										
278	Calluna vulgaris		2	O	1	O			1	O				
1571	Campylium stellatum		0	R	3	F								
295	Cardamine pratensis												1	O
319	Carex echinata								2	F			2	O
323	Carex flacca		3	F										
325	Carex hostiana		2	F										
333	Carex nigra												3	F
339	Carex panicea		0	O			3	F					2	O
347	Carex pulicaris						3	F					1	R
312	Carex viridula ssp oedocarpa						4	A					0	R
384	Cerastium fontanum						1	O						
418	Cirsium palustre		1	O									1	R
1598	Cratoneuron filicinum						4	A						
1600	Ctenidium molluscum		0	O	0	O								
3266	Drepanocladus revolvens v	Scorpidium cossonnii			0	O	4	A						
494	Drosera rotundifolia				3	F	3	F					0	O
510	Eleocharis quinqueflora						4	A					0	R
532	Equisetum arvense		3	F										
533	Equisetum fluviatile		0	O							0	R		
535	Equisetum palustre				2	F								
542	Erica tetralix		2	O	4	F			4	A				
546	Eriophorum angustifolium						4	A	4	A			3	F
609	Galium palustre												3	F
612	Galium uliginosum		3	F										
680	Holcus lanatus		1	O									1	O
690	Hydrocotyle vulgaris		5	A							2	O	3	F
719	Juncus acutiflorus		4	A			3	F			3	F	3	
726	Juncus bulbosus						3	F			3	F	3	F
729	Juncus conglomeratus								3	F				
733	Juncus inflexus		0	O										
2732	Juncus subnodulosus				8	D								
802	Lotus pedunculatus												1	O
862	Menyanthes trifoliata				2	O					0	O	0	R
876	Molinia caerulea		4	A			3	F	7	A			4	A
893	Myrica gale		0	O	3	F								
900	Nardus stricta						2	O						
901	Narthecium ossifragum						6	A	4	A	2	O	2	O
946	Pedicularis palustris				0	R								
2222	Pellia endiviifolia		1	O										
970	Pinguicula vulgaris		0	O	0	O								
1037	Potamogeton polygonifolius										10	D	4	A
1046	Potentilla erecta								3	F			1	R
1081	Ranunculus acris		0	O										
1089	Ranunculus flammula										3	F	4	A
2293	Scapania undulata						1	R						
1207	Schoenus nigricans		6	A	4	F								
1947	Scorpidium scorpioides				0	O	3	F						
1960	Sphagnum capillifolium				3	F								
1969	Sphagnum magellanicum				3	F								
1972	Sphagnum papillosum				4	A			4	A				
1976	Sphagnum recurvum	Sphagnum fallax			3	F			4	A				
1973	Sphagnum subnitens		2	F	3	F								
1295	Stellaria alsine												1	O
1305	Succisa pratensis		3	F	0	O							1	R
1354	Triglochin palustre		0	O									2	O
1380	Valeriana dioica		3	F										
1427	Viola palustris								2	O				

8.12 KEPWICK MOOR (WHITE GILL) (NORTH YORK MOORS SSSI)

8.12.1 Site Description

Springs emerging in this steep-sided valley tend to be very confined to runnels flanked by *Juncus effusus* and *Juncus acutiflorus* flowing through the heathy vegetation. *Carex echinata, Carex panicea* and *Carex flacca* occur locally, and there are sometimes patches of *Palustriella commutata* and *Philonotis calcarea*. The distinctive liverwort *Trichocolea tormentella* was recorded in one base-rich runnel. There are a few springs which have been captured as part of a water supply system which support low-growing spring vegetation dominated by *Palustriella commutata* (M37: Stand 1). Generally this moorland unit does not appear to support extensive wetland vegetation; consequently there is no illustrative image to accompany this account. A quadrat record is shown in the accompanying spreadsheet extract.

8.12.2 Stand Descriptions

Stand 1 (SE48539 92632)

M37 *Cratoneuron commutatum – Festuca rubra* spring

(MATCH coefficient 19.3%)

This stand comprises a very small spring near a water collection point named 'spring no. 6'. It supports very low-growing vegetation dominated by a mixture of *Palustriella commutata, P. falcata, Philonotis calcarea* and *P. fontana*. *Anagallis tenella, Carex dioica, Carex panicea, Juncus articulatus* and *Valeriana dioica* form a very sparse sward. This stand is not easily assigned to any NVC vegetation type, but it has affinities to M37, and could perhaps be considered to be a form of Alkaline Fen.

8.12.3 Wetland Substrata & Water Supply

The interstitial water is base-rich: pH 7.4; EC 387 µS cm^{-1}.

8.12.4 Site Management

The site is sheep grazed, and water is collected from the springs here and at nearby Dunsforth's Hill; collectively the springs in this area provide an important domestic water supply (see Annex 4 for more detail).

North York Moors		Site name	Kepwick Moor (White Gill)	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	278	
		Quadrat ID	278001	
		Stand ref	Stand 1	
		NGR	SE	
Domin scores for all quadrats		Easting	448539	
DAFOR scores for stands		Northing	492632	
		Date	13/10/2011	
PE	Phil Eades	Recorder name	RT	
RT	Ros Tratt	NVC community	M37aff	
		Notes	small spring near ram no 6	
		Quadrat size	1x4m	
		pH	7.37	
		EC (µS cm-^{1})	387	
		Photo?		

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)
163	Anagallis tenella		2	O
315	Carex dioica		2	O
323	Carex flacca		2	O
339	Carex panicea		2	O
418	Cirsium palustre		0	R
1596	Cratoneuron commutatum	Palustriella commutata	4	A
4340	Cratoneuron commutatum falcatum	Palustriella falcata	7	A
3266	Drepanocladus revolvens var. intermedius	Scorpidium cossonnii	3	F
542	Erica tetralix		1	O
690	Hydrocotyle vulgaris		1	O
1845	Philonotis calcarea		4	A
1235	Selaginella selaginoides		1	R
1380	Valeriana dioica		1	R

8.13 LONGSTONE MEADOW

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.13.1 Site Description

The Alkaline Fen interest feature at Longstone Meadow is located on the gentle north slope of Dale Beck, which drains from Newton Mulgrave Moor in the west, south-eastwards into Mickleby Beck. The south side of Dale Beck is afforested with a dense *Pinus sylvestris* plantation, while to the north lies improved grassland, cut for silage. The northern banks of the beck, between the beck and the silage meadow, are no longer grazed, and consequently the vegetation is generally unmanaged and robust. This area supports a mixture of *Crataegus monogyna*, *Salix* spp. and *Ulex europaeus* scrub, mingled with stands of dense bracken *Pteridium aquilinum*. Between these is a long strip of mainly dense herbaceous vegetation that supports an abundance of *Angelica sylvestris*, *Equisetum telmateia*, *Filipendula ulmaria* and *Juncus acutiflorus*, towards the south-eastern end of which is a small area of lower growing, more diverse vegetation (Stand 1).

8.13.2 Stand Descriptions

Stand 1 (NZ 78640 12852; Quadrat 285001)

M13 *Schoenus nigricans–Juncus subnodulosus* mire /
M22 *Juncus subnodulosus–Cirsium palustre* fen-meadow

Toward the south-eastern end of the herbaceous strip is a small area (*c.* 500 m^2) where the vegetation becomes lower and more open. The vegetation of this stand reaches a height of about 50 cm, and is dominated by a mixture of grasses, sedges, rushes, horsetails and other forbs, and most notably supports a great abundance of *Epipactis palustris* and *Parnassia palustris*. It holds a wide variety of other species, including *Agrostis stolonifera, Angelica sylvestris, Briza media, Campylium stellatum, Carex flacca, C. hostiana, C. nigra, C. panicea, Centaurea nigra, Cirsium palustre, Cratoneuron filicinum, Ctenidium molluscum, Dactylorhiza* sp., *Equisetum fluviatile, E. palustre, E. telmateia, Galium uliginosum, Holcus lanatus, Hydrocotyle vulgaris, Juncus acutiflorus, Menyanthes trifoliata, Molinia caerulea, Plagiomnium affine, Succisa pratensis* and *Valeriana dioica*. It is difficult to assign this stand to a particular NVC community since it has strong affinities to all of M13, M22, M24 and M26 (e.g. MATCH coefficients: M13b 45.8%; M22b 45.6%; M26b 43.9%; M24b 42%). It may be best to consider this as Alkaline Fen vegetation that is intermediate between the NVC communities M13 mire and M22 fen-meadow.

8.13.3 Wetland Substrata & Water Supply

The stand of Alkaline Fen vegetation is found on peat up to 65 cm deep, over more than 50 cm of sandy silt with pebbles; sandstone is exposed in the beck below the stand. The steep bank upslope of the stand was dry, and the ground became damp at the base of the bank. From this it is assumed that the stand is irrigated by a permanent but gentle sub-surface seepage. Although the soil surface was damp to the touch, no free water was available to measure pH or EC.

8.13.4 Site Management

Although previously grazed by cattle (G. Smalley, pers. comm.), the site is currently ungrazed. While scrub encroachment does not seem to be a problem, the herbaceous vegetation is becoming quite rank, particularly in the adjacent wetland strip, and it is likely that continued dereliction could well lead to the loss of plant diversity, including species such as *Epipactis palustris* and *Parnassia palustris*. The reintroduction of light grazing and poaching by cattle would therefore probably be beneficial in helping to maintain plant diversity in this vegetation.


Longstone Meadow (FenBase Site 285)
Central grid ref: NZ 78640 12852
Surveyor: Phil Eades 07/10/2011
Alkaline Fen (Stand 1: M13 / M22)
1

North York Moors	Site name	Longstone Meadow
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011	**Site ref**	285
	Quadrat ID	285001
	Stand ref	Stand 1
	NGR	NZ
Domin scores for all quadrats	**Easting**	478640
DAFOR scores for stands	**Northing**	512852
	Date	07/10/2011
PE Phil Eades	**Recorder name**	PE
RT Ros Tratt	**NVC community**	M13 / M22
	Notes	Diverse, much Epipactis pal. & Parnassia
	Quadrat size	2x2m
	pH	
	EC (µS cm-^{1})	
	Photo?	Y

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)
122	Agrostis stolonifera		2	F
167	Angelica sylvestris		3	A
251	Briza media		4	A
1445	Calliergon cuspidatum	Calliergonella cuspidata	0	O
1571	Campylium stellatum		0	O
323	Carex flacca		1	F
325	Carex hostiana		0	F
333	Carex nigra		2	F
339	Carex panicea		2	F
371	Centaurea nigra		2	F
418	Cirsium palustre		3	A
1598	Cratoneuron filicinum		0	O
1600	Ctenidium molluscum		0	O
3192	Dactylorhiza sp.		2	A
531	Epipactis palustris		3	A
533	Equisetum fluviatile		0	O
535	Equisetum palustre		3	F
538	Equisetum telmateia		4	A
2776	Euphrasia nemorosa		2	F
1677	Eurhynchium praelongum	Kindbergia praelonga	1	F
576	Festuca rubra		3	F
1683	Fissidens adianthoides		0	O
612	Galium uliginosum		3	F
680	Holcus lanatus		2	F
690	Hydrocotyle vulgaris		0	O
719	Juncus acutiflorus		3	F
758	Lathyrus pratensis		0	F
813	Lychnis flos-cuculi		1	F
855	Mentha aquatica		0	F
862	Menyanthes trifoliata		0	O
876	Molinia caerulea		4	A
944	Parnassia palustris		4	A
1791	Plagiomnium affine		0	O
1795	Plagiomnium rostratum		1	F
1807	Plagiomnium undulatum		2	F
1914	Pseudoscleropodium purum		2	F
1940	Rhytidiadelphus squarrosus		2	F
1305	Succisa pratensis		4	A
1380	Valeriana dioica		4	A
1411	Vicia cracca		3	F

8.14 LOW MOOR (NORTH YORK MOORS SSSI)

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.14.1 Site Description

This site is situated in Unit 88 of the North York Moors SSSI, immediately to the north of Biller Howe Dale SSSI, and separated from that by a shallow ridge that forms a catchment divide. The mire vegetation described here is found within unenclosed moorland of heather and bracken, adjacent to an area of enclosed & improved pasture that forms part of the landholding of Foulsike Farm.

8.14.2 Stand Descriptions

Stand 1 (NZ 91264 02693; Quadrat 286001)

M10 *Carex dioica–Pinguicula vulgaris* mire
(MATCH coefficient 35.1%)

A small iron-rich stream arises in open moorland approximately 120 m north of the pasture boundary, and flows to the south-east for about 200 m, before entering the pasture. For the final 120 m of this route it is flanked by seepages that support an abundance of small sedges and 'brown mosses', rushes and forbs, including *Anagallis tenella, Briza media, Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Carex echinata, C. nigra, C. panicea, C. viridula* subsp. *brachyrrhyncha, C. viridula* subsp. *oedocarpa, Eriophorum angustifolium, Festuca rubra, Fissidens adianthoides, Hydrocotyle vulgaris, Hypericum tetrapterum, Juncus articulatus, J. inflexus, Lotus pedunculatus, Menyanthes trifoliata, Succisa pratensis,* and *Scorpidium cossonii.* The vegetation of these seepage areas (Stand 1) has some affinity to the M10 community (35.1% fit), and for the purpose of this survey it has been assigned to that plant community. It is considered to be Alkaline Fen.

Stand 2 (NZ 91287 02683; Quadrat 286002)

M9 *Carex rostrata–Calliergon cuspidatum* mire
(MATCH coefficient 26.2%)

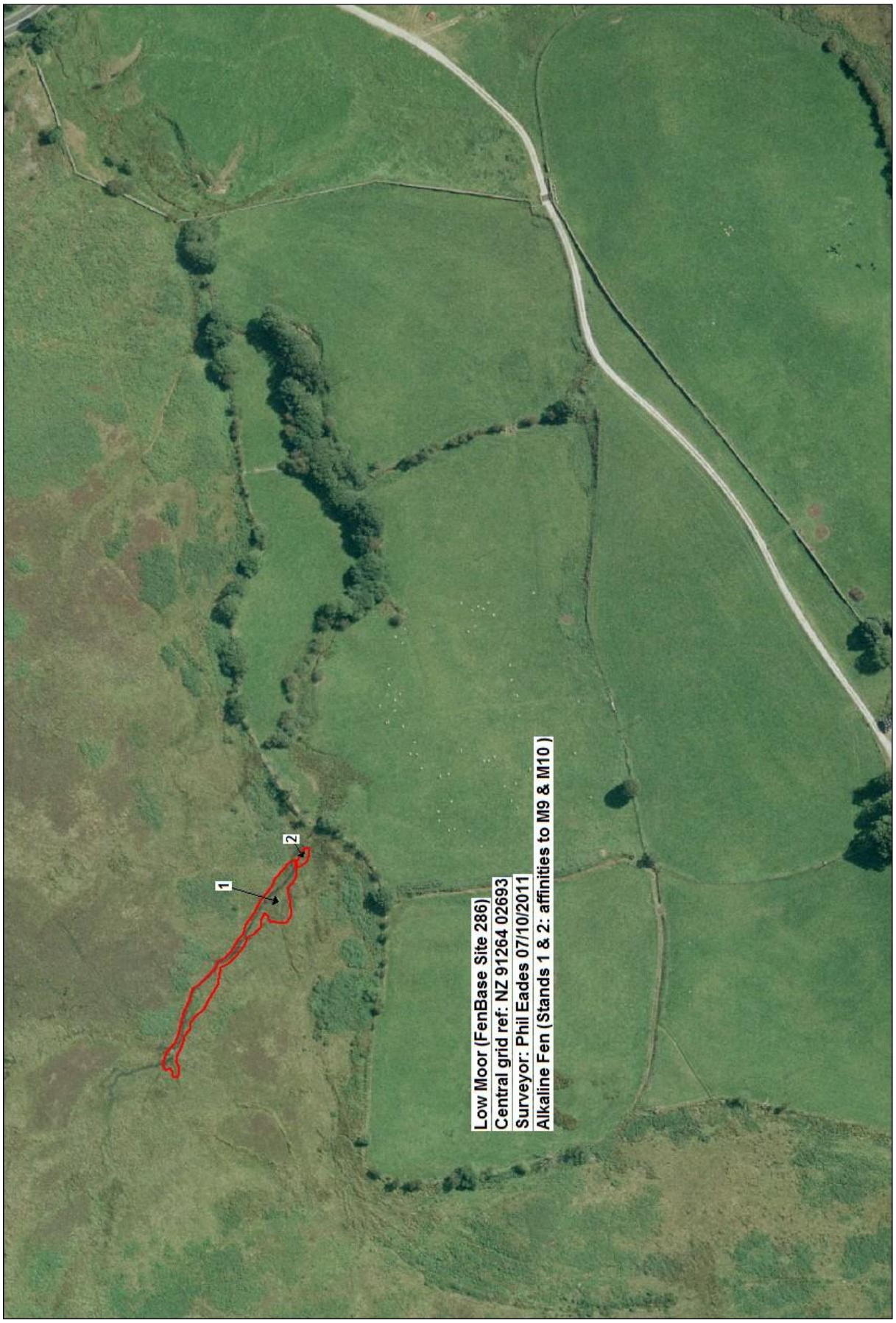
At the south-western end of this seepage zone is a small soakway (Stand 2) that is dominated by *Carex rostrata,* with frequent *Carex dioica, Juncus bulbosus, Menyanthes trifoliata, Palustriella falcata, Scorpidium cossonii,* and lesser quantities of *Anagallis tenella, Bryum pseudotriquetrum, Calliergonella cuspidata, Equisetum fluviatile, Hydrocotyle vulgaris* and *Scorpidium scorpioides*. This stand has weak affinities with the M9 community (26.2% fit), and may perhaps be referable to the M9-1 sub-community that is described by Wheeler, Shaw & Tanner (2009). It is probably best to consider this a form of Alkaline Fen.

8.14.3 Wetland Substrata & Water Supply

No free water was available within the seepage areas, but water from the stream itself had a pH of 6.6 and EC of 370 μS cm^{-1}. It is not clear what the source of the water is, but it is possible that surface water flow and precipitation are augmented by diffuse groundwater outflow.

8.14.4 Site Management

The open moorland is grazed by sheep; the mire areas examined here showed signs of being quite heavily grazed, with moderate poaching in some places.


Low Moor (FenBase Site 286)
Central grid ref: NZ 91264 02693
Surveyor: Phil Eades 07/10/2011
Alkaline Fen (Stands 1 & 2: affinities to M9 & M10)
1
2

North York Moors		Site name	Low Moor		Low Moor	
Alkaline Fen &		Site ref	286		286	
Transition Mire / Quaking Bog		Quadrat ID	286001		286002	
Survey 2011		Stand ref	Stand 1		Stand 2	
		NGR	NZ		NZ	
Domin scores for all quadrats		Easting	491264		491287	
DAFOR scores for stands		Northing	502693		502683	
		Date	07/10/2011		07/10/2011	
PE	Phil Eades	Recorder name	PE		PE	
RT	Ros Tratt	NVC community	M10		M9a	
		Notes	seepage beside ochreous stream		C.rostrata soakway	
		Quadrat size	2x2m		1x4m	
		pH	6.6			
		EC (µS cm-1)	370			
		Photo?	Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
163	Anagallis tenella		3	F	1	R
251	Briza media		3	F		
1546	Bryum pseudotriquetrum		2	O	1	R
1445	Calliergon cuspidatum	Calliergonella cuspidata	4	A	2	O
1571	Campylium stellatum		3	F		
315	Carex dioica				4	A
319	Carex echinata		3	F		
333	Carex nigra		4	A		
339	Carex panicea		5	A		
352	Carex rostrata				9	D
329	Carex viridula ssp brachyrrhyncha		3	F		
312	Carex viridula ssp oedocarpa		3	F		
4340	Cratoneuron commutatum	Palustriella falcata			3	F
3266	Drepanocladus revolvens v	Scorpidium cossonnii	4	A	3	F
533	Equisetum fluviatile				2	O
535	Equisetum palustre		1	O		
546	Eriophorum angustifolium		3	F		
576	Festuca rubra		2	F		
1683	Fissidens adianthoides		1	O		
690	Hydrocotyle vulgaris		3	F	2	O
703	Hypericum tetrapterum		1	O		
722	Juncus articulatus		3	F		
726	Juncus bulbosus				3	F
733	Juncus inflexus		4	A		
802	Lotus pedunculatus		2	F		
862	Menyanthes trifoliata		3	F	3	F
1804	Plagiomnium elatum		1	O		
1046	Potentilla erecta		1	O		
1947	Scorpidium scorpioides				1	R
1305	Succisa pratensis		4	A		

8.15 LOW PASTURE SSSI

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.15.1 Site Description

Low Pasture is situated on gentle slopes above the River Rye and comprises two fields supporting species-rich grassland, together with a narrow strip of woodland which extends along the river bank. The site is of particular interest as wet, unimproved, neutral grassland and for the vegetation of the flush line above the river. The Alkaline Fen interest at this site is of very limited extent. At the lower end of a gently-sloping damp mesotrophic pasture is a small area of low-growing bryophyte-rich vegetation only about 4 x 4 m in extent. This grades obliquely downslope into a larger patch of species-rich rushy vegetation, before dropping into a short, steeply sloping strip of wet willow and birch woodland above the river.

8.15.2 Stand Descriptions

Stand 1 (SE 53976 89338; Quadrat 142001)

M10 *Carex dioica–Pinguicula vulgaris* mire

(MATCH coefficient: 44.0%)

The small bryophyte-rich area (Stand 1) supports a variety of mosses including *Aneura pinguis, Calliergonella cuspidata, Campylium stellatum, Ctenidium molluscum, Fissidens adianthoides, Scorpidium cossonii, S. revolvens, Sphagnum palustre,* and *S. subnitens.* Growing through the bryophyte mat are a mixture of sedges, grasses and other herbs, including *Briza media, Carex hostiana, C. panicea, C. pulicaris, Crepis paludosa, Drosera rotundifolia, Eleocharis quinqueflora, Galium uliginosum, Juncus articulatus, Molina caerulea, Pinguicula vulgaris, Succisa pratensis* and *Valeriana dioica.* This stand can be best assigned to M10, and categorised as Alkaline Fen.

Stand 2 (SE 53992 89335; Quadrat 142002)

M24 *Molinia caerulea–Cirsium dissectum* fen-meadow

(MATCH coefficient: 45.6%)

The adjacent wetland vegetation (Stand 2) covers approximately 90 m^2, and is dominated by *Juncus acutiflorus*, with some *J. conglomeratus*, and an abundance of *Molinia caerulea* and *Valeriana dioica*. The stand also supports a wide variety of other plant species at lower cover, including *Achillea ptarmica, Agrostis canina, Calliergonella cuspidata, Carex hostiana, Cirsium palustre, Dactylorhiza fuchsii, Filipendula ulmaria, Galium uliginosum, Lathyrus pratensis, Lotus pedunculatus, Pseudoscleropodium purum,* and *Succisa pratensis*. This vegetation appears somewhat intermediate between several plant communities. While it has affinities to M26 (MATCH coefficient 46.3%), it lacks many of the characteristic species of that community, such as *Trollius europaeus, Sanguisorba officinalis, Crepis paludosa,* etc. Similarly it lacks many typical species of M22 (MATCH coefficient 40.5%), e.g. *Juncus subnodulosus, Hydrocotyle vulgaris, C. acutiformis, Mentha aquatic*. There are also affinities with M25c, (MATCH coefficient 41.9%), although that is generally dominated by *Molinia*, and appears to be restricted to south-west Britain (Rodwell, 1991). On balance the closest fit may be with M24 fen-meadow (MATCH coefficient 45.6%), despite lacking *Cirsium dissectum*.

8.15.3 Wetland Substrata & Water Supply

The M10 vegetation is located on a small mound of deep wet peat (>120 cm deep), upslope of which is drier ground comprising c. 50 cm of sandy clay over rock, while downslope the fen meadow vegetation is associated with a few centimetres of wet peat over a stiff sandy clay. The M10 vegetation seems to be associated with a moderately base-rich seepage (pH 6.1), which then flushes downslope through the fen meadow area.

8.15.4 Site Management

The site appears to be lightly cattle-grazed. The Alkaline Fen interest here is situated adjacent to a densely wooded slope, and grazing probably helps to prevent scrub encroaching upon the fen area.

North York Moors		Site name	Low Pasture		Low Pasture	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	142		142	
		Quadrat ID	142001		142002	
		Stand ref	Stand 1		Stand 2	
		NGR	SE		SE	
Domin scores for all quadrats		Easting	453976		453992	
DAFOR scores for stands		Northing	489338		489335	
		Date	26/08/2011		26/08/2011	
PE	Phil Eades	Recorder name	PE		PE	
RT	Ros Tratt	NVC community	M10		M24	
		Notes	small spring mound		Spp-rich rush pasture	
		Quadrat size	2x2m		2x2m	
		pH	6.1		5.8	
		EC (µS cm-^{1})	180		50	
		Photo?	Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
105	Achillea ptarmica				3	O
120	Agrostis canina				4	F
127	Ajuga reptans				1	O
2256	Aneura pinguis		3	F		
167	Angelica sylvestris				2	F
1482	Aulacomnium palustre		4	A		
251	Briza media		0	O		
1445	Calliergon cuspidatum	Calliergonella cuspidata	4	A	3	F
1571	Campylium stellatum		3	F		
319	Carex echinata				1	O
323	Carex flacca				0	O
325	Carex hostiana		4	A	0	O
339	Carex panicea		5	A	0	O
347	Carex pulicaris		3	F		
418	Cirsium palustre		2	O	3	F
449	Crepis paludosa		2	O		
1600	Ctenidium molluscum		3	F		
466	Dactylorhiza fuchsii				0	O
1658	Drepanocladus revolvens	Scorpidium revolvens	4	A		
3266	Drepanocladus revolvens v	Scorpidium cossonnii	2	F		
494	Drosera rotundifolia		3	F		
510	Eleocharis quinqueflora		2	F		
525	Epilobium palustre				2	F
583	Filipendula ulmaria				4	F
1683	Fissidens adianthoides		1	O		
609	Galium palustre				1	O
612	Galium uliginosum		2	O	3	F
680	Holcus lanatus				2	F
719	Juncus acutiflorus				8	D
722	Juncus articulatus		6	A		
729	Juncus conglomeratus				3	F
758	Lathyrus pratensis				0	F
802	Lotus pedunculatus				4	F
876	Molinia caerulea		4	A	4	A
970	Pinguicula vulgaris		3	F		
1807	Plagiomnium undulatum				1	O
1046	Potentilla erecta				1	O
1914	Pseudoscleropodium purum				0	O
1940	Rhytidiadelphus squarrosus				3	F
1139	Rumex acetosa				2	F
1971	Sphagnum palustre		3	F		
1973	Sphagnum subnitens		0	F		
234	Stachys officinalis				0	O
1305	Succisa pratensis		0	O	2	O
2003	Thuidium tamariscinum				0	O
1380	Valeriana dioica		4	A	5	A
1411	Vicia cracca				2	F
1427	Viola palustris		0	O		

8.16 NODDLE END SSSI

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.16.1 Site Description

Noddle End SSSI is situated on the steep north-east facing slope of Gowerdale Bank, the lower part of the site lying on acid strata of Oxford Clay and Kellaway's Rock while Calcareous Grit is exposed towards the top of the slope. The site is of importance for the corresponding range of habitats including woodland, herb-rich grasslands, both calcareous and acid grassland, and of particular note, a series of species-rich fen communities. The majority of the fen interest is found on the lower slopes at the eastern end of the site, with a smaller patch further north-west, near to a small wooded pool. These areas of fen vegetation are embedded within a mixture of dense bracken, hawthorn scrub, and damp neutral grassland. The site does not support Alkaline Fen or Transition Mire / Quaking Bog.

8.16.2 Stand Descriptions

Stands 1–6 (central grid ref: SE 52878 88815; Quadrats 170001–6);
Stand 7 (SE 52837 88896; Quadrat 170007)

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

Embedded within more robust rush-pasture (see Stands 8–10) is a series of patches of lower-growing bryophyte-, grass-, sedge-, rush- and forb-rich vegetation. These areas support a wide variety of species including *Agrostis canina, Angelica sylvestris, Anthoxanthum odoratum, Briza media, Bryum pseudotriquetrum, Calliergonella cuspidata, Caltha palustris, Campylium stellatum, C. echinata, C. flacca, C. hirta, C. nigra, C. panicea, C. pulicaris, C. viridula* subsp. *brachyrrhyncha, Crepis paludosa, Climacium dendroides, Ctenidium molluscum, Dactylorhiza fuchsii, Danthonia decumbens, Epilobium parviflorum, Festuca rubra, Fissidens adianthoides, Galium uliginosum, Juncus articulatus, J. effusus, J. inflexus, Lathyrus pratensis, Lychnis flos-cuculi, Lysimachia nemorum, Palustriella commutata, Parnassia palustris, Pinguicula vulgaris, Succisa pratensis, Triglochin palustre,* and *Valeriana dioica.* These stands are probably best assigned to the M22b fen-meadow community (MATCH coefficients ranging from 21.9% to 49.4%); although for most samples MATCH gave slightly higher co-efficients for M26, that is considered an unlikely result as this vegetation lacks many distinctive species of M26 (e.g. *Trollius europaeus, Sanguisorba officinalis, Molinia caerulea, Serratula tinctoria, Anemone nemorosa*, and while *Crepis paludosa* is present it is very infrequent).

Stand 8 (SE 52833 88896; Quadrat 170008);
Stands 9 & 10 (central grid ref: SE 52913 88730; Quadrat 170009)

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

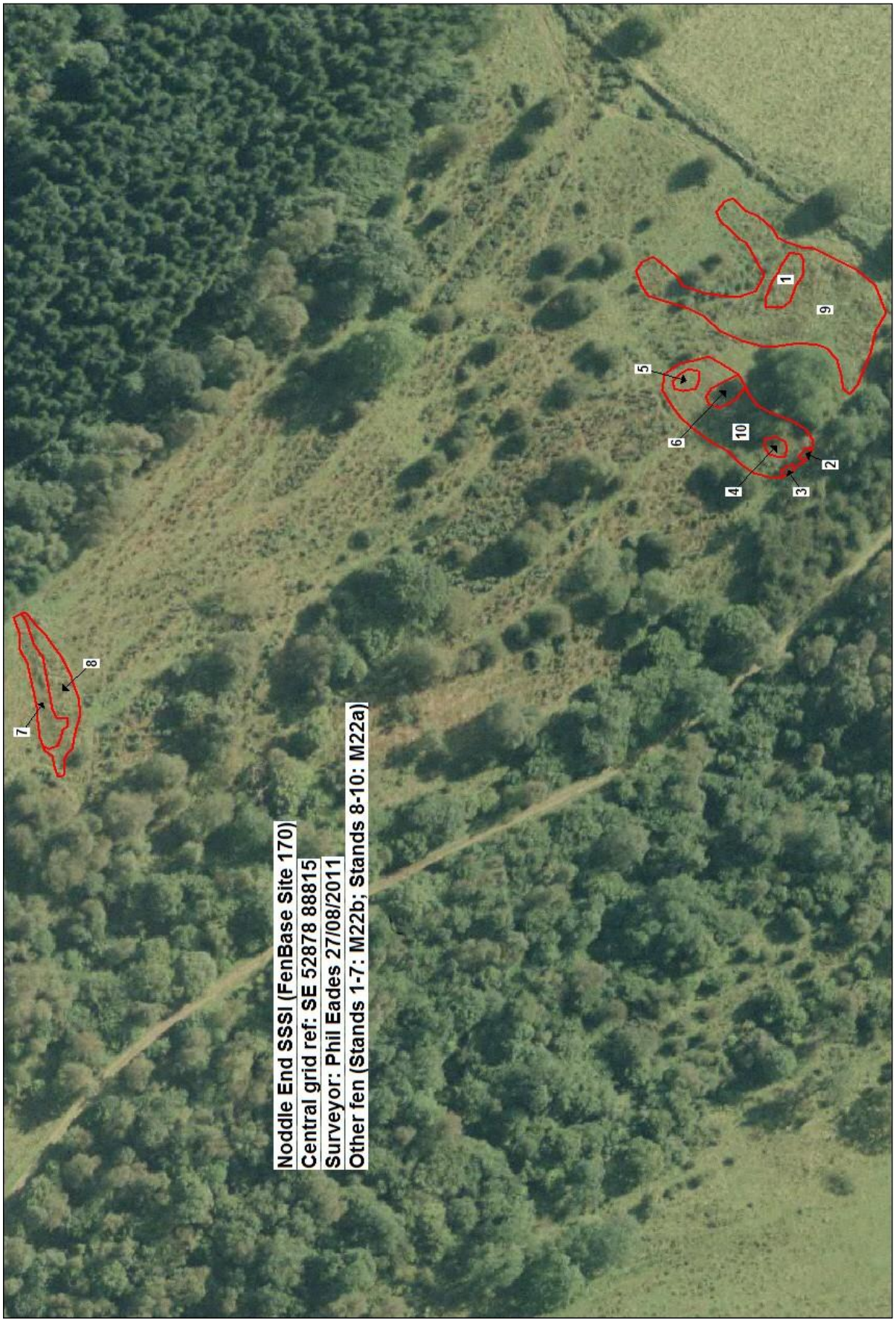
The majority of the fen vegetation at Noddle End comprises somewhat less diverse rush pasture that is dominated by *Juncus inflexus*, with a mixture of other, mainly quite robust, species such as *Achillea ptarmica, Agrostis canina, Epilobium parviflorum, Festuca rubra, Filipendula ulmaria, Galium uliginosum, Holcus lanatus, Lathyrus pratensis, Lotus pedunculatus, Lychnis flos-cuculi, Mentha aquatica, Rumex crispus*, and *Valeriana dioica*. Bryophyte diversity is restricted to *Calliergonella cuspidata, Climacium dendroides, Plagiomnium undulatum* and *Thuidium tamariscinum*. These areas can be best assigned to the M22a fen-meadow community (MATCH coefficients ranging from 38.1% to 48.3%).

8.16.3 Wetland Substrata & Water Supply

The more species-rich M22b stands were clearly much wetter underfoot than the surrounding M22a areas, and water samples in these M22b areas were between pH 6.5–7.2, with EC of 210–380 µS/cm. No free water was available in the drier M22a stands. Augering within the various M22b areas found 15–55 cm of sandy peat, over 0–55 cm of sandy gravelly clay, over rock. Within the M22a areas peat depth seemed to be less (10–20 cm, where sampled), again over sandy clay, then rock. From this it seems likely that the fen vegetation as a whole is irrigated by base-rich seepages that are able to percolate through the clay-rich subsoil, and that the wetter, more diverse M22b stands mark out areas of more vigorous seepage, or thinner subsoils.

8.16.4 Site Management

This site is lightly grazed by cattle and wild deer, which appears sufficient to prevent scrub encroachment. The vegetation is generally quite coarse, and the diversity of the fen vegetation would probably benefit from slightly more intensive grazing and poaching, to open up the stands and provide more bare ground for species such as *Pinguicula vulgaris.*


Noddle End SSSI (FenBase Site 170)
Central grid ref: SE 52878 88815
Surveyor: Phil Eades 27/08/2011
Other fen (Stands 1-7: M22b; Stands 8-10: M22a)
1
2
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10

North York Moors	Site name	Noddle End		Noddle End		Noddle End		Noddle End		Noddle End	
Alkaline Fen &	Site ref	170		170		170		170		170	
Transition Mire / Quaking Bog	Quadrat ID	170001		170002		170003		170004		170005	
Survey 2011	Stand ref	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5	
	NGR	SE		SE		SE		SE		SE	
Domin scores for all quadrats	Easting	452931		452881		452876		452888		452903	
	Northing	488726		488722		488728		488729		488751	
PE Phil Eades	Date	27/08/2011		27/08/2011		27/08/2011		27/08/2011		27/08/2011	
RT Ros Tratt	Recorder name	PE		PE		PE		PE		PE	
	NVC community	M22b		M22b		M22b		M22b		M22b	
	Notes	spp-rich seepage within rush pasture		Tiny mossy seepage		Tiny mossy seepage		spp-rich seepage within rush pasture		spp-rich seepage within rush pasture	
	Quadrat size	1x4m		0.5x2m		0.5x2m		2x2m		2x2m	
	pH	6.9		6.9		7.2		6.5		6.6	
	EC (µS cm-1)	330		380		290		210		210	
	Photo?	Y		Y		Y		Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
120	Agrostis canina		1	O								
122	Agrostis stolonifera				1	O						
127	Ajuga reptans		1	O							2	O
167	Angelica sylvestris		3	F	2	O			3	F	3	F
171	Anthoxanthum odoratum								2	O		
251	Briza media		3	F					3	F	3	F
1445	Calliergon cuspidatum	Calliergonella cuspidata	6	A	8	D	3	F	3	F	5	A
279	Caltha palustris		3	O					2	O		
1571	Campylium stellatum		2	F							1	O
295	Cardamine pratensis				3	F	3	F				
319	Carex echinata		4	A					4	A		
323	Carex flacca		3	F	6	A	8	D	2	O	4	A
324	Carex hirta								1	R		
333	Carex nigra		4	A					2	O	4	A
339	Carex panicea		5	A	1	R			4	A	5	A
329	Carex viridula ssp brachyrrhyncha		3	F					3	F	4	A
418	Cirsium palustre		3	F	1	R	1	R	2	O	3	F
1593	Climacium dendroides		5	A					5	A		
1596	Cratoneuron commutatum	Palustriella commutata			3	F	8	D				
449	Crepis paludosa								2	O		
1600	Ctenidium molluscum		1	O							3	F
460	Cynosurus cristatus		1	O								
465	Dactylis glomerata				1	O						
466	Dactylorhiza fuchsii		2	F					2	F		
1249	Danthonia decumbens		2	O								
477	Deschampsia cespitosa cespitosa				2	O						
526	Epilobium parviflorum				1	R			1	O		
532	Equisetum arvense		2	O					2	F	2	O
576	Festuca rubra		3	O							3	F
583	Filipendula ulmaria		3	F			3	O	1	R		
612	Galium uliginosum		3	F								
680	Holcus lanatus		3	F	1	R			3	F	2	F
722	Juncus articulatus		6	A	5	F	3	F	4	A	3	F
729	Juncus conglomeratus								3	F		
730	Juncus effusus		3	F	3	O			3	F		
733	Juncus inflexus										6	A
758	Lathyrus pratensis		3	O					3	F		
802	Lotus pedunculatus		3	F					3	F		
825	Lysimachia nemorum		1	O	3	F	3	F				
855	Mentha aquatica								1	O	3	F
944	Parnassia palustris								3	F		
2222	Pellia endiviifolia						3	F				
970	Pinguicula vulgaris										1	R
1804	Plagiomnium elatum		1	O					0	R		
1807	Plagiomnium undulatum						2	O	3	F		
990	Poa trivialis								1	R		
1046	Potentilla erecta		2	F					1	O		
1059	Prunella vulgaris		2	O	2	R			0	O	2	F
1914	Pseudoscleropodium purum		4	F					3	F		
1081	Ranunculus acris		2	O								
1089	Ranunculus flammula		1	O								
1095	Ranunculus repens				3	F	1	O				
1940	Rhytidiadelphus squarrosus		1	O					2	O	1	O
1305	Succisa pratensis								1	O	3	F
2003	Thuidium tamariscinum		1	O					1	O		
1350	Trifolium repens		3	F					1	O		
1354	Triglochin palustre		3	O					0	R		
1380	Valeriana dioica		5	A	3	F			4	A	5	A

North York Moors	Site name	Noddle End		Noddle End		Noddle End		Noddle End	
Alkaline Fen &	Site ref	170		170		170		170	
Transition Mire / Quaking Bog	Quadrat ID	170006		170007		170008		170009	
Survey 2011	Stand ref	Stand 6		Stand 7		Stand 8		Stand 9	
	NGR	SE		SE		SE		SE	
Domin scores for all quadrats	Easting	452899		452837		452833		452921	
	Northing	488744		488896		488896		488731	
PE Phil Eades	Date	27/08/2011		27/08/2011		27/08/2011		27/08/2011	
RT Ros Tratt	Recorder name	PE		PE		PE		PE	
	NVC community	M22b		M22b		M22a		M22a	
	Notes	spp-rich seepage within rush pasture		spp-rich soakway within rush pasture		Diverse rush pasture		Diverse rush pasture	
	Quadrat size	1x4m		2x2m		2x2m		2x2m	
	pH	6.6		7.0					
	EC (µS cm-1)	220		230					
	Photo?	Y		Y		Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
105	Achillea ptarmica						3	F		
120	Agrostis canina						3	F		
167	Angelica sylvestris		2	O	2	O	8	A	3	A
1546	Bryum pseudotriquetrum				3					
1445	Calliergon cuspidatum	Calliergonella cuspidata	7	A	5	A	4	A		
1571	Campylium stellatum		3	F	3	F				
319	Carex echinata		3	F	4	A				
323	Carex flacca		3	F	5	A				
324	Carex hirta						0	O		
333	Carex nigra		3	F						
339	Carex panicea		4	A	5	A				
329	Carex viridula ssp brachyrrhyncha		4	A	4	A				
384	Cerastium fontanum		1	O						
418	Cirsium palustre		3	F	1	O	0	F	2	F
1593	Climacium dendroides								4	A
1596	Cratoneuron commutatum	Palustriella commutata			3	F				
449	Crepis paludosa		1	R	3	F				
455	Cruciata laevipes						0	O		
1600	Ctenidium molluscum		3	F						
465	Dactylis glomerata		3	F						
466	Dactylorhiza fuchsii		0	O			0	O		
526	Epilobium parviflorum								3	F
532	Equisetum arvense				2	O			4	F
535	Equisetum palustre						3	F		
576	Festuca rubra		4	F			3	F	4	F
583	Filipendula ulmaria						5	A	4	A
1683	Fissidens adianthoides		3	F						
612	Galium uliginosum		2	F			3	O	3	F
641	Glyceria plicata		3	F						
680	Holcus lanatus				3	F	1	F	3	F
722	Juncus articulatus		4	A	7	A				
730	Juncus effusus		1	O			0	O		
733	Juncus inflexus				3	F			8	D
758	Lathyrus pratensis		3	F			2	F		
802	Lotus pedunculatus						4	F	3	F
813	Lychnis flos-cuculi		1	O			1	O	3	F
825	Lysimachia nemorum								2	O
855	Mentha aquatica		2	O	3	F	4	F	0	O
944	Parnassia palustris		2	O						
1804	Plagiomnium elatum				3	F	4	F	3	F
1807	Plagiomnium undulatum				0	O			3	F
990	Poa trivialis						1	F		
1059	Prunella vulgaris		3	F						
1914	Pseudoscleropodium purum		2	F						
1081	Ranunculus acris								2	O
1940	Rhytidiadelphus squarrosus		1	O					1	O
1139	Rumex acetosa						0	F		
1143	Rumex crispus								1	O
1305	Succisa pratensis		2	O			0	F		
2003	Thuidium tamariscinum								1	O
1354	Triglochin palustre				1	R				
1380	Valeriana dioica		6	A	4	A	4	A	4	A

8.17 RIVERHEAD FARM

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.17.1 Site Description

The area of fen interest at Riverhead Farm is located to the south-west of the farm, within and adjoining the improved pasture that slopes south-westwards down to an un-named headwater stream of the River Derwent. Three main areas of Alkaline Fen and Transition Mire / Quaking Bog vegetation were identified: one situated on a steep slope irrigated by springs and seepages close to the valley bottom, and the others associated with a large spring mound and an area of quaking mire within the improved pasture. The stream forms a boundary with the North York Moors National Park, and on the opposite (south-western) side of the stream, within the Park, the land is afforested.

Despite their small size, the Alkaline Fen and Transition Mire plant communities found at Riverhead Farm, and the associated mires and wet heaths that surround or intergrade with these, are a significant resource. Together with larger areas of fen at the nearby Jugger Howe Beck, these sites support much of the M14 vegetation that is found in the North York Moors area. Consequently it is important that these areas are adequately protected.

8.17.2 Stand Descriptions

Stands 1–4 (SE 92623 96888; Quadrats 273001–4)

M10a *Carex dioica–Pinguicula vulgaris* mire,
Carex demissa–Juncus bulbosus/kochii sub-community

M15a *Scirpus cespitosus–Erica tetralix* wet heath,
Carex panicea sub-community

M21 *Narthecium ossifragum–Sphagnum papillosum* valley mire

Part of a steep bluff that drops down to the stream is irrigated by at least three vigorous springs that arise beneath and within an outcrop of sandstone that forms the top of the bluff. Above this there is a wire fence, beyond which the ground comprises improved pasture, which slopes more gently up north-eastwards towards Riverhead Farm.

Away from the springs the steep bluff supports a mixture of dense bracken, heathland, and scrub. The wetland area, which covers approximately 20 x 50 metres, supports a mixture of species-rich low-growing vegetation along the runnels, water tracks and soakways that issue from fairly base-rich (pH 6.0) and iron ochre-rich springs and seepages, with less diverse, more robust vegetation supporting dwarf shrubs and tall sedges and herbs on the flushed ground between these.

The two main water-courses, a vigorous runnel and water track on the north side (Stand 1), and a gently flowing soakway along the southern edge (Stand 4), both support diverse bryophyte and sedge-rich vegetation, with species such as *Anagallis tenella, Aneura pinguis, Campylium stellatum, Carex dioica, C. panicea, C. viridula* subsp. *oedocarpa, Eleocharis quinqueflora, Juncus bulbosus, Pinguicula vulgaris, Potamogeton polygonifolius, Scorpidium cossonii,* and *Selaginella selaginoides.* This vegetation can be assigned to the M10a mire community (MATCH coefficients 45.2% & 44.1% respectively for Stands 1 and 4), and is considered to be Alkaline Fen.

The ground immediately surrounding the fen area supports a form of wet heath vegetation, and the flushed sloping ground between Stands 1 & 4 in places appears transitional between wet heath and M10 mire. The lower end of this area (Stand 2) supports a robust mixture of *Carex rostrata, Erica tetralix, Molinia caerulea, Myrica gale* and *Schoenus nigricans,* with lesser quantities of species such as *Juncus acutiflorus, Menyanthes trifoliata, Narthecium ossifragum, Sphagnum subnitens, S. inundatum & S. palustre.* Although this vegetation has some affinities to M14 mire, it is probably best

assigned to the M15a wet heath community, which is not a target fen community (MATCH coefficient 43.7%).

Upslope of this area is an irregularly-shaped band of flushed vegetation (Stand 3) that is dominated by *Carex rostrata*, with a scattering of other species such as *Campylium stellatum, Erica tetralix, Myrica gale, Narthecium ossifragum, Sphagnum palustre, S. papillosum*, and *S. subnitens*. While this area has affinities with M15a and M14, it can probably be best assigned to the M21 valley mire community (MATCH coefficient 35.5%), and is categorised as Transition Mire / Quaking Bog.

Stands 5 & 6 (SE 92875 96857; Quadrats 273005 & 6)

M14 *Schoenus nigricans–Narthecium ossifragum* mire

M21 *Narthecium ossifragum–Sphagnum papillosum* valley mire

Stands 5 and 6 are situated on an impressive spring mound about 40 x 30 metres in extent, and elevated above the surrounding pasture by approximately 1.5 m. It consists of a mound of deep peat, with a small spring-fed soakway at its northern end that flows gently to the south-west. The soakway is moderately base-rich (pH 6.3) and supports a diverse mixture of higher plants and bryophytes (Stand 6), including *Campylium stellatum, Carex dioica, C. pulicaris, Eleocharis multicaulis, E. quinqueflora, Erica tetralix, Menyanthes trifoliata, Molinia caerulea, Pinguicula vulgaris, Schoenus nigricans, Scorpidium revolvens,* and *Sphagnum magellanicum.* This stand may best be assigned to the M14 mire community (MATCH coefficient: 34.8%), which is considered to be a form of Transition Mire / Quaking Bog, and is nationally very restricted in its occurrence.

The M14 soakway is surrounded by vegetation that shows a more ombrogenous character, although with a few species more indicative of base-enrichment (Stand 5). This vegetation is dominated by a mixture of bog mosses, including *Sphagnum magellanicum, S. papillosum, S. subnitens, S. capillifolium* and *S. fallax*, with an abundance of *Erica tetralix, Molinia caerulea* and *Narthecium ossifragum*, and a scattering of *Anagallis tenella, Carex hostiana, Ctenidium molluscum, Drosera rotundifolia,* and *Eleocharis quinqueflora*. This vegetation covers much of the mound, and can best be assigned to the M21 valley mire community (MATCH coefficient: 44.9%), and classed as Transition Mire / Quaking Bog. The mound itself is surrounded by a band of soft rush (*Juncus effusus*).

Stands 7 & 8 (SE 93162 96721; Quadrats 273007 & 8)

M14 *Schoenus nigricans–Narthecium ossifragum* mire

M15b *Scirpus cespitosus–Erica tetralix* wet heath,
Typical sub-community

A series of seepages arise in a nearby area of poorly drained land to the south-east within the same intensive pasture. Two of these seepages occur just below a low (c. 50 cm) earthen 'step', causing the development of a small quaking raft from which several soakways lead downslope to the south-west. These quaking areas and soakways are irrigated by moderately base-poor water (pH 4.9), and support a stand of vegetation (Stand 7) similar in composition to Stand 5, including *Aneura pinguis, Campylium stellatum, Carex panicea, C. pulicaris, Eleocharis quinqueflora, Erica tetralix, Menyanthes trifoliata, Narthecium ossifragum, Pinguicula vulgaris, Schoenus nigricans, Scorpidium revolvens, Sphagnum capillifolium, S. papillosum,* and *S. subnitens.* Again, Stand 7 may best be assigned to the very uncommon M14 mire community (MATCH coefficient: 38.5%), and classed as Transition Mire / Quaking Bog.

Away from the seepages the vegetation grades into M15b wet heath (Stand 8) supporting a mixture of bog-mosses, including *Sphagnum palustre, S. papillosum, S. subnitens,* and *S. capillifolium* with an abundance of *Anthoxanthum odoratum, Erica tetralix, Molinia caerulea* and *Narthecium ossifragum,* and a scattering of other sedges, grasses, forbs and bryophytes (MATCH coefficient: 50.8%).

8.17.3 Wetland Substrata & Water Supply

Stands 1–4 are irrigated with fairly base-rich water (pH 6.0) by springs and seepages that appear to issue from just below or within a substantial outcrop of sandstone at the top of the slope. Below the outcrop was a sloping area of soft, friable clay-like material. Soil investigations within the fen areas in all cases found varying depths of silty peat (0–90 cm) over a sticky clay of unknown depth. It appears that groundwater is unable to penetrate the impermeable clay-like substrata, and flows along the sandstone strata to emerge where it outcrops, before flushing down over the clayey slopes below the springs.

Stand 5, on the large spring mound, is also irrigated by base-rich water (pH 6.3). Stand 6, which surrounds it, appears to be more ombrogenous in character, although possibly with some limited base-rich influence immediately adjacent to the soakway area. Soil investigation found the spring mound to be composed of a considerable depth of peat (> 120 cm). The adjacent pasture comprised a shallow layer (10 cm) of peaty soil over a dry sandy clay. It is less clear how this area is supplied with water, but it is possible that there is a band of sandstone close enough to the surface for groundwater to emerge through the overlying sandy clay subsoil. For such a large mound of peat to have formed there must be a fairly constant supply of groundwater emerging at this point.

Stand 7 has formed in a similar situation to Stands 5 & 6, although with a less pronounced mound of peat. The main seepage areas comprise quaking rafts of rhizomes over approximately 60 cm of peaty silt, over a sandy clay. The adjacent wet heath vegetation was found on about 45 cm of firm peat, over soft sandy clay. It appears likely that Stand 7 is supplied with water in a similar fashion to Stand 5.

8.17.4 Site Management

The intensive pasture within which the spring mounds are situated is heavily grazed by cattle, and has the appearance of receiving regular applications of artificial fertiliser. However, the mounds appear to be only lightly grazed, showing few signs of trampling. The larger of the two mounds in particular, is elevated above the surrounding pasture, and neither area appears to be influenced by nutrient-rich runoff which, judging by the bands of soft-rush surrounding both areas, seems to flow around them.

The river-edge site (Stand 1 – 4) appears to be very lightly grazed, although the nutrient-poor nature of the soils and spring water appear sufficient to maintain a fairly open sward around the water tracks and soakways themselves. Enrichment of the irrigating spring water, perhaps resulting from excessive application of fertiliser to the pastures above this site, might be expected to cause a change in the nature of the plant communities present there, although it is not at all certain how likely this would be to occur. It may be that the impervious clay-rich substrata in this area prevent nutrient-enriched runoff from soaking into the ground, in which case the springs and seepages that support these important wetland features may be to some degree protected from the effects of pasture intensification.

However, it would be beneficial to try to ensure that no further drainage works (i.e. ditch excavation or improvement) are carried out in the vicinity of these features, and that the vegetation of the spring mounds is monitored with regard to the possible effects of over-grazing and nutrient-enrichment.


Riverhead Farm (FenBase Site 273)
Central grid ref: SE 92874 96859
Surveyor: Phil Eades 16/09/2011
Alkaline Fen (Stands 1 & 4: M10a)
Transition Mire (Stands 5 & 7: M14; Stands 3 & 6: M21)
Other (Stands 2 & 8: M15)
1
2
3
4
5
6
7
8

North York Moors	Site name	Riverhead Farm		Riverhead Farm		Riverhead Farm		Riverhead Farm	
Alkaline Fen &	Site ref	273		273		273		273	
Transition Mire / Quaking Bog	Quadrat ID	273001		273002		273003		273004	
Survey 2011	Stand ref	Stand 1		Stand 2		Stand 3		Stand 4	
	NGR	SE		SE		SE		SE	
Domin scores for all quadrats	Easting	492624		492613		492619		492627	
	Northing	496880		496861		496862		496865	
PE Phil Eades	Date	16/09/2011		16/09/2011		16/09/2011		16/09/2011	
RT Ros Tratt	Recorder name	PE		PE		PE		PE	
	NVC community	M10a		M15a		M21		M10a	
	Notes	runnel fed by iron-rich springs		Wet heath with Schoenus & Myrica		Wet slope between runnels		Sedge- & herb-rich eastern soakway	
	Quadrat size	1x4m		2x8m		4x4m		2x2m	
	pH	6.0		6.0					
	EC (µS cm-^{1})	140		140					
	Photo?	Y		Y		Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
163	Anagallis tenella		3	F					3	F
2256	Aneura pinguis		3	F					2	O
171	Anthoxanthum odoratum		0	O						
1445	Calliergon cuspidatum	Calliergonella cuspidata					2	O		
1571	Campylium stellatum		4	F			3	F	4	A
315	Carex dioica		0	O						
319	Carex echinata		3	F	2	O	2	O	3	F
339	Carex panicea		2	F					4	A
352	Carex rostrata				4	A	9	D		
312	Carex viridula ssp oedocarpa		1	F						
418	Cirsium palustre		1	F			1	O	1	O
3192	Dactylorhiza sp.		0	O						
1658	Drepanocladus revolvens	Scorpidium revolvens							1	R
3266	Drepanocladus revolvens var. intermedius	Scorpidium cossonnii	3	F			2	O		
494	Drosera rotundifolia		3	F					2	F
510	Eleocharis quinqueflora		3	F						
535	Equisetum palustre		3	F					1	O
542	Erica tetralix		4	F	4	A	2	O	3	F
546	Eriophorum angustifolium								4	A
576	Festuca rubra		2	O						
2855	Hypericum sp		2	O			2	O	3	F
719	Juncus acutiflorus		0	O	3	F				
726	Juncus bulbosus		3	F					1	O
729	Juncus conglomeratus				1	O				
862	Menyanthes trifoliata				1	O				
876	Molinia caerulea		2	F	4	A			2	O
893	Myrica gale				7	A	3	F		
900	Nardus stricta		1	O						
901	Narthecium ossifragum		3	F	3	F	3	F	4	A
946	Pedicularis palustris		1	O						
970	Pinguicula vulgaris		3	F						
1037	Potamogeton polygonifolius		2	F			2	O	2	F
1046	Potentilla erecta		1	O	2	O	3	F		
1914	Pseudoscleropodium purum				1	O				
1207	Schoenus nigricans				4	A				
1235	Selaginella selaginoides								1	R
2700	Sphagnum auriculatum var auriculatum	Sphagnum denticulatum	3	F	3	F				
1971	Sphagnum palustre				2	O	2	O		
1972	Sphagnum papillosum						2	O		
2738	Sphagnum sp				3	F				
1973	Sphagnum subnitens				3	F	3	F		
1305	Succisa pratensis		3	F	3	F	3	F	4	A

North York Moors	Site name	Riverhead Farm		Riverhead Farm		Riverhead Farm		Riverhead Farm	
Alkaline Fen &	Site ref	273		273		273		273	
Transition Mire / Quaking Bog	Quadrat ID	273005		273006		273007		273008	
Survey 2011	Stand ref	Stand 5		Stand 6		Stand 7		Stand 8	
	NGR	SE		SE		SE		SE	
Domin scores for all quadrats	Easting	492874		492871		493162		493165	
	Northing	496859		496859		496722		496715	
PE Phil Eades	Date	16/09/2011		16/09/2011		16/09/2011		16/09/2011	
RT Ros Tratt	Recorder name	PE		PE		PE		PE	
	NVC community	M14		M21b		M14		M15b	
	Notes	Base-rich soakway on spring mound		Wet heath on spring mound		Seepages & soakways with Schoenus		Wet heath fringing soakways	
	Quadrat size	1x4m		2x2m		2x2m		2x2m	
	pH	6.3				4.9			
	EC (µS cm-^{1})	330				190			
	Photo?	Y		Y		Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
123	Agrostis capillaris								3	F
122	Agrostis stolonifera				2	O				
163	Anagallis tenella				1	R				
2256	Aneura pinguis						3	F		
171	Anthoxanthum odoratum				2	F	0	O	4	A
1482	Aulacomnium palustre				1	R	0	O	3	F
1445	Calliergon cuspidatum	Calliergonella cuspidata	1	O	1	O	3	F		
1571	Campylium stellatum		4	A			4	A		
315	Carex dioica		1	O						
319	Carex echinata		4	A	3	F	4	A	4	A
325	Carex hostiana				1	R				
339	Carex panicea		3	F			3	F		
347	Carex pulicaris		2	F			1	R		
312	Carex viridula ssp oedocarpa						3	F		
418	Cirsium palustre						1	O		
1600	Ctenidium molluscum				1	R				
1658	Drepanocladus revolvens	Scorpidium revolvens	2	F			3	F		
3266	Drepanocladus revolvens var. intermedius	Scorpidium cossonnii					4	A		
494	Drosera rotundifolia		2	O	2	F	3	F		
508	Eleocharis multicaulis		4	A						
510	Eleocharis quinqueflora		4	A	3	F	4	F	3	F
542	Erica tetralix		2	O	5	A	3	F	5	A
546	Eriophorum angustifolium						3	F	2	O
680	Holcus lanatus						0	O		
2695	Hypnum jutlandicum				2	O				
719	Juncus acutiflorus						2	O	2	O
726	Juncus bulbosus		2	O			2	O		
730	Juncus effusus								3	F
809	Luzula multiflora								1	O
862	Menyanthes trifoliata		4	A						
876	Molinia caerulea		3	F	4	A			7	A
893	Myrica gale						2	O		
900	Nardus stricta								3	F
901	Narthecium ossifragum				5	A	5	A	5	A
946	Pedicularis palustris								3	F
970	Pinguicula vulgaris		2	F			0	R		
994	Polygala serpyllifolia								1	O
1891	Polytrichum commune								3	F
1037	Potamogeton polygonifolius		4	A			3	F		
1046	Potentilla erecta				2	F	3	F	3	F
1207	Schoenus nigricans		3	F			5	A		
1947	Scorpidium scorpioides		2	F						
1235	Selaginella selaginoides		1	O			2	O		
1960	Sphagnum capillifolium				5	A	2	O	2	O
1969	Sphagnum magellanicum		3	F						
1971	Sphagnum palustre								3	F
1972	Sphagnum papillosum				5	A	2	F	4	A
1976	Sphagnum recurvum	Sphagnum fallax			3	F				
1973	Sphagnum subnitens				4	A	5	A	4	A

8.18 SAND DALE (ADJACENT TO ELLERS WOOD & SAND DALE SSSI)

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.18.1 Site Description

Sand Dale is the southernmost main side valley on the eastern side of Thornton Dale, and extends east-north-eastwards to the plateau at the heart of Dalby Forest. The valley sides rise steeply on both sides of the stream axis, to form the fairly narrow ridge of White Cliff Rigg to the north, and Wilton Heights and Stonygate Moor to the south. Wetland interest in Sand Dale is represented by a series of small seepages which occur on both sides of the valley along its lowermost slopes for about 1 km from its confluence with Thornton Dale, generally becoming less prominent and less consistently wet up-valley. Consistent with this trend, the 'best' seepage area is at the confluence with Thornton Dale, located below Ellerburn Banks, and this area is sometimes known as Ellerburn Fen. This area has been surveyed in the past (Fojt, 1994), and is within unit 2 of the Ellers Wood & Sand Dale SSSI.

The focus of this survey was an area of seepages and flushes immediately to the north of the axial stream that forms the northern boundary of the SSSI. This area was under conifer plantation until fairly recently. Consequently, the mire vegetation has been greatly influenced by dense shading, and is really only present along a series of narrow soakways and water tracks that flow downslope from seepages and springs just below the northern limit of this land parcel, which is bounded by a fence and forestry track. These water flow tracks are very linear and in some places quite deep, and it is possible that they have been artificially deepened as part of the forestry operation.

8.18.2 Stand Description

Quadrats 206001 & 2, TN1; SE 86027 84940)

M13 *Schoenus nigricans–Juncus subnodulosus* mire

(MATCH coefficients: 25.7% & 33.4%)

The remnant mire vegetation that flanks the flow tracks is quite diverse, supporting a wide range of bryophytes, sedges, rushes, grasses, and forbs, including *Anagallis tenella, Angelica sylvestris, Calliergonella cuspidata, Campylium stellatum, Carex echinata, C. flacca, C. pulicaris, C. viridula* subsp. *brachyrrhyncha, C. viridula* subsp. *oedocarpa, Dactylorhiza* sp., *Filipendula ulmaria, Festuca rubra, Fissidens adianthoides, Galium uliginosum, Hypericum pulchrum, Juncus subnodulosus, J. bulbosus, J. articulatus, Palustriella commutatum, Pinguicula vulgaris, Plagiomnium elatum, P. affine, Triglochin palustris,* and *Valeriana dioica.* The two samples that were recorded showed weak affinities with M13, M22, M37 and M10. However, whilst the highly modified nature of this site makes it difficult to assign it to a particular NVC community, its greatest affinity is with M13 *Schoenus nigricans–Juncus subnodulosus* mire. Therefore it is considered to be a modified form of this community, and has been classified as Alkaline Fen. The site should be monitored in future years in order to assess its recovery following deforestation.

8.18.3 Wetland Substrata & Water Supply

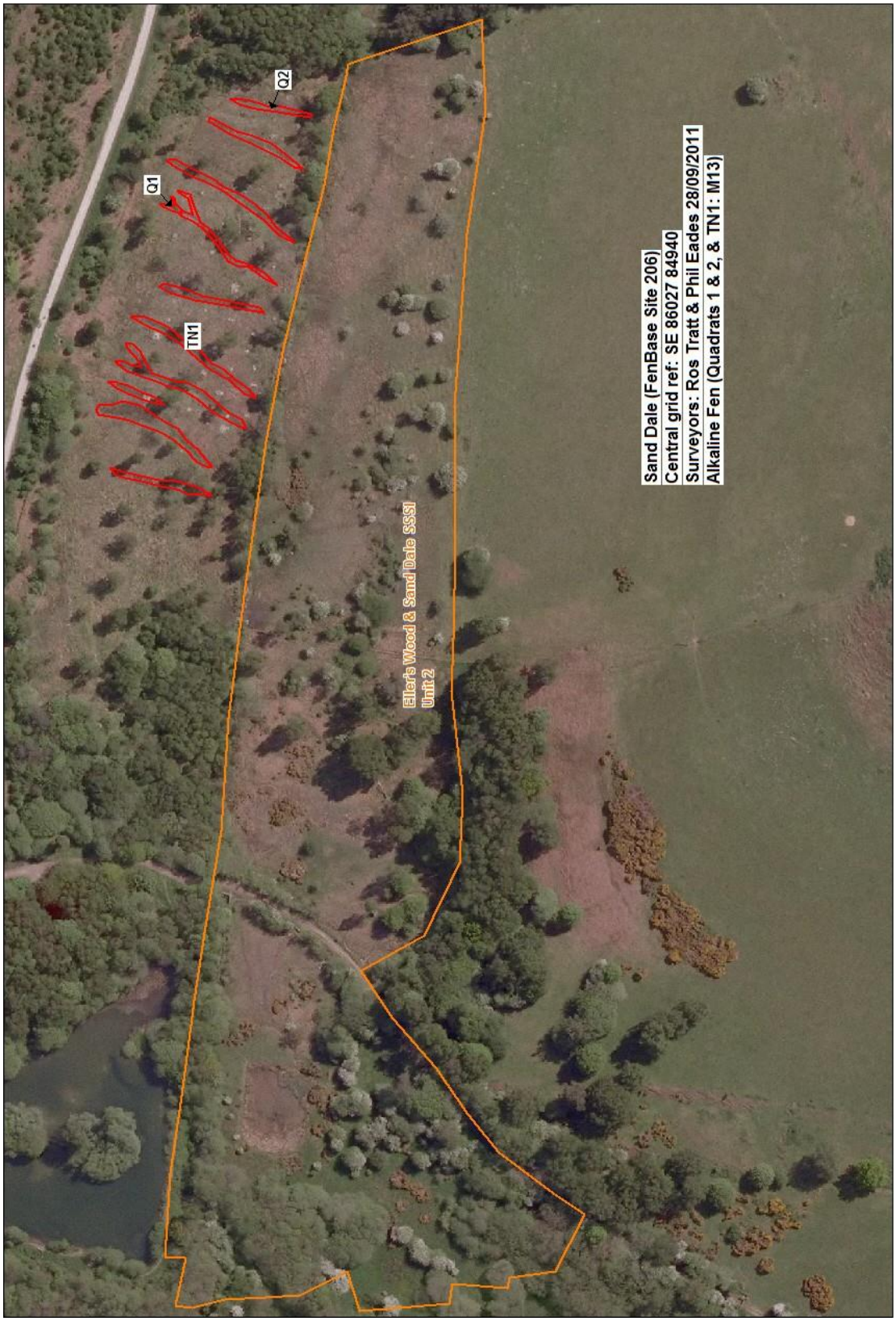
Base-rich groundwater outflow (pH 7.8; EC 510 µS cm^{-1}) occurs here on rising soligenous slopes, probably sourced from the higher limestone and sandstone strata that overly a mudstone aquitard. The latter forms the valley-bottom in this location, and impeded drainage from this may help to maintain wetter conditions in the SSSI on the southern side of the axial stream.

8.18.4 Site Management

The area examined during this survey is open to grazing by cattle that currently graze the SSSI land on the southern side of the stream, which forms the eastern section of SSSI unit 2, east of a fence-line. That area is at present not separated from improved pasture on the slopes above (to the south of) unit 2 and, perhaps as a consequence, at the time of survey it was very heavily grazed, being cropped very

low, and with extensive poaching. In contrast, the western part of unit 2 was lightly grazed, with management aimed at conserving the snail *Vertigo geyeri*, which is a SAC interest feature here; consequently, the M13 vegetation in that part of the site was in very good condition.

It is suggested that the eastern section of unit 2 be fenced off from the adjacent improved pasture, and that it and the newly de-forested seepage area be subject to light cattle grazing. This should serve to improve the situation both for M13 vegetation, and for *Vertigo geyeri*.



North York Moors		Site name	Sand Dale		Sand Dale	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	206		206	
		Quadrat ID	206001		206002	
		Stand ref	n/a		n/a	
		NGR	SE		SE	
Domin scores for all quadrats		Easting	486027		486064	
		Northing	484940		484912	
PE	Phil Eades	Date	28/09/2011		28/09/2011	
RT	Ros Tratt	Recorder name	RT & PE		RT & PE	
		NVC community	M13		M13	
		Notes	Spp-rich spring & soakway		Spp-rich spring & soakway	
		Quadrat size	1x4m		1x4m	
		pH	7.8		8.2	
		EC (µS cm-^{1})	510		520	
		Photo?	Y		Y	
Species code	**MATCH species name**	**Modern synonym (where changed)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**
163	Anagallis tenella		3	A	3	F
1445	Calliergon cuspidatum	Calliergonella cuspidata	0	F	2	F
1571	Campylium stellatum				2	F
323	Carex flacca		5	A	5	A
347	Carex pulicaris				2	F
329	Carex viridula ssp brachyrrhyncha		2	F	2	F
418	Cirsium palustre		2	F	2	F
1596	Cratoneuron commutatum	Palustriella commutata	8	A	8	A
1600	Ctenidium molluscum		1	O	1	O
526	Epilobium parviflorum		1	F	1	F
576	Festuca rubra		1	F	1	F
1683	Fissidens adianthoides				2	F
722	Juncus articulatus		3	A	3	F
2732	Juncus subnodulosus		1	O	1	O
2222	Pellia endiviifolia				1	O
970	Pinguicula vulgaris				2	R
1089	Ranunculus flammula				0	O
2254	Riccardia multifida				1	O

8.19 SCARTH WOOD MOOR (NORTH YORK MOORS SSSI)

Vegetation stands and target notes are identified in the images following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.19.1 Site Description

Scarth Wood Moor is situated in Unit 1 of the North York Moors SSSI, on the south-eastern side-slope of a hog-back hill, at the north-west extremity of the Cleveland Hills immediately north of Osmotherley. Scarth Wood Moor is located on the south-eastern slope of the hill, and forms the north-western part of the valleyhead of the Cod Beck, much of which is now impounded along the valley bottom by the Cod Beck reservoir. A number of springs are mapped on Scarth Wood Moor, and some of these have associated wetland interest. The wetlands can be grouped by their topographical context. On the hill slope there are a number of small, soligenous wetlands, associated with small springs, seepages and soakways, flanked by wet heath, and surrounded by dense bracken. Most of these are associated with the three mapped streams that flow down the hillside to dissipate into the valley bottom. Along the valley bottom, wetlands form areas more akin to topogenous mire, but with well-defined soakways.

8.19.2 Stand Descriptions

Stands 4, 5, 7, 8 & 9 (central grid ref: SE 46610 99580; Quadrats 284004, 5, 7, 8 & 9)

M10 *Carex dioica–Pinguicula vulgaris* mire

(MATCH coefficients: 35.1% to 40.6%)

Much of the mire interest in this area consists of a series of long narrow soakways and tiny streamlets that emanate from at least six small seepages areas (including TN 1 & 2), embedded in dense bracken, and in a few cases flanked by patches of wet heath vegetation (not sampled). In a few areas these soakways broaden out into small wet, sloping mires, particularly where the hillslope becomes gentler, whilst elsewhere the soakways almost vanish beneath the adjacent bracken. In all cases the seepages and soakways are characterised by a low sward of small sedges & rushes, and a distinctive bryophyte flora of 'brown mosses'. Typical species include *Anagallis tenella, Aneura pinguis, Briza media, Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Carex dioica, C. echinata, C. flacca, C. pulicaris, C. panicea, C. viridula* subsp. *oedocarpa, Cirsium palustre, Drosera rotundifolia, Eriophorum angustifolium, Juncus articulatus, J. bulbosus, Molinia caerulea, Palustriella falcata, Philonotis fontana, Scorpidium cossonii, S. revolvens,* and *Valeriana dioica.* These areas have their greatest affinity with the M10 community, although MATCH coefficients were generally quite low (35.1% to 40.6% fit). They have been classified as Alkaline Fen.

Stand 1 (SE 46754 99455; Quadrat 284001)

M9a *Carex rostrata–Calliergon cuspidatum/giganteum* mire,
Campylium stellatum–Scorpidium scorpioides sub-community

(MATCH coefficient: 36.2%)

This is a small soakway that is effectively a continuation of one of the base-rich soakways described above (Stand 4), that here runs out across a small area of topogenous mire. It supports a mixture of 'brown mosses', sedges and small rushes, such as *Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Carex panicea, C. viridula* subsp. *brachyrrhyncha, C. viridula* subsp. *oedocarpa, Cirsium palustre, Eleocharis quinqueflora, Eriophorum angustifolium, Juncus bulbosus, Menyanthes trifoliata, Potamogeton polygonifolius,* and *Scorpidium cossonii*. This stand of vegetation is probably best assigned to the M9a community, although MATCH coefficients were generally quite low (36.2% fit for M9a). This stand is considered to be Transition Mire / Quaking Bog, since it is a soakway associated with moderately base-rich conditions (pH 6.1, EC 200 µS cm^{-1}) that passes into a

small topogenous (basin) mire that mainly supports base-deficient poor-fen communities (see Stands 2 and 3, below).

Stands 2 & 10 (SE 46746 99455, SE 46806 99339; Quadrats 284002 & 10)

M4 *Carex rostrata–Sphagnum recurvum* mire

(MATCH coefficients: 45.7% and 52.3%)

Stand 2 flanks the soakway community described as Stand 1, in a small topogenous basin, and is dominated by a mixture of *Carex rostrata* and *Sphagnum fallax*, with a few other species scattered through it. Stand 10 is situated in the valley bottom, flanking a broad soakway (see Stand 6, below), and is of almost identical composition to Stand 2. These areas can be mostly clearly assigned to the M4 community (MATCH coefficients of 45.7% and 52.3% fit for stands 2 and 10 respectively), and is classed as Transition Mire / Quaking Bog.

Stand 6 (SE 46787 99311; Quadrat 284006)

M29 *Hypericum elodes–Potamogeton polygonifolius* soakway

(MATCH coefficient: 36.2%)

This is a broad soakway situated in the valley bottom, adjacent to the road and car-park, and dominated by *Hypericum elodes, Potamogeton polygonifolius, Calliergon giganteum,* and *Equisetum fluviatile*, with a range of other species at low cover, including *Comarum palustre*, *Eriophorum angustifolium, Mentha aquatica,* and *Ranunculus flammula*. This area is clearly a form of the M29 soakway community, although MATCH coefficients were generally quite low (36.2% fit). This is considered to be Transition Mire / Quaking Bog.

Stand 3 (SE 46762 99442; Quadrat 284003)

M6a *Carex echinata–Sphagnum recurvum/auriculatum* mire

(MATCH coefficient: 60.8%)

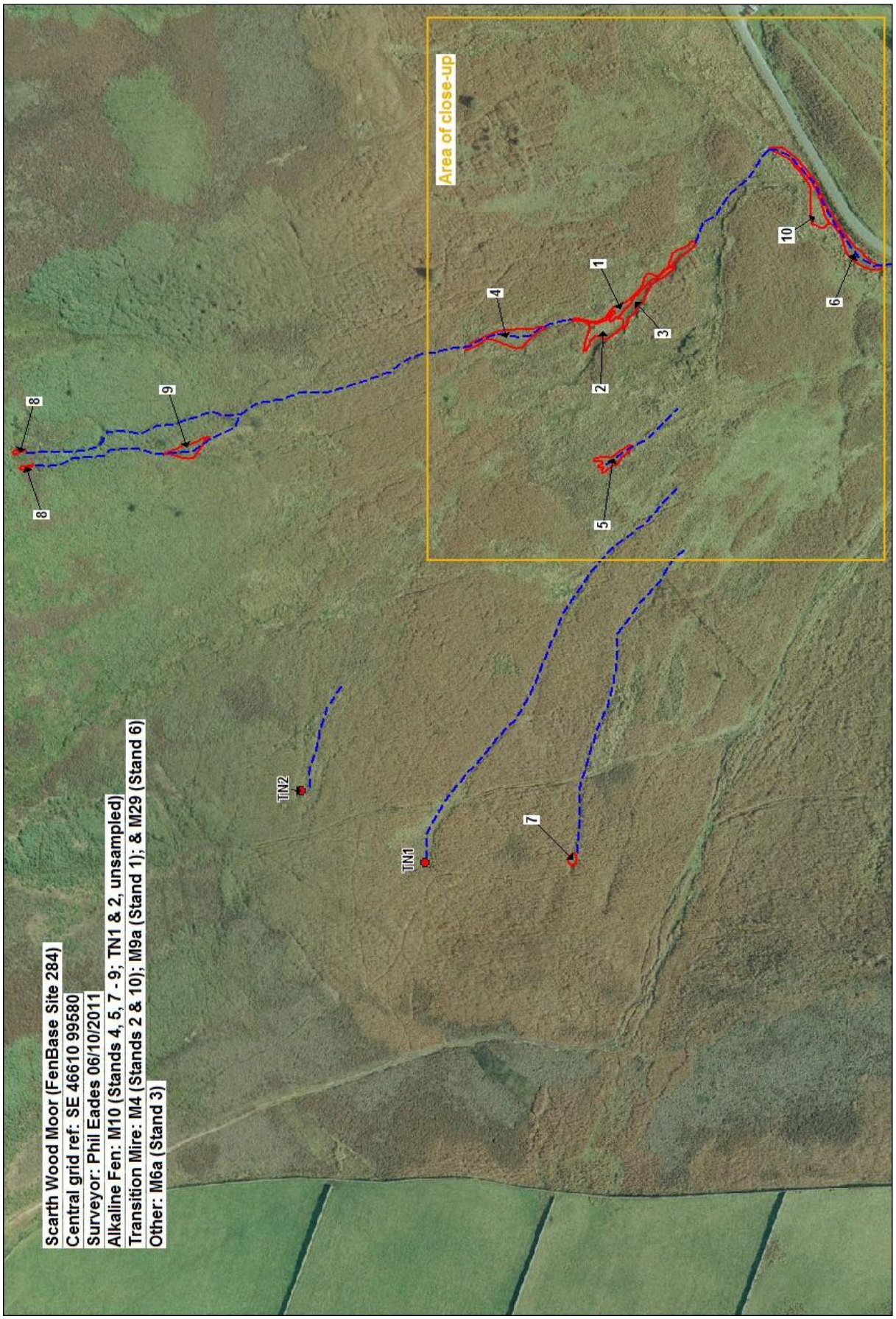
The 'down-slope' (south-eastern) end of the small basin mire (see Stands 1 & 2) supports vegetation that is dominated by *Sphagnum fallax* and *Eriophorum angustifolium*, but with a range of other species including *Agrostis canina, Carex echinata, Juncus acutiflorus, Molinia caerulea, S. denticulatum* and *S. subnitens.* The water here is much more base-poor (pH 4.5, EC 100 µS cm^{-1}) than that in the soakway that flows through it (Stand 1). This area represents an example of the M6a poor-fen community.

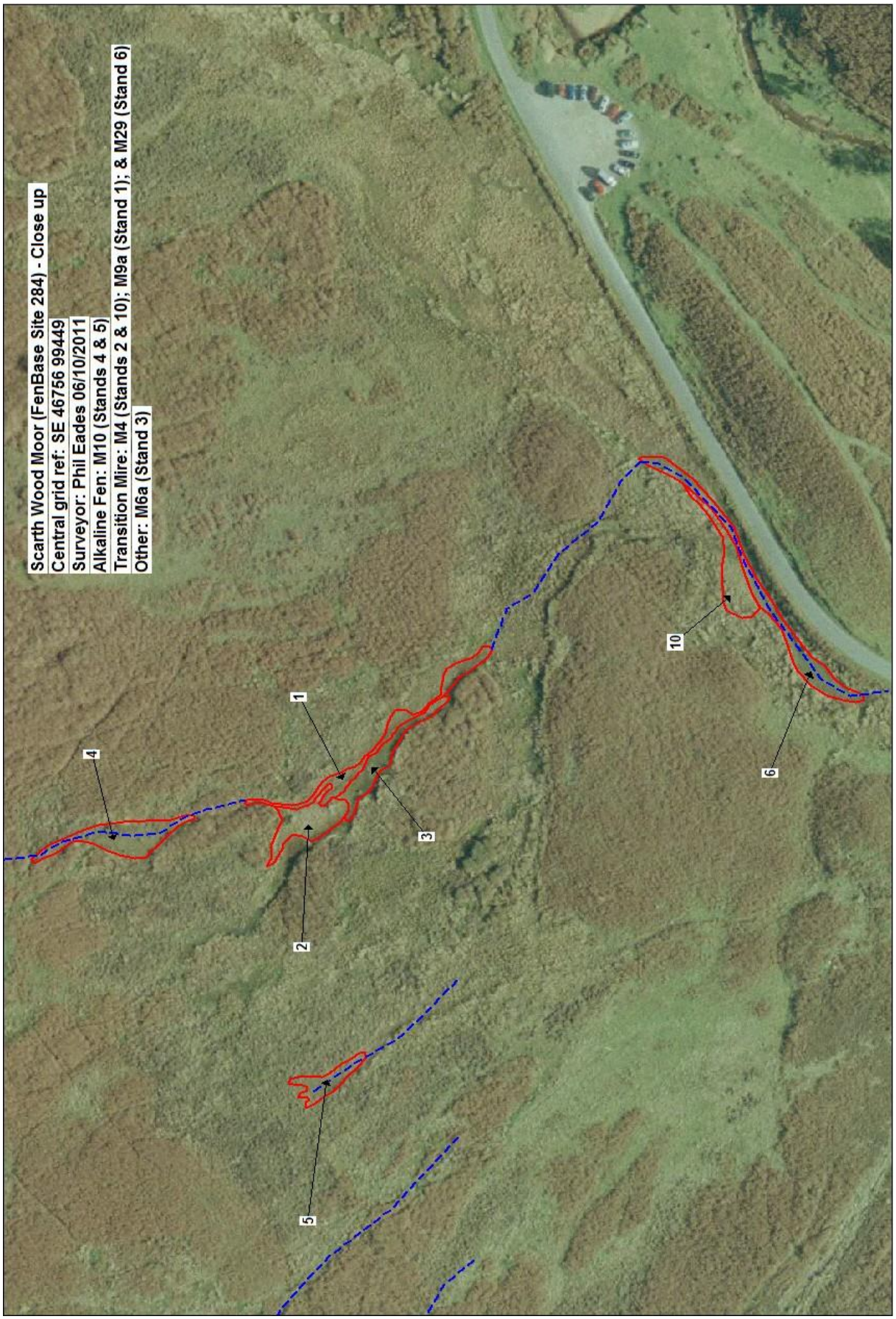
8.19.3 Wetland Substrata & Water Supply

The seepages and their associated soakways are all moderately base-rich (pH values ranging from 5.9–6.2, EC from 200–230 µS cm⁻1), and are most likely to be groundwater fed. Where investigated, they were found on shallow peat up to 65 cm deep, over sand and rocks. The small, elongate basin (Stands 1–3) is generally base-poor (pH 4.5–5.0; EC 100 µS cm^{-1}), with the exception of the base-rich soakway flowing into it from upslope (pH 6.1; EC 200 µS cm^{-1}), and was filled with approximately 105 cm of peat over sand. The broad M29 soakway in the valley bottom (Stand 6) was associated with moderately base-poor conditions (pH 5.5; EC 160 µS cm^{-1}), with 60 cm of silty peat over 40 cm of sandy silt, over a rock base.

8.19.4 Site Management

The whole area of moorland is unenclosed, and seems to be quite lightly grazed by sheep, at an intensity that is clearly sufficient to prevent scrub encroachment, but light enough for wetland plants to flower and set seed. Whilst there are a number of heavily used footpaths in the vicinity, and land around the car parks is quite heavily trampled by people, the wetland features are generally far enough away not to suffer damage. Stands 6 & 10, although adjacent to the road and car park, are very wet and quaking, and this appears to deter any foot traffic.


Scarth Wood Moor (FenBase Site 284)
Central grid ref: SE 46610 99580
Surveyor: Phil Eades 06/10/2011
Alkaline Fen: M10 (Stands 4, 5, 7 - 9; TN1 & 2, unsampled)
Transition Mire: M4 (Stands 2 & 10); M9a (Stand 1); & M29 (Stand 6)
Other: M6a (Stand 3)
Area of close-up
TN1
TN2
1
2
3
4
5
6
7
8
8
9
10


Scarth Wood Moor (FenBase Site 284) - Close up
Central grid ref: SE 46756 99449
Surveyor: Phil Eades 06/10/2011
Alkaline Fen: M10 (Stands 4 & 5)
Transition Mire: M4 (Stands 2 & 10); M9a (Stand 1); & M29 (Stand 6)
Other: M6a (Stand 3)
1
2
3
4
5
6
10

North York Moors	Site name	Scarth Wood Moor		Scarth Wood Moor		Scarth Wood Moor		Scarth Wood Moor		Scarth Wood Moor		Scarth Wood Moor		Scarth Wood Moor		Scarth Wood Moor		Scarth Wood Moor		Scarth Wood Moor	
Alkaline Fen &	**Site ref**	284		284		284		284		284		284		284		284		284		284	
Transition Mire / Quaking Bog	**Quadrat ID**	284001		284002		284003		284004		284005		284006		284007		284008		284009		284010	
Survey 2011	**Stand ref**	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5		Stand 6		Stand 7		Stand 8		Stand 9		Stand 10	
	NGR	SE		SE		SE		SE		SE		SE		SE		SE		SE		SE	
Domin scores for all quadrats	**Easting**	446754		446747		446760		446744		446668		446787		446436		446672		446673		446806	
	Northing	499455		499455		499444		499501		499456		499311		499478		499804		499712		499339	
PE Phil Eades	**Date**	06/10/2011		06/10/2011		06/10/2011		06/10/2011		06/10/2011		06/10/2011		06/10/2011		06/10/2011		06/10/2011		06/10/2011	
RT Ros Tratt	**Recorder name**	PE		PE		PE		PE		PE		PE		PE		PE		PE		PE	
	NVC community	M9a		M4		M6a		M10		M10		M29		M10		M10		M10		M4	
	Notes	Soakway in topogenous mire		Cx rostrata & Sphag fallax		E.ang & Sphag fallax mire		Sedge- & moss-rich soakway leading to Q1-3		spp-rich soakway within wet heath		soakway with Hyp. elodes & Pot poly		small mossy spring-head within bracken		2 springheads w. basic influences		soakway from spring		Cx rostrata & Sphag fallax	
	Quadrat size	0.5x8m		4x4m		4x4m		1x4m		1x4m		2x8m		1x4m		0.5x8m		0.5x8m		2x8m	
	pH	6.1		5.0		4.5		6.2		5.9		5.5		6.4		6.5		6.2			
	EC (µS cm^{-1})	200		100		100		210		200		160		200		220		230			
	Photo?	Y		Y		Y		Y		Y		Y		Y		Y		Y		Y	
Species code	**MATCH species name**	**Modern synonym (where changed)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**	**Domin score (Quadrat)**	**DAFOR (Stand)**
120	Agrostis canina				3	F	3	F														
122	Agrostis stolonifera																			2	O
163	Anagallis tenella		0	O					2	F	2	F			2	F	2	F	3	F		
2256	Aneura pinguis								2	O	1	O			1	R	1	R				
171	Anthoxanthum odoratum										1	O					1	O				
251	Briza media										2	F			1	O			3	F		
1546	Bryum pseudotriquetrum		3	F											3	F	4	A	2	F		
1444	Calliergon cordifolium														3	F						
1445	Calliergon cuspidatum	Calliergonella cuspidata							0	O	2	F					5	A	5	A		
1446	Calliergon giganteum												4	A			5	A				
1571	Campylium stellatum		4	A					5	A	5	A										
295	Cardamine pratensis																2	O				
315	Carex dioica								3	F	3	F			3	F	2	O	2	O		
319	Carex echinata				1	O	0	O					1	R			3	F	4	A		
323	Carex flacca														2	F			3	F		
339	Carex panicea		4	A			0	O	3	A	3	F			5	A	4	A	4	A		
347	Carex pulicaris																1	R	1	R		
352	Carex rostrata				9	D	3	F													8	D
329	Carex viridula ssp brachyrrhyncha		2	F																		
312	Carex viridula ssp oedocarpa		3	F					5	A	2	F			4	A			2	F		
418	Cirsium palustre		1	R					1	O	2	O	1	O	3	F	2	O				
1596	Cratoneuron commutatum	Palustriella commutata													4	F						
4340	Cratoneuron commutatum	Palustriella falcata							3	F					4	F						
1598	Cratoneuron filicinum		2	F																		
1658	Drepanocladus revolvens	Scorpidium revolvens							1	O	3	F										
3266	Drepanocladus revolvens v	Scorpidium cossonnii	4	A					3	A	3	F										
494	Drosera rotundifolia		2	O			0	R	1	O	2	F										
510	Eleocharis quinqueflora		4	F																		
525	Epilobium palustre		0	R									1	O								
533	Equisetum fluviatile		3	F	2	O	2	O	3	F			4	A							3	F
542	Erica tetralix						0	O	1	R					1	O	1	O				
546	Eriophorum angustifolium		5	A	3	F	7	A	1	O	4	A	1	O	3	F	2	O				
547	Eriophorum latifolium										2	O										
576	Festuca rubra																		3	F		
612	Galium uliginosum										2	F					1	O	2	O		
680	Holcus lanatus												3	F	1	O					1	O
690	Hydrocotyle vulgaris										1	O					1	O	4	A	1	O
696	Hypericum elodes												9	D								
719	Juncus acutiflorus		3	F	1	O	3	F	1	O	2	O	3	F							1	O
722	Juncus articulatus								4	F					2	F	3	F	3	F		
726	Juncus bulbosus		2	O	1	R	1	R			3	F			4	F	3	F	2	F		
730	Juncus effusus								1	O	1	O							2	O	1	O
855	Mentha aquatica												3	F								
862	Menyanthes trifoliata		0	O																		
876	Molinia caerulea		3	F	2	O	2	O	2	O	4	F					1	R				
900	Nardus stricta						0	O														
1847	Philonotis fontana														3	F	5	A				
1891	Polytrichum commune				1	O	1	O													1	O
1037	Potamogeton polygonifolius		5	A					0	R	2	O	6	A								
1046	Potentilla erecta				1	O	0	O			1	O										
1049	Potentilla palustris	Comarum palustre											2	F								
1089	Ranunculus flammula		0	O									2	O								
2700	Sphagnum auriculatum va	Sphagnum denticulatum					3	F														
1976	Sphagnum recurvum	Sphagnum fallax			9	D	8	D													9	D
1973	Sphagnum subnitens						2	O			0	O										
1305	Succisa pratensis		1	O							1	O										
2982	Taraxacum seedlings										1	R										
1354	Triglochin palustre										1	R							1	O		
1380	Valeriana dioica										2	O							3	F		
1427	Viola palustris				4	F	1	O													3	F

8.20 SNAPER FARM MEADOWS SSSI

Vegetation stands are identified in the images following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.20.1 Site Description

Snaper Farm Meadows consists of a series of unimproved neutral grassland fields, situated at the head of Riccal Dale, above Helmsley. While the site was notified mainly for dry and damp grassland vegetation, it is also notable for supporting a large expanse (*c.* 600 m^2) of base-rich spring-fed fen vegetation that is situated on a gentle slope above the main axial stream, in the centre of the site. A much smaller patch (*c.* 40 m^2) is located at the south-eastern end of the site, just outside the SSSI boundary.

8.20.2 Stand Descriptions

Stand 1 (SE 59991 91006; Quadrat 283001)

M10 *Carex dioica–Pinguicula vulgaris* mire.

(MATCH coefficient 31.3%)

This is a small, relatively species-rich stand of sedge-, bryophyte- & herb-rich vegetation, situated at the base of a short, steep slope with a series of strong, base-rich seepages (pH 7.4; EC 370 µS/cm) that flow down into and across the fen area. The slope is covered with dense hazel (*Corylus avellana*) scrub, which partially shades the fen. Downslope of the open fen the soakways flow into dense wet alder (*Alnus glutinosa*) woodland, and from there down to the axial stream.

This small area of open herbaceous fen vegetation supports a variety of plant species: particularly abundant are sedges such as *Carex dioica, C. flacca, C. nigra, C. panicea & C. viridula* subsp. *brachyrrhyncha*, and bryophytes such as *Aneura pinguis, Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Palustriella commutata*, and *Palustriella falcata*. Other herbs include *Anagallis tenella, Hydrocotyle vulgaris, Ranunculus flammula*, and *Valeriana dioica*. While this stand has some affinity toward M13, it is probably best regarded as a form of the M10 *Carex dioica–Pinguicula vulgaris* mire community, and can be categorised as Alkaline Fen.

Stand 2 (SE 59708 91238; Quadrat 283002)

M10 *Carex dioica–Pinguicula vulgaris* mire.

(MATCH coefficient 36.4%)

Stand 2 lies c. 400 metres to the north-west of Stand 1, and is much larger. It is situated immediately adjacent to a fast-flowing spring-fed stream whose origin lies approximately 20 m upslope. The fen vegetation itself is associated with a large spring-mound, and appears to be fed by sub-surface seepages (pH 6.7; EC 430 µS cm^{-1}). The fen is very wet underfoot, and supports a wide variety of low-growing sedges and bryophytes, with a diverse range of basiphilous grasses, rushes and forbs. Particularly notable is the abundance of *Blysmus compressus*, while other frequent to abundant plants include *Anagallis tenella, Carex echinata, C. panicea, C. viridula* subsp. *brachyrrhyncha, Hydrocotyle vulgaris, Juncus articulatus, J. inflexus, Palustriella falcata, Pinguicula vulgaris, Succisa pratensis, Triglochin palustre* and *Valeriana dioica*. Bryophytes include *Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Ctenidium molluscum* and *Fissidens adianthoides.* While quite different in character to Stand 1, Stand 2 is also probably best considered as M10, although it does has some affinities with M13 & M22.

To the north the fen grades into damp rushy grassland, to the south into dense, species-poor *Juncus inflexus* rush pasture, and to the south-west into species-rich damp hay meadow.

8.20.3 Wetland Substrata & Water Supply

Stand 1 is clearly fed by base-rich springs and seepages (pH 6.7–7.4; EC 370–430 µS cm^{-1}) immediately above the fen, water from which then flows across a peat-filled bench or hollow; here peat has built up to 60 cm depth over a stony base. In contrast, Stand 2 appears to have formed over a spring- or seepage-fed peat mound, which at its centre is more than 120 cm deep. To all sides this mound is flanked by thinner soils no more than 10–20 cm deep, over a gravelly subsoil. Water can be seen seeping out of the steep southern and western flanks of the peat mound, and tufa encrustations are also visible there.

8.20.4 Site Management

Both stands are lightly grazed by sheep, and this appears sufficient to maintain them in an open form. Stand 1 could perhaps benefit from some careful trimming of the adjacent hazel and alder scrub, to prevent the stand from being too heavily shaded. Thought could be given to extending the site boundary to encompass Stand 1.

North York Moors		Site name	Snaper Farm Meadows		Snaper Farm Meadows	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	283		283	
		Quadrat ID	283001		283002	
		Stand ref	Stand 1		Stand 2	
		NGR	SE		SE	
Domin scores for all quadrats		Easting	459991		459708	
		Northing	491006		491238	
PE	Phil Eades	Date	01/09/2011		01/09/2011	
RT	Ros Tratt	Recorder name	PE		PE	
		NVC community	M10		M10	
		Notes	Tiny seepage & flush below hazel slope		Large diverse spring mound with Blysmus	
		Quadrat size	2x2m		2x2m	
		pH	7.4		6.7	
		EC (µS cm^{-1})	370		430	
		Photo?	Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
122	Agrostis stolonifera				1	O
163	Anagallis tenella		3	A	3	A
2256	Aneura pinguis		3	F		
243	Blysmus compressus				5	A
251	Briza media				2	F
1546	Bryum pseudotriquetrum		2	F	2	F
1445	Calliergon cuspidatum	Calliergonella cuspidata	3	F	3	A
1571	Campylium stellatum		2	F	2	F
315	Carex dioica		4	A		
319	Carex echinata				4	A
323	Carex flacca		4	A		
333	Carex nigra		5	A		
339	Carex panicea		6	A	5	A
329	Carex viridula ssp brachyrrhyncha		5	A	3	A
418	Cirsium palustre				2	F
1596	Cratoneuron commutatum	Palustriella commutata	7	A		
4340	Cratoneuron commutatum	Palustriella falcata	3	F	6	A
449	Crepis paludosa		1	O		
1600	Ctenidium molluscum				2	F
466	Dactylorhiza fuchsii				1	F
535	Equisetum palustre				2	F
2776	Euphrasia nemorosa				3	F
576	Festuca rubra				1	F
1683	Fissidens adianthoides		2	F	2	F
690	Hydrocotyle vulgaris		5	A	3	F
722	Juncus articulatus		5	A	3	F
733	Juncus inflexus				4	A
855	Mentha aquatica		3	F		
970	Pinguicula vulgaris				3	F
1804	Plagiomnium elatum		2	F		
1081	Ranunculus acris				1	F
1089	Ranunculus flammula		2	F	0	O
1095	Ranunculus repens		1	O		
1106	Rhinanthus minor				0	R
1305	Succisa pratensis				5	A
1354	Triglochin palustre				1	F
1380	Valeriana dioica		3	F	4	A


Snaper Farm Meadows SSSI (FenBase Site 283)
Central grid ref: SE 59991 91006
Surveyor: Phil Eades 01/09/2011
Alkaline Fen (Stand 1: M10)
1


2
Snaper Farm Meadows SSSI (FenBase Site 283)
Central grid ref: SE 59708 91238
Surveyor: Phil Eades 01/09/2011
Alkaline Fen (Stand 2: M10)

8.21 STONY MOOR SIKE

Vegetation stands and target notes are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.21.1 Site Description

The Stony Moor Sike mires are situated immediately adjacent to Unit 8 of the North York Moors SSSI. Stony Moor lies on a south-east-facing hillslope near the western end of the Cleveland Hills. The Stony Moor Sike (a stream) originates well above the wetlands considered here, and flows south through a deepening valley to join the headwaters of the south-flowing River Rye. The Stony Moor Sike mires are situated some 300 m north of the confluence of the sike with the Rye, on the quite steeply sloping valleyside west of the sike. A short, steep slope of bracken separates the mires from a pasture to the west. Beneath this (to the south-east) is a seepage zone with a number of small springs and seepages. One 'spring' (sampled as Stand 4) is higher and stronger than the others, and may actually be an outflow from a pipe or tile drain beneath the pasture, although this was not verified by direct observation. This 'spring' helps to feed a small water track / soakway which runs down the valley side into the Stony Moor Sike.

The wet seepage slope is quite broad, and supports a variety of vegetation types; much of it is occupied by low-growing sedge-rich vegetation, but there are also stands of rush-dominated vegetation, some quite diverse, others quite species-poor (not sampled). In addition, there are two small stands of taller *Carex rostrata* vegetation, plus a *Palustriella commutata*-dominated seepage close to the sike itself (TN4; not sampled but possibly M37). These base-rich areas are embedded within more acidic grassland and stands of bracken on dry ground. Interestingly, springs and seepages on the opposite (eastern) side of the sike all appear to be more-or-less acidic in nature, in strong contrast to the base-rich nature of the western side of the sike. Three small ditches, now partly occluded, have been cut into the base of the bracken-clad slope above the main seepages; one of these drains into the main water track / soakway, while the other two drain into a smaller soakway to the south. None appears to carry much water.

8.21.2 Stand Descriptions

Stand 1 (SE 50886 97060; Quadrats 276001 & 3, & TN1)

M10b *Carex dioica–Pinguicula vulgaris* mire,
Briza media – Primula farinosa sub-community

(MATCH coefficients 43.3 – 52.2%)

This extensive stand lies on a wet, gently sloping valleyside, and has very low-growing sward that is dominated by small sedges and bryophytes, and is notable for the abundance of *Parnassia palustris* and *Eriophorum latifolium.* Other typical species include *Anagallis tenella, Aneura pinguis, Briza media, Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Carex dioica, C. flacca, C. hostiana, C. pulicaris, C. panicea, C. viridula* subsp. *brachyrrhyncha, C. viridula* subsp. *oedocarpa, Ctenidium molluscum, Eriophorum angustifolium, Euphrasia officinalis* agg., *Fissidens adianthoides, Hydrocotyle vulgaris, Juncus articulatus, J. bulbosus, Molinia caerulea, Pedicularis sylvatica, Pinguicula vulgaris, Scorpidium cossonii, Succisa pratensis, Triglochin palustris,* and *Valeriana dioica.* This zone includes the banks of the main water track/soakway (TN 1) that flows down from the upper 'spring', and a series of smaller springs and seepages. Towards the northern end of this seepage slope, base-rich fen becomes less distinct, and there are broad transitions from the base-rich soakways to surrounding damp acidic grassland and rush stands. The whole of this main seepage zone can be confidently assigned to the M10 community, and can be classed as Alkaline Fen.

Stand 2 (SE 50843 97015; Quadrat 276002 & TN2)

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

(MATCH coefficient 37.8%)

To the south-west of Stand 1 and the main soakway is a broad and quite heterogeneous stand of fen vegetation that is similar in some respects to Stand 1. However, it is less diverse than that stand, lacks many of the characteristic small sedges, bryophytes, *Eriophorum latifolium*, *Parnassia* and *Pinguicula*, and has a greater frequency of grasses and medium stature forbs, such as *Agrostis canina*, *A. stolonifera*, *Cardamine pratensis*, *Cirsium palustre*, *Holcus lanatus*, and *Trifolium repens*. A smaller stand of similar vegetation is also found on the south-west bank of the main soakway (TN2). Both of these can probably be best assigned to the M22b fen-meadow community, which was not a target of this survey.

Stand 3 (SE 50881 97048; Quadrat 276004)

M29 *Hypericum elodes–Potamogeton polygonifolius* soakway

(MATCH coefficient of 28.8%)

The outflow from the main 'spring' is supplemented by inflows from various seepages and from two small ditches, and the combined flow follows a shallow defile that is partly occluded by a dense growth of *Potamogeton polygonifolius*, with patches of *Montia fontana* at the upper end, plus a variety of other plants growing along its edges, including *Dichodontium palustre*, *Eriophorum angustifolium*, *Juncus articulatus*, *J. bulbosus*, *Mentha aquatica*, *Palustriella commutata*, and *P. falcata*. Despite the low MATCH coefficients, this water track / soakway is probably best assigned to M29, although it also has affinities to M37 and M35. Community analysis is probably confused by a large 'edge effect', with species of the adjacent communities mingling with the soakway vegetation. This stand may be considered to be a form of Transition Mire / Quaking Bog.

Stand 4 (SE 50848 97066; Quadrat 276005)

M6a *Carex echinata–Sphagnum recurvum/auriculatum* mire

(MATCH coefficient of 47.5%)

Where water spills out of the main 'spring' (or possible tile drain outflow) there is a large swelling mound of *Sphagnum denticulatum*, with *Hydrocotyle vulgaris*, *Juncus bulbosus*, *Nardus stricta* and *Sphagnum fallax*, plus a scattering of other plants. This is quite clearly a form of M6a poor-fen, which is not a target community of this survey. At its lower end it appears to become more influenced by base-rich water, as species such as *Anagallis tenella* become abundant, and it then grades into a stand of M10 vegetation.

Stand 5 (SE 50911 97044; Quadrat 276006 & TN3)

Affinities to both M9 *Carex rostrata–Calliergon cuspidatum* mire, and M13 *Schoenus nigricans–Juncus subnodulosus* mire

(MATCH coefficients: 32.2% & 28.2%, respectively)

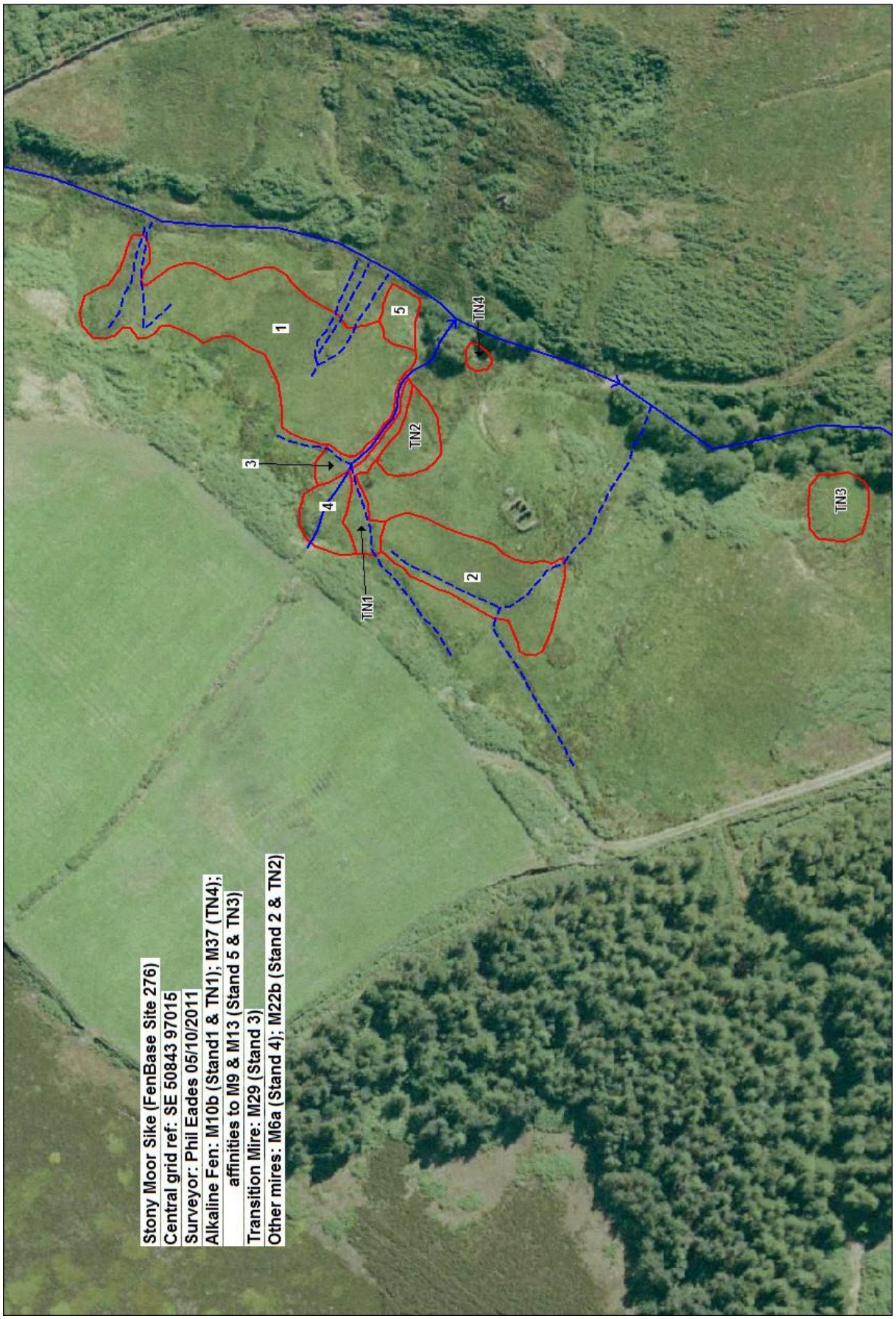
Two small stands of vegetation situated on the lower slopes close to the sike itself are dominated by *Carex rostrata*, and support a diverse suite of species typical of base-rich conditions, including *Anagallis tenella*, *Calliergonella cuspidata*, *C. viridula* subsp. *brachyrrhyncha*, *Eriophorum angustifolium*, *Equisetum fluviatile*, *Galium uliginosum*, *Hydrocotyle vulgaris*, *Juncus articulatus*, *J. inflexus*, *Lysimachia nemorum*, *Mentha aquatica*, *Palustriella commutata*, *Parnassia palustris*, *Philonotis calcarea*, *Scorpidium cossonii*, *Succisa pratensis*, and *Valeriana dioica*. These stands are difficult to assign to a particular community, having weak affinities to both M9 and M13. However, they may well represent a form of Alkaline Fen.

8.21.3 Wetland Substrata & Water Supply

In most places where the wetland soils were investigated by augering, they comprised shallow peat (30–90 cm deep) over sand and rocks. Most of the seepages were associated with moderately base-rich water (pH 5.9–6.7; EC 220–440 µS cm^{-1}), although the main 'spring' at the head of the slope is of lower pH (5.0), and it is associated with more calcifuge vegetation. Hence, while it seems clear that the seepages seem mostly to be fed by groundwater, it appears that the lower seepages are fed by more calcareous strata, while the upper 'spring' may be fed by an outflow from more base-poor strata.

8.21.4 Site Management

The site shows signs of moderate grazing pressure by sheep, with some slight poaching on very wet ground. Small drains have been cut at the upper edge of the seepage slope, and this may have caused some drying of part of the site (e.g. Stand 2). It might be beneficial to consider blocking these drains. However, most of the site appears to be unaffected by drainage, and remains very wet even during dry summer months.


Stony Moor Sike (FenBase Site 276)
Central grid ref: SE 50843 97015
Surveyor: Phil Eades 05/10/2011
Alkaline Fen: M10b (Stand1 & TN1); M37 (TN4);
affinities to M9 & M13 (Stand 5 & TN3)
Transition Mire: M29 (Stand 3)
Other mires: M6a (Stand 4); M22b (Stand 2 & TN2)
1
2
3
4
5
TN1
TN2
TN3
TN4

North York Moors	Site name	Stony Moor Sike	Stony Moor Sike		Stony Moor Sike		Stony Moor Sike		Stony Moor Sike		Stony Moor Sike	
Alkaline Fen &	Site ref	276	276		276		276		276		276	
Transition Mire / Quaking Bog	Quadrat ID	276001	276003		276002		276004		276005		276006	
Survey 2011	Stand ref	Stand 1	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5	
	NGR	SE	SE		SE		SE		SE		SE	
Domin scores for all quadrats	Easting	450886	450883		450841		450883		450848		450911	
	Northing	497060	497045		497021		497040		497066		497044	
PE Phil Eades	Date	05/10/2011	05/10/2011		05/10/2011		05/10/2011		05/10/2011		05/10/2011	
RT Ros Tratt	Recorder name	PE	PE		PE		PE		PE		PE	
	NVC community	M10b	M10b		M22b		M29		M6a		Affinity to M9 & M13	
	Notes	Moss-, sedge- & herb-rich seepage area	Moss-, sedge- & herb-rich seepage area		Diverse but grassy seepage		Water track with Pot.poly		Large mound of Sphag. dentic		Cx rostrata area beside stream	
	Quadrat size	2x2m	1x4m		2x2m		0.5x8m		4x4m		4x4m	
	pH	6.7			6.2		6.2		5.0		5.9	
	EC (µS cm-1)	440			410		220		85		360	
	Photo?	Y	Y		Y		Y		Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
120	Agrostis canina					4	A						
122	Agrostis stolonifera					2	O						
163	Anagallis tenella		3	3	F	3	F					3	F
2256	Aneura pinguis			1	O			1	R				
171	Anthoxanthum odoratum									1	O		
1482	Aulacomnium palustre					0	O						
251	Briza media		0	3	F	3	F	1	R				
1546	Bryum pseudotriquetrum		3	2	F			1	R				
1445	Calliergon cuspidatum	Calliergonella cuspidata	2	2	F	5	A					4	F
1571	Campylium stellatum		3		F	1	O						
295	Cardamine pratensis					2	O						
315	Carex dioica		3		F	5	F						
319	Carex echinata		4		F	5	A			1	O		
323	Carex flacca		4	4	A	3	F	2	O				
325	Carex hostiana		4		F								
333	Carex nigra		3		F								
339	Carex panicea		4	3	A	2	F						
347	Carex pulicaris		0		O								
352	Carex rostrata											9	D
329	Carex viridula ssp brachyrrhyncha		3		F	2	F					2	O
312	Carex viridula ssp oedocarpa		2		O								
384	Cerastium fontanum		0		O								
418	Cirsium palustre		0		O	3	F			1	R		
1593	Climacium dendroides		1		O	3	F					1	R
1596	Cratoneuron commutatum	Palustriella commutata						3	F			3	F
4340	Cratoneuron commutatum	Palustriella falcata		6	A	3	F	4	A			2	O
1600	Ctenidium molluscum		3	3	F								
1249	Danthonia decumbens		0		O								
1616	Dicranella palustris							2	O				
1658	Drepanocladus revolvens	Scorpidium revolvens	0		O								
3266	Drepanocladus revolvens v	Scorpidium cossonnii	5	1	A	5	A					3	F
525	Epilobium palustre					1	O					1	O
532	Equisetum arvense		2		O								
533	Equisetum fluviatile									1	O	2	O
535	Equisetum palustre		0		O	2	O						
546	Eriophorum angustifolium		4	3	A	3	F	3	F	1	R	2	F
547	Eriophorum latifolium		4	4	A								
2776	Euphrasia nemorosa		2	2	F								
1683	Fissidens adianthoides		3	3	F								
612	Galium uliginosum		0		O	1	R					1	R
680	Holcus lanatus					0	O	1	R			1	R
690	Hydrocotyle vulgaris		3	2	F	2	O			3	F	2	O
722	Juncus articulatus		3	2	F	1	O	3	F			2	O
726	Juncus bulbosus		0	3	F	2	O	3	F	3	F		
730	Juncus effusus		0		O					1	R		
733	Juncus inflexus											2	O
769	Leontodon hispidus		2		O								
786	Linum catharticum		0	2	O								
802	Lotus pedunculatus							1	R				
825	Lysimachia nemorum											1	O
855	Mentha aquatica			0	O			3	F			3	F
862	Menyanthes trifoliata		0		O								
876	Molinia caerulea		3	3	F								
900	Nardus stricta									3	F		
944	Parnassia palustris		3		F	0	R					1	O
946	Pedicularis palustris			2	O								
1845	Philonotis calcarea											2	O
1847	Philonotis fontana							1	R				
970	Pinguicula vulgaris			2	O								
1804	Plagiomnium elatum											3	F
1795	Plagiomnium rostratum		1		O								
1891	Polytrichum commune									0	O		
1037	Potamogeton polygonifolius							7	D				
1046	Potentilla erecta		2		O	2	O						
2700	Sphagnum auriculatum var	Sphagnum denticulatum						1	R	9	D		
1971	Sphagnum palustre									0	O		
1976	Sphagnum recurvum	Sphagnum fallax								3	F		
1980	Sphagnum squarrosum					0	O						
1973	Sphagnum subnitens			0	O								
1305	Succisa pratensis		4	3	A	2	F					3	F
2003	Thuidium tamariscinum		1		O								
1350	Trifolium repens					3	F						
1354	Triglochin palustre		3		F								
1380	Valeriana dioica		4	3	A	5	A					4	F
1427	Viola palustris									1	O		

8.22 TROUTSDALE & ROSEKIRK DALE FENS SSSI

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.22.1 Site Description

Troutsdale supports extensive areas of M13 vegetation often occupying soakways and runnels beneath strong springs (mainly in unit 2 of the SSSI). Low ridges adjacent to the runnels often support rather heathy vegetation with dwarf shrubs, and *Juncus subnodulosus*-dominated rushy pasture is widespread too. The area outside the SSSI (but contiguous with it) to the south-west supports rather rank, damp, and possibly semi-improved, grassland. Here, and at the edges of the SSSI, the vegetation is coarser, lacking the diversity of vegetation within the main part of the SSSI (units 1 & 2) on either side. The extensive strong springs found at the edge of the SSSI are dominated by tufa-encrusted *Palustriella commutata* vegetation (M37), but they grade into coarse *Juncus effusus*- (M23) and *Juncus subnodulosus*- dominated stands, rather than the species-rich *Schoenus nigricans*-dominated vegetation found nearby. There is also much willow scrub, some of which has been cleared in the past.

8.22.2 Stand Descriptions

Stands 1, 2 & 4 (SE90191 87495; SE90067 87536; SE89878 87692; quadrats 247001, 2 & 4)

M13b *Schoenus nigricans–Juncus subnodulosus* mire
Briza media–Pinguicula vulgaris sub-community

(MATCH coefficients: 53.9%, 53.4% & 45.7%, respectively)

Stands 1 & 2 are located in unit 2 of the SSSI, alongside runnels. *Schoenus nigricans* is a prominent component of the species-rich vegetation, forming tussocks with *Molinia caerulea*. Between the tussocks there is a patchy cover of tufa-encrusted bryophytes including *Aneura pinguis, Bryum pseudotriquetrum, Campylium stellatum, Fissidens adianthoides, Palustriella commutata, Plagiomnium elatum, Riccardia multifida* and *Scorpidium cossonii*. *Chara* sp. and *Pinguicula vulgaris* also occur in the runnels. Many associates are scattered through the very open vegetation including sedges *Carex dioica, C. flacca, C. panicea, C. pulicaris, C. viridula* subsp. *brachyrrhyncha*; grasses e.g. *Briza media, Festuca rubra*; and herbs *Anagallis tenella, Dactylorhiza spp., Parnassia palustris, Pedicularis palustris, Succisa pratensis*.

Stand 4 is located further west, in a shallow ditch or runnel near the boundary of SSSI unit 1 (which was not visited during this survey). The vegetation here is rather less rich than that found in Stands 1 & 2 but still supports a suite of species characteristic of M13 vegetation. *Schoenus nigricans* and *Pinguicula vulgaris* are both absent here, and there is rather more *Juncus subnodulosus.* These three stands all represent Alkaline Fen.

Stand 3 (SE 90005 87490; quadrat 247003)

M22 *Juncus subnodulosus–Cirsium palustre* fen-meadow
(with affinities to M37 *Cratoneuron commutatum–Festuca rubra* spring).

(MATCH coefficient: 39.6%)

This is a stand of rather coarse vegetation associated with a large *Palustriella commutata* spring-head at the south-western edge of unit 2 of the SSSI. The water flows in a northerly direction down a runnel flanked by tall, rushy vegetation. The spring-head is shaded by patchy mature willow and birch scrub, some of which has been cleared in the past. Most of this stand is located in the area outside the SSSI. Similar stands occur throughout this non-SSSI area.

Juncus subnodulosus and *Holcus lanatus* form a coarse sward over abundant *Palustriella commutata* with some patches of *Calliergonella cuspidata*. *Equisetum arvense* and *E. palustre* are both abundant and a very prominent component of the vegetation. *Angelica sylvestris, Carex flacca, C. panicea, Cirsium palustre* and *Mentha aquatica* are scattered throughout. Localised patches of *Rananuculus repens* and *Urtica dioica* give the stand a rather rank and weedy character, and may indicate nutrient enrichment.

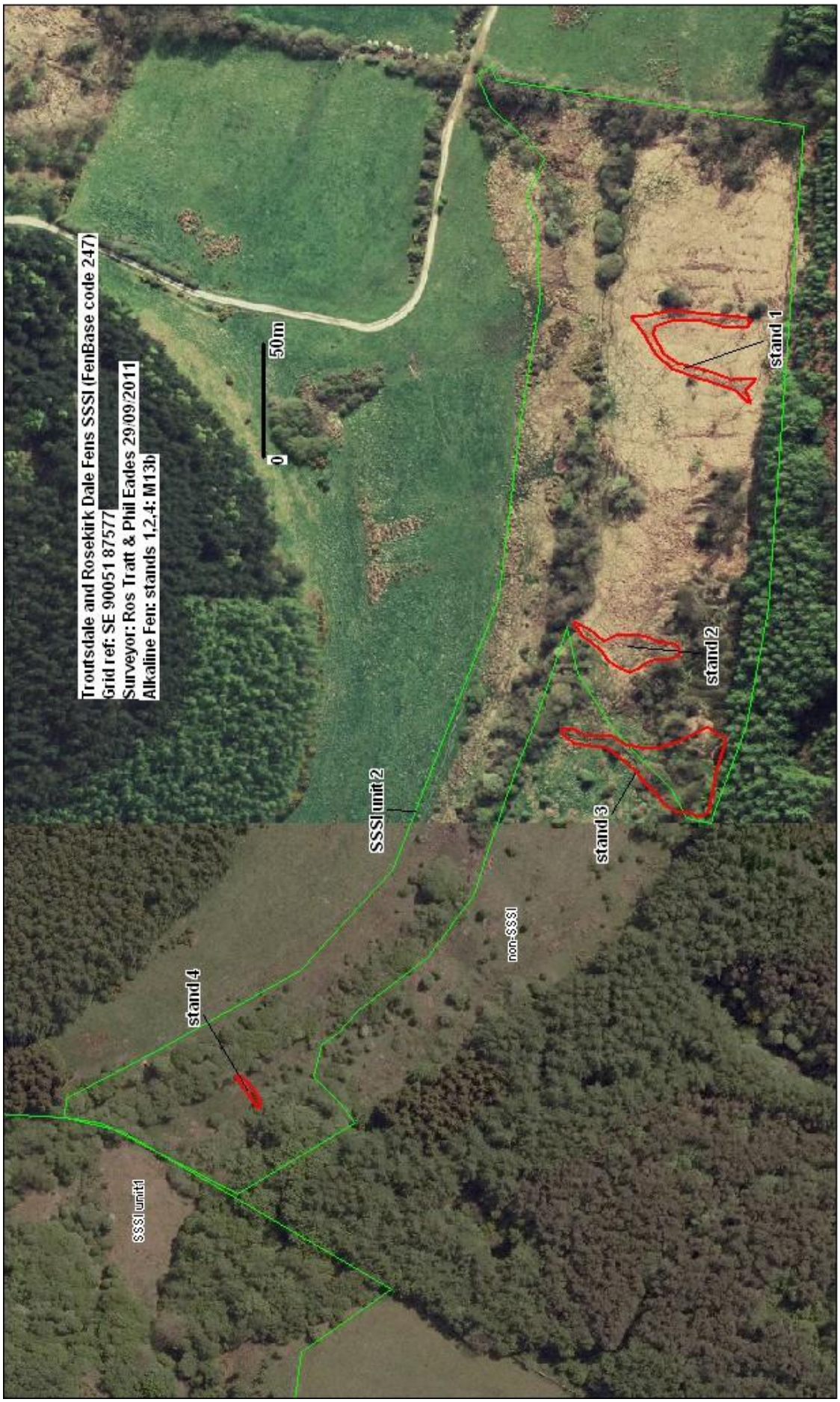
8.22.3 Wetland Substrata & Water Supply

The wetland vegetation at Troutsdale is irrigated by base-rich ground-water (ranging from pH 7.3–7.9; EC 520–690 µS cm^{-1}, with marl and tufa deposition.

8.22.4 Site Management

The Troutsdale section of the SSSI, and adjacent non-SSSI land, is grazed by a small herd of cattle. Some willow scrub has been removed from the non-SSSI area south of the stream.

The Rosekirk Dale section of the site (not sampled here) appears to support rather derelict M13 vegetation, and would benefit from vegetation management (grazing and scrub removal). Planted conifers were removed from this area in the late 1980's (see note in Natural England site file). The site has recently been entered into HLS and a base-line survey should be made so that the recovery of this area can be monitored.


Troutsdale and Rosekirk Dale Fens SSSI (FenBase code 247)
Grid ref: SE 90051 87577
Surveyor: Ros Tratt & Phil Eades 29/09/2011
Alkaline Fen: stands 1,2,4: M13b
0
50m
stand 1
stand 2
stand 3
stand 4
SSSI unit 2
non-SSSI
SSSI unit1

North York Moors	Site name	Troutsdale		Troutsdale		Troutsdale		Troutsdale	
Alkaline Fen &	**Site ref**	247		247		247		247	
Transition Mire / Quaking Bog	**Quadrat ID**	247001		247002		247003		247004	
Survey 2011	**Stand ref**	Stand 1		Stand 2		Stand 3		Stand 4	
	NGR	SE		SE		SE		SE	
Domin scores for all quadrats	**Easting**	490191		490067		490005		489878	
	Northing	487495		487536		487490		487692	
PE Phil Eades	**Date**	29/09/2011		29/09/2011		29/09/2011		29/09/2011	
RT Ros Tratt	**Recorder name**	RT		RT		RT		RT	
	NVC community	M13b		M13b		M22		M13	
	Notes	Pinguicula-Schoenus spring		ditch at edge of SSSI area		spring		spp-rich runnel	
	Quadrat size	2x2m		2x2m		2x2m		2x2m	
	pH			7.4		7.4		7.9	
	EC (µS cm-^{1})			690		690		520	
	Photo?								

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
122	Agrostis stolonifera						1	F	1	O
163	Anagallis tenella		1	F	2	F			1	O
2256	Aneura pinguis		2	O	2	O				
167	Angelica sylvestris						1	O		
236	Betula pubescens						0	R		
251	Briza media		1	F	1	O				
1546	Bryum pseudotriquetrum				1	O			1	O
1445	Calliergon cuspidatum	Calliergonella cuspidata			2	O	3	F	2	O
1571	Campylium stellatum		4	F	2	F			1	O
295	Cardamine pratensis						1	O		
323	Carex flacca		3	F	1	O	2	O		
325	Carex hostiana		0	O					0	O
339	Carex panicea		3	F	3	F	2	O	3	F
347	Carex pulicaris		1	O						
329	Carex viridula ssp brachyrrhyncha		0	F	2	F			3	F
2730	Chara sp		0	O	2	O				
418	Cirsium palustre		1	F	1	F	3	F	1	O
1596	Cratoneuron commutatum	Palustriella commutata	5	A	4	A	8	A	4	A
1600	Ctenidium molluscum		3	F	4	F				
3192	Dactylorhiza sp.		2	F	1	F	0	R		
477	Deschampsia cespitosa cespitosa						0	O		
1658	Drepanocladus revolvens	Scorpidium revolvens							1	O
3266	Drepanocladus revolvens v	Scorpidium cossonnii	3	F	0	O				
501	Dryopteris carthusiana						1	O		
532	Equisetum arvense						4	A		
535	Equisetum palustre		1	O	1	F	4	F		
576	Festuca rubra		1	F	1	O	2	F		
1683	Fissidens adianthoides		3	F	3	F				
612	Galium uliginosum		0	F	0	O				
638	Glyceria declinata						0	O		
680	Holcus lanatus						4	A	1	O
690	Hydrocotyle vulgaris				0	O				
722	Juncus articulatus		0	O	2	F	2	O	2	O
2732	Juncus subnodulosus		4	A	5	A	3	F	5	A
2167	Lophocolea bidentata								0	O
813	Lychnis flos-cuculi						1	O	0	O
855	Mentha aquatica				2	F	3	F		
876	Molinia caerulea		4	A	3	F			0	R
944	Parnassia palustris		1	O						
946	Pedicularis palustris		0	F	2	F			3	F
2222	Pellia endiviifolia								1	O
1845	Philonotis calcarea								3	F
970	Pinguicula vulgaris		2	O	1	O				
1804	Plagiomnium elatum		1	O	0	O			1	O
1046	Potentilla erecta		1	F	0	F				
1914	Pseudoscleropodium purum		0	O	0	O				
1095	Ranunculus repens						3	F		
2254	Riccardia multifida		1	O	1	O				
1169	Salix cinerea						6	A		
1207	Schoenus nigricans		6	A	6	A				
1296	Stellaria graminea						1	O		
1305	Succisa pratensis		2	F	0	F			0	O
1354	Triglochin palustre		0	O	2	F			2	O
1368	Urtica dioica						3	F		
1380	Valeriana dioica		2	O			2	O	2	O

8.23 CARTER'S HOUSE (NEWTONDALE SSSI)

8.23.1 Site Description

This comprises a very localised surface-water flush within the forestry plantation on the western side of Newtondale that supports abundant *Pinguicula vulgaris* with *Sphagnum palustre* and *S. recurvum* and the purple liverwort *Scapania undulata*. This site represents a flushed area within base-poor, heath vegetation. *Pinguicula vulgaris* can sometimes be abundant in these habitats, making them very eye-catching. Quadrat records are shown in the accompanying spreadsheet extract.

8.23.2 Stand Descriptions

Stand 1 (SE84008 95979) - M15a *Scirpus cespitosus – Erica tetralix* wet heath; *Carex panicea* sub-community.

This is essentially a wet heath plant community, with dwarf shrubs, abundant *Sphagnum* species typical of base-poor wetlands and locally abundant *Pinguicula vulgaris*. It is a non-target wetland habitat, and no site map has been provided.

8.23.3 Wetland Substratum & Water Supply

Sticky clay soil. Base-poor interstitial water pH 5.7; EC 107 µS cm^{-1}.

8.23.4 Site Management

Within dense forestry plantation.

North York Moors		Site name	Carter's House	
Alkaline Fen &		Site ref	290	
Transition Mire / Quaking Bog		Quadrat ID	290001	
Survey 2011		Stand ref	Stand 1	
		NGR	SE	
Domin scores for all quadrats		Easting	484008	
DAFOR scores for stands		Northing	495979	
		Date	30/09/2011	
PE	Phil Eades	Recorder name	RT	
RT	Ros Tratt	NVC community	M15a	
		Notes	seepage in forest	
		Quadrat size	2x2m	
		pH	5.7	
		EC (µS cm^{-1})	107	
		Photo?	Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (stand)
278	Calluna vulgaris		2	O
308	Carex binervis		0	R
319	Carex echinata		1	O
312	Carex viridula ssp oedocarpa		2	O
418	Cirsium palustre		4	F
494	Drosera rotundifolia		0	O
535	Equisetum palustre		1	O
576	Festuca rubra		3	F
702	Hypericum pulchrum		0	O
706	Hypochoeris radicata		0	O
726	Juncus bulbosus		1	O
730	Juncus effusus		2	O
2207	Mylia anomala		3	O
2223	Pellia epiphylla		0	O
970	Pinguicula vulgaris		4	F
1046	Potentilla erecta		3	F
2972	Sphagnum auriculatum var	Sphagnum inundatum	3	F
1971	Sphagnum palustre		3	F

8.24 CHALYBEATE SPRING (NEWTONDALE SSSI)

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.24.1 Site Description

The Chalybeate Spring is situated towards the southern end of Newtondale, at the base of the valley between Levisham Woods to the east, and Howlgate Farm to the west. North of the spring, and immediately to the southwest of the railway, the valley bottom supports a strip of moderately diverse tall herbaceous vegetation roughly 150 m long by 20 m wide, intermingled with grey willow (*Salix cinerea*) scrub.

8.24.2 Stand Descriptions

Stand 1 (SE 82587 88976; Quadrat 297001)

M24 *Molinia caerulea–Cirsium dissectum* fen-meadow.

(MATCH coefficient 36.3%)

This stand supports a mixture of robust plant species, including frequent *Angelica sylvestris, Carex otrubae, Cirsium palustre, Eupatorium cannabinum, Filipendula ulmaria, Juncus subnodulosus, Lychnis flos-cuculi, Myrica gale, Phragmites australis, Serratula tinctoria, Thalictrum flavum*, and occasional plants of *Carex acutiformis, Deschampsia cespitosa, Potentilla erecta, Rubus idaeus, Sanguisorba officinalis, Sphagnum subnitens, S. squarrosum* and *Viola palustris*, amongst others. Towards the southern end of the stand, close to the Chalybeate Spring, was found a small patch of *Cirsium dissectum* (SE 82621 88907).

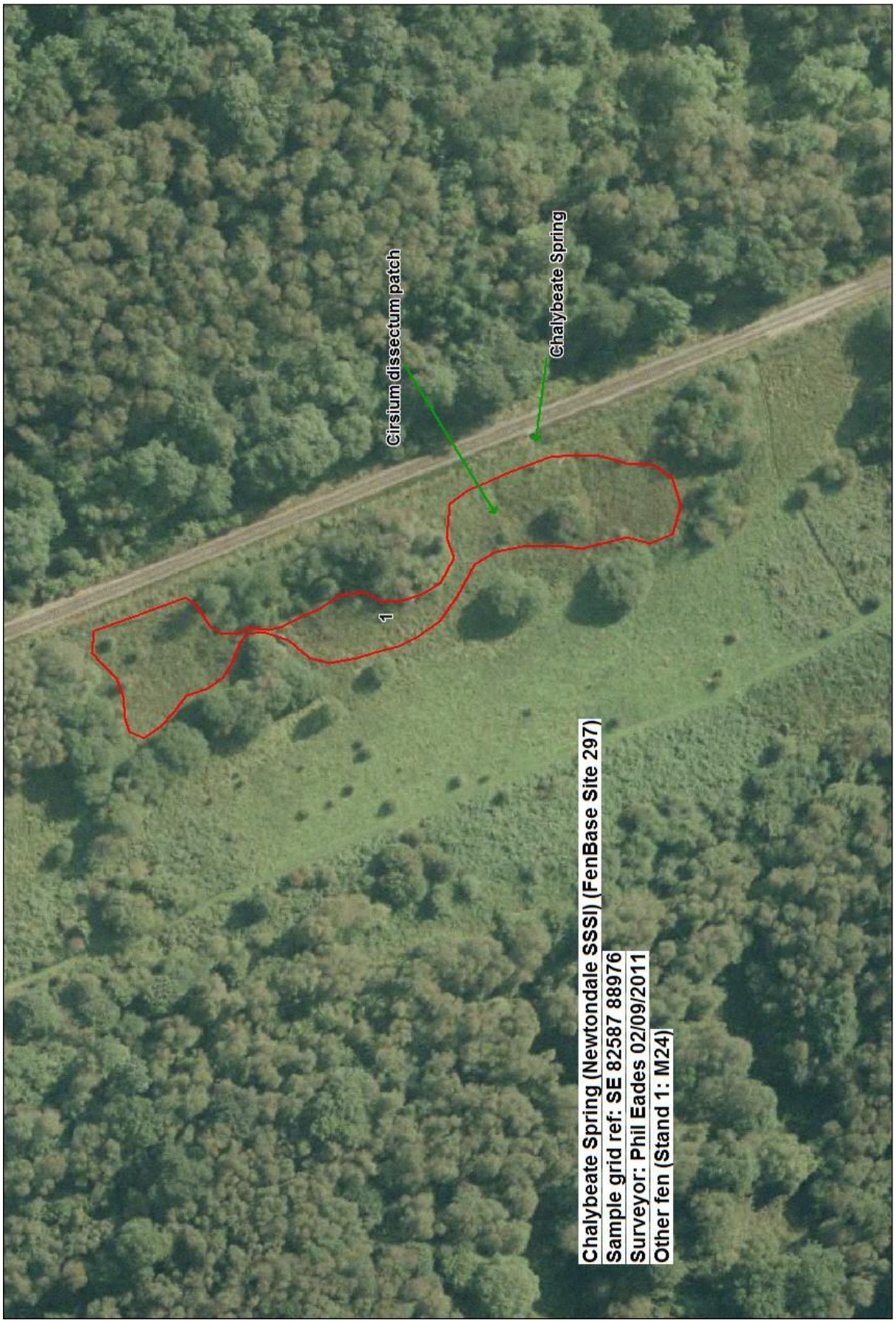
This vegetation is weakly allied to the M24 *Molinia caerulea–Cirsium dissectum* fen-meadow community, which was not a target community for this project.

8.24.3 Wetland Substrata & Water Supply

The stand was damp underfoot, and free water from a small hole dug within the sample area gave a pH value of 6.5, with EC of 280 µS cm^{-1}. The substratum was peaty, but neither depth nor basal layers were investigated. The fen is in a topogenous situation, on a very gently sloping valley floor, but judging by the presence of the nearby iron-rich spring it may also be fed to some extent by moderately base-rich seepages.

8.24.4 Site Management

At present the site appears to be totally unmanaged, and scrub is encroaching upon the fen vegetation. Removing scrub and re-instating light cattle grazing in this area would help to maintain the open nature of the vegetation, and could help to prevent the loss of some of the less robust species.


Cirsium dissectum patch
Chalybeate Spring
1
Chalybeate Spring (Newtondale SSSI) (FenBase Site 297)
Sample grid ref: SE 82587 88976
Surveyor: Phil Eades 02/09/2011
Other fen (Stand 1: M24)

North York Moors		Site name	Chalybeate Spring	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	297	
		Quadrat ID	297001	
		Stand ref	Stand 1	
		NGR	SE	
Domin scores for all quadrats		Easting	482587	
DAFOR scores for stands		Northing	488976	
		Date	02/09/2011	
PE	Phil Eades	Recorder name	PE	
RT	Ros Tratt	NVC community	M24	
		Notes	Derelict tall-herb fen: Serratula & Thalictrum	
		Quadrat size	4x4m	
		pH	6.5	
		EC (µS cm-^{1})	280	
		Photo?	Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)
167	Angelica sylvestris		4	A
302	Carex acutiformis		1	O
336	Carex otrubae		2	O
2714	Cirsium dissectum		0	R
418	Cirsium palustre		2	O
477	Deschampsia cespitosa cespitosa		1	O
1638	Dicranum scoparium		2	O
501	Dryopteris carthusiana		2	O
558	Eupatorium cannabinum		3	F
1677	Eurhynchium praelongum	Kindbergia praelonga	3	F
583	Filipendula ulmaria		2	O
602	Galeopsis tetrahit		1	O
612	Galium uliginosum		3	F
2732	Juncus subnodulosus		5	F
802	Lotus pedunculatus		0	R
813	Lychnis flos-cuculi		2	O
876	Molinia caerulea		3	F
893	Myrica gale		5	A
961	Phragmites australis		4	F
1804	Plagiomnium elatum		0	R
1046	Potentilla erecta		2	O
1137	Rubus idaeus		1	R
1190	Sanguisorba officinalis		1	O
1244	Serratula tinctoria		2	O
1980	Sphagnum squarrosum		1	R
1973	Sphagnum subnitens		1	R
1323	Thalictrum flavum		3	F
1427	Viola palustris		1	O

8.25 CRAB APPLE FIELDS (NEWTONDALE SSSI)

Vegetation stands and target notes are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.25.1 Site Description

The old pasture known as Crab Apple Fields occupies part of the lower eastern slope of south Newtondale, roughly 400 m to the north of the Chalybeate Spring (see Section 8.24). At the base of the slope the pasture grades into an area of wet fen meadow occupying the valley floor, which is dominated by *Juncus subnodulosus*. Within this is an area of more open, species-rich mire vegetation that occupies an apparent seepage zone and a soakway leading from this to the terrestrialised remnants of an old stream channel, which appears to have been cut off from the present course of the stream by the construction of the railway.

8.25.2 Stand Descriptions

Stand 1 (SE 82493 89351; Quadrat 296001)

M13c *Schoenus nigricans–Juncus subnodulosus* mire,
Caltha palustris–Galium uliginosum sub-community

(MATCH coefficient: 49.2%)

This stand of rich-fen vegetation supports a variety of sedges, rushes, grasses and forbs, including abundant *Calliergonella cuspidata, Campylium stellatum, Carex echinata, C. flacca, C. panicea, C. viridula* subsp. *brachyrrhyncha, Eriophorum angustifolium, Hydrocotyle vulgaris, Pedicularis palustris, Ranunculus flammula* and *Valeriana dioica,* plus a scattering of other species including *Caltha palustris, Chara* sp., *Juncus subnodulosus,* and *Triglochin palustre*. The terrestrialised stream channel supports a similar complement of species to the seepage and soakway, but with small shallow pools holding frequent charophytes.

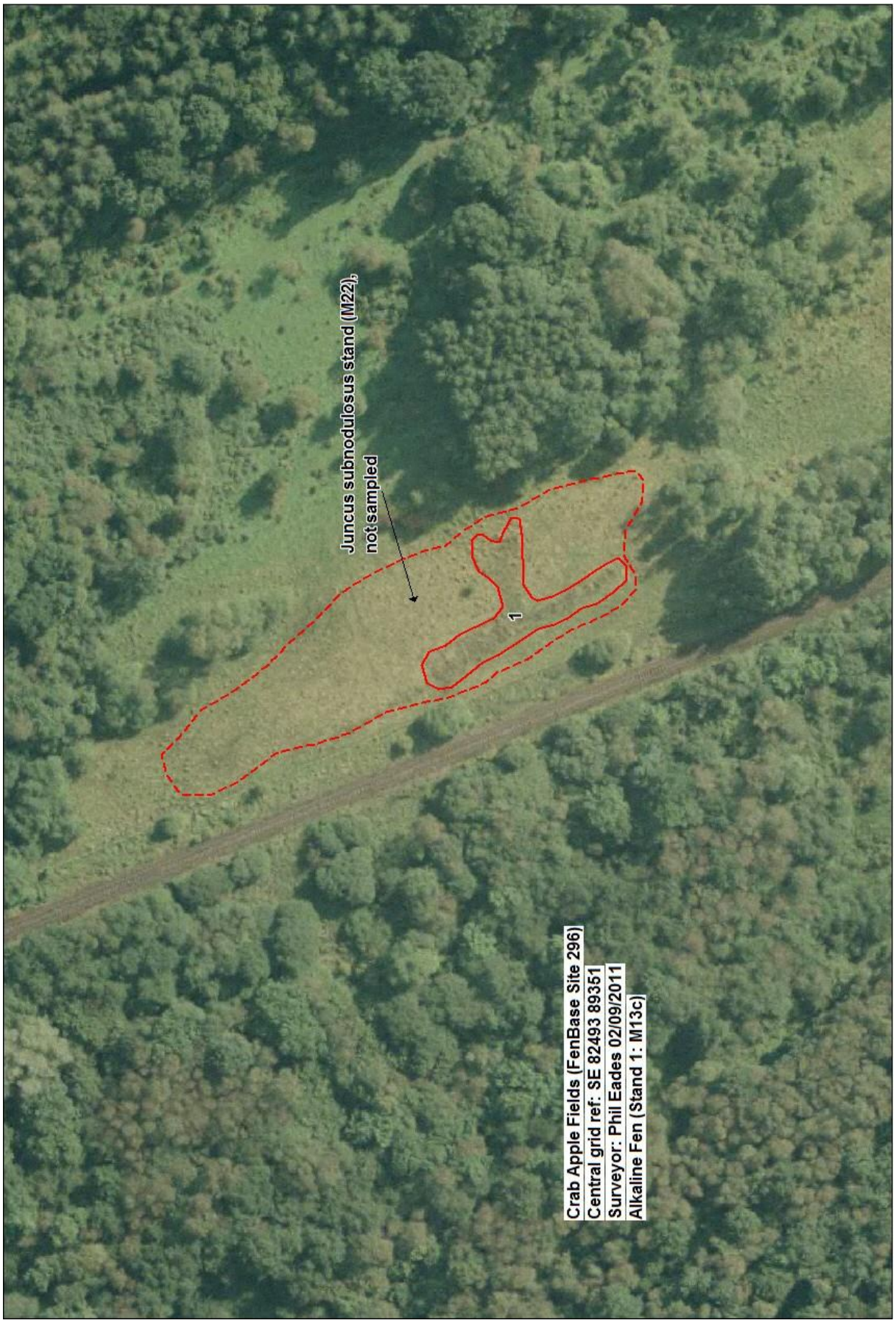
The rich-fen vegetation has been assigned to the M13c mire sub-community (MATCH coefficient 49.2%), although it also has a strong affinity with M22b (MATCH coefficient 45.0%). The surrounding species-rich fen that is dominated by *Juncus subnodulosus*, although not sampled here, is probably a form of M22b fen-meadow.

8.25.3 Wetland Substrata & Water Supply

The M13c stand was associated with base-rich conditions (pH 6.4; EC 350 µS/cm, in the soakway area), and augering found a greater than 100 cm depth of soft peat. Vegetation in the terrestrialised stream channel has formed a quaking raft. The vegetation is likely to have formed in association with base-rich seepages issuing from the base of the valley side.

8.25.4 Site Management

This area of the valley is lightly grazed by cattle and sheep, and this seems adequate in terms of preventing scrub encroachment and maintaining an open stand structure. However, since the time of survey the site has been greatly damaged by quad-bikes (J. Clark, pers. comm.).


Juncus subnodulosus stand (M22), not sampled
1
Crab Apple Fields (FenBase Site 296)
Central grid ref: SE 82493 89351
Surveyor: Phil Eades 02/09/2011
Alkaline Fen (Stand 1: M13c)

North York Moors		Site name	Crab Apple Fields	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	296	
		Quadrat ID	296001	
		Stand ref	Stand 1	
		NGR	SE	
Domin scores for all quadrats		Easting	482493	
DAFOR scores for stands		Northing	489351	
		Date	02/09/2011	
PE	Phil Eades	Recorder name	PE	
RT	Ros Tratt	NVC community	M13c	
		Notes	Sedge- & herb-rich soakways in J.subnod area	
		Quadrat size	2x2m	
		pH	6.4	
		EC (µS cm-^{1})	350	
		Photo?	Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)
122	Agrostis stolonifera		2	O
167	Angelica sylvestris		0	R
1445	Calliergon cuspidatum	Calliergonella cuspidata	4	A
279	Caltha palustris		1	O
1571	Campylium stellatum		3	F
319	Carex echinata		3	F
323	Carex flacca		3	F
339	Carex panicea		4	A
329	Carex viridula ssp brachyrrhyncha		5	A
2730	Chara sp		0	O
466	Dactylorhiza fuchsii		1	O
535	Equisetum palustre		2	O
546	Eriophorum angustifolium		5	A
583	Filipendula ulmaria		0	O
612	Galium uliginosum		2	O
690	Hydrocotyle vulgaris		3	F
722	Juncus articulatus		2	O
2732	Juncus subnodulosus		2	O
855	Mentha aquatica		2	O
876	Molinia caerulea		2	O
946	Pedicularis palustris		3	F
1046	Potentilla erecta		1	R
1089	Ranunculus flammula		3	F
1305	Succisa pratensis		1	O
1354	Triglochin palustre		1	O
1380	Valeriana dioica		3	F

8.26 FEN BOGS (NEWTONDALE SSSI)

Vegetation stands and target notes are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

This survey was mainly concerned with sampling areas of Transition Mire (designated as a SAC feature), and Alkaline Fen within springs issuing along the eastern margins of the site.

8.26.1 Site Description

Fen Bogs (within units 2 & 4 of Newtondale SSSI) is an extensive area of wetland in the valley bottom in north Newtondale, occupying a trough at the watershed of the Pickering Beck (flowing south) and Ellerbeck, flowing north. The peat deposits are up to 10 m deep (Atherden, 1976), and much of the site supports ombrotrophic vegetation characterised by abundant *Sphagnum* (mainly *S. papillosum*, with occasional *S. magellanicum*) and dwarf shrubs.

On the margins of the site there are several springs and flushes feeding into the main wetland area. These seem to be associated with complex mosaics of pools and soakways in the main, topogenous, part of the wetland; however, except for the northern-most area (just south of the access track), these have not been mapped or sampled in detail. This cluster of base-rich springs and flushes and the associated soakways and pools are particularly interesting, supporting many species characteristic of base-rich wetlands, including bryophytes such as *Aneura pinguis, Campylium stellatum, Scorpidium cossonii, Scorpidium revolvens* and *Scorpidium scorpioides*, and the sedges *Carex dioica, C. lasiocarpa* and *Eleocharis quinqueflora,* as well as *E. multicaulis* and *Rhynchospora alba* in the soakways. These areas are described in more detail below.

Further south and west, and on the west side of the railway line, the marginal springs and flushes are base-poor, characterised by abundant *Carex echinata* and *Eriophorum angustifolium* with much *Sphagnum denticulatum. Anagallis tenella, Drosera rotundifolia* and *Pinguicula vulgaris* are found only very occasionally in these areas. There the associated pools and soakways lack the base-rich 'indicators', particularly the bryophytes, found in the northern part of the site. Some pools, on both sides of the railway, support *Carex limosa*.

The route of an old trackway across the northern section of the site is now submerged, and the resulting elongated pools support M4 *Carex rostrata–Sphagnum recurvum* poor-fen with *Carex rostrata, Menyanthes trifoliata* and *Potentilla palustris* over a treacherous lawn of *Sphagnum fallax* and *Sphagnum palustre* (see TN3).

In the south and west part of the site, near Fen House (see Section 8.27), areas marked as fields on 19th Century OS maps now support very swampy, rush and sedge-dominated vegetation. *Juncus acutiflorus* and tall tussocks of *Molinia caerulea* co-dominate between the Thack Sike inflow and the main area of ombrotrophic vegetation (this transition is marked by an abrupt linear 'frontier' with *Myrica gale* abundant on the northern side and absent to the south. *Carex acutiformis* swamp occupies a large area below the inflow from the seepage & flush above (west of) Fen House. Towards the railway (northwards) this grades into *Carex rostrata–Potentilla palustris* swamp (S27a – TN4). As well as *Carex rostrata* and *Potentilla palustris*, this vegetation includes *Caltha palustris, Epilobium palustre, Equisetum fluviatile, Menyanthes trifoliata, Lotus pedunculatus, Lychnis flos-cuculi, Scutellaria galericulata,* and the bryophytes *Calliergonella cuspidata* and *Calliergon giganteum.*

8.26.2 Stand Descriptions

Stands 1 & 3 (SE 85375 98032; SE 85407 97970; quadrats 78001 & 3)

M14 *Schoenus nigricans–Narthecium ossifragum* mire

(MATCH coefficient 37.2%)

This is a very unusual and atypical type of vegetation with base-rich and base-poor elements in close juxtaposition. Stand 1 occupies a small area immediately south of the access track, adjacent to more extensive soakways (see Stand 2 below). This shallow hollow supports a low moss carpet with abundant *Scorpidium scorpioides*, and patches of *Aneura pinguis, Campylium stellatum, Scorpidium revolvens* and *Sphagnum inundatum*. *Drosera rotundifolia, Pinguicula vulgaris* and *Potamogeton polygonifolius* are scattered throughout. *Anagallis tenella* straggles over the moss carpet. *Carex dioica, Carex viridula* subsp. *oedocarpa, Carex rostrata, Eleocharis multicaulis* and *Rhynchospora alba* form a low, scattered sward. Although it is clearly atypical, and lacks *Schoenus nigricans* and *Narthecium ossifragum*, this vegetation can be assigned to M14, a form of Transition Mire / Quaking Bog.

Stand 3 is a small elongated flush at the eastern margin of the site, which feeds into the soakway described below (Stand 2). The vegetation is a similar mixture: a mossy carpet with much *Scorpidium revolvens* and *S. scorpioides* and an open sward of mixed sedges. *Carex lasiocarpa, Eriophorum latifolium* and *Narthecium ossifragum* occur here. An adjacent flush (TN2) supports vegetation referable to M10 with *Scorpidium cossonii, Carex viridula* subsp. *brachyrrhyncha* and *Anagallis tenella*. This can be categorised as Alkaline Fen.

Stand 2 (SE 85375 98025; quadrat 78002; also TN1, not sampled)

M9a (M9-1) *Carex rostrata–Calliergon cuspidatum* mire,
Campylium stellatum–Scorpidium scorpioides sub-community

(MATCH coefficient 33.2%)

This is an extensive soakway feature with abundant *Potamogeton polygonifolius* and *Scorpidium scorpioides* within water flow tracks under a sward made up of mixtures of *Carex lasiocarpa, C. rostrata, Eleocharis multicaulis, E. quinqueflora* and *Rhynchospora alba*, with scattered *Menyanthes trifoliata* and *Potentilla palustris*. There is only very slight visible flow. Similar vegetation has been recorded in many similar soakway habitats in Cumbria, and it fits best with M9a, although it is not directly referable to the published description of M9a which is rather indistinct. This type of vegetation should be assigned to the M9-1 soakway community of Wheeler, Shaw & Tanner (2009), which is a distinctive soakway sub-community of M9-type vegetation, and here it should be considered to be a form of Transition Mire / Quaking Bog.

Stand 4 (SE 85411 97917; quadrat 78004)

M10a *Carex dioica–Pinguicula vulgaris* mire

(MATCH coefficient: 42.5%)

The vegetation here is a very low-growing, flushed sward on the slope at the very edge of the main wetland area, supporting a short turf of *Carex dioica, C. echinata, Eleocharis quinqueflora, Eriophorum angustifolium, E. latifolium, Juncus articulatus J. bulbosus,* and *Rhynchospora alba*. *Narthecium ossifragum* and *Succisa pratensis* are abundant with short shoots of *Erica tetralix*. *Drosera rotundifolia* and *Pinguicula vulgaris* are scattered throughout amongst a patchy carpet of bryophytes including *Aneura pinguis, Campylium stellatum, Scorpidium revolvens* and *Scorpidium scorpioides*. This area of Alkaline Fen marks the limit of the most interesting 'mixed mire' vegetation at Fen Bogs.

Stand 5 (SE 85375 97942; quadrat 78005)

M21 *Narthecium ossifragum–Sphagnum papillosum* valley mire (with *Carex lasiocarpa*)

(MATCH coefficient 46.0%)

This large stand of vegetation occurs in many areas surrounding the soakways and pools described above, on the north-eastern part of the site. The vegetation is dominated by *Carex lasiocarpa*,

accompanied by abundant *Carex rostrata, Molinia caerulea, Narthecium ossifragum* and *Myrica gale*. *Sphagnum capillifolium, S. fallax and S. subnitens* form low hummocks. Several other plants including *Carex echinata, Festuca rubra, Polygala vulgaris* and *Potentilla erecta* are scattered throughout. This vegetation is referable to M21 *Narthecium ossifragum–Sphagnum papillosum* valley mire, and is classed as Transition Mire / Quaking Bog.

Westwards, towards the railway, this stand grades into similar vegetation with more abundant *Carex rostrata* replacing *Carex lasiocarpa*, and further south areas with abundant dwarf shrubs and *Eriophorum vaginatum* become more extensive (referable to M18 *Erica tetralix–Sphagnum papillosum* mire).

8.26.3 Wetland Substrata & Water Supply

The peat substratum is very deep over much of the site and the stratigraphy has been studied in detail by Atherden (1976). The peat deposits are mainly 'fen' peat, laid down under minerotrophic conditions, with many fragments of monocots including *Phragmites australis*. Bog peat is only present at the very surface of the deposits, indicating that it is relatively recent in origin.

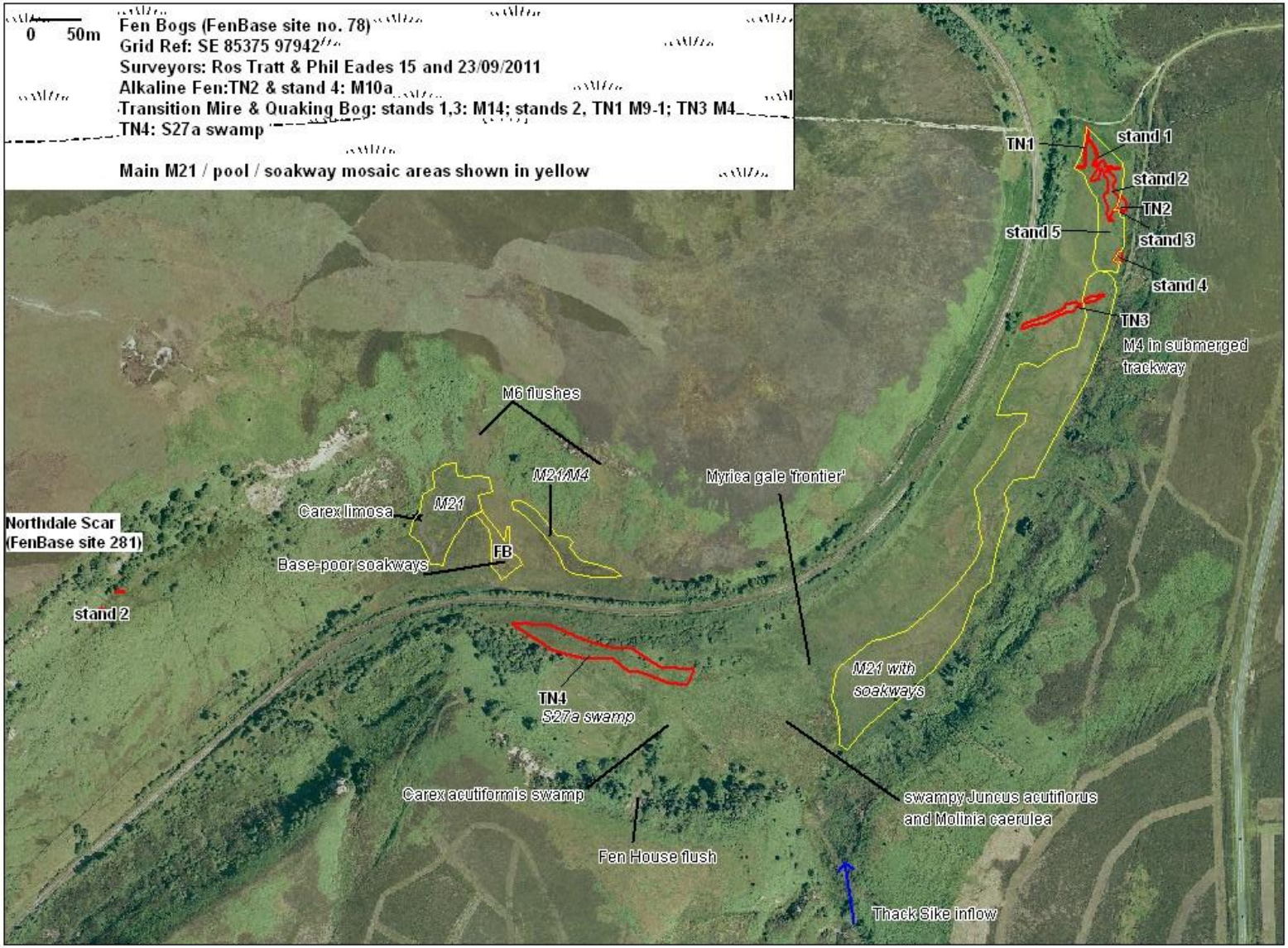
Area south of the access track:

> Flushes and soakways (not marl- or tufa-forming) pH 5.8–6.5; EC 175–329 µS cm^{-1}.
>
> M21 area with *Carex lasiocarpa* pH 4.3; EC 230 µS cm^{-1}.
>
> The relatively wide variation in pH and EC readings reflects the intimate mosaic of flushes, soakways and pools in the area immediately south of the access track. These are the areas regarded as good examples of Transition Mire and Quaking Bog habitat where both base-rich and base-poor conditions are found closely juxtaposed, resulting in very interesting vegetation mosaics.

Western side of Fen Bogs: pH 5.9–6.9; EC 125–130 µS cm^{-1}.

8.26.4 Site Management

Phragmites australis forms a sparse component of the vegetation over much of the site, but becomes dense in the wettest areas, particularly alongside the railway line. The reed does not appear to be invading but it should be mapped so that any future change can be detected. There have been several small fires in the past. *Myrica gale* is abundant over much of the site. Areas where *Myrica gale* is low-growing mark the areas most recently affected by fire. There was no evidence of grazing during the survey; however the site is part of an extensive moorland unit which is lightly grazed by sheep.


0 50m
Fen Bogs (FenBase site no. 78)
Grid Ref: SE 85375 97942
Surveyors: Ros Tratt & Phil Eades 15 and 23/09/2011
Alkaline Fen:TN2 & stand 4: M10a
Transition Mire & Quaking Bog: stands 1,3: M14; stands 2, TN1 M9-1; TN3 M4
TN4: S27a swamp
Main M21 / pool / soakway mosaic areas shown in yellow
TN1
stand 1
stand 2
TN2
stand 5
stand 3
stand 4
TN3
M4 in submerged trackway
M6 flushes
M21/M4
Myrica gale 'frontier'
Carex limosa
M21
Northdale Scar
(FenBase site 281)
FB
Base-poor soakways
stand 2
TN4
S27a swamp
M21 with soakways
Carex acutiformis swamp
swampy Juncus acutiflorus and Molinia caerulea
Fen House flush
Thack Sike inflow

North York Moors	Site name	Fen Bogs		Fen Bogs		Fen Bogs		Fen Bogs		Fen Bogs	
Alkaline Fen &	**Site ref**	78		78		78		78		78	
Transition Mire / Quaking Bog	**Quadrat ID**	78001		78002		78003		78004		78005	
Survey 2011	**Stand ref**	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5	
	NGR	SE		SE		SE		SE		SE	
Domin scores for all quadrats	**Easting**	485370		485373		485405		485411		485375	
DAFOR scores for stands	**Northing**	498033		498027		497973		497917		497942	
	Date	15/09/2011		23/09/2011		15/09/2011		15/09/2011		23/09/2011	
PE Phil Eades	**Recorder name**	RT		RT		RT		RT		RT	
RT Ros Tratt	**NVC community**	M14		M9a-1		M14		M10a		M21	
	Notes	Pinguicula scorpidium area		soakway at N end of FB		E latifolium flush		Pinguicula flush at edge of fen		Carex lasiocarpa dominant	
	Quadrat size	1x4m		1x4m		1x4m		2x2m		2x2m	
	pH	6.5		6.8		6.3		5.8		4.3	
	EC (µS cm-^{1})	284		175		250		329		230	
	Photo?	Y		Y						Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
163	Anagallis tenella		3	F								
2256	Aneura pinguis		3	F			3	F	2	O		
1445	Calliergon cuspidatum	Calliergonella cuspidata									1	O
1571	Campylium stellatum				1	O	6	A	4	A		
315	Carex dioica		2	F	2	O			2	O		
319	Carex echinata								2	O	2	O
328	Carex lasiocarpa						3	F			7	D
339	Carex panicea						3	F			1	O
352	Carex rostrata		4	A	3	F	1	O			4	A
312	Carex viridula ssp oedocarpa		2	O			0	O				
1658	Drepanocladus revolvens	Scorpidium revolvens					3	F	2	O		
494	Drosera rotundifolia		2	O			3	F	3	F	1	R
508	Eleocharis multicaulis		3	F	0	O						
510	Eleocharis quinqueflora		1	O	0	O	4	A	2	F		
535	Equisetum palustre						2	F			1	R
542	Erica tetralix		2	O			2	O	3	F		
546	Eriophorum angustifolium		1	O	1	O			1	O	1	O
547	Eriophorum latifolium						4	A	1	O		
576	Festuca rubra										2	O
2695	Hypnum jutlandicum										1	O
719	Juncus acutiflorus						2	O	3	F	2	O
726	Juncus bulbosus		0	O	1	O			1	O		
729	Juncus conglomeratus										1	R
862	Menyanthes trifoliata		1	O	2	F						
876	Molinia caerulea		3	F			2	O	5	A	5	A
893	Myrica gale		4	F	1	O	4	A			5	A
901	Narthecium ossifragum						3	F	5	A	5	A
970	Pinguicula vulgaris		2	F					3	F		
995	Polygala vulgaris										1	R
1037	Potamogeton polygonifolius		5	A	5	A	4	A				
1046	Potentilla erecta										1	R
1049	Potentilla palustris	Comarum palustre			2	F						
1109	Rhynchospora alba		3	F	1	O	3	F	2	O		
1947	Scorpidium scorpioides		5	A	7	A	3	F	4	A		
1235	Selaginella selaginoides		0	O			2	O				
2972	Sphagnum auriculatum var	Sphagnum inundatum	1	O								
1960	Sphagnum capillifolium										3	F
1971	Sphagnum palustre										1	O
1972	Sphagnum papillosum										0	O
1976	Sphagnum recurvum	Sphagnum fallax									3	F
1973	Sphagnum subnitens										3	F
1305	Succisa pratensis								4	F		

8.27 FEN HOUSE (NEWTONDALE SSSI)

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.27.1 Site Description

Situated in Unit 4 of Newtondale SSSI, this small site supports a significant spring & flush complex, with numerous strong tufa-depositing springs and seepages emerging from several rock layers and flushing through species-rich herbaceous fen vegetation that is characterised by abundant *Eriophorum latifolium*. The rare liverwort *Moerkia hibernica* was recorded here. On gentler slopes below, the flush vegetation becomes dominated by *Juncus acutiflorus*, and where the slope joins Fen Bogs on the valley floor the vegetation abruptly changes to extensive dense *Carex acutiformis* swamp.

8.27.2 Stand Descriptions

Stand 2 (SE 84803 97225; quadrat 282002)

M10b *Carex dioica–Pinguicula vulgaris* mire,
Briza media – Primula farinosa sub-community

Stand 1 (SE 84813 97273; quadrat 282001)

M10bii *Molinia caerulea–Eriophorum latifolium* variant

(MATCH coefficients: 56.4% & 47.5% respectively)

The vegetation at this site is low growing, over a mixture of very open, stony runnels with active tufa deposition, and forming an extensive flushed turf on the lower slopes and on flatter patches between rock 'steps'.

The springs, seepages and runnels of Stand 2 support abundant *Pinguicula vulgaris* with patches of tufa encrusted bryophytes including *Aneura pinguis, Campylium stellatum, Fissidens adianthoides, Palustriella commutata, P. falcata, Pellia endiviifolia, Riccardia multifida,* and *Scorpidium cossonii*. The rare liverwort *Moerkia hibernica* was also found here. A mixture of sedges forms a very sparse, low, sward (*Carex dioica, C. hostiana, C. viridula* subsp. *brachyrrhyncha*, *Eleocharis quinqueflora* and *Eriophorum latifolium*), while *Anagallis tenella* and *Selaginella selaginoides* are frequently found within mossy patches. This habitat is very open, with much bare ground, and is clearly mire vegetation of the M10b community (Alkaline Fen).

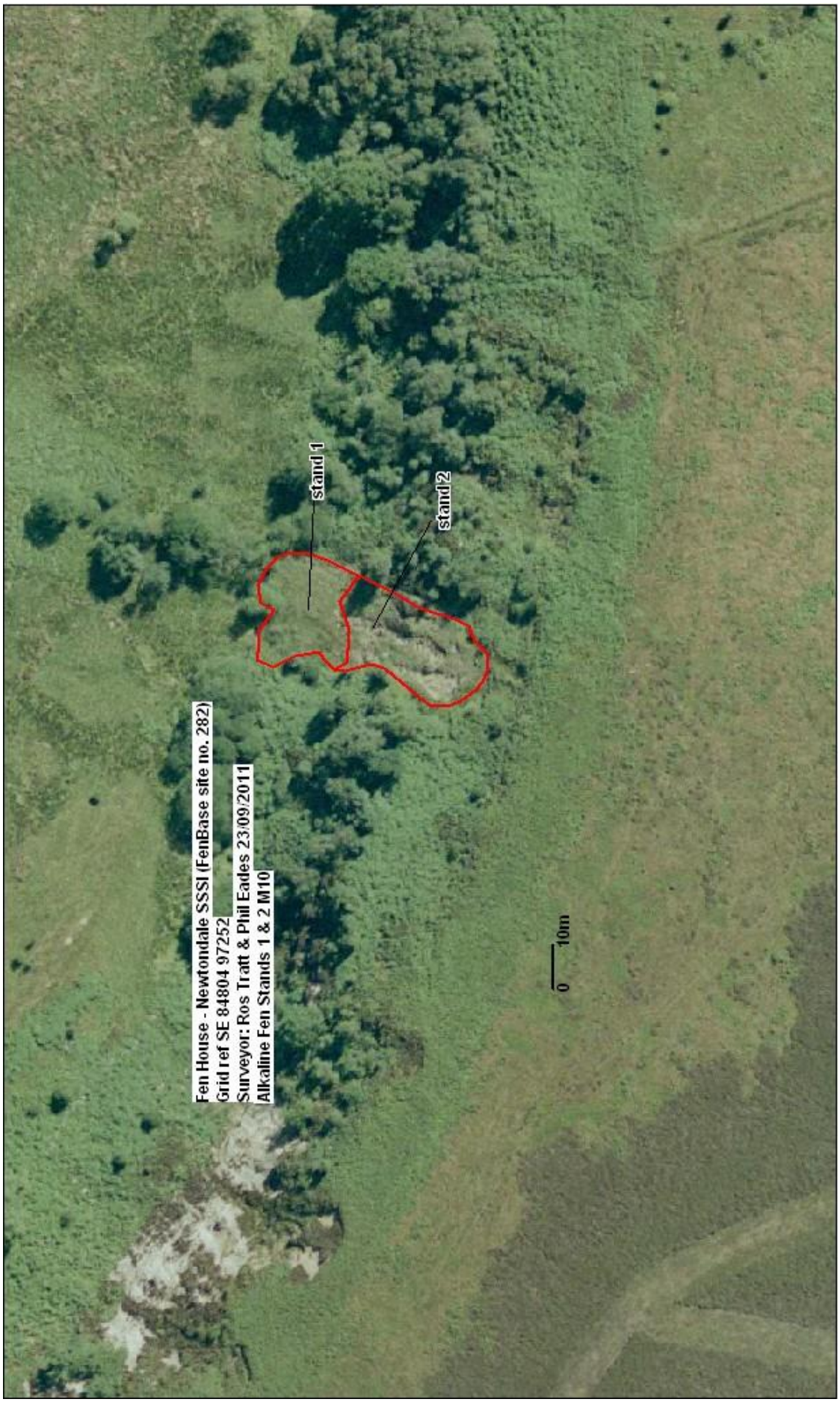
Where thin soils have developed over more gently sloping ground (Stand 1) the vegetation is taller, forming a continuous but still very open sward that is very species-rich. Most of the species found in the springs and runnels are also found here, but additional species become prominent including *Briza media, Carex flacca, Festuca rubra, Molinia caerulea, Succisa pratensis* and *Valeriana dioica*. The mosses *Ctenidium molluscum* and *Fissidens adianthoides* are frequent around low tussocks. The vegetation here fits well with the M10bii variant, and can also be classed as Alkaline Fen.

8.27.3 Wetland Substrata & Water Supply

This site is characterised by bare rock and stony runnels with tufa deposits on the steepest slopes, and skeletal soils developing on shallower slopes. The water supply is very base-rich (pH 8.4; EC 350 µS cm^{-1}), and the site is clearly groundwater fed.

8.27.4 Site Management

The site is grazed lightly by sheep as part of a large moorland grazing unit.


Fen House - Newtondale SSSI (FenBase site no. 282)
Grid ref SE 84804 97252
Surveyor: Ros Tratt & Phil Eades 23/09/2011
Alkaline Fen Stands 1 & 2 M10
stand 1
stand 2
0
10m

North York Moors		Site name	Fen House		Fen House	
Alkaline Fen &		Site ref	282		282	
Transition Mire / Quaking Bog		Quadrat ID	282001		282002	
Survey 2011		Stand ref	Stand 1		Stand 2	
		NGR	SE		SE	
Domin scores for all quadrats		Easting	484813		484803	
DAFOR scores for stands		Northing	497273		497225	
		Date	23/09/2011		23/09/2011	
PE	Phil Eades	Recorder name	RT & PE		RT & PE	
RT	Ros Tratt	NVC community	M10bii		M10b	
		Notes	extensive Eriophorum latifolium flush		Springs & seepages on steep slope	
		Quadrat size	2x2m		2x2m	
		pH	8.4			
		EC (µS cm-^{1})	350			
		Photo?	Y		Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
163	Anagallis tenella		2	F	1	O
2256	Aneura pinguis				2	O
251	Briza media		3	F	0	O
1546	Bryum pseudotriquetrum		0	O		
1445	Calliergon cuspidatum	Calliergonella cuspidata	1	O		
1571	Campylium stellatum		4	A	3	F
315	Carex dioica		2	F	1	O
323	Carex flacca		2	F	1	O
325	Carex hostiana		4	A	2	F
339	Carex panicea		3	F	3	F
329	Carex viridula ssp brachyrrhyncha		3	F	3	F
418	Cirsium palustre		0	O		
1596	Cratoneuron commutatum	Palustriella commutata	4	A	4	A
4340	Cratoneuron commutatum	Palustriella falcata			3	F
1600	Ctenidium molluscum		3	F	2	O
1658	Drepanocladus revolvens	Scorpidium revolvens	2	F	0	O
3266	Drepanocladus revolvens v	Scorpidium cossonnii	3	F	2	O
510	Eleocharis quinqueflora		2	O	3	F
532	Equisetum arvense				0	O
535	Equisetum palustre		1	O		
546	Eriophorum angustifolium		0	R		
547	Eriophorum latifolium		4	A	3	F
2776	Euphrasia nemorosa		0	R		
576	Festuca rubra		3	F		
1683	Fissidens adianthoides		2	O	1	O
722	Juncus articulatus		2	O	2	O
733	Juncus inflexus				1	R
769	Leontodon hispidus		1	O	1	O
786	Linum catharticum		0	R		
2206	Moerckia hibernica				1	R
876	Molinia caerulea		4	F	1	O
946	Pedicularis palustris		0	O		
2222	Pellia endiviifolia				1	F
1845	Philonotis calcarea				0	F
970	Pinguicula vulgaris		1	F	3	F
1795	Plagiomnium rostratum		1	O		
1914	Pseudoscleropodium purum		0	R		
2254	Riccardia multifida		2	O	1	O
1235	Selaginella selaginoides		1	O	1	O
1305	Succisa pratensis		4	A		
1354	Triglochin palustre				0	O
1360	Tussilago farfara				0	O
1380	Valeriana dioica		3	F	1	F

8.28 HAGG WOOD MARSH (NEWTONDALE SSSI)

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.28.1 Site Description

This site occupies a section of valley bottom alongside Levisham Beck (a tributary of Pickering Beck, in south Newtondale), about 450 m north-east of Ness Head. Here an area of open herbaceous vegetation, approximately 850 m^2 in extent, is situated on the valley floor, between dry neutral grassland on the western valley side, and dense wet alder woodland flanking the beck. There are also patches of dense *Carex paniculata* and *C. acutiformis*.

8.28.2 Stand Descriptions

Stand 1 (SE 83126 88856; Quadrat 295001)

Mosaic of M22b *Juncus subnodulosus–Cirsium palustre* fen-meadow,
Briza media–Trifolium spp. sub-community (*c.* 10%)

and M22a *Juncus subnodulosus–Cirsium palustre* fen-meadow,
typical sub-community (*c.* 90%)

The fen here is dominated by quite species-poor *Juncus subnodulosus* vegetation, although scattered throughout are more diverse patches, with abundant *Calliergonella cuspidata, Campylium stellatum, Carex flacca, C. viridula* subsp. *brachyrrhyncha, Festuca rubra, Succisa pratensis,* and *Triglochin palustre,* plus occasional species such as *Aneura pinguis, Equisetum palustre, Galium uliginosum, Juncus articulatus, Pedicularis palustris* and *Pseudoscleropodium purum.*

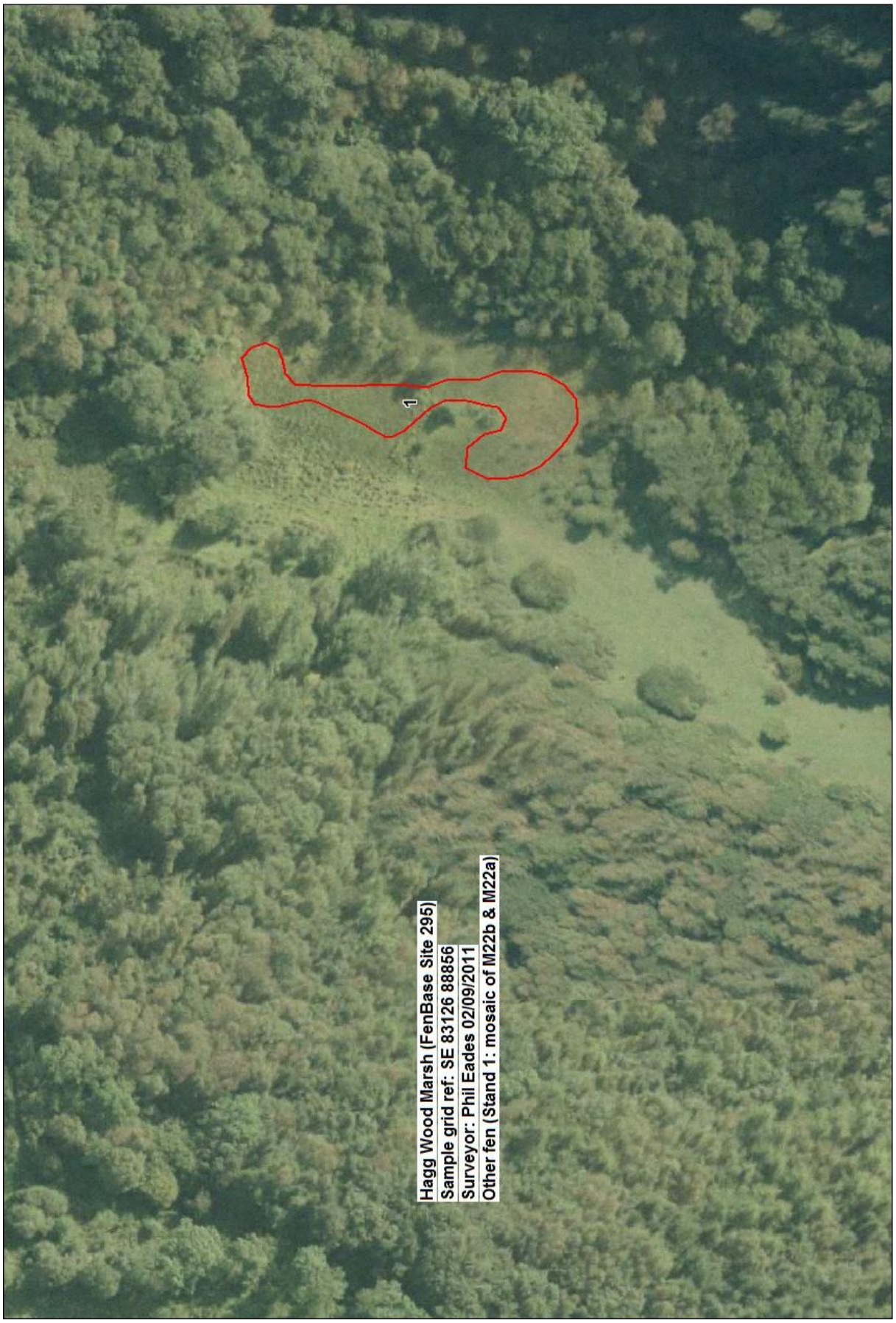
The more diverse patches of fen vegetation have been assigned to M22b fen-meadow (MATCH coefficient 38.2%). Although there is also an affinity with M13c (MATCH coefficient 43.1%), the species composition and general over-whelming dominance of *Juncus subnodulosus*, combined with a lack of *Schoenus nigricans,* makes this an unfavoured diagnosis. The site as a whole should perhaps best be viewed as a mosaic of M22b and M22a fen-meadow sub-communities.

8.28.3 Wetland Substrata & Water Supply

The fen is associated with moderately base-rich water (pH 6.5, EC 390 µS cm^{-1}) and peat more than 100 cm in depth. While it undoubtedly receives runoff from the adjacent steep valley side, it is not clear whether it also receives some groundwater input from submerged seepages. However, the adjacent valley side immediately upslope of the fen boundary is covered by a thick layer of sticky sandy clay, which precludes any upslope seepage outflows there.

8.28.4 Site Management

The site is grazed by cattle, and there has been recent clearance of alder scrub. Continued cattle grazing should help to maintain the cleared areas, and may encourage an increase in species diversity in the areas of dense *Juncus subnodulosus* fen by opening up the dense litter.


1
Hagg Wood Marsh (FenBase Site 295)
Sample grid ref: SE 83126 88856
Surveyor: Phil Eades 02/09/2011
Other fen (Stand 1: mosaic of M22b & M22a)

North York Moors		Site name	Hagg Wood Marsh	
Alkaline Fen &		Site ref	295	
Transition Mire / Quaking Bog		Quadrat ID	295001	
Survey 2011		Stand ref	Stand 1	
		NGR	SE	
Domin scores for all quadrats		Easting	483126	
DAFOR scores for stands		Northing	488856	
		Date	02/09/2011	
PE	Phil Eades	Recorder name	PE	
RT	Ros Tratt	NVC community	M22b	
		Notes	Spp. rich J.subnod in valley bottom	
		Quadrat size	2x2m	
		pH	6.5	
		EC (µS cm-^{1})	390	
		Photo?	Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)
2256	Aneura pinguis		1	R
1482	Aulacomnium palustre		0	R
1445	Calliergon cuspidatum	Calliergonella cuspidata	5	A
1571	Campylium stellatum		4	A
295	Cardamine pratensis		2	F
319	Carex echinata		2	F
323	Carex flacca		4	F
339	Carex panicea		2	F
329	Carex viridula ssp brachyrrhyncha		4	F
418	Cirsium palustre		1	O
1593	Climacium dendroides		0	R
535	Equisetum palustre		1	O
576	Festuca rubra		3	F
583	Filipendula ulmaria		0	F
612	Galium uliginosum		1	F
722	Juncus articulatus		1	F
2732	Juncus subnodulosus		8	D
946	Pedicularis palustris		0	O
1804	Plagiomnium elatum		0	O
1914	Pseudoscleropodium purum		0	O
1089	Ranunculus flammula		1	O
1305	Succisa pratensis		3	F
1354	Triglochin palustre		3	F
1380	Valeriana dioica		2	F

8.29 HAVERN BECK (NEWTONDALE SSSI)

Vegetation stands and target notes are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.29.1 Site Description

Havern Beck is a small tributary stream of Pickering Beck and drains from the western side of Allerston High Moor along the southern edge of Saltergate Moor. North-west of Saltergate the stream flows roughly north-westwards along a narrow and deepening defile below Pifel Head to enter Newtondale a short distance north of Needle Point. The lower section of Havern Beck is situated in Unit 4 of Newtondale SSSI.

The majority of the mires found were in the lower section of Havern Beck, downstream of a small waterfall. The mires examined comprise a number of small, often skeletal, soligenous mires on the steep, partly craggy, valleyside slopes below a conspicuous tree-lined rock outcrop that marks the brink of the valley. Above the outcrop the vegetation is dominated by heather moorland. Below the outcrop, the friable slopes support a mixture of scrub, bracken, heather, species-rich grassland, rushy vegetation, and low-growing rich-fen vegetation.

8.29.2 Stand Descriptions

Stands 1–5 (central grid ref: SE 84663 95004; Quadrats 280001–5)

M10 *Carex dioica–Pinguicula vulgaris* mire

(MATCH coefficients ranged from 23.7–41.7%)

Thirteen discrete areas of rich fen were found in the lower part of Havern Beck (mainly on the eastern side of the beck), all supporting very similar vegetation, but often grading into the surrounding grassland; five were sampled, and the remainder were target noted (TN 1-8). In many cases the fens occupy very wet seepage slopes and flushed ground, in others the seepages are merely damp, marked mainly by the presence of *Pinguicula vulgaris*. The seepages and flushes are typically species-rich, sometimes with much bare gravelly ground, elsewhere with a more-or-less closed sward. Species found in these areas comprise a diverse mix of small sedges, grasses, rushes, forbs and bryophytes, including *Anagallis tenella, Aneura pinguis, Briza media, Bryum pseudotriquetrum, Calliergonella cuspidata, Calluna vulgaris, Campylium stellatum, Carex flacca, C. panicea, C. pulicaris, C. viridula* subsp. *brachyrrhyncha, Cirsium palustre, Ctenidium molluscum, Dactylorhiza fuchsii, Equisetum arvense, Eriophorum angustifolium, Euphrasia officinalis* agg., *Fissidens adianthoides, Leontodon hispidus, Lotus pedunculatus, Juncus articulatus, J. bulbosus, Juncus effusus, Palustriella commutata, Pellia endiviifolia, Philonotis calcarea, Pinguicula vulgaris, Prunella vulgaris, Succisa pratensis,* and *Valeriana dioica.*

These areas can be clearly assigned to the M10 community, and are classified as Alkaline Fen.

Stands 6 & 7 (SE 84811 94634; Quadrats 280006 & 7)

M10 *Carex dioica–Pinguicula vulgaris* mire (MATCH coefficient of 41.7%).

M23a *Juncus effusus/acutiflorus–Galium palustre* rush pasture,
Juncus acutiflorus sub-community (MATCH coefficient of 35.2%)

A tiny patch of M10 mire (Stand 6) is found much further south, upstream along Havern Beck, where a small tributary stream enters from the south. Adjacent to the beck is a small rock exposure and skeletal seepage area (roughly 1 x 2 m in extent) that supports a mixture of *Aneura pinguis, Campylium stellatum, Carex dioica, C. flacca, C. panicea, C. pulicaris, C. viridula* subsp. *oedocarpa, Cirsium palustre, Drosera rotundifolia, Juncus acutiflorus, J. bulbosus* and *Succisa pratensis*.

Immediately adjacent to this is a slightly larger stand (Stand 7, c. 2 x 4 m in extent) that supports more robust vegetation on deeper soils. This vegetation is dominated by *Juncus acutiflorus*, with fewer sedges, more grasses, and small quantities of *Sphagnum subnitens* and *S. inundatum*, and is probably best assigned to the M23a rush pasture community.

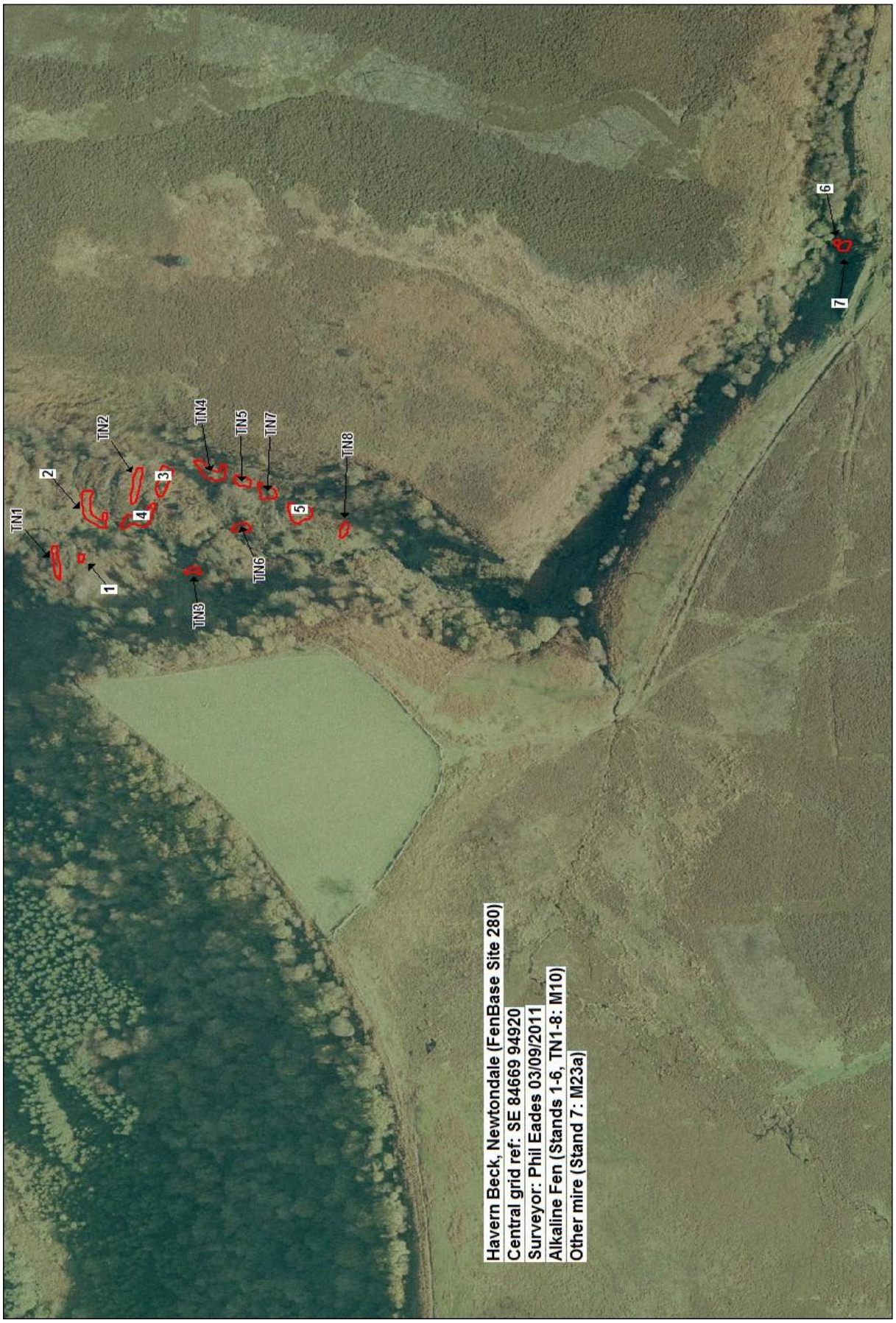
The small tributary stream is notable in that it supports a clump of *Myosotis stolonifera*, which is restricted in its distribution.

8.29.3 Wetland Substrata & Water Supply

All of the seepages in the lower Havern Beck were found on skeletal soils, with occasional pockets of deeper soils (e.g. Stand 4: 5–15 cm peat over gravel), and all are very base-rich, with water samples ranging from pH 6.7–7.8; and EC from 135–320 µS cm^{-1}. It appears likely that these mires are irrigated by permanent groundwater seepages emerging from the base of the line of rock outcrops. The upper Havern Beck samples (Stands 6 & 7) were associated with less base-rich water (pH 5.0, EC 220 µS cm^{-1}, and this may well be receiving water from a different source.

8.29.4 Site Management

The entire area is lightly grazed by sheep and deer. Particularly in lower Havern Beck, the steep slopes and soft crumbly nature of the exposed substrata seem sufficient to keep most areas open, and *Pinguicula vulgaris* is abundant even in the absence of poaching.


TN1
TN2
TN3
TN4
TN5
TN6
TN7
TN8
1
2
3
4
5
6
7
Havern Beck, Newtondale (FenBase Site 280)
Central grid ref: SE 84669 94920
Surveyor: Phil Eades 03/09/2011
Alkaline Fen (Stands 1-6, TN1-8: M10)
Other mire (Stand 7: M23a)

North York Moors		Site name	Havern Beck		Havern Beck		Havern Beck		Havern Beck		Havern Beck		Havern Beck		Havern Beck	
Alkaline Fen &		Site ref	280		280		280		280		280		280		280	
Transition Mire / Quaking Bog		Quadrat ID	280001		280002		280003		280004		280005		280006		280007	
Survey 2011		Stand ref	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5		Stand 6		Stand 7	
		NGR	SE		SE		SE		SE		SE		SE		SE	
Domin scores for all quadrats		Easting	484643		484666		484679		484662		484669		484811		484811	
DAFOR scores for stands		Northing	495036		495032		494993		495003		494920		494634		494634	
		Date	03/09/2011		03/09/2011		03/09/2011		03/09/2011		03/09/2011		21/09/2011		21/09/2011	
PE	Phil Eades	Recorder name	PE		PE		PE		PE		PE		PE		PE	
RT	Ros Tratt	NVC community	M10		M10		M10		M10		M10		M10		M23a	
		Notes	Steep spp-rich seepages & flushes		Steep spp-rich seepages & flushes		Steep spp-rich seepages & flushes		Steep spp-rich seepages & flushes		Steep spp-rich seepages & flushes		Tiny seepage		Small spp-rich rush pasture	
		Quadrat size	1x4m		1x4m		1x4m		2x2m		2x2m		1x2m		2x2m	
		pH	7.7		6.7		7.2				7.8		5.0			
		EC (µS cm-1)	320		135		285				320		220			
		Photo?	Y		Y		Y		Y		Y		Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
120	Agrostis canina														3	F
122	Agrostis stolonifera		1	O												
163	Anagallis tenella				0	F	1	O								
2256	Aneura pinguis		2	O	2	O	2	O					4	A	2	O
167	Angelica sylvestris		0	R												
171	Anthoxanthum odoratum				0	R									3	F
247	Brachypodium sylvaticum						1	O								
251	Briza media		1	O			5	A	4	A	3	F				
1546	Bryum pseudotriquetrum		1	O			2	F	2	F					2	O
1445	Calliergon cuspidatum	Calliergonella cuspidata					3	F	3	F					5	A
278	Calluna vulgaris								1	R						
1571	Campylium stellatum				5	A			3	F	2	O	4	A		
315	Carex dioica												3	F		
319	Carex echinata		3	F	2	O					3	F			1	O
323	Carex flacca		2	F	1	O	1	R			5	A	3	F	5	A
339	Carex panicea		3	F									5	A	5	A
347	Carex pulicaris		2	F	3	F							2	F		
329	Carex viridula ssp brachyrrhyncha				4	A	3	F	1	R	4	A			1	F
312	Carex viridula ssp oedocarpa												5	A	3	F
371	Centaurea nigra										3	F				
418	Cirsium palustre				1	O	1	O	2	O			1	O	4	A
1596	Cratoneuron commutatum	Palustriella commutata	7	A	0	O	5	A	3	F						
4340	Cratoneuron commutatum	Palustriella falcata	2	O							4	A				
449	Crepis paludosa								0	O						
1600	Ctenidium molluscum		2	O	3	F	3	F	5	A	5	A				
466	Dactylorhiza fuchsii				1	O			2	F	2	O				
3192	Dactylorhiza sp.														1	O
1249	Danthonia decumbens				1	R					2	O				
1616	Dicranella palustris		2	O												
494	Drosera rotundifolia				3	F							3	F	3	F
515	Empetrum nigrum nigrum								3	F						
532	Equisetum arvense				2	O	2	O	2	F	3	F				
535	Equisetum palustre				0	O										
538	Equisetum telmateia						4	A								
546	Eriophorum angustifolium								3	F						
2776	Euphrasia nemorosa				2	O	4	A	3	F	2	O				
576	Festuca rubra										3	F				
1683	Fissidens adianthoides		2	O	1	O	2		2	O						
609	Galium palustre														2	O
680	Holcus lanatus														3	F
702	Hypericum pulchrum														1	O
719	Juncus acutiflorus				0	R							3	F	7	A
722	Juncus articulatus		3	F					4	A	4	A				
726	Juncus bulbosus		3	F	3	F					3	F	3	F		
730	Juncus effusus		2	O							1	R				
768	Leontodon autumnalis		1	R												
769	Leontodon hispidus						3	F	3	F	3	F				
786	Linum catharticum						3	F								
802	Lotus pedunculatus								2	O						
876	Molinia caerulea				4	F							2	O	1	R
900	Nardus stricta		1	R							1	O				
946	Pedicularis palustris				4	F										
2222	Pellia endiviifolia		2	O			2	F	2	O	1	O				
1845	Philonotis calcarea						4	A	4	F						
970	Pinguicula vulgaris		4	A	4	A			3	F			3	F		
973	Plantago lanceolata								3	F	3	F				
1046	Potentilla erecta				1	O									1	R
1059	Prunella vulgaris						3	F	3	F	2	F				
1270	Solidago virgaurea		1	R							1	R				
2972	Sphagnum auriculatum va	Sphagnum inundatum													3	F
1973	Sphagnum subnitens				0	O					0	R			3	F
1305	Succisa pratensis		3	F	3	F	6	A	4	A	4	A	1	O	5	A
2982	Taraxacum seedlings						2	O			1	O				
1354	Triglochin palustre				1	O										
1360	Tussilago farfara		1	R			4	F			3	F				
1380	Valeriana dioica						3	F	3	F	2	F				

8.30 KIDSTYE FARM (NEWTONDALE SSSI)

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.30.1 Site Description

Kidstye Farm is situated on the valley floor of Newtondale, approximately 400 m west of the railway station known as Newtondale Halt. Immediately to the east of the farm is an area of enclosed pasture between the railway line and the deciduous woodland that occupies the steeper valley sides. At the valley bottom, adjacent to the railway line, is a narrow strip of wet ground dominated in most places by *Juncus effusus*, with scattered willow scrub edging the railway embankment.

8.30.2 Stand Descriptions

Stand 1 (SE 83088 94724; Quadrat 292001)

S27a *Carex rostrata–Potentilla palustris* tall-herb fen, *Carex rostrata–Equisetum fluviatile* sub-community

(MATCH coefficient: 51.2%)

Within the stand of *Juncus effusus*-dominated mire there is a small stand (c. 6x8 m in extent) of quite diverse vegetation that is dominated by a mixture of *Carex rostrata*, *Comarum palustre*, *Juncus acutiflorus* and *Calliergon giganteum*. With these are a range of other rushes, grasses and forbs, such as *Agrostis canina*, *Caltha palustris*, *Cardamine pratensis*, *Eleocharis palustris*, *Epilobium obscurum*, *E. palustre*, *Equisetum fluviatile*, *Galium palustre*, *Juncus articulatus*, *J. effusus*, *Mentha aquatica*, *Ranunculus flammula* and *Stellaria palustris*. The latter species is notable for its scarcity and very scattered distribution in the UK.

This stand can be assigned to the S27a tall-herb fen community, which is considered to be a form of Transition Mire / Quaking Bog.

8.30.3 Wetland Substrata & Water Supply

The fen vegetation here is associated with moderately base-rich conditions (pH 6.2, EC 300 µS cm^{-1}), and appears to have developed as a semi-floating raft that has grown across a silt-filled sump, which may have formed as a consequence of the railway embankment preventing overland flow from the higher ground reaching the beck (which flows on the far side of the railway).

8.30.4 Site Management

The site is effectively unmanaged, apart from some very light grazing by cattle or sheep, and it is expected that scrub invasion will gradually shade out the herbaceous fen area over coming decades.


Kidstye Farm, Newtondale (FenBase Site 292)
Central grid ref: SE 83088 94724
Surveyor: Phil Eades 22/09/2011
Transition Mire (Stand 1: S27a)
1

North York Moors		Site name	Kidstye Farm	
Alkaline Fen &		Site ref	293	
Transition Mire / Quaking Bog		Quadrat ID	292001	
Survey 2011		Stand ref	Stand 1	
		NGR	SE	
Domin scores for all quadrats		Easting	483088	
DAFOR scores for stands		Northing	494724	
		Date	22/09/2011	
PE	Phil Eades	Recorder name	PE	
RT	Ros Tratt	NVC community	S27a	
		Notes	Carex rostrata in sump adjacent to rail track	
		Quadrat size	4x4m	
		pH	6.2	
		EC (µS cm-^{1})	300	
		Photo?	Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)
120	Agrostis canina		3	F
1446	Calliergon giganteum		6	A
279	Caltha palustris		1	O
295	Cardamine pratensis		3	F
352	Carex rostrata		7	A
509	Eleocharis palustris		3	F
524	Epilobium obscurum		4	A
525	Epilobium palustre		4	A
533	Equisetum fluviatile		2	F
609	Galium palustre		4	A
2710	Glyceria seedling/sp		1	R
719	Juncus acutiflorus		5	A
722	Juncus articulatus		1	O
730	Juncus effusus		3	F
855	Mentha aquatica		3	F
1049	Potentilla palustris	Comarum palustre	5	A
1089	Ranunculus flammula		3	F
1302	Stellaria palustris		4	A

8.31 LEVISHAM BOTTOM (NEWTONDALE SSSI)

Vegetation stands are identified in the following image; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.31.1 Site Description

This site is located in the central part of Newtondale, and is situated on the eastern side of the railway line, at the base of the gentle lower slopes of the valley side between about 130–140 m aOD, downslope from a bench that is marked as Levisham Bottoms on the OS 1:25,000 map. The mire is surrounded by dense stands of bracken with occasional trees and scrub, and above (east of) the wetland the ground steepens markedly. On the opposite side of the railway the valleyside is afforested, predominantly with conifers.

8.31.2 Stand Descriptions

Stand 1 (central grid ref: SE 82834 93592; Quadrats 291001–3)

M10a *Carex dioica–Pinguicula vulgaris* mire,
Carex demissa–Juncus bulbosus/kochii sub-community (MATCH coefficients: 40.0–46.5%)

(M15a *Scirpus cespitosus–Erica tetralix* wet heath, *Carex panicea* sub-community)

The mire is a broad stand of approximately 25 x 50 m in extent, arising as a series of springs and seepages at the head of a gentle slope, and stretching down to the fence at the base of the slope, beside the railway. A branching network of soakways flow down from the seepage zone, the upper limit of which is marked by several large boulders. At the time of survey the whole site was notable for the abundance of flowering *Parnassia palustris*.

The soakways and seepage areas are particularly rich in bryophytes and low-growing sedges, plus a variety of other plants, with species such as *Anagallis tenella, Aneura pinguis, Campylium stellatum, Ctenidium molluscum, Carex dioica, C. echinata, C. flacca, C. viridula* subsp. *brachyrrhyncha, Drosera rotundifolia, Erica tetralix, Equisetum arvense, Eriophorum latifolium, Juncus bulbosus Molinia caerulea, Parnassia palustris, Pinguicula vulgaris, Scorpidium cossonii*, and *Succisa pratensis*. These parts of the site can clearly be assigned to the M10a sub-community.

The intervening wet ground between the soakways supports a greater proportion of heathy species such as *Erica tetralix, Sphagnum subnitens, S. fallax*, and *S. palustre*, with occasional *S. capillifolium, Calluna vulgaris, Empetrum nigrum* and *Vaccinium myrtillus*. However, amongst these species are also found almost all of the plants that are present in the soakways, plus a number of additional species that can also be characteristic of base-rich mires, including *Briza media, Carex pulicaris, Dactylorhiza* sp., and *Valeriana dioica.* Consequently these more heathy areas appear to be somewhat intermediate between M10 mire and M15a wet heath (MATCH coefficients of 34.0% and 41.4% respectively).

For the purpose of this survey project, the entire site should probably be regarded as Alkaline Fen, mostly M10 but with oxyphilous nuclei between the main soakways and seepages that give it affinities to M15a.

8.31.3 Wetland Substrata & Water Supply

The mire is fairly base-rich, with a pH range of 6.0–6.3 and EC values of 280–300 μS cm^{-1}, and the substratum typically consists of a soft, wet peat from 25–80 cm deep over a silt or clay-rich gravelly deposit, to 100 cm or more in depth. The mire appears to be fed by groundwater outflow.

8.31.4 Site Management

The site is lightly grazed by sheep and deer; there appear to be no adverse management issues.

North York Moors		Site name	Levisham Bottom	Levisham Bottom	Levisham Bottom	
Alkaline Fen &		Site ref	291	291	291	
Transition Mire / Quaking Bog		Quadrat ID	291001	291002	291003	
Survey 2011		Stand ref	Stand 1	Stand 1	Stand 1	
		NGR	SE	SE	SE	
Domin scores for all quadrats		Easting	482841	482834	482828	
DAFOR scores for stands		Northing	493579	493593	493604	
		Date	21/09/2011	21/09/2011	21/09/2011	
PE	Phil Eades	Recorder name	PE	PE	PE	
RT	Ros Tratt	NVC community	M10a	M10a	M10a (M15a)	
		Notes	Seepage & soakway, much Parnassia etc	Seepage & soakway, much Parnassia etc	Heathy between soakways, much Parnassia	
		Quadrat size	1x4m	1x4m	2x2m	
		pH	6.3	6.3	6.0	
		EC (µS cm-^{1})	300	300	280	
		Photo?	Y	Y	Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	Domin score (Quadrat)	Domin score (Quadrat)	DAFOR (Stand)
122	Agrostis stolonifera				3	O
163	Anagallis tenella		1		1	F
2256	Aneura pinguis		1	1	1	F
171	Anthoxanthum odoratum				0	O
1482	Aulacomnium palustre				3	O
2802	Betula seedling/sp				1	O
251	Briza media				3	F
278	Calluna vulgaris				0	O
1571	Campylium stellatum		4	4	4	A
315	Carex dioica		4	5	3	A
319	Carex echinata		2		1	F
323	Carex flacca			1	2	F
339	Carex panicea		4	3	3	A
347	Carex pulicaris				4	F
329	Carex viridula ssp brachyrrhyncha		3	3		A
418	Cirsium palustre				1	O
1600	Ctenidium molluscum		2	2	1	F
3192	Dactylorhiza sp.				1	F
3266	[illegible] var. intermedius	Scorpidium cossonnii	3	3		F
494	Drosera rotundifolia		3	3	1	F
510	Eleocharis quinqueflora		3			O
515	Empetrum nigrum nigrum				0	O
532	Equisetum arvense		1	2		F
542	Erica tetralix		2		4	F
546	Eriophorum angustifolium				0	O
547	Eriophorum latifolium		5			O
576	Festuca rubra				4	F
690	Hydrocotyle vulgaris				0	O
2695	Hypnum jutlandicum				1	O
719	Juncus acutiflorus		2		4	F
726	Juncus bulbosus		3			O
2167	Lophocolea bidentata				3	O
876	Molinia caerulea		3	2	4	A
901	Narthecium ossifragum		2			O
944	Parnassia palustris		3	1	3	A
970	Pinguicula vulgaris		1	2		A
4390	Polygala sp				0	O
995	Polygala vulgaris				0	O
1037	Potamogeton polygonifolius		3			F
1046	Potentilla erecta				3	F
1801	Rhizomnium punctatum				1	R
1167	Salix aurita				1	R
1960	Sphagnum capillifolium				0	O
1971	Sphagnum palustre				3	F
1976	Sphagnum recurvum	Sphagnum fallax			4	F
1973	Sphagnum subnitens				6	F
1305	Succisa pratensis		1		3	F
1375	Vaccinium myrtillus				0	O
1380	Valeriana dioica				3	F

8.32 NESS HEAD (NEWTONDALE SSSI)

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.32.1 Site Description

Several small springs and seepages emerge at the base of the western side of Ness Head, in south Newtondale, approximately 500 m south-east of the Chalybeate Spring (see Section 8.24). The springs and seepages are at the southern end of a long narrow field that supports quite diverse rush pasture (unsampled but possibly with affinities to M22) adjacent to the railway, and the water that issues from them flows to the south-west along three substantial water-tracks, which merge before flowing beneath the railway towards the beck on the western side of the valley.

8.32.2 Stand Descriptions

Stand 1 (SE 82844 88486; Quadrat 294001)

M9 *Carex rostrata–Calliergon cuspidatum* mire (M9-1 *Carex lasiocarpa–Scorpidium* mire)

(MATCH coefficient: 26.1%)

The springs, seepages and water-tracks are characterised by an abundant carpet of *Palustriella commutata* and *Carex rostrata*, with much *Juncus acutiflorus*, *Eriophorum angustifolium* and *Equisetum palustre*, and occasional *Cirsium palustre*, *Mentha aquatica* and *Palustriella falcata*. The MATCH coefficients are very low for all NVC types, but it may perhaps be best considered to be a form of M9, and possibly the soakway sub-community M9-1 that has been described by Wheeler, Shaw & Tanner (2009). Because of its species composition, water chemistry, and situation within species-rich fen, it is here considered to be a form of Alkaline Fen.

8.32.3 Wetland Substrata & Water Supply

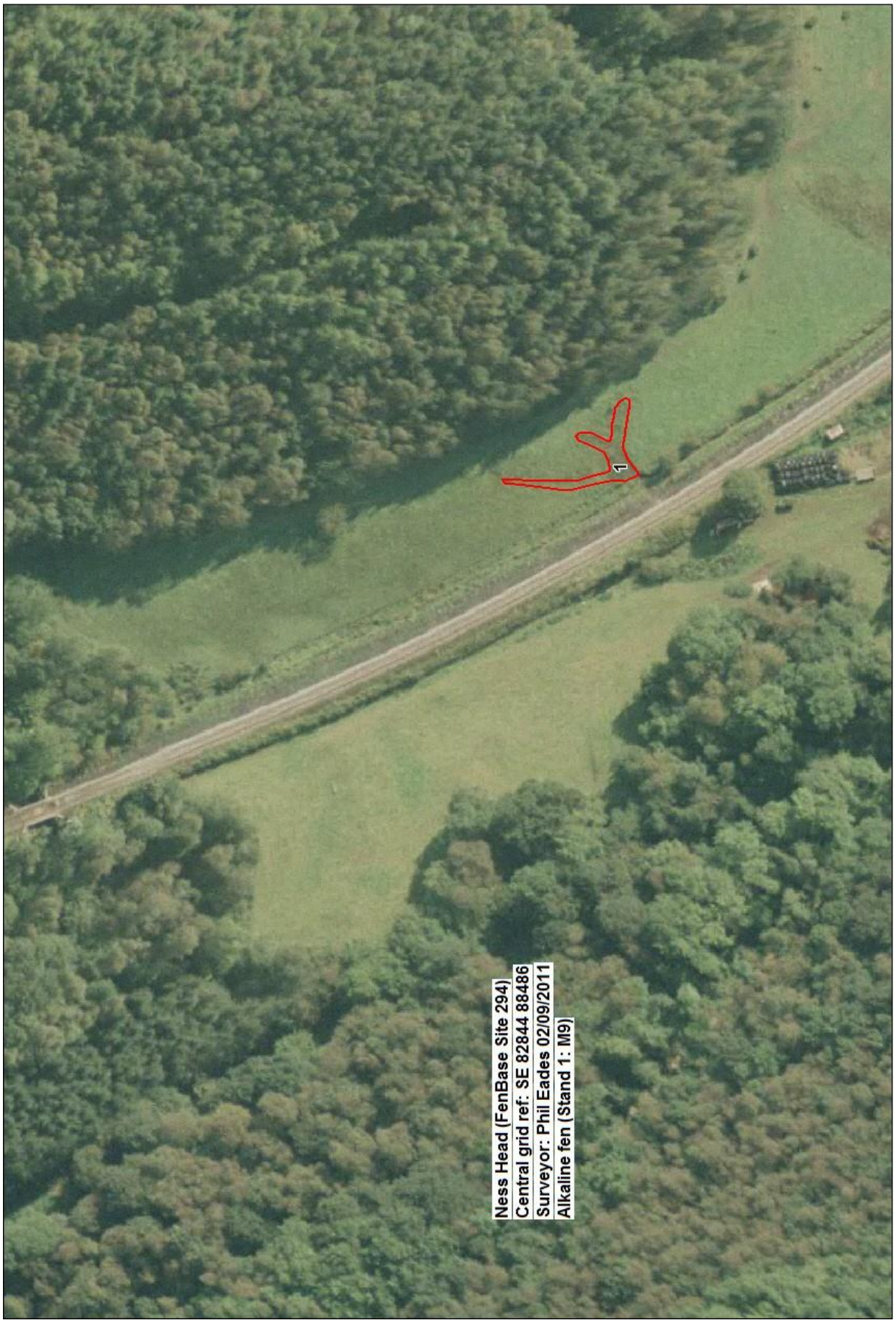
This stand is clearly irrigated by a permanent and vigorous supply of base-rich groundwater (pH 7.3; EC 430 µS cm^{-1}) which emerges at the break of slope and then flows down to Pickering Beck.

8.32.4 Site Management

At the time of survey the site was grazed by cattle at an intensity that appeared suitable. However, since that time the site has been greatly damaged by quad-bikes (J. Clark, pers. comm.).

North York Moors		Site name	Ness Head	
Alkaline Fen &		Site ref	294	
Transition Mire / Quaking Bog		Quadrat ID	294001	
Survey 2011		Stand ref	Stand 1	
		NGR	SE	
Domin scores for all quadrats		Easting	482844	
DAFOR scores for stands		Northing	488486	
		Date	02/09/2011	
PE	Phil Eades	Recorder name	PE	
RT	Ros Tratt	NVC community	M9	
		Notes	water tracks with C.rostrata	
		Quadrat size	1x4m	
		pH	7.3	
		EC (µS cm^{-1})	425	
		Photo?	Y	

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)
352	Carex rostrata		6	D
418	Cirsium palustre		1	R
1596	Cratoneuron commutatum	Palustriella commutata	8	D
4340	Cratoneuron commutatum	Palustriella falcata	1	O
535	Equisetum palustre		3	F
546	Eriophorum angustifolium		4	F
719	Juncus acutiflorus		5	F
855	Mentha aquatica		1	O


Ness Head (FenBase Site 294)
Central grid ref: SE 82844 88486
Surveyor: Phil Eades 02/09/2011
Alkaline fen (Stand 1: M9)
1

8.33 NORTH DALE (NEWTONDALE SSSI)

Vegetation stands and target notes are identified in the images following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.33.1 Site Description

Northdale refers to part of the northern section of Newtondale, stretching from immediately south of Fen Bogs (see Section 8.26) and Fen House (see Section 8.27), southwards to the confluence with Havern Beck (see Section 8.29). The dale is steep sided, with valley slopes that support a mixture of bracken, heathland, scattered scrub, and occasional base-rich seepages that tend to emerge just below a line of low, discontinuous crags near the top of the eastern valley side. Much of the western valley side is afforested with conifer plantation. The valley floor is generally occupied by a mixture of tall-herb fen and swamp communities on either side of the railway and the small, slowly meandering Pickering Beck.

8.33.2 Stand Descriptions

Stands 1–3, 5, 6 & 9 (SE 84107 96289 to SE84379 95473; Quadrats 289001–3, 5, 6 & 9)

M10 *Carex dioica–Pinguicula vulgaris* mire

(MATCH coefficients ranged from 31.7–49.0%)

The majority of mires sampled in Northdale were small, skeletal, base-rich seepages on steep ground beneath a discontinuous outcrop near the top of the slope, and flushed areas downslope of the seepages. In addition to the six sampled sites, there were at least six further seepages that were noted (TN 1 – 6) but not sampled due to time constraints. However, cursory inspection showed that they were of similar character to the sampled mires.

In all cases these stands supported a variety of bryophytes and low-growing sedges, rushes, grasses and forbs, including *Anagallis tenella, Aneura pinguis, Briza media, Bryum pseudotriquetrum, Campylium stellatum, C. dioica, C. flacca, C. hostiana, C. pulicaris, C. panicea, C. viridula* subsp. *brachyrrhyncha, C. viridula* subsp. *oedocarpa, Cirsium palustre, Ctenidium molluscum, Dactylorhiza fuchsii, Dactylorhiza* spp., *Drosera rotundifolia, Eleocharis quinqueflora, Eriophorum angustifolium, Philonotis calcarea, Fissidens adianthoides, Leontodon hispidus, L. autumnalis, Linum catharticum, Juncus articulatus, J. bulbosus, Palustriella falcata, Pellia endiviifolia, Philonotis calcarea, Pinguicula vulgaris, Prunella vulgaris, Scorpidium cossonii, S. scorpioides, Succisa pratensis, Tussilago farfara, Triglochin palustris* and *Valeriana dioica.* Notably, Stand 1 also supported occasional *Chara* sp. in small runnels at the base of the steep slope.

These base-rich stands of mire vegetation can be clearly assigned to the M10 community and categorised as Alkaline Fen.

Stand 10 (SE 84379 95473; Quadrat 289010)

M9 *Carex rostrata–Calliergon cuspidatum/giganteum* mire /
M22 *Juncus subnodulosus–Cirsium palustre* fen meadow

(MATCH coefficient for M9: 29.6%)

Near the southern end of Northdale, on the valley bottom close to the confluence with Havern Beck, there is a broad strip of species-poor mire vegetation dominated by *Juncus subnodulosus* and *Myrica gale* (not sampled although probably has affinity to species-poor M22). Within this is a small stand (only c. 5 m^2) of lower-growing vegetation where the *Juncus subnodulosus* and *Myrica* are less robust and are accompanied by *Campylium stellatum, Carex rostrata, C. viridula* subsp. *brachyrrhyncha, Drosera rotundifolia, Eleocharis quinqueflora, Menyanthes trifoliata, Pinguicula vulgaris, Potamogeton polygonifolius,* and *Scorpidium scorpioides.* The vegetation is poorly defined, and all

MATCH coefficients are correspondingly low; the stand should probably best be considered to have affinities to both M9 and M22, and be categorised as Alkaline Fen.

Stand 11 (SE 84374 95440; Quadrat 289011)

M13c *Schoenus nigricans–Juncus subnodulosus* mire,
Caltha palustris–Galium uliginosum sub-community

(MATCH coefficient: 39.1%)

In the same strip of *Juncus subnodulosus* and *Myrica* vegetation as Stand 10, is a second small stand (approximately 12 m^2) of low-growing vegetation where the *Juncus subnodulosus* and *Myrica* are accompanied by a more diverse mix of species such as *Bryum pseudotriquetrum, Campylium stellatum, Carex panicea, C. viridula* subsp. *brachyrrhyncha, Ctenidium molluscum, Eleocharis quinqueflora, Fissidens adianthoides, Menyanthes trifoliata, Molinia caerulea, Palustriella falcata, Pedicularis palustris, Pinguicula vulgaris, Philonotis calcarea, Plagiomnium elatum, Scorpidium cossonii, Succisa pratensis,* and *Valeriana dioica.* Again the MATCH coefficients are low; however this stand can probably best be assigned to the M13c community, and categorised as Alkaline Fen.

Stand 4 (SE 84150 96214; Quadrat 289004)

M37 *Cratoneuron commutatum–Festuca rubra* spring

(MATCH coefficient: 26.3%)

Two narrow steep gullies run from just below a short rock scar near the top of the eastern slope of Northdale. The eastern-most of these has two small springs issuing from just below the top of the gully, and the western of these supports a narrow strip of bryophyte-rich vegetation on loose, rocky soils, dominated in parts by *Palustriella commutata* and *Philonotis calcarea*, with a scattering of *Bryum pseudotriquetrum, Calliergonella cuspidata* and *Pellia endiviifolia*. Mingled with these are occasional grasses, rushes and forbs, including *Anagallis tenella, Carex flacca, C. viridula* subsp. *oedocarpa, Cirsium palustre, Holcus lanatus, Juncus articulatus, J. acutiflorus, J. inflexus, Prunella vulgaris* and *Ranunculus repens.* MATCH coefficients are extremely low, but the vegetation can probably be assigned to the M37 spring community.

Stand 7 (SE 84178 96048; Quadrat 289007)

S27a *Carex rostrata–Potentilla palustris* tall-herb fen,
Carex rostrata–Equisetum fluviatile sub-community /

M9 *Carex rostrata–Calliergon cuspidatum/giganteum* mire

(MATCH coefficients: S27a - 41.6% fit; M9b – 34.2% fit)

Stand 7 is a small patch of quaking fen on the valley bottom of Northdale (about 350 m north-west of Stand 8) that is dominated by *Carex rostrata,* with abundant *Calliergon giganteum, Comarum palustre, Juncus acutiflorus, Menyanthes trifoliata, Myrica gale* and *Scorpidium scorpioides*, plus a scattering of *Caltha palustris, Equisetum fluviatile, E. palustre* and *Potamogeton polygonifolius.* Whilst the highest MATCH coefficient was for S9b (52.1%), it is not considered to be that plant community because it supports abundant bryophytes and a number of poor-fen plant species that are also characteristic of S27a and M9, and it is part of a fairly continuous semi-floating raft that nearby supports more typical S27a vegetation. Rodwell (1991) considers that these two factors can to some extent be used to distinguish between S9 and S27. Stand 7 is probably intermediate between M9 and S27a, and qualifies as a form of Transition Mire / Quaking Bog.

Stand 8 (SE 84383 95672; Quadrat 289008)

S27a *Carex rostrata–Potentilla palustris* tall-herb fen,
Carex rostrata–Equisetum fluviatile sub-community

(MATCH coefficient: 61.3% fit)

Various parts of the valley bottom of Northdale support stands of vegetation, some quite large, that are dominated by a mixture of *Carex rostrata, Comarum palustre, Equisetum fluviatile, Hydrocotyle vulgaris, Juncus acutiflorus* and *Mentha aquatica,* plus a number of other associates at lower cover,

including *Agrostis canina, A. stolonifera, Calliergon giganteum, Caltha palustris, Cardamine pratensis, Epilobium palustre, Galium palustre, Menyanthes trifoliata.* These stands are particularly notable for the presence of the increasingly scarce *Stellaria palustris*. This vegetation type can clearly be assigned to S27a and is considered to be a form of Transition Mire / Quaking Bog.

8.33.3 Wetland Substrata & Water Supply

The M10 mires are generally associated with permanent but quite weak seepages that, in some cases, are barely damp in summer months. They appear to be irrigated by base-rich groundwater (pH 6.9–7.9; EC 270–570 µS cm^{-1}) emerging from the base of the outcropping strata near the top of the slope. The putative M37 spring stand is associated with a more vigorous upwelling of base-rich ground water (pH 8.1; EC 470 µS cm^{-1}) in the same situation. However, the adjacent gully vegetation is quite robust and grassy, so perhaps nutrient-enrichment is preventing the development of the typically oligotrophic M10 vegetation that is present on nearby seepage areas, although the source of any such enrichment is not obvious.

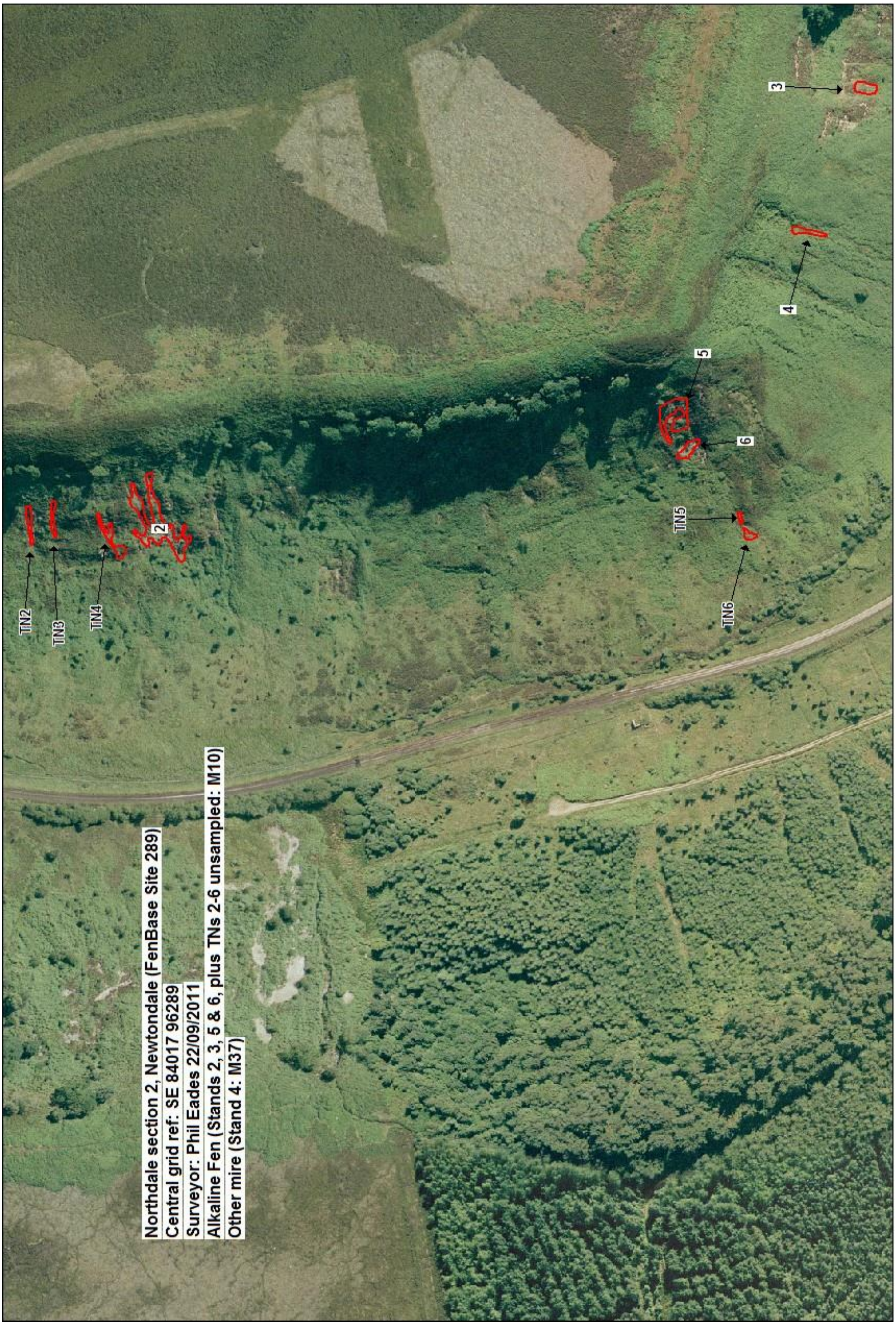
The small patches of probable M9/M22 and M13c Alkaline Fen vegetation over deep peat on the valley bottom show no obvious water sources, although their contrast with the surrounding rushy vegetation suggests that these patches may mark some sort of base-rich (pH 6.5–7.0; EC 440–510 µS cm^{-1}) and nutrient-poor seepage emanating from beneath the peat.

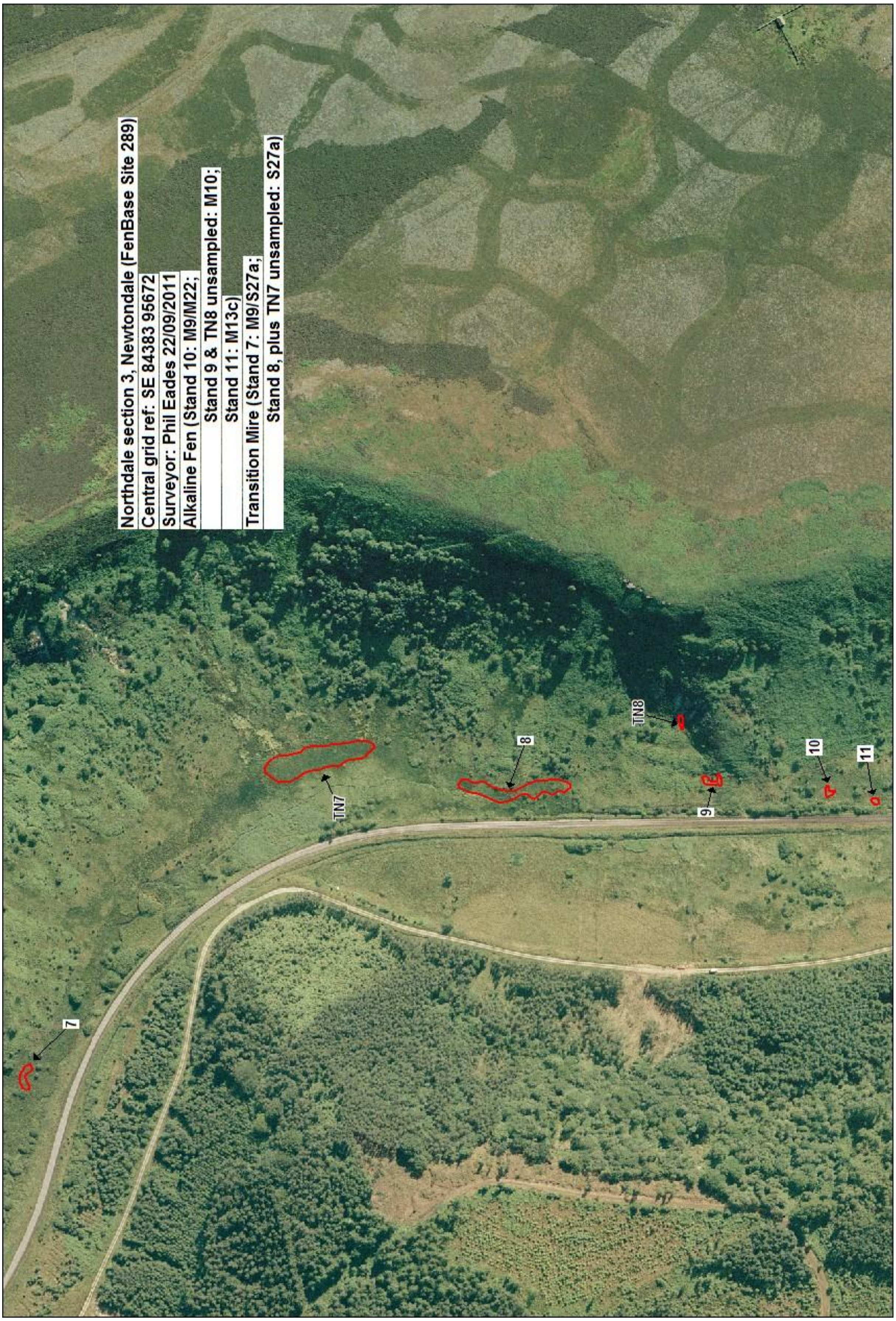
The water source of the S27a tall-herb fen stands is also unclear; however they may be irrigated by a combination of surface flow from the valley side and impeded drainage / percolation along the peaty valley floor (measured pH range: pH 5.7–6.1; EC 150–320 µS cm^{-1}).

8.33.4 Site Management

The whole of Northdale is lightly grazed by sheep and deer, and no management issues were observed at this location.


Northdale section 1, Newtondale (FenBase Site 289)
Central grid ref: SE 84017 96289
Surveyor: Ros Tratt 22/09/2011
Alkaline Fen (Stand 1, plus TN 1 unsampled: M10)
TN1
1


Northdale section 2, Newtondale (FenBase Site 289)
Central grid ref: SE 84017 96289
Surveyor: Phil Eades 22/09/2011
Alkaline Fen (Stands 2, 3, 5 & 6, plus TNs 2-6 unsampled: M10)
Other mire (Stand 4: M37)
TN2
TN3
TN4
2
5
6
TN5
TN6
3
4


Northdale section 3, Newtondale (FenBase Site 289)
Central grid ref: SE 84383 95672
Surveyor: Phil Eades 22/09/2011
Alkaline Fen (Stand 10: M9/M22;
Stand 9 & TN8 unsampled: M10;
Stand 11: M13c)
Transition Mire (Stand 7: M9/S27a;
Stand 8, plus TN7 unsampled: S27a)
TN8
8
TN7
9
10
11
7

North York Moors	Site name	North Dale		North Dale		North Dale		North Dale		North Dale		North Dale	
Alkaline Fen &	Site ref	289		289		289		289		289		289	
Transition Mire / Quaking Bog	Quadrat ID	289001		289002		289003		289004		289005		289006	
Survey 2011	Stand ref	Stand 1		Stand 2		Stand 3		Stand 4		Stand 5		Stand 6	
	NGR	SE		SE		SE		SE		SE		SE	
Domin scores for all quadrats	Easting	484351		484004		484239		484150		484043		484017	
	Northing	497261		496610		496181		496214		496292		496288	
PE Phil Eades	Date	22/09/2011		30/09/2011		30/09/2011		30/09/2011		22/09/2011		22/09/2011	
RT Ros Tratt	Recorder name	RT		PE		PE		PE		PE		PE	
	NVC community	M10		M10		M10		M37		M10		M10	
	Notes	Base-rich seepage & flush		Large base-rich seepage		Damp seepage		small base-rich spring, on steep slope		seepages & steep flushes below outcrop		seepages & steep flushes below outcrop	
	Quadrat size	2x2m		1x4m		1x4m		1x4m		1x4m		1x4m	
	pH	7.0		7.9				8.1		6.9		7.5	
	EC (µS cm-1)	357		460				470		570		360	
	Photo?	Y		Y		Y		Y		Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
122	Agrostis stolonifera				1	O								
163	Anagallis tenella		3	A			2	F	3	A				
2256	Aneura pinguis		3	F										
230	Bellis perennis				1	O							3	F
251	Briza media		0	O	2	F	2	F			4	A	3	F
1546	Bryum pseudotriquetrum								2	F				
1445	Calliergon cuspidatum	Calliergonella cuspidata							2	F				
1571	Campylium stellatum		4	A	3	A	3	A					4	A
315	Carex dioica		3	F	3	F								
319	Carex echinata				0	O								
323	Carex flacca				0	O	3	F	1	R	0	F	4	A
325	Carex hostiana		2	F	0	O	2	O			0	O		
339	Carex panicea		3	A	3	A	5	A			4	A		
347	Carex pulicaris				0	O								
329	Carex viridula ssp brachyrrhyncha		3	A	4	A	2	F	3	F	4	A		
312	Carex viridula ssp oedocarpa												5	A
362	Carlina vulgaris										0	R		
2730	Chara sp		1	O										
418	Cirsium palustre				2	O			3	F	3	F	3	F
1596	Cratoneuron commutatum	Palustriella commutata	0	O	3	F			7	A	4	A		
4340	Cratoneuron commutatum	Palustriella falcata			4	A					4	A		
1600	Ctenidium molluscum		3	F			2	F			0	O	1	O
1249	Danthonia decumbens				0	R					2	O		
3266	Drepanocladus revolvens v	Scorpidium cossonnii	3	F										
494	Drosera rotundifolia				0	O								
532	Equisetum arvense		0	O	0	O								
535	Equisetum palustre		0	O	0	O								
542	Erica tetralix				0	O								
546	Eriophorum angustifolium		3	F										
576	Festuca rubra		1	O					3	F				
1683	Fissidens adianthoides		3	F	0	F					1	O		
587	Fragaria vesca												1	R
680	Holcus lanatus								3	F				
719	Juncus acutiflorus				2	F			4	A				
722	Juncus articulatus		3	F	3	F			3	F	3	F	4	A
729	Juncus conglomeratus						1	O			0	R	4	F
730	Juncus effusus				2	O					1	R		
733	Juncus inflexus								3	F				
768	Leontodon autumnalis				2	O							3	F
769	Leontodon hispidus				0	R	2	O			3	F		
786	Linum catharticum				0	R					3	F		
876	Molinia caerulea		3	F	4	A	6	A			1	O	1	R
885	Myosotis stolonifera								0	R				
893	Myrica gale		1	O										
900	Nardus stricta										3	F	2	O
946	Pedicularis palustris		1	O										
2222	Pellia endivifolia								2	F				
1845	Philonotis calcarea								4	A			3	F
970	Pinguicula vulgaris		3	F	3	F	3	F			3	F	3	A
1046	Potentilla erecta						2	O			1	O	1	O
1059	Prunella vulgaris								2	F	2	F	1	O
1089	Ranunculus flammula										1	O	1	R
1095	Ranunculus repens								3	F			1	R
2254	Riccardia multifida		3	F										
1179	Salix repens agg.		0	O	3	O								
1235	Selaginella selaginoides		3	F										
1305	Succisa pratensis		3	F	0	F								
2982	Taraxacum seedlings												0	R
1354	Triglochin palustre				0	O								
1360	Tussilago farfara				1	O					2	F		
1380	Valeriana dioica		2	F							3	F		

North York Moors		Site name	North Dale		North Dale		North Dale		North Dale		North Dale	
Alkaline Fen &		Site ref	289		289		289		289		289	
Transition Mire / Quaking Bog		Quadrat ID	289007		289008		289009		289010		289011	
Survey 2011		Stand ref	Stand 7		Stand 8		Stand 9		Stand 10		Stand 11	
		NGR	SE		SE		SE		SE		SE	
Domin scores for all quadrats		Easting	484178		484383		484386		484379		484374	
		Northing	496048		495672		495560		495473		495440	
PE	Phil Eades	Date	22/09/2011		22/09/2011		03/09/2011		22/09/2011		22/09/2011	
RT	Ros Tratt	Recorder name	PE		PE		PE		PE		PE	
		NVC community	S27a		S27a		M10		M9a		M13c	
		Notes	small stand of quaking Cx rostrata swamp		Extensive quaking Cx rostrata swamp		Springs & flush at base of bracken slope		Base-rich soakway within J.sub & Myrica		Base-rich soakway within J.sub & Myrica	
		Quadrat size	3x8m		4x4m		1x4m		2x2m		2x2m	
		pH	6.1		5.7		7.1		7.0		6.5	
		EC (µS cm-1)	320		150		270		440		510	
		Photo?	Y		Y		Y		Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
120	Agrostis canina				4	F						
122	Agrostis stolonifera				2	O						
163	Anagallis tenella						3	F				
2256	Aneura pinguis						1	O				
251	Briza media						1	O				
1546	Bryum pseudotriquetrum						2	O	3	F	4	A
1445	Calliergon cuspidatum	Calliergonella cuspidata					3	F			4	A
1446	Calliergon giganteum		4	A	4	A						
279	Caltha palustris		1	O	3	F						
1571	Campylium stellatum						3	A	3	A	3	F
295	Cardamine pratensis				2	F						
319	Carex echinata						5	A				
323	Carex flacca						4	A			3	F
339	Carex panicea						4	A			5	A
352	Carex rostrata		9	A	6	A			4	A		
329	Carex viridula ssp brachyrrhyncha						1	O	4	A	4	A
312	Carex viridula ssp oedocarpa						4	A				
418	Cirsium palustre						1	O				
4340	Cratoneuron commutatum	Palustriella falcata									3	F
1600	Ctenidium molluscum						3	F			2	O
466	Dactylorhiza fuchsii						1	O				
3192	Dactylorhiza sp.										1	O
3266	Drepanocladus revolvens v	Scorpidium cossonnii					1	O			3	F
494	Drosera rotundifolia						3	F	3	F		
510	Eleocharis quinqueflora						4	A	3	F	3	F
525	Epilobium palustre				3	F						
532	Equisetum arvense										2	O
533	Equisetum fluviatile		3	F	5	A			1	O		
535	Equisetum palustre		1	R			4	A	1	R	1	O
546	Eriophorum angustifolium						3	F				
1683	Fissidens adianthoides						0	O			3	F
609	Galium palustre				4	F						
690	Hydrocotyle vulgaris				6	A						
719	Juncus acutiflorus		4	A	4	F						
722	Juncus articulatus						0	O				
726	Juncus bulbosus						3	F				
2732	Juncus subnodulosus								6	A	6	A
855	Mentha aquatica				6	A						
862	Menyanthes trifoliata		6	A	0	F			0	O		
876	Molinia caerulea						1	O			3	F
893	Myrica gale		5	A					3	F	7	A
946	Pedicularis palustris										4	A
2222	Pellia endiviifolia						1	O				
1845	Philonotis calcarea						4	A			4	A
970	Pinguicula vulgaris						3	F	3	A	3	F
1804	Plagiomnium elatum										3	F
1037	Potamogeton polygonifolius		3	F					3	F		
1049	Potentilla palustris	Comarum palustre	6	A	5	A						
1089	Ranunculus flammula				0	O						
1947	Scorpidium scorpioides		6	A					7	A		
1223	Scutellaria galericulata				3	F						
1302	Stellaria palustris				1	F						
1305	Succisa pratensis						3	F			3	F
1354	Triglochin palustre						0	F				
1380	Valeriana dioica						2	O			3	F

8.34 NORTHDALE SCAR (NEWTONDALE SSSI)

See Fen Bogs site map (Section 8.26) for stand locations. Quadrat records are shown in the accompanying spreadsheet extract.

8.34.1 Site Description

Strong springs and seepages emerge from the very steep lower face of the scarp, and flush down rather loose and very steep shaley slopes with sparse patches of *Bryum pseudotriquetum, Palustriella commutata* and *Philonotis calcarea,* and scattered *Carex flacca* and *Carex viridula* subsp. *brachyrrhyncha*. The water is then channelled into a landslip area downslope, mainly dominated by bracken and rushy vegetation. In some areas the water spreads to form very small patches of swampy wetlands in soakways and hollows. These tend to support vegetation rich in sedges, in particular *Carex echinata*, *Carex rostrata* and *Carex viridula* subsp. *brachyrrhyncha*. The wetland areas are very small and quickly become drier and dominated by rushes *(Juncus acutiflorus* and *Juncus* effusus) away from the main water sources. *Menyanthes trifoliata* is scattered throughout and *Potentilla palustris* is sometimes prominent. *Calliergon giganteum* was recorded in one of these hollows during the survey.

8.34.2 Stand Descriptions

Stand 1 (SE84179 97492; quadrat 281001)

Affinities to M9 *Carex rostrata–Calliergon cuspidatum* mire

(MATCH coefficient 30.5%)

This is a very small area (15 x 2 m) of wetland vegetation developed in a small hollow around a strong water track associated with a spring outflow, and fringed by abundant *Equisetum telmateia* at the edge of the adjacent alder wood. *Carex echinata* and *Carex viridula* subsp. *brachyrrhyncha* form a tall sward over a moss layer with *Calliergon cuspidatum, Climacium dendroides* and *Plagiomnium rostratum*. Herbs include *Cirsium palustre, Galium uliginosum, Hydrocotyle vulgaris, Lotus pedunculatus, Mentha aquatica* and *Menyanthes trifoliata*. This vegetation is difficult to assign to a particular NVC community, having affinities to M9, but also to M23 rush pasture, but can be considered to fit the Alkaline Fen category.

Stand 2 (SE 84145 97477; quadrat 281002)

S27a *Carex rostrata–Potentilla palustris* swamp
Carex rostrata–Equisetum fluviatile sub-community

(MATCH coefficient 40.0%)

This is a small stand (approx 15 x 30 m) of swamp which grades into rush-dominated vegetation. *Carex rostrata, Juncus acutiflorus* and *Comarum palustre* are co-dominant, with scattered *Equisetum fluviatile, Myosotis laxa, Mentha aquatica, Ranunculus flammula* and *Lotus pedunculatus*. Mosses *Calliergonella cuspidata* and *Plagiomnium rostratum* occur in low hummocks, and there are also a few patches of *Calliergon giganteum.* This vegetation can be assigned to S27a *Carex rostrata–Potentilla palustris* swamp, *Carex rostrata–Equisetum fluviatile* sub-community, and is considered to be Transition Mire / Quaking Bog.

8.34.3 Wetland Substrata & Water Supply

Base-rich: pH 6.1–7.2; EC 275–350 µS cm^{-1}). No tufa deposition.

8.34.4 Site Management

Grazed by sheep. No management issues noted.

North York Moors		Site name	Northdale Scar		Northdale Scar	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	281		281	
		Quadrat ID	281001		281002	
		Stand ref	Stand 1		Stand 2	
		NGR	SE		SE	
Domin scores for all quadrats		Easting	484176		484145	
		Northing	497504		497476	
PE	Phil Eades	Date	22/09/2011		22/09/2011	
RT	Ros Tratt	Recorder name	RT		RT	
		NVC community	M9aff		S27a	
		Notes			landslip area with springs and flushes	
		Quadrat size	2x2m		2x2m	
		pH			6.1	
		EC (µS cm-1)				
		Photo?				

Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
1445	Calliergon cuspidatum	Calliergonella cuspidata	5	A	3	F
1446	Calliergon giganteum				4	A
319	Carex echinata		3	F	1	O
323	Carex flacca		2	F		
352	Carex rostrata				6	A
329	Carex viridula ssp brachyrrhyncha		5	A		
418	Cirsium palustre		0	O		
1593	Climacium dendroides		0	O		
533	Equisetum fluviatile		1	O	3	F
535	Equisetum palustre				1	O
538	Equisetum telmateia		1	O		
583	Filipendula ulmaria		0	O		
612	Galium uliginosum		2	F	2	O
690	Hydrocotyle vulgaris		4	A		
719	Juncus acutiflorus		8	A	4	A
802	Lotus pedunculatus		1	O	2	F
855	Mentha aquatica		4	A	0	O
862	Menyanthes trifoliata		3	F		
886	Myosotis laxa caespitosa	Myosotis laxa			1	O
1795	Plagiomnium rostratum		4	A	6	A
1049	Potentilla palustris	Comarum palustre			6	A
1089	Ranunculus flammula				2	O
1971	Sphagnum palustre		0	O		
1980	Sphagnum squarrosum		0	O		
1380	Valeriana dioica		1	O		

8.35 RAINDALE BECK (NEWTONDALE SSSI)

8.35.1 Site Description

Felled plantation areas identified as potential areas of wetland interest. None found.

8.36 RAYGATE SLACK (NEWTONDALE SSSI)

8.36.1 Site Description

Situated in Unit 10 of Newtondale SSSI, this clearing within forestry plantation supported tall species-rich fen meadow vegetation on damp soils that have been partially drained. The area is managed by regular mowing. No target Alkaline Fen or Transition Mire vegetation was identified.

8.37 RHUMBARD SNOUT (NEWTONDALE SSSI)

Vegetation stands are identified in the image following this account; quadrat records are shown in the accompanying spreadsheet extract. The general site location is shown on Figure 1.

8.37.1 Site Description

Rhumbard Snout is a small promontory in the lower part of the steep eastern side of Newton Dale, formed at a point where a small side-valley cuts back obliquely north-eastwards from the vicinity of Levisham station towards the adjoining plateau with Levisham village. The side-valley contains a small, partly ditched, stream and the road to the station. Towards the lower end of the side-valley, at about 90–100 m aOD, small soligenous wetlands occur on the steeply-sloping ground alongside the road, where a low outcrop of rock is visible.

8.37.2 Stand Descriptions

Stand 1 (SE 81882 91203; Quadrat 293001)

M10 *Carex dioica–Pinguicula vulgaris* mire

Stand 2 (SE 81870 91155; Quadrat 293002)

M10aiii *Carex dioica–Pinguicula vulgaris* mire,
Carex demissa–Juncus bulbosus/kochii sub-community, *Schoenus nigricans* variant

(MATCH coefficients: 39.7% and 42.9% respectively)

Both wetland stands are characterised by a diverse mix of bryophytes, small sedges, rushes, grasses and forbs, including *Anagallis tenella, Briza media, Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Ctenidium molluscum, C. echinata, C. flacca, C. panicea, C. viridula* subsp. *oedocarpa, Cirsium palustre, Drosera rotundifolia, Fissidens adianthoides, Juncus articulatus, J. bulbosus, Pinguicula vulgaris, Scorpidium cossonii*, and *Succisa pratensis*. Stand 1, which is found on steeper ground where the bedrock outcrops, can clearly be assigned to M10, although it also has a strong affinity to M13b.

Stand 2 is situated on a gentler slope and deeper soil, and in addition to the above species it supports a clump of *Schoenus nigricans,* plus *Aneura pinguis, Carex hostiana, C. pulicaris, C. viridula* subsp. *brachyrrhyncha, Eleocharis quinqueflora, Hydrocotyle vulgaris, Molinia caerulea, Parnassia palustris* and *Triglochin palustris.* MATCH analysis shows this stand to have almost equally strong affinities with M10a and M13b (48.4% and 48.6% coefficients respectively). However, it can probably be best assigned to the *Schoenus nigricans* variant of M10a, since it lacks *Juncus subnodulosus, Schoenus* is only very localised, and there are nearby sites supporting much more typical M13 vegetation (e.g. Troutsdale & Rosekirk Dale SSSI (see Section 8.22), Eller's Wood & Sand Dale SSSI (see Section 8.18), and Seive Dale Fen SSSI (not sampled)). Both stands can be categorised as Alkaline Fen.

8.37.3 Wetland Substrata & Water Supply

The seepages associated with these mires are in places skeletal, but elsewhere they are associated with shallow peat (up to 45 cm deep) over clay, and strong enough to give rise to a small rivulet that runs alongside the road. The seepages are also base-rich: pH values measured were 6.5 and 7.3, with associated EC values of 360 and 300 μS cm^{-1}, and they may represent groundwater seeping from the exposed band of bedrock, or from the overlying strata.

8.37.4 Site Management

The vegetation here is lightly grazed and poached by both sheep and cattle. More importantly, there is a small water abstraction structure approximately 10 m upslope of the main wetland feature, and this appears to have had an impact upon the wetland immediately below, which appears drier and more grass-dominated than the adjacent sampled mire stands.


Rhumbard Snout, Newtondale (FenBase Site 293)
Central grid ref: SE 81869 91154
Surveyor: Phil Eades 21/09/2011
Alkaline Fen (Stand 1: M10; Stand 2: M10aiii)
1
2

North York Moors		Site name	Rhumbard Snout		Rhumbard Snout	
Alkaline Fen & Transition Mire / Quaking Bog Survey 2011		Site ref	293		293	
		Quadrat ID	293001		293002	
		Stand ref	Stand 1		Stand 2	
		NGR	SE		SE	
Domin scores for all quadrats		Easting	481881		481869	
		Northing	491202		491154	
PE	Phil Eades	Date	21/09/2011		21/09/2011	
RT	Ros Tratt	Recorder name	PE		PE	
		NVC community	M10a		M10aiii	
		Notes	Wet seepage with Ping.vulg beside road		Wet seepage with Schoenus, beside road	
		Quadrat size	1x4m		2x2m	
		pH	7.3		6.5	
		EC (µS cm-1)	300		360	
		Photo?	Y		Y	
Species code	MATCH species name	Modern synonym (where changed)	Domin score (Quadrat)	DAFOR (Stand)	Domin score (Quadrat)	DAFOR (Stand)
163	Anagallis tenella		4	A	3	F
2256	Aneura pinguis				0	O
171	Anthoxanthum odoratum		0	O		
251	Briza media		3	F	3	F
1546	Bryum pseudotriquetrum		0	O	0	O
1445	Calliergon cuspidatum	Calliergonella cuspidata	3	F	1	O
278	Calluna vulgaris		2	O		
1571	Campylium stellatum		4	A	0	O
319	Carex echinata		3	F	2	O
323	Carex flacca		3	F	3	F
325	Carex hostiana				1	O
339	Carex panicea		5	A	6	A
347	Carex pulicaris		1	O	0	O
329	Carex viridula ssp brachyrrhyncha				4	A
312	Carex viridula ssp oedocarpa		4	A	2	F
418	Cirsium palustre		2	F	2	F
1596	Cratoneuron commutatum	Palustriella commutata	4	A		
1600	Ctenidium molluscum		3	F	0	O
1249	Danthonia decumbens		3	F		
3266	Drepanocladus revolvens v	Scorpidium cossonnii	3	F	6	A
494	Drosera rotundifolia		1	O	1	O
510	Eleocharis quinqueflora				5	A
524	Epilobium obscurum		0	O		
532	Equisetum arvense		2	O		
542	Erica tetralix				0	O
1683	Fissidens adianthoides		3	F	1	O
680	Holcus lanatus		1	O		
690	Hydrocotyle vulgaris				3	F
719	Juncus acutiflorus		0	O		
722	Juncus articulatus		3	F	4	A
726	Juncus bulbosus		3	F		
729	Juncus conglomeratus		3	F		
736	Juncus squarrosus		1	O		
768	Leontodon autumnalis		1	O		
802	Lotus pedunculatus		0	O	1	O
876	Molinia caerulea				3	F
900	Nardus stricta		2	O		
944	Parnassia palustris				1	R
946	Pedicularis palustris		3	F		
2222	Pellia endiviifolia		0	O		
1847	Philonotis fontana		1	O		
970	Pinguicula vulgaris		3	F	2	F
1804	Plagiomnium elatum				0	O
973	Plantago lanceolata		1	O	1	O
1037	Potamogeton polygonifolius				3	F
1046	Potentilla erecta		2	O		
1059	Prunella vulgaris		3	F		
1914	Pseudoscleropodium purum		1	O		
1089	Ranunculus flammula		1	O		
1207	Schoenus nigricans				5	A
1305	Succisa pratensis		3	F	0	F
1354	Triglochin palustre				0	O
1380	Valeriana dioica				2	F

9. ANNEX 2: MATCH OUTPUTS

Matching of data with diagnoses for:
Swamps & tall-herb fens
Mires
Mesotrophic grasslands
Calcicolous grasslands
Acid grasslands + montane
Heaths
Woodland and scrub
Sand-dunes & shingle
Weeds & other vegetation

The matching procedures have produced the following results for ARDEN MOOR
sample 29277001

Community code	co-efficient	
M10	43.9	3 subcommunities.
M11	32.8	2 subcommunities.
M13	32.8	3 subcommunities.
M38	29.6	0 subcommunities.
M12	23.7	0 subcommunities.
M 8	23.6	0 subcommunities.
U15	23.5	0 subcommunities.
H 5	22.9	2 subcommunities.
M37	22.6	0 subcommunities.
M26	22.4	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	47.6
M10	43.9
M10a	43.3
M11b	39.8
M13b	37.4
M13c	33.4
M10c	33.0
M11	32.8
M13	32.8
M11a	30.3

The matching procedures have produced the following results for
sample 29277002

Community code	co-efficient	
M10	46.7	3 subcommunities.
M11	34.9	2 subcommunities.
M13	32.8	3 subcommunities.
M38	30.9	0 subcommunities.
M26	25.0	2 subcommunities.
M37	24.4	0 subcommunities.
M 8	24.3	0 subcommunities.
U15	22.5	0 subcommunities.
SD14	22.2	4 subcommunities.
M12	21.7	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	49.4
M10a	47.1
M10	46.7
M11b	40.4
M13b	38.9
M11	34.9
M10c	34.2
M11a	33.4
M13	32.8
M13c	31.0

The matching procedures have produced the following results for
sample 29277003

Community code	co-efficient	
M10	38.8	3 subcommunities.
M13	33.0	3 subcommunities.
M11	30.8	2 subcommunities.
SD14	30.1	4 subcommunities.
M37	28.1	0 subcommunities.
M 9	25.7	2 subcommunities.
M26	25.3	2 subcommunities.
M38	24.9	0 subcommunities.
M22	24.8	4 subcommunities.
M24	21.7	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	43.0
M10	38.8
M13b	37.6
M10c	35.7
M10a	35.6
M11b	35.1
M13c	33.2
M13	33.0
M11	30.8
SD14	30.1

The matching procedures have produced the following results for
sample 29277004

Community code	co-efficient	
M10	37.1	3 subcommunities.
M11	35.7	2 subcommunities.
M13	27.0	3 subcommunities.
M38	25.1	0 subcommunities.
M37	24.7	0 subcommunities.
M 9	23.6	2 subcommunities.
M26	18.2	2 subcommunities.
M12	17.8	0 subcommunities.
M14	16.6	0 subcommunities.
M 8	16.3	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M11b	41.3
M10b	38.7
M10c	37.6
M10	37.1
M11	35.7
M10a	35.6
M13c	29.6
M11a	29.4
M13b	29.0
M13	27.0

The matching procedures have produced the following results for
sample 29277005

Community code	co-efficient	
M10	47.0	3 subcommunities.
M11	40.9	2 subcommunities.
M38	31.5	0 subcommunities.
M13	31.2	3 subcommunities.
H 5	27.0	2 subcommunities.
M26	26.9	2 subcommunities.
M 9	26.7	2 subcommunities.
M37	25.3	0 subcommunities.
M12	23.3	0 subcommunities.
M 8	22.8	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	48.3
M10	47.0
M11b	43.8
M10a	43.2
M11	40.9
M11a	36.8
M13b	36.0
M13c	33.7
M10c	33.2
M38	31.5

The matching procedures have produced the following results for
sample 29277006

Community code	co-efficient	
M10	49.8	3 subcommunities.
M11	46.1	2 subcommunities.
M13	32.7	3 subcommunities.
M38	28.8	0 subcommunities.
M12	26.3	0 subcommunities.
M 9	26.2	2 subcommunities.
M26	23.9	2 subcommunities.
M 8	23.2	0 subcommunities.
M37	21.6	0 subcommunities.
M14	21.5	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	50.5
M10	49.8
M10a	49.7
M11b	48.7
M11	46.1
M11a	41.6
M13b	39.4
M10c	38.6
M13c	33.8
M13	32.7

The matching procedures have produced the following results for
sample 29277007

Community code	co-efficient	
M10	39.1	3 subcommunities.
M11	32.3	2 subcommunities.
M13	31.1	3 subcommunities.
M38	26.8	0 subcommunities.
M 9	26.0	2 subcommunities.
M26	25.8	2 subcommunities.
SD14	23.9	4 subcommunities.
M37	20.7	0 subcommunities.
M24	19.5	3 subcommunities.
M22	19.4	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	41.3
M10	39.1
M11b	37.6
M10a	36.5
M13b	35.0
M11	32.3
M13c	31.7
M13	31.1
M10c	30.5
M 9a	28.7

The matching procedures have produced the following results for BILLER HOWE
sample 29018001

Community code	co-efficient	
M 5	30.7	0 subcommunities.
S 9	30.1	2 subcommunities.
S27	29.0	2 subcommunities.
M 9	28.1	2 subcommunities.
M23	27.3	2 subcommunities.
M29	26.3	0 subcommunities.
M25	25.2	3 subcommunities.
M 4	24.4	0 subcommunities.
S10	24.1	2 subcommunities.
W 3	22.7	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
S27a	38.1
S 9b	36.4
S10b	31.9
M 5	30.7
S 9	30.1
M 9b	30.1
S27	29.0
M 9	28.1
M23	27.3
M23a	26.5

The matching procedures have produced the following results for sample 29018002

Community code	co-efficient	
M29	38.6	0 subcommunities.
M21	36.2	2 subcommunities.
M10	34.9	3 subcommunities.
M 6	31.7	4 subcommunities.
M15	29.9	4 subcommunities.
M14	29.6	0 subcommunities.
M11	29.5	2 subcommunities.
M 9	28.8	2 subcommunities.
M 4	26.1	0 subcommunities.
M25	25.7	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M29	38.6
M15a	38.0
M21b	37.7
M 6a	36.5
M21	36.2
M10a	35.6
M10	34.9
M21a	34.0
M 9a	32.7
M 6	31.7

The matching procedures have produced the following results for sample 29018003

Community code	co-efficient	
M21	42.6	2 subcommunities.
M 2	39.7	2 subcommunities.
M15	34.8	4 subcommunities.
M 4	34.6	0 subcommunities.
M 5	32.5	0 subcommunities.
M 6	30.8	4 subcommunities.
W 4	28.9	3 subcommunities.
M17	27.5	3 subcommunities.
M18	26.9	2 subcommunities.
M25	25.7	3 subcommunities.

Matches against sub-communities

Community code	co-efficient
M21b	47.3
M21	42.6
M 2b	42.3
M 2	39.7
M 6a	35.1
M15b	34.8
M15	34.8
M 4	34.6
W 4c	34.3
M15a	34.1

The matching procedures have produced the following results for sample 29018004

Community code	co-efficient	
S 9	52.1	2 subcommunities.
S10	35.6	2 subcommunities.
S 8	29.7	3 subcommunities.
M 4	28.1	0 subcommunities.
S19	26.2	3 subcommunities.
M29	24.5	0 subcommunities.
S11	19.8	3 subcommunities.
S27	19.2	2 subcommunities.
S 4	18.4	4 subcommunities.
S12	17.3	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
S 9	52.1
S 9b	47.7
S 8c	44.0
S 4c	43.6
S10b	39.8
S 9a	37.8
S10	35.6
S12d	33.3
S10a	30.4
S19b	30.3

The matching procedures have produced the following results for sample 29018005

Community code	co-efficient	
M11	42.9	2 subcommunities.
M10	42.6	3 subcommunities.
M29	34.3	0 subcommunities.
M 9	32.3	2 subcommunities.
M 8	25.1	0 subcommunities.
M14	24.6	0 subcommunities.
M13	23.7	3 subcommunities.
M15	22.7	4 subcommunities.
M 6	21.8	4 subcommunities.
M12	21.6	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	45.2
M11	42.9
M10	42.6
M11b	41.6
M 9a	38.8
M11a	38.3
M15a	35.5
M29	34.3
M 9	32.3
M10b	32.3

The matching procedures have produced the following results for sample 29018006

Community code	co-efficient	
M10	43.9	3 subcommunities.
M29	43.7	0 subcommunities.
M11	38.7	2 subcommunities.
M 9	33.9	2 subcommunities.
M14	32.0	0 subcommunities.
M13	31.3	3 subcommunities.
M21	28.7	2 subcommunities.
M38	27.8	0 subcommunities.
M15	27.5	4 subcommunities.
M 8	26.3	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10	43.9
M29	43.7
M10a	43.0
M 9a	39.3
M11	38.7
M10b	38.0
M11b	37.0
M11a	36.6
M15a	34.1
M 9	33.9

The matching procedures have produced the following results for sample 29018007

Community code	co-efficient	
M10	42.0	3 subcommunities.
M14	38.3	0 subcommunities.
M21	34.8	2 subcommunities.
M15	33.6	4 subcommunities.
H 5	33.2	2 subcommunities.
M 6	31.5	4 subcommunities.
M24	31.0	3 subcommunities.
M25	30.6	3 subcommunities.
M11	29.9	2 subcommunities.
M17	28.9	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	47.5
M10a	46.3
M10	42.0
M14	38.3
M10b	38.1
H 5b	36.5
M21b	35.3
M21	34.8
M 6a	34.0
M15b	33.8

The matching procedures have produced the following results for sample 29018008

Community code	co-efficient	
M10	46.2	3 subcommunities.
M11	42.3	2 subcommunities.
M26	31.6	2 subcommunities.
M13	31.3	3 subcommunities.
M14	29.4	0 subcommunities.
H 5	28.9	2 subcommunities.
M 9	28.7	2 subcommunities.
M24	28.4	3 subcommunities.
M29	28.2	0 subcommunities.
M25	26.4	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	52.2
M10	46.2
M11	42.3
M11b	42.0
M11a	39.7
M10b	39.4
M 9a	33.5
M13b	33.3
M13a	32.4
M26	31.6

The matching procedures have produced the following results for sample 29018009

Community code	co-efficient	
M10	43.4	3 subcommunities.
M11	39.8	2 subcommunities.
M14	34.7	0 subcommunities.
H 5	27.0	2 subcommunities.
M15	24.5	4 subcommunities.
M13	23.7	3 subcommunities.
M21	23.6	2 subcommunities.
M17	20.4	3 subcommunities.
SD14	18.9	4 subcommunities.
M 9	18.2	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	49.0
M10	43.4
M11b	42.9
M11	39.8
M10b	35.7
M14	34.7
M15a	33.3
M11a	33.1
M13b	28.6
H 5b	28.0

The matching procedures have produced the following results for sample 29018010

Community code	co-efficient	
M4	49.4	0 subcommunities.
M6	38.8	4 subcommunities.
M5	36.5	0 subcommunities.
S9	29.8	2 subcommunities.
S27	26.3	2 subcommunities.
M23	24.5	2 subcommunities.
W4	24.3	3 subcommunities.
M29	22.3	0 subcommunities.
M25	22.2	3 subcommunities.
M 7	21.7	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M4	49.4
M6c	41.3
M6	38.8
M5	36.5
M6d	35.4
M6a	34.6
S27a	30.0
S9	29.8
W4c	26.9
S27	26.3

The matching procedures have produced the following results for sample 29018011

Community code	co-efficient	
M29	40.9	0 subcommunities.
S27	28.8	2 subcommunities.
M5	26.9	0 subcommunities.
M9	26.5	2 subcommunities.
M38	25.8	0 subcommunities.
M23	24.2	2 subcommunities.
M37	22.1	0 subcommunities.
M35	21.5	0 subcommunities.
M11	21.5	2 subcommunities.
M 32	20.3	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M29	40.9
S27a	31.6
S27	28.8
M5	26.9
M9b	26.7
M9	26.5
S27b	26.2
M38	25.8
M9a	24.6
M23	24.2

The matching procedures have produced the following results for BISHOP MONKTON INGS sample 29038001

Community code	co-efficient	
M22	53.0	4 subcommunities.
M13	41.5	3 subcommunities.
M24	38.5	3 subcommunities.
M26	37.4	2 subcommunities.
M 9	34.8	2 subcommunities.
SD15	31.2	4 subcommunities.
MG 8	30.9	0 subcommunities.
M27	29.9	3 subcommunities.
M25	28.9	3 subcommunities.
SD17	28.3	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M22	53.0
M22b	51.9
M22a	51.2
M22d	43.9
M22c	43.1
M24a	41.7
M13a	41.6
M13c	41.5
M13	41.5
M24b	40.0

The matching procedures have produced the following results for sample 29038002

Community code	co-efficient	
M22	50.1	4 subcommunities.
M13	41.1	3 subcommunities.
M24	40.3	3 subcommunities.
M26	36.6	2 subcommunities.
M 9	33.1	2 subcommunities.
SD15	30.3	4 subcommunities.
M27	27.4	3 subcommunities.
M25	26.6	3 subcommunities.
MG12	26.6	2 subcommunities.
M10	26.2	3 subcommunities.

Matches against sub-communities

Community code	co-efficient
M22	50.1
M22a	49.5
M22b	49.4
M24a	44.2
M22d	42.2
M24b	41.5
M13	41.1
M13c	41.1
M13a	41.0
M24	40.3

The matching procedures have produced the following results for sample 29038003

Community code	co-efficient	
M22	53.8	4 subcommunities.
M13	45.5	3 subcommunities.
M24	43.9	3 subcommunities.
M26	40.7	2 subcommunities.
M 9	36.4	2 subcommunities.
S24	33.1	7 subcommunities.
M25	30.7	3 subcommunities.
M27	30.5	3 subcommunities.
SD15	30.2	4 subcommunities.
MG 8	28.4	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M22	53.8
M22b	52.6
M22a	52.4
M22d	51.4
M13c	48.0
M24a	48.0
M13	45.5
M24b	45.4
M22c	45.2
M13b	44.3

The matching procedures have produced the following results for sample 29038004

Community code	co-efficient	
M13	48.1	3 subcommunities.
M22	42.7	4 subcommunities.
M 9	37.5	2 subcommunities.
M26	36.7	2 subcommunities.
M24	36.0	3 subcommunities.
M10	32.6	3 subcommunities.
SD15	29.8	4 subcommunities.
M25	27.1	3 subcommunities.
S24	26.6	7 subcommunities.
SD14	26.1	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13c	50.9
M13	48.1
M13a	47.1
M13b	44.3
M22	42.7
M24a	42.1
M22a	41.5
M26a	40.6
M22b	39.3
M22c	37.6

The matching procedures have produced the following results for sample 29038005

Community code	co-efficient	
M22	47.3	4 subcommunities.
S24	35.7	7 subcommunities.
SD15	35.4	4 subcommunities.
S25	34.1	3 subcommunities.
M24	32.0	3 subcommunities.
M13	31.9	3 subcommunities.
W 3	31.0	0 subcommunities.
W 5	29.2	3 subcommunities.
M23	28.7	2 subcommunities.
OV26	28.3	5 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M22a	49.8
M22	47.3
M22d	44.8
M22c	44.0
M22b	39.7
S24d	39.5
S24c	39.5
M24a	39.4
SD15d	38.9
S25a	37.7

The matching procedures have produced the following results for CARTERS HOUSE sample 29290001

Community code	co-efficient	
M15	27.0	4 subcommunities.
M25	22.8	3 subcommunities.
M 6	20.1	4 subcommunities.
H 8	20.0	5 subcommunities.
M23	19.4	2 subcommunities.
M17	19.0	3 subcommunities.
M10	19.0	3 subcommunities.
H 7	18.4	5 subcommunities.
M21	18.1	2 subcommunities.
M29	18.0	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	34.1
M15	27.0
M15b	26.3
M 6a	24.6
M25	22.8
M10a	22.5
M17a	22.4
M25c	21.6
M 6d	21.3
H 8d	20.9

The matching procedures have produced the following results for CASTLEBECK WOODS FEN sample 29298001

Community code	co-efficient	
M24	45.6	3 subcommunities.
M22	43.2	4 subcommunities.
M26	40.1	2 subcommunities.
M13	38.8	3 subcommunities.
SD15	36.5	4 subcommunities.
M 9	32.1	2 subcommunities.
M25	31.9	3 subcommunities.
M23	31.2	2 subcommunities.
SD14	31.1	4 subcommunities.
M27	30.3	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M22b	47.1
M24b	46.0
M24	45.6
M22	43.2
M26b	42.7
M22a	42.7
M24a	42.2
SD15d	40.5
M13a	40.3
M26	40.1

The matching procedures have produced the following results for CAWTHORN MOOR sample 29049001

Community code	co-efficient	
M14	38.6	0 subcommunities.
M10	38.5	3 subcommunities.
M13	32.9	3 subcommunities.
M11	32.5	2 subcommunities.
M15	32.1	4 subcommunities.
M21	30.8	2 subcommunities.
M17	28.1	3 subcommunities.
M 9	25.2	2 subcommunities.
M 8	24.6	0 subcommunities.
H 5	24.2	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	42.6
M15a	42.0
M14	38.6
M10	38.5
M10b	37.0
M11b	35.0
M13b	34.7
M13c	34.3
M13	32.9
M11	32.5

The matching procedures have produced the following results for sample 29049002

Community code	co-efficient	
M10	46.1	3 subcommunities.
M11	35.7	2 subcommunities.
M13	35.7	3 subcommunities.
M 9	31.1	2 subcommunities.
M38	29.0	0 subcommunities.
M26	27.2	2 subcommunities.
H 5	26.5	2 subcommunities.
M14	25.1	0 subcommunities.
M37	23.9	0 subcommunities.
M 8	21.7	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	47.3
M10	46.1
M10a	45.4
M11b	41.2
M13b	36.7
M13c	36.5
M11	35.7
M13	35.7
M 9a	35.1
M 9	31.1

The matching procedures have produced the following results for sample 29049003

Community code	co-efficient	
M26	38.0	2 subcommunities.
M 9	36.5	2 subcommunities.
M22	36.4	4 subcommunities.
M13	36.3	3 subcommunities.
M24	33.4	3 subcommunities.
M25	32.6	3 subcommunities.
M10	31.2	3 subcommunities.
SD15	30.5	4 subcommunities.
SD17	30.0	4 subcommunities.
SD14	28.9	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13a	43.2
M26b	40.0
M22b	38.9
M26	38.0
M13b	36.5
M 9	36.5
M22	36.4
M13	36.3
M10b	35.6
M 9b	35.3

The matching procedures have produced the following results for CHALYBEATE SPRING sample 29297001

Community code	co-efficient	
M24	29.8	3 subcommunities.
M25	28.2	3 subcommunities.
M22	28.1	4 subcommunities.
M13	27.4	3 subcommunities.
M27	26.3	3 subcommunities.
S24	25.6	7 subcommunities.
W 2	24.7	2 subcommunities.
S25	23.4	3 subcommunities.
M26	21.2	2 subcommunities.
W 3	20.3	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M24a	36.3
S24c	34.9
M25c	32.8
M13c	30.7
M22d	30.4
M24	29.8
M22a	29.4
M25	28.2
M22	28.1
S25a	27.8

The matching procedures have produced the following results for CRAB APPLE FIELDS sample 29296001

Community code	co-efficient	
M13	47.1	3 subcommunities.
M 9	45.1	2 subcommunities.
M22	45.1	4 subcommunities.
M24	38.9	3 subcommunities.
M26	38.9	2 subcommunities.
M10	36.1	3 subcommunities.
SD15	35.6	4 subcommunities.
SD14	33.2	4 subcommunities.
M25	31.9	3 subcommunities.
W 3	30.0	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13c	49.2
M13b	47.9
M13a	47.3
M13	47.1
M 9b	45.8
M 9	45.1
M22	45.1
M22b	45.0
M26a	44.4
M22d	44.4

The matching procedures have produced the following results for DEEPDALE sample 29274001

Community code	co-efficient	
M13	45.0	3 subcommunities.
M22	42.4	4 subcommunities.
M26	40.2	2 subcommunities.
M24	39.3	3 subcommunities.
SD15	33.1	4 subcommunities.
M 9	30.4	2 subcommunities.
M25	29.9	3 subcommunities.
SD14	28.9	4 subcommunities.
SD17	26.4	4 subcommunities.
W 3	26.2	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13a	48.7
M24a	47.8
M13c	47.2
M13	45.0
M13b	44.2
M22a	43.5
M26a	42.9
M22	42.4
M22b	40.8
M24b	40.7

The matching procedures have produced the following results for sample 29274002

Community code	co-efficient	
M13	42.9	3 subcommunities.
M26	36.1	2 subcommunities.
M24	32.1	3 subcommunities.
M22	31.0	4 subcommunities.
M10	28.3	3 subcommunities.
H 5	26.0	2 subcommunities.
M 9	25.0	2 subcommunities.
SD15	24.7	4 subcommunities.
M11	24.0	2 subcommunities.
M38	23.1	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13c	44.1
M13b	43.0
M13	42.9
M13a	41.4
M24a	37.8
M26	36.1
M26a	35.0
M26b	35.0
M10b	33.2
M24	32.1

The matching procedures have produced the following results for DUNSFORTHS HILL sample 29279001

Community code	co-efficient	
M10	40.0	3 subcommunities.
M11	33.2	2 subcommunities.
M13	31.5	3 subcommunities.
M38	29.6	0 subcommunities.
M 9	29.1	2 subcommunities.
M37	26.1	0 subcommunities.
SD14	24.6	4 subcommunities.
M26	23.6	2 subcommunities.
M 8	23.5	0 subcommunities.
M22	21.6	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10	40.0
M10b	38.6
M10a	37.9
M11b	34.7
M11	33.2
M13c	32.8
M13b	32.2
M11a	32.0
M13	31.5
M38	29.6

The matching procedures have produced the following results for sample 29279002

Community code	co-efficient	
M37	31.6	0 subcommunities.
M38	19.1	0 subcommunities.
M13	17.8	3 subcommunities.
M 9	17.8	2 subcommunities.
M22	17.7	4 subcommunities.
W 3	17.6	0 subcommunities.
M26	15.7	2 subcommunities.
M11	15.1	2 subcommunities.
M10	14.7	3 subcommunities.
M32	13.9	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M37	31.6
M10b	22.0
M13a	22.0
M 9b	19.6
M38	19.1
M13c	18.2
M22a	18.0
M13b	17.9
M13	17.8
M 9	17.8

The matching procedures have produced the following results for sample 29279003

Community code	co-efficient	
M24	37.3	3 subcommunities.
M25	37.1	3 subcommunities.
M26	35.4	2 subcommunities.
M22	30.0	4 subcommunities.
M13	28.1	3 subcommunities.
H 5	27.2	2 subcommunities.
M23	27.1	2 subcommunities.
H 4	24.8	4 subcommunities.
SD15	24.6	4 subcommunities.
W 4	22.6	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M24	37.3
M25	37.1
M24b	35.8
M26	35.4
M26b	35.2
M25c	35.1
M13a	34.9
M24c	34.4
M25b	34.2
M24a	34.0

The matching procedures have produced the following results for sample 29279004

Community code	co-efficient	
M10	41.6	3 subcommunities.
M11	34.0	2 subcommunities.
M 9	33.1	2 subcommunities.
M38	30.9	0 subcommunities.
M13	30.5	3 subcommunities.
M37	30.3	0 subcommunities.
M26	28.4	2 subcommunities.
M 8	25.6	0 subcommunities.
M12	25.0	0 subcommunities.
M22	23.8	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	44.2
M10	41.6
M10a	40.5
M10c	37.7
M 9a	36.3
M11b	35.4
M11	34.0
M13c	33.7
M 9	33.1
M13b	32.8

The matching procedures have produced the following results for FEN BOGS sample 29078001

Community code	co-efficient	
M14	37.2	0 subcommunities.
M21	33.9	2 subcommunities.
M29	32.2	0 subcommunities.
M10	32.1	3 subcommunities.
M11	30.0	2 subcommunities.
M15	29.8	4 subcommunities.
M 1	27.5	0 subcommunities.
M 2	25.9	2 subcommunities.
M 9	25.3	2 subcommunities.
M17	22.5	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	37.4
M14	37.2
M10a	37.1
M21a	34.6
M21	33.9
M29	32.2
M10	32.1
M11b	32.1
M 9a	30.7
M21b	30.1

The matching procedures have produced the following results for sample 29078002

Community code	co-efficient	
M 9	29.6	2 subcommunities.
M 1	29.6	0 subcommunities.
M29	27.2	0 subcommunities.
S 9	27.1	2 subcommunities.
S27	26.5	2 subcommunities.
M14	23.0	0 subcommunities.
M 5	23.0	0 subcommunities.
M10	20.6	3 subcommunities.
M 4	19.6	0 subcommunities.
M 2	19.4	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M 9a	33.2
S 9b	32.1
M 9	29.6
M 1	29.6
M29	27.2
S 9	27.1
S27	26.5
M 2a	25.2
M10a	24.7
S27a	24.4

The matching procedures have produced the following results for sample 29078003

Community code	co-efficient	
M14	42.7	0 subcommunities.
M10	39.6	3 subcommunities.
M21	34.9	2 subcommunities.
M11	33.7	2 subcommunities.
M15	30.1	4 subcommunities.
M 9	26.4	2 subcommunities.
M29	24.8	0 subcommunities.
M17	24.5	3 subcommunities.
H 5	22.5	2 subcommunities.
M16	21.9	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M14	42.7
M10a	42.0
M10	39.6
M15a	38.5
M21a	36.8
M21	34.9
M11b	34.8
M11	33.7
M21b	33.7
M 9a	33.1

The matching procedures have produced the following results for sample 29078004

Community code	co-efficient	
M14	43.8	0 subcommunities.
M10	42.5	3 subcommunities.
M21	39.9	2 subcommunities.
M15	33.8	4 subcommunities.
M11	33.4	2 subcommunities.
M29	28.7	0 subcommunities.
M17	28.1	3 subcommunities.
H 5	27.0	2 subcommunities.
M 9	25.7	2 subcommunities.
M 6	25.3	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	49.5
M15a	44.9
M14	43.8
M10	42.5
M21	39.9
M21a	39.4
M21b	38.8
M11b	35.3
M15	33.8
M 9a	33.5

The matching procedures have produced the following results for sample 29078005

Community code	co-efficient	
M21	46.0	2 subcommunities.
M15	42.8	4 subcommunities.
M 6	39.8	4 subcommunities.
M17	39.4	3 subcommunities.
M14	35.4	0 subcommunities.
M25	34.2	3 subcommunities.
M 4	30.4	0 subcommunities.
M 9	28.0	2 subcommunities.
M18	27.8	2 subcommunities.
M16	26.0	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M21b	48.8
M15a	47.4
M21	46.0
M15b	45.4
M 6d	44.7
M17a	44.3
M15	42.8
M21a	40.6
M25a	40.4
M 6	39.8

The matching procedures have produced the following results for FEN HOUSE sample 29282001

Community code	co-efficient	
M10	50.1	3 subcommunities.
M13	43.0	3 subcommunities.
M11	38.0	2 subcommunities.
M26	32.8	2 subcommunities.
M 9	32.1	2 subcommunities.
M38	28.8	0 subcommunities.
M24	27.0	3 subcommunities.
M22	24.5	4 subcommunities.
SD14	24.1	4 subcommunities.
H 5	24.1	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	56.4
M10	50.1
M13b	48.3
M10a	46.4
M13c	44.5
M11b	43.2
M13	43.0
M11	38.0
M11a	35.7
M10c	34.5

The matching procedures have produced the following results for sample 29282002

Community code	co-efficient	
M10	43.4	3 subcommunities.
M11	37.1	2 subcommunities.
M13	31.9	3 subcommunities.
M38	25.7	0 subcommunities.
H 5	20.8	2 subcommunities.
M26	20.5	2 subcommunities.
SD14	20.0	4 subcommunities.
M37	19.9	0 subcommunities.
M14	19.3	0 subcommunities.
U15	18.5	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	47.5
M10	43.4
M11b	42.9
M10a	42.8
M13b	37.4
M11	37.1
M10c	35.1
M13c	33.1
M11a	32.4
M13	31.9

The matching procedures have produced the following results for HAGG WOOD MARSH sample 29295001

Community code	co-efficient	
M13	41.3	3 subcommunities.
M22	37.6	4 subcommunities.
M26	37.4	2 subcommunities.
M 9	37.1	2 subcommunities.
M10	31.3	3 subcommunities.
M24	30.9	3 subcommunities.
M38	29.6	0 subcommunities.
W 3	25.7	0 subcommunities.
SD14	25.5	4 subcommunities.
M11	23.9	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13c	43.1
M13	41.3
M13a	40.9
M26a	38.8
M13b	38.7
M22b	38.2
M22	37.6
M 9b	37.5
M26	37.4
M10b	37.3

The matching procedures have produced the following results for HASTY BANK FARM sample 29271001

Community code	co-efficient	
M10	36.3	3 subcommunities.
M11	31.0	2 subcommunities.
M13	26.0	3 subcommunities.
H 5	24.0	2 subcommunities.
M 9	23.4	2 subcommunities.
M26	21.3	2 subcommunities.
M14	21.0	0 subcommunities.
M37	19.6	0 subcommunities.
M38	19.5	0 subcommunities.
M15	19.0	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	38.6
M11b	38.0
M10b	37.1
M10	36.3
M10c	34.4
M13b	32.2
M11	31.0
M13c	26.5
M 9a	26.4
M13	26.0

The matching procedures have produced the following results for sample 29271002

Community code	co-efficient	
M10	43.3	3 subcommunities.
M11	36.1	2 subcommunities.
M13	31.5	3 subcommunities.
M37	26.6	0 subcommunities.
M 9	24.9	2 subcommunities.
M26	24.6	2 subcommunities.
M38	21.1	0 subcommunities.
M24	20.9	3 subcommunities.
M12	20.6	0 subcommunities.
M14	20.1	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	43.7
M10	43.3
M10a	39.8
M11b	39.1
M10c	37.0
M11	36.1
M13b	34.5
M13c	32.9
M13	31.5
M11a	31.1

The matching procedures have produced the following results for sample 29271003

Community code	co-efficient	
M26	35.2	2 subcommunities.
M13	33.3	3 subcommunities.
M 9	32.7	2 subcommunities.
M22	30.8	4 subcommunities.
M24	29.8	3 subcommunities.
M10	29.0	3 subcommunities.
SD14	26.8	4 subcommunities.
M25	26.0	3 subcommunities.
SD15	25.1	4 subcommunities.
M23	23.4	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M26b	35.6
M13b	35.4
M26	35.2
M13	33.3
M10b	33.1
M22b	33.0
M13a	32.8
M 9	32.7
M26a	31.7
M13c	31.3

The matching procedures have produced the following results for sample 29271004

Community code	co-efficient	
M10	34.6	3 subcommunities.
M11	29.1	2 subcommunities.
M13	25.8	3 subcommunities.
M 9	22.9	2 subcommunities.
SD14	22.1	4 subcommunities.
M29	19.2	0 subcommunities.
M38	18.9	0 subcommunities.
SD15	17.5	4 subcommunities.
M 8	16.0	0 subcommunities.
SD17	15.6	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	36.8
M11b	36.8
M10	34.6
M10b	34.1
M13b	29.8
M11	29.1
M 9a	27.4
M13c	26.2
M13	25.8
M10c	24.9

The matching procedures have produced the following results for HAVERN BECK sample 29280001

Community code	co-efficient	
M11	41.0	2 subcommunities.
M10	40.4	3 subcommunities.
M38	29.1	0 subcommunities.
M37	27.4	0 subcommunities.
M13	24.8	3 subcommunities.
M 8	23.6	0 subcommunities.
U15	22.4	0 subcommunities.
M26	21.8	2 subcommunities.
SD14	21.7	4 subcommunities.
SD13	20.6	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	41.2
M11	41.0
M10	40.4
M11b	39.2
M11a	37.8
M10a	36.6
M13b	30.9
M10c	29.5
M38	29.1
M37	27.4

The matching procedures have produced the following results for sample 29280002

Community code	co-efficient	
M10	41.0	3 subcommunities.
M13	37.3	3 subcommunities.
M11	31.0	2 subcommunities.
H 5	30.6	2 subcommunities.
M26	27.8	2 subcommunities.
M14	27.4	0 subcommunities.
M25	26.8	3 subcommunities.
M24	25.1	3 subcommunities.
M15	24.7	4 subcommunities.
M 9	24.7	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	44.0
M10b	42.7
M10a	42.0
M10	41.0
M13	37.3
M13c	34.6
M15a	33.5
H 5b	31.1
M11	31.0
H 5	30.6

The matching procedures have produced the following results for sample 29280003

Community code	co-efficient	
M13	28.0	3 subcommunities.
M10	25.3	3 subcommunities.
M38	24.2	0 subcommunities.
M11	24.0	2 subcommunities.
SD14	21.6	4 subcommunities.
CG 2	21.4	4 subcommunities.
CG 6	21.3	2 subcommunities.
U15	20.6	0 subcommunities.
CG 8	20.5	3 subcommunities.
CG 5	20.5	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	34.7
SD14c	32.2
M13b	30.8
M13c	29.5
M13	28.0
CG 6a	25.8
M11b	25.4
M10	25.3
M38	24.2
M11	24.0

The matching procedures have produced the following results for sample 29280004

Community code	co-efficient	
M10	31.2	3 subcommunities.
M13	29.6	3 subcommunities.
M11	27.3	2 subcommunities.
M26	25.9	2 subcommunities.
M 9	24.9	2 subcommunities.
M38	23.5	0 subcommunities.
M24	22.6	3 subcommunities.
M22	22.3	4 subcommunities.
SD14	21.7	4 subcommunities.
U15	19.2	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	36.2
M13b	35.0
M13c	31.7
M10	31.2
M11b	30.2
M13	29.6
M10a	28.4
M11	27.3
M26b	26.2
SD14c	26.1

The matching procedures have produced the following results for sample 29280005

Community code	co-efficient	
M26	24.8	2 subcommunities.
CG 6	24.6	2 subcommunities.
M10	23.7	3 subcommunities.
M13	22.9	3 subcommunities.
SD14	22.8	4 subcommunities.
CG 3	22.6	4 subcommunities.
MG 5	22.0	3 subcommunities.
CG 2	21.7	4 subcommunities.
CG 8	21.5	3 subcommunities.
CG 5	20.6	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
MG 5c	29.7
CG 6a	29.1
M13b	27.9
M10b	27.3
M26b	27.1
SD14c	26.3
M26	24.8
CG 6	24.6
M10a	24.5
SD14d	24.2

The matching procedures have produced the following results for sample 29280006

Community code	co-efficient	
M10	41.7	3 subcommunities.
M11	40.2	2 subcommunities.
H 5	31.9	2 subcommunities.
M14	27.5	0 subcommunities.
M26	26.9	2 subcommunities.
M13	26.3	3 subcommunities.
M25	25.3	3 subcommunities.
M29	24.7	0 subcommunities.
M15	23.8	4 subcommunities.
M24	23.7	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	46.9
M10	41.7
M11	40.2
M11a	38.5
M11b	36.4
M15a	35.9
M10b	34.8
H 5b	32.4
H 5	31.9
H 5a	30.1

The matching procedures have produced the following results for sample 29280007

Community code	co-efficient	
M25	40.2	3 subcommunities.
M13	33.5	3 subcommunities.
M 6	32.6	4 subcommunities.
M24	32.3	3 subcommunities.
M26	32.1	2 subcommunities.
M10	31.0	3 subcommunities.
M23	30.6	2 subcommunities.
M15	28.5	4 subcommunities.
M 9	28.4	2 subcommunities.
M11	27.2	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13a	40.5
M25	40.2
M25c	38.8
M25b	38.5
M 6d	38.2
M23a	35.2
M 6a	35.1
M15a	34.6
M24c	33.7
M13	33.5

The matching procedures have produced the following results for HOLE OF HORCUM sample 29272001

Community code	co-efficient	
M23	35.2	2 subcommunities.
M 9	33.6	2 subcommunities.
SD15	33.2	4 subcommunities.
M22	32.1	4 subcommunities.
M 5	31.6	0 subcommunities.
M13	31.0	3 subcommunities.
M24	30.3	3 subcommunities.
SD17	29.8	4 subcommunities.
M38	29.7	0 subcommunities.
M29	28.9	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M22b	36.8
M23a	35.4
M23	35.2
M 9b	34.9
M23b	34.9
SD15b	33.9
M 9	33.6
SD15	33.2
SD15c	33.0
M22	32.1

The matching procedures have produced the following results for sample 29272002

Community code	co-efficient	
M23	32.7	2 subcommunities.
M38	31.0	0 subcommunities.
M22	29.1	4 subcommunities.
M37	28.6	0 subcommunities.
M24	28.1	3 subcommunities.
SD14	27.8	4 subcommunities.
SD15	27.2	4 subcommunities.
M25	27.0	3 subcommunities.
M13	26.9	3 subcommunities.
M32	25.3	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M23a	35.8
M23b	33.8
M23	32.7
M22b	32.2
M38	31.0
SD15b	30.4
SD15c	29.9
M24c	29.4
M22	29.1
SD14b	28.9

The matching procedures have produced the following results for sample 29272003

Community code	co-efficient	
M10	36.4	3 subcommunities.
M13	34.2	3 subcommunities.
M38	31.6	0 subcommunities.
M26	28.7	2 subcommunities.
M11	27.2	2 subcommunities.
M 9	27.1	2 subcommunities.
SD14	26.8	4 subcommunities.
M22	26.8	4 subcommunities.
M24	26.6	3 subcommunities.
M 8	22.7	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	42.1
M13b	39.0
M10	36.4
M13	34.2
M13c	33.6
M22b	32.6
M10a	32.4
M38	31.6
M11b	31.1
M26	28.7

The matching procedures have produced the following results for sample 29272004

Community code	co-efficient	
M10	27.8	3 subcommunities.
M38	26.2	0 subcommunities.
M13	23.8	3 subcommunities.
M29	23.8	0 subcommunities.
M11	23.3	2 subcommunities.
SD14	21.5	4 subcommunities.
M26	20.3	2 subcommunities.
M 9	20.2	2 subcommunities.
M35	19.6	0 subcommunities.
M22	19.3	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	29.1
M10	27.8
M10a	27.5
M38	26.2
M13c	25.7
M13b	25.5
M10c	24.9
M13	23.8
M29	23.8
SD14b	23.7

The matching procedures have produced the following results for sample 29272005

Community code	co-efficient	
M10	31.7	3 subcommunities.
M24	30.1	3 subcommunities.
M25	29.9	3 subcommunities.
M 9	26.2	2 subcommunities.
M13	26.1	3 subcommunities.
M22	25.9	4 subcommunities.
M26	24.7	2 subcommunities.
M29	24.6	0 subcommunities.
SD14	24.4	4 subcommunities.
M11	24.3	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10	31.7
M13a	31.1
M24	30.1
M25	29.9
M24b	29.5
M10a	28.8
M10b	28.6
M22b	28.1
M25b	27.2
M25a	27.0

The matching procedures have produced the following results for JUGGER HOWE
sample 29133001

Community code	co-efficient	
M13	41.5	3 subcommunities.
M10	35.5	3 subcommunities.
H 5	31.1	2 subcommunities.
M11	30.7	2 subcommunities.
M 9	29.1	2 subcommunities.
M24	28.4	3 subcommunities.
M26	28.4	2 subcommunities.
M22	27.0	4 subcommunities.
M14	26.1	0 subcommunities.
SD14	24.0	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13c	44.4
M13	41.5
M13b	40.3
M13a	39.3
M10b	37.2
M24a	36.5
M10	35.5
M11b	35.0
M10a	34.8
M26a	33.0

The matching procedures have produced the following results for sample 29133002

Community code	co-efficient	
H 5	31.5	2 subcommunities.
M25	28.4	3 subcommunities.
H 3	26.0	3 subcommunities.
M14	25.7	0 subcommunities.
M24	25.4	3 subcommunities.
M16	22.8	4 subcommunities.
M21	22.5	2 subcommunities.
H 4	22.4	4 subcommunities.
M15	21.8	4 subcommunities.
M13	21.5	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
H 5	31.5
M25c	30.6
M13a	30.0
H 3a	29.1
M16b	28.7
M25	28.4
M25a	28.0
H 5a	27.8
M16a	26.5
H 5b	26.4

The matching procedures have produced the following results for sample 29133003

Community code	co-efficient	
M14	43.8	0 subcommunities.
M21	40.5	2 subcommunities.
M10	40.3	3 subcommunities.
M15	37.5	4 subcommunities.
M11	35.2	2 subcommunities.
M 9	33.2	2 subcommunities.
H 5	30.9	2 subcommunities.
M29	30.7	0 subcommunities.
M17	30.6	3 subcommunities.
M25	28.9	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	52.2
M10a	45.9
M14	43.8
M21b	42.4
M21	40.5
M10	40.3
M 9a	39.5
M21a	38.8
M15b	37.5
M15	37.5

The matching procedures have produced the following results for sample 29133004

Community code	co-efficient	
M21	49.1	2 subcommunities.
M15	48.2	4 subcommunities.
M25	45.1	3 subcommunities.
M17	44.7	3 subcommunities.
M14	38.1	0 subcommunities.
M16	37.3	4 subcommunities.
H 5	35.4	2 subcommunities.
M18	32.7	2 subcommunities.
H 4	32.6	4 subcommunities.
M 6	30.4	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M21b	51.4
M17a	51.0
M21	49.1
M15	48.2
M15b	47.2
M16b	47.2
M25a	46.7
M15a	45.6
M25	45.1
M17	44.7

The matching procedures have produced the following results for sample 29133005

Community code	co-efficient	
M14	46.3	0 subcommunities.
M21	42.9	2 subcommunities.
M10	39.5	3 subcommunities.
M15	36.9	4 subcommunities.
M11	33.4	2 subcommunities.
M17	33.1	3 subcommunities.
M29	32.4	0 subcommunities.
H 5	30.5	2 subcommunities.
M13	28.9	3 subcommunities.
M18	28.0	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	49.2
M14	46.3
M10a	45.7
M21	42.9
M21a	42.5
M21b	41.9
M10	39.5
H 5b	37.0
M15	36.9
M17a	36.4

The matching procedures have produced the following results for sample 29133006

Community code	co-efficient	
M14	47.9	0 subcommunities.
M10	41.8	3 subcommunities.
H 5	38.8	2 subcommunities.
M13	35.9	3 subcommunities.
M11	32.5	2 subcommunities.
M15	32.0	4 subcommunities.
M21	30.4	2 subcommunities.
M24	29.6	3 subcommunities.
M25	28.4	3 subcommunities.
M29	26.0	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M14	47.9
M10a	47.5
M15a	42.5
M10	41.8
H 5	38.8
M13b	37.9
H 5b	37.5
H 5a	37.0
M10b	36.2
M13	35.9

The matching procedures have produced the following results for sample 29133007

Community code	co-efficient	
M13	42.1	3 subcommunities.
M24	37.0	3 subcommunities.
M10	35.9	3 subcommunities.
M26	35.3	2 subcommunities.
M22	31.7	4 subcommunities.
M25	30.9	3 subcommunities.
M 9	30.3	2 subcommunities.
H 5	29.9	2 subcommunities.
SD14	28.7	4 subcommunities.
M14	28.7	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	44.0
M13a	42.8
M13	42.1
M10b	38.9
M13c	37.9
M24	37.0
M24b	36.3
M10	35.9
M10a	35.8
M22b	35.5

The matching procedures have produced the following results for sample 29133008

Community code	co-efficient	
M14	38.3	0 subcommunities.
M21	35.2	2 subcommunities.
M15	32.2	4 subcommunities.
M17	30.2	3 subcommunities.
M18	28.6	2 subcommunities.
M10	27.8	3 subcommunities.
M13	26.5	3 subcommunities.
M 2	25.1	2 subcommunities.
M 9	23.2	2 subcommunities.
H 5	22.9	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	39.1
M14	38.3
M21	35.2
M17a	33.0
M15	32.2
M10a	32.1
M21b	31.6
M21a	31.6
M18a	31.4
M17	30.2

The matching procedures have produced the following results for sample 29133009

Community code	co-efficient	
M11	34.4	2 subcommunities.
M14	33.4	0 subcommunities.
M10	32.1	3 subcommunities.
M21	31.9	2 subcommunities.
M15	28.1	4 subcommunities.
M29	27.7	0 subcommunities.
M 6	25.0	4 subcommunities.
M17	24.4	3 subcommunities.
M31	23.9	0 subcommunities.
M12	23.3	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	36.4
M10a	35.8
M11	34.4
M14	33.4
M10	32.1
M21b	32.1
M21	31.9
M11a	31.1
M21a	29.5
M11b	29.4

The matching procedures have produced the following results for sample 29133010

Community code	co-efficient	
M21	57.0	2 subcommunities.
M15	48.2	4 subcommunities.
M17	44.1	3 subcommunities.
M 6	41.2	4 subcommunities.
M 2	39.0	2 subcommunities.
M16	38.7	4 subcommunities.
M25	38.3	3 subcommunities.
M18	36.7	2 subcommunities.
H 4	34.2	4 subcommunities.
M 7	33.5	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M21b	63.4
M21	57.0
M15b	49.9
M25a	48.8
M15	48.2
M17a	46.6
M21a	46.2
M 6a	45.2
M15c	44.8
M15a	44.6

The matching procedures have produced the following results for sample 29133011

Community code	co-efficient	
M29	41.6	0 subcommunities.
S 9	31.2	2 subcommunities.
S10	26.6	2 subcommunities.
S 8	26.1	3 subcommunities.
M35	23.0	0 subcommunities.
M 1	22.6	0 subcommunities.
S19	21.0	3 subcommunities.
S27	19.2	2 subcommunities.
M14	18.8	0 subcommunities.
S 4	18.4	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M29	41.6
S 9b	39.8
S 8c	37.5
S 4c	32.0
S 9	31.2
S27a	27.5
S10	26.6
S 8	26.1
S10b	25.6
S19b	25.0

The matching procedures have produced the following results for sample 29133012

Community code	co-efficient	
M29	43.0	0 subcommunities.
M10	37.8	3 subcommunities.
M25	37.8	3 subcommunities.
M23	37.2	2 subcommunities.
M24	36.6	3 subcommunities.
M 6	35.9	4 subcommunities.
M 9	35.5	2 subcommunities.
M13	33.4	3 subcommunities.
M38	31.0	0 subcommunities.
M26	31.0	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M29	43.0
M23a	39.7
M 6b	39.1
M10	37.8
M25	37.8
M25c	37.5
M24c	37.4
M10a	37.3
M23	37.2
M 6d	37.1

The matching procedures have produced the following results for KEPWICK WHITE GILL
sample 29278001

Community code	co-efficient	
M13	21.9	3 subcommunities.
M10	20.5	3 subcommunities.
M11	19.4	2 subcommunities.
M37	19.3	0 subcommunities.
H 5	18.6	2 subcommunities.
M38	18.5	0 subcommunities.
M24	15.9	3 subcommunities.
M26	15.2	2 subcommunities.
SD15	15.2	4 subcommunities.
M14	15.0	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M11b	23.5
M13a	23.0
M13c	22.0
M13	21.9
M13b	21.5
M10c	21.2
M10a	21.1
M10b	20.9
M10	20.5
M11	19.4

The matching procedures have produced the following results for KIDSTYE FARM
sample 29292001

Community code	co-efficient	
S27	42.6	2 subcommunities.
S 9	36.7	2 subcommunities.
M23	35.6	2 subcommunities.
M 5	34.9	0 subcommunities.
M 9	33.1	2 subcommunities.
S11	32.7	3 subcommunities.
W 3	31.2	0 subcommunities.
W 1	29.0	0 subcommunities.
S19	27.8	3 subcommunities.
S12	27.4	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
S27a	51.3
S27	42.6
S 9b	39.0
M 9b	38.9
S27b	38.4
S 9	36.7
M23	35.6
M 5	34.9
M23b	34.4
S12b	34.4

The matching procedures have produced the following results for LEVISHAM BOTTOM
sample 29291001

Community code	co-efficient	
M10	38.8	3 subcommunities.
M14	37.2	0 subcommunities.
M21	29.3	2 subcommunities.
M11	29.2	2 subcommunities.
M29	29.1	0 subcommunities.
H 5	27.5	2 subcommunities.
M15	27.4	4 subcommunities.
M13	27.4	3 subcommunities.
M25	21.6	3 subcommunities.
M 9	21.5	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	46.5
M10	38.8
M15a	38.4
M14	37.2
M10b	35.3
M21b	30.7
M21	29.3
M11	29.2
M29	29.1
M13b	28.6

The matching procedures have produced the following results for sample 29291002

Community code	co-efficient	
M10	33.8	3 subcommunities.
M11	30.5	2 subcommunities.
M14	25.7	0 subcommunities.
M13	24.5	3 subcommunities.
H 5	19.8	2 subcommunities.
M21	18.7	2 subcommunities.
M15	18.3	4 subcommunities.
M 9	17.6	2 subcommunities.
M37	17.3	0 subcommunities.
M26	17.1	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	40.0
M10b	34.3
M10	33.8
M10c	33.4
M11	30.5
M11b	29.6
M11a	28.6
M14	25.7
M13b	25.5
M15a	25.1

The matching procedures have produced the following results for sample 29291003

Community code	co-efficient	
M15	35.9	4 subcommunities.
M13	35.9	3 subcommunities.
M10	34.0	3 subcommunities.
M26	32.2	2 subcommunities.
M14	31.8	0 subcommunities.
M25	30.9	3 subcommunities.
M24	30.3	3 subcommunities.
M21	29.6	2 subcommunities.
H 5	29.1	2 subcommunities.
M17	28.8	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	41.4
M13b	38.4
M15	35.9
M13	35.9
M10b	35.4
M10	34.0
M15b	33.9
M10a	33.0
M13c	32.6
H 5b	32.4

The matching procedures have produced the following results for LONGSTONE MEADOW sample 29285001

Community code	co-efficient	
M26	44.4	2 subcommunities.
M13	42.7	3 subcommunities.
M22	40.6	4 subcommunities.
M24	39.2	3 subcommunities.
M 9	36.2	2 subcommunities.
SD15	33.3	4 subcommunities.
SD14	30.8	4 subcommunities.
SD17	29.7	4 subcommunities.
W 3	29.0	0 subcommunities.
M10	28.4	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13c	45.9
M26	44.4
M22b	44.1
M26b	43.9
M13b	43.4
M13	42.7
M24b	40.9
M22a	40.6
M22	40.6
M26a	39.8

The matching procedures have produced the following results for LOW MOOR sample 29286001

Community code	co-efficient	
M13	35.9	3 subcommunities.
M10	35.1	3 subcommunities.
M 9	33.3	2 subcommunities.
M22	30.9	4 subcommunities.
M26	30.8	2 subcommunities.
M11	29.3	2 subcommunities.
M38	28.5	0 subcommunities.
M24	28.2	3 subcommunities.
SD14	27.7	4 subcommunities.
M29	26.5	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13c	37.6
M13b	36.9
M10a	36.2
M13	35.9
M10	35.1
M 9a	34.5
M10b	34.5
M13a	34.0
M 9	33.3
M26b	31.4

The matching procedures have produced the following results for sample 29286002

Community code	co-efficient	
S 9	31.5	2 subcommunities.
M 9	26.2	2 subcommunities.
S27	24.6	2 subcommunities.
S10	24.2	2 subcommunities.
M29	20.7	0 subcommunities.
S 8	19.7	3 subcommunities.
M 5	19.4	0 subcommunities.
W 3	17.3	0 subcommunities.
SD15	17.2	4 subcommunities.
M 4	16.8	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
S 9b	33.5
S10b	32.8
S 8c	32.2
S 9	31.5
S27a	29.0
M 9	26.2
M 9a	25.9
S27	24.6
S 9a	24.4
S10	24.2

The matching procedures have produced the following results for LOW PASTURE sample 29142001

Community code	co-efficient	
M10	44.0	3 subcommunities.
M13	35.3	3 subcommunities.
M26	35.1	2 subcommunities.
M11	34.5	2 subcommunities.
M24	30.9	3 subcommunities.
M 9	29.8	2 subcommunities.
M 8	26.4	0 subcommunities.
M14	24.9	0 subcommunities.
H 5	23.5	2 subcommunities.
M22	21.5	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10	44.0
M10b	44.0
M10a	43.9
M13b	39.4
M26a	39.0
M11b	36.4
M13c	36.1
M13	35.3
M26	35.1
M11	34.5

The matching procedures have produced the following results for sample 29142002

Community code	co-efficient	
M26	46.3	2 subcommunities.
M24	45.6	3 subcommunities.
M22	40.2	4 subcommunities.
M25	37.7	3 subcommunities.
M23	35.5	2 subcommunities.
M13	34.9	3 subcommunities.
M27	31.5	3 subcommunities.
M 9	29.6	2 subcommunities.
W 3	27.6	0 subcommunities.
SD15	25.1	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M26	46.3
M24	45.6
M26b	45.1
M24b	43.0
M25c	41.9
M26a	41.0
M22b	40.5
M22	40.2
M22a	40.0
M24c	39.8

The matching procedures have produced the following results for NESS HEAD
sample 29294001

Community code	co-efficient	
M 9	26.1	2 subcommunities.
S 9	22.8	2 subcommunities.
S27	22.4	2 subcommunities.
S 1	21.3	0 subcommunities.
M22	21.0	4 subcommunities.
M 4	20.3	0 subcommunities.
S 2	19.0	2 subcommunities.
M 5	18.9	0 subcommunities.
S25	18.8	3 subcommunities.
M 3	17.8	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M 9b	27.5
M 9	26.1
S27b	23.0
S 9	22.8
S27	22.4
M22a	22.0
S25c	22.0
S27a	21.6
S 1	21.3
S25a	21.1

The matching procedures have produced the following results for NODDLE END
sample 29170001

Matches against sub-communities.

Community code	co-efficient	
M26	46.7	2 subcommunities.
M22	38.9	4 subcommunities.
M13	38.2	3 subcommunities.
MG 8	34.0	0 subcommunities.
M24	33.2	3 subcommunities.
M38	33.0	0 subcommunities.
M23	32.2	2 subcommunities.
SD17	27.9	4 subcommunities.
M 9	27.6	2 subcommunities.
M10	27.5	3 subcommunities.

Community code	co-efficient
M26b	48.4
M22b	47.6
M26	46.7
M26a	39.0
M22	38.9
M13b	38.9
M13	38.2
M13c	36.8
M22a	35.0
M13a	34.9

The matching procedures have produced the following results for sample 29170002

Matches against sub-communities.

Community code	co-efficient	
MG10	37.0	3 subcommunities.
MG 9	34.2	2 subcommunities.
M23	33.3	2 subcommunities.
M22	32.4	4 subcommunities.
SD17	30.9	4 subcommunities.
M26	29.6	2 subcommunities.
MG 8	27.4	0 subcommunities.
M24	27.1	3 subcommunities.
MG13	27.1	0 subcommunities.
SD15	26.6	4 subcommunities.

Community code	co-efficient
MG10a	38.5
M22b	38.4
M23b	37.5
MG10	37.0
MG 9	34.2
SD17b	33.7
M22a	33.4
M23	33.3
MG 9a	33.0
M22	32.4

The matching procedures have produced the following results for sample 29170003

Matches against sub-communities.

Community code	co-efficient	
SD17	23.9	4 subcommunities.
M27	23.2	3 subcommunities.
W 7	23.2	3 subcommunities.
W 3	22.2	0 subcommunities.
M22	21.9	4 subcommunities.
OV26	21.3	5 subcommunities.
M37	21.0	0 subcommunities.
M23	20.9	2 subcommunities.
SD15	20.6	4 subcommunities.
SD14	19.7	4 subcommunities.

Community code	co-efficient
W 7b	26.5
SD17b	24.9
SD17a	24.9
SD17	23.9
M27c	23.7
SD15c	23.3
M27	23.2
W 7	23.2
M22b	22.2
SD17d	22.2

The matching procedures have produced the following results for sample 29170004

Matches against sub-communities.

Community code	co-efficient	
M26	49.3	2 subcommunities.
M22	41.5	4 subcommunities.
M13	36.1	3 subcommunities.
M24	35.3	3 subcommunities.
M23	31.3	2 subcommunities.
MG 8	31.1	0 subcommunities.
M27	29.6	3 subcommunities.
W 3	29.4	0 subcommunities.
M 9	28.0	2 subcommunities.
M38	26.5	0 subcommunities.

Community code	co-efficient
M26b	53.1
M22b	49.4
M26	49.3
M22	41.5
M26a	39.5
M13b	37.9
M22a	36.8
M24b	36.5
M13	36.1
M24	35.3

The matching procedures have produced the following results for sample 29170005

Community code	co-efficient	
M26	42.2	2 subcommunities.
M13	35.4	3 subcommunities.
M22	35.3	4 subcommunities.
M10	32.8	3 subcommunities.
SD14	32.0	4 subcommunities.
M24	30.6	3 subcommunities.
SD15	29.8	4 subcommunities.
SD17	29.1	4 subcommunities.
M 9	28.9	2 subcommunities.
MG 8	25.5	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M26	42.2
M26b	42.2
M22b	39.5
M13b	38.4
M26a	38.2
M10b	37.9
M13a	37.9
M13	35.4
M22	35.3
M22a	34.7

The matching procedures have produced the following results for sample 29170006

Community code	co-efficient	
M26	43.1	2 subcommunities.
M13	35.2	3 subcommunities.
M22	35.0	4 subcommunities.
M24	30.7	3 subcommunities.
M 9	30.2	2 subcommunities.
M10	27.8	3 subcommunities.
SD14	25.1	4 subcommunities.
SD15	25.1	4 subcommunities.
SD17	24.9	4 subcommunities.
M38	24.8	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M26	43.1
M26b	41.9
M22b	40.7
M26a	40.4
M13c	37.2
M13b	36.8
M22a	35.3
M13	35.2
M22	35.0
M10b	33.7

The matching procedures have produced the following results for sample 29170007

Community code	co-efficient	
M26	33.4	2 subcommunities.
M13	31.5	3 subcommunities.
M 9	30.7	2 subcommunities.
M22	29.3	4 subcommunities.
SD14	29.0	4 subcommunities.
M10	26.6	3 subcommunities.
M11	25.7	2 subcommunities.
M38	24.6	0 subcommunities.
SD15	24.1	4 subcommunities.
M37	22.3	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M26	33.4
M26b	33.1
M13b	32.7
M13	31.5
M22b	31.4
M13c	31.4
M13a	31.3
M26a	31.2
M 9	30.7
M10b	30.5

The matching procedures have produced the following results for sample 29170008

Community code	co-efficient	
M22	47.7	4 subcommunities.
M23	39.0	2 subcommunities.
M27	38.5	3 subcommunities.
M24	37.2	3 subcommunities.
W 3	32.1	0 subcommunities.
M28	31.1	3 subcommunities.
M13	30.5	3 subcommunities.
M26	30.5	2 subcommunities.
MG 8	30.0	0 subcommunities.
MG 9	29.2	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M22a	48.3
M22	47.7
M22b	47.4
M27c	43.8
M23a	39.3
M23	39.0
M27	38.5
M22d	38.3
M28a	38.3
M23b	38.2

The matching procedures have produced the following results for sample 29170009

Community code	co-efficient	
M22	35.8	4 subcommunities.
M27	33.5	3 subcommunities.
M26	29.3	2 subcommunities.
M28	26.9	3 subcommunities.
M24	26.2	3 subcommunities.
W 3	25.1	0 subcommunities.
M23	24.8	2 subcommunities.
OV26	24.4	5 subcommunities.
MG 8	24.3	0 subcommunities.
MG10	23.9	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M22a	38.1
M22b	36.4
M22	35.8
OV26c	34.2
M27	33.5
M28a	33.0
M26b	31.7
M22d	30.8
M27c	29.5
M26	29.3

The matching procedures have produced the following results for NORTH DALE sample 29289001

Community code	co-efficient	
M10	45.8	3 subcommunities.
M13	35.2	3 subcommunities.
M11	34.5	2 subcommunities.
M 9	27.4	2 subcommunities.
M26	27.0	2 subcommunities.
H 5	25.2	2 subcommunities.
M38	25.0	0 subcommunities.
M37	24.5	0 subcommunities.
M14	23.9	0 subcommunities.
M24	23.7	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	47.9
M10	45.8
M10a	44.4
M13b	41.1
M11b	37.2
M13c	35.7
M13	35.2
M11	34.5
M11a	33.0
M10c	31.2

The matching procedures have produced the following results for sample 29289002

Community code	co-efficient	
M10	42.4	3 subcommunities.
M11	33.1	2 subcommunities.
M13	32.7	3 subcommunities.
H 5	29.7	2 subcommunities.
M26	28.5	2 subcommunities.
SD14	28.1	4 subcommunities.
M24	27.8	3 subcommunities.
M38	27.0	0 subcommunities.
M25	24.6	3 subcommunities.
M 9	24.2	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	46.9
M10	42.4
M10a	42.3
M13b	40.6
M11b	38.0
M11	33.1
M13	32.7
M11a	31.0
H 5a	30.3
M10c	29.8

The matching procedures have produced the following results for sample 29289003

Community code	co-efficient	
M10	33.1	3 subcommunities.
H 5	31.9	2 subcommunities.
M13	28.8	3 subcommunities.
M26	27.3	2 subcommunities.
M11	25.3	2 subcommunities.
M14	24.4	0 subcommunities.
M24	24.3	3 subcommunities.
CG 9	23.2	5 subcommunities.
M25	21.4	3 subcommunities.
M15	21.3	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	38.8
M10b	36.1
M13b	33.3
M10	33.1
H 5	31.9
H 5a	30.0
M13	28.8
M13a	28.3
H 5b	27.6
M26	27.3

The matching procedures have produced the following results for sample 29289004

Community code	co-efficient	
SD16	30.6	4 subcommunities.
SD14	27.2	4 subcommunities.
SD17	26.8	4 subcommunities.
M37	26.3	0 subcommunities.
M13	24.1	3 subcommunities.
MG 8	23.2	0 subcommunities.
M38	23.1	0 subcommunities.
SD13	22.7	2 subcommunities.
MG10	22.2	3 subcommunities.
M23	21.8	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
SD14c	33.0
SD17b	31.4
SD16d	31.3
SD14d	30.9
SD16	30.6
SD16b	28.4
SD16c	28.4
SD14	27.2
SD17	26.8
SD17a	26.5

The matching procedures have produced the following results for sample 29289005

Community code	co-efficient	
M10	34.2	3 subcommunities.
M13	30.3	3 subcommunities.
M11	28.9	2 subcommunities.
M26	28.6	2 subcommunities.
M24	27.9	3 subcommunities.
CG 9	24.8	5 subcommunities.
M38	23.4	0 subcommunities.
M25	22.7	3 subcommunities.
CG10	21.0	3 subcommunities.
M23	20.3	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	42.1
M13b	36.8
M10	34.2
M10a	33.1
M11b	31.8
M13	30.3
M11	28.9
M26b	28.8
M26	28.6
M24	27.9

The matching procedures have produced the following results for sample 29289006

Community code	co-efficient	
M10	31.7	3 subcommunities.
M11	31.6	2 subcommunities.
M38	27.9	0 subcommunities.
SD14	26.8	4 subcommunities.
M26	24.4	2 subcommunities.
M13	22.1	3 subcommunities.
M23	20.8	2 subcommunities.
CG10	20.5	3 subcommunities.
M25	20.1	3 subcommunities.
M24	19.5	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	33.3
M10a	32.3
M10	31.7
M11	31.6
M11a	30.2
M11b	30.0
M38	27.9
SD14c	27.7
SD14	26.8
CG10c	26.3

The matching procedures have produced the following results for sample 29289007

Community code	co-efficient	
S 9	43.8	2 subcommunities.
S10	34.2	2 subcommunities.
S27	33.8	2 subcommunities.
M 9	33.8	2 subcommunities.
W 3	27.6	0 subcommunities.
S 8	25.6	3 subcommunities.
M 5	23.1	0 subcommunities.
S11	21.6	3 subcommunities.
M 4	21.5	0 subcommunities.
S 2	21.1	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
S 9b	52.1
S10b	46.8
S 9	43.8
S27a	41.6
S 8c	37.8
M 9b	34.2
S10	34.2
S27	33.8
M 9	33.8
S11c	32.6

The matching procedures have produced the following results for sample 29289008

Community code	co-efficient	
S27	50.1	2 subcommunities.
M 9	41.3	2 subcommunities.
S 9	40.6	2 subcommunities.
W 3	36.3	0 subcommunities.
M 5	35.9	0 subcommunities.
S11	33.3	3 subcommunities.
M23	31.8	2 subcommunities.
S10	31.4	2 subcommunities.
SD15	30.1	4 subcommunities.
W 1	28.2	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
S27a	61.3
S27	50.1
M 9b	46.7
S 9b	45.4
S27b	44.6
S10b	43.2
M 9	41.3
S 9	40.6
W 3	36.3
M 5	35.9

The matching procedures have produced the following results for sample 29289009

Community code	co-efficient	
M10	48.7	3 subcommunities.
M11	40.8	2 subcommunities.
M13	39.0	3 subcommunities.
M 9	34.1	2 subcommunities.
M26	31.6	2 subcommunities.
M38	31.4	0 subcommunities.
M 8	25.9	0 subcommunities.
M22	24.7	4 subcommunities.
M29	24.5	0 subcommunities.
SD14	24.2	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	49.1
M10b	49.0
M10	48.7
M13b	43.7
M11b	42.5
M13c	41.7
M11	40.8
M13	39.0
M 9a	37.4
M11a	37.3

The matching procedures have produced the following results for sample 29289010

Community code	co-efficient	
M 9	29.6	2 subcommunities.
S 9	25.8	2 subcommunities.
S27	25.3	2 subcommunities.
M10	23.0	3 subcommunities.
S 2	22.3	2 subcommunities.
M11	22.2	2 subcommunities.
S10	21.4	2 subcommunities.
M13	19.7	3 subcommunities.
M 1	17.2	0 subcommunities.
M14	17.1	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M 9a	33.3
S 9b	30.7
M 9	29.6
S10b	29.4
M10a	28.6
S 9	25.8
S27	25.3
M11b	25.2
S27a	24.8
M 9b	24.8

The matching procedures have produced the following results for sample 29289011

Community code	co-efficient	
M13	37.8	3 subcommunities.
M10	34.9	3 subcommunities.
M11	28.5	2 subcommunities.
M 9	28.1	2 subcommunities.
M26	26.9	2 subcommunities.
M22	23.0	4 subcommunities.
M24	21.8	3 subcommunities.
M38	21.1	0 subcommunities.
SD14	20.5	4 subcommunities.
H 5	19.9	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13c	39.1
M13	37.8
M10b	36.8
M13b	36.5
M10a	36.1
M13a	35.8
M10	34.9
M11b	31.6
M26a	30.2
M 9a	28.8

The matching procedures have produced the following results for NORTHDALE SCAR sample 29281001

Community code	co-efficient	
W 3	32.0	0 subcommunities.
M 9	30.6	2 subcommunities.
M22	30.0	4 subcommunities.
M13	25.3	3 subcommunities.
M 5	25.2	0 subcommunities.
SD15	25.1	4 subcommunities.
M26	23.8	2 subcommunities.
M24	23.0	3 subcommunities.
M23	22.9	2 subcommunities.
M25	21.7	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M 9b	33.2
W 3	32.0
M22d	30.7
M 9	30.6
M22c	30.1
M22	30.0
M22a	29.8
M13a	29.7
M13c	28.8
SD15a	27.4

The matching procedures have produced the following results for sample 29281002

Community code	co-efficient	
M 9	35.2	2 subcommunities.
S 9	33.7	2 subcommunities.
S27	31.6	2 subcommunities.
W 3	29.0	0 subcommunities.
M 5	28.2	0 subcommunities.
M23	25.0	2 subcommunities.
M22	24.8	4 subcommunities.
S10	23.5	2 subcommunities.
SD15	22.9	4 subcommunities.
S11	22.5	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
S27a	40.0
M 9b	35.8
M 9	35.2
S 9b	33.9
S 9	33.7
S27	31.6
M23a	29.8
S10b	29.4
M 9a	29.3
W 3	29.0

The matching procedures have produced the following results for RHUMBARD SNOUT sample 29293001

Community code	co-efficient	
M10	39.7	3 subcommunities.
M13	36.7	3 subcommunities.
M11	36.5	2 subcommunities.
M38	34.9	0 subcommunities.
M26	32.3	2 subcommunities.
M24	31.0	3 subcommunities.
CG10	28.5	3 subcommunities.
M 8	28.0	0 subcommunities.
SD14	27.4	4 subcommunities.
M25	25.2	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	42.9
M10b	41.1
M10	39.7
M10a	37.6
M13	36.7
M11	36.5
M11a	35.7
M26b	35.0
M38	34.9
M11b	33.8

The matching procedures have produced the following results for sample 29293002

Community code	co-efficient	
M10	46.2	3 subcommunities.
M13	43.9	3 subcommunities.
M11	37.7	2 subcommunities.
H 5	32.6	2 subcommunities.
M24	31.6	3 subcommunities.
M26	30.1	2 subcommunities.
M 9	29.3	2 subcommunities.
M38	28.2	0 subcommunities.
M14	26.6	0 subcommunities.
SD14	25.8	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	48.6
M10a	48.4
M10b	47.3
M10	46.2
M13	43.9
M13c	43.0
M11b	39.6
M11	37.7
M11a	33.2
H 5b	32.8

The matching procedures have produced the following results for RIVERHEAD FARM sample 29273001

Community code	co-efficient	
M10	40.9	3 subcommunities.
M14	36.8	0 subcommunities.
M15	33.9	4 subcommunities.
M29	33.2	0 subcommunities.
M11	32.7	2 subcommunities.
M25	31.0	3 subcommunities.
M21	30.8	2 subcommunities.
M13	30.4	3 subcommunities.
M 6	28.7	4 subcommunities.
M24	28.5	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	45.2
M15a	43.4
M10	40.9
M14	36.8
M11a	35.3
M15b	34.4
M 6a	34.0
M15	33.9
M 6d	33.8
M10b	33.6

The matching procedures have produced the following results for sample 29273002

Community code	co-efficient	
M14	43.1	0 subcommunities.
M15	40.3	4 subcommunities.
M25	39.5	3 subcommunities.
M21	38.3	2 subcommunities.
M 6	34.5	4 subcommunities.
M17	32.2	3 subcommunities.
H 5	29.3	2 subcommunities.
M 4	28.8	0 subcommunities.
M16	26.7	4 subcommunities.
M24	26.7	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	43.7
M14	43.1
M15b	42.7
M25a	42.2
M 6d	42.2
M15	40.3
M21b	39.7
M25	39.5
M21	38.3
M17a	38.2

The matching procedures have produced the following results for sample 29273003

Community code	co-efficient	
M21	35.5	2 subcommunities.
M15	33.5	4 subcommunities.
M14	32.1	0 subcommunities.
M17	30.1	3 subcommunities.
M25	30.0	3 subcommunities.
M 6	29.8	4 subcommunities.
M 9	23.5	2 subcommunities.
M 5	23.3	0 subcommunities.
M 4	21.9	0 subcommunities.
M 8	21.6	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	37.3
M21b	36.8
M21	35.5
M15b	34.8
M17a	33.7
M15	33.5
M14	32.1
M25a	31.7
M 6d	31.4
M21a	30.1

The matching procedures have produced the following results for sample 29273004

Community code	co-efficient	
M14	41.5	0 subcommunities.
M21	38.4	2 subcommunities.
M10	38.0	3 subcommunities.
M29	36.6	0 subcommunities.
M15	33.2	4 subcommunities.
M11	31.2	2 subcommunities.
M 9	29.7	2 subcommunities.
H 5	29.3	2 subcommunities.
M13	26.6	3 subcommunities.
M17	26.1	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	45.3
M10a	44.1
M14	41.5
M21b	40.4
M21	38.4
M10	38.0
M29	36.6
M21a	34.3
H 5b	33.2
M15	33.2

The matching procedures have produced the following results for sample 29273005

Community code	co-efficient	
M10	39.8	3 subcommunities.
M11	36.7	2 subcommunities.
M14	34.8	0 subcommunities.
H 5	30.9	2 subcommunities.
M29	29.7	0 subcommunities.
M15	28.5	4 subcommunities.
M 9	27.3	2 subcommunities.
M13	26.2	3 subcommunities.
M21	24.1	2 subcommunities.
M 8	22.3	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	47.8
M15a	42.0
M10	39.8
M11b	38.5
M11	36.7
M14	34.8
M 9a	33.9
M11a	32.6
H 5b	32.6
H 5	30.9

The matching procedures have produced the following results for sample 29273006

Community code	co-efficient	
M21	44.9	2 subcommunities.
M15	40.7	4 subcommunities.
M17	40.7	3 subcommunities.
M14	38.2	0 subcommunities.
M 6	34.6	4 subcommunities.
M25	33.0	3 subcommunities.
M18	31.5	2 subcommunities.
M16	27.6	4 subcommunities.
M10	25.5	3 subcommunities.
M24	25.2	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M21b	47.9
M21	44.9
M17a	41.8
M15b	41.3
M15	40.7
M17	40.7
M 6d	40.0
M15a	38.9
M14	38.2
M25a	38.0

The matching procedures have produced the following results for sample 29273007

Community code	co-efficient	
M10	41.9	3 subcommunities.
M14	38.5	0 subcommunities.
M15	38.4	4 subcommunities.
M11	37.0	2 subcommunities.
M21	35.7	2 subcommunities.
M17	35.5	3 subcommunities.
M 8	32.5	0 subcommunities.
M 6	31.4	4 subcommunities.
M13	30.9	3 subcommunities.
M25	28.9	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15a	51.9
M10a	46.7
M10	41.9
M15b	38.5
M14	38.5
M15	38.4
M17a	37.4
M11	37.0
M21b	37.0
M21	35.7

The matching procedures have produced the following results for sample 29273008

Community code	co-efficient	
M15	48.5	4 subcommunities.
M 6	46.1	4 subcommunities.
M17	45.0	3 subcommunities.
M21	43.5	2 subcommunities.
M25	38.9	3 subcommunities.
M14	31.9	0 subcommunities.
M18	31.8	2 subcommunities.
M16	31.5	4 subcommunities.
U 5	30.0	5 subcommunities.
M 7	28.1	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M15b	50.8
M15	48.5
M 6d	46.8
M21b	46.2
M 6	46.1
M17a	45.4
M15a	45.3
M17	45.0
M25a	44.7
M 6a	44.5

The matching procedures have produced the following results for SAND DALE
sample 29206001

Community code	co-efficient	
M13	25.7	3 subcommunities.
M37	24.6	0 subcommunities.
M22	24.1	4 subcommunities.
SD14	20.9	4 subcommunities.
SD15	20.3	4 subcommunities.
SD17	18.9	4 subcommunities.
SD16	18.7	4 subcommunities.
M11	18.0	2 subcommunities.
M26	17.9	2 subcommunities.
M38	16.9	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	28.1
M13a	27.3
M13	25.7
M22a	25.4
M37	24.6
M22	24.1
SD17b	23.3
SD15c	23.3
M22b	23.0
M13c	22.9

The matching procedures have produced the following results for sample 29206002

Community code	co-efficient	
M13	33.4	3 subcommunities.
M11	31.2	2 subcommunities.
M10	28.7	3 subcommunities.
SD14	27.6	4 subcommunities.
U15	23.5	0 subcommunities.
M38	23.4	0 subcommunities.
H 5	22.8	2 subcommunities.
M37	22.3	0 subcommunities.
M22	22.0	4 subcommunities.
M26	20.4	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	38.4
M13	33.4
M11b	33.4
M10b	33.3
M13c	31.8
M11	31.2
M10a	31.1
M10	28.7
SD14b	27.9
SD14	27.6

The matching procedures have produced the following results for SCARTH WOOD MOOR sample 29284001

Community code	co-efficient	
M29	38.1	0 subcommunities.
M 9	36.1	2 subcommunities.
M10	30.2	3 subcommunities.
M11	27.2	2 subcommunities.
M13	26.8	3 subcommunities.
M14	24.5	0 subcommunities.
H 5	23.9	2 subcommunities.
M25	23.2	3 subcommunities.
M 5	23.0	0 subcommunities.
M21	22.3	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M29	38.1
M 9a	36.2
M 9	36.1
M10a	34.2
M 9b	32.7
M13c	31.0
M10	30.2
H 5b	29.0
M10b	28.3
M13a	28.0

The matching procedures have produced the following results for sample 29284002

Community code	co-efficient	
M 4	52.3	0 subcommunities.
M 6	51.2	4 subcommunities.
M25	35.3	3 subcommunities.
M 5	33.9	0 subcommunities.
M 7	33.1	2 subcommunities.
M29	32.9	0 subcommunities.
M15	31.9	4 subcommunities.
M21	30.3	2 subcommunities.
W 4	29.4	3 subcommunities.
S 9	26.2	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M 6a	52.9
M 6d	52.9
M 4	52.3
M 6	51.2
M 6c	44.6
M 6b	44.4
M25a	41.2
M21b	36.9
M25	35.3
M 5	33.9

The matching procedures have produced the following results for sample 29284003

Community code	co-efficient	
M 6	53.7	4 subcommunities.
M 4	46.1	0 subcommunities.
M21	45.8	2 subcommunities.
M15	42.7	4 subcommunities.
M29	38.9	0 subcommunities.
M25	36.9	3 subcommunities.
M14	34.7	0 subcommunities.
M17	34.5	3 subcommunities.
M 7	34.3	2 subcommunities.
M 5	30.5	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M 6a	60.8
M 6	53.7
M 6d	53.3
M 6b	51.6
M21b	48.9
M15a	46.4
M 4	46.1
M25a	46.0
M21	45.8
M15b	43.7

The matching procedures have produced the following results for sample 29284004

Community code	co-efficient	
M29	35.4	0 subcommunities.
M10	35.3	3 subcommunities.
M14	35.0	0 subcommunities.
M11	33.0	2 subcommunities.
M 9	30.1	2 subcommunities.
M21	30.1	2 subcommunities.
M15	27.7	4 subcommunities.
M13	26.9	3 subcommunities.
H 5	25.6	2 subcommunities.
M25	24.0	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10a	36.9
M29	35.4
M10	35.3
M14	35.0
M 9a	34.0
M11	33.0
M15a	31.7
M11a	31.2
M11b	31.1
M21b	30.1

The matching procedures have produced the following results for sample 29284005

Community code	co-efficient	
M10	40.6	3 subcommunities.
M13	37.1	3 subcommunities.
M24	34.4	3 subcommunities.
M29	32.4	0 subcommunities.
M 9	31.0	2 subcommunities.
M14	30.4	0 subcommunities.
M26	30.0	2 subcommunities.
M11	29.7	2 subcommunities.
M25	28.1	3 subcommunities.
M15	26.9	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10	40.6
M10a	40.2
M10b	40.2
M13c	38.7
M13b	37.1
M13	37.1
M 9a	35.2
M24	34.4
M24b	34.0
M15a	33.6

The matching procedures have produced the following results for sample 29284006

Community code	co-efficient	
M29	36.2	0 subcommunities.
M 9	31.8	2 subcommunities.
S27	28.2	2 subcommunities.
M23	27.7	2 subcommunities.
M 5	27.6	0 subcommunities.
S 9	25.9	2 subcommunities.
W 1	25.0	0 subcommunities.
S10	24.4	2 subcommunities.
M25	22.4	3 subcommunities.
M 6	22.4	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M29	36.2
S27a	34.6
M 9b	33.7
M 9	31.8
M23a	31.0
S 9b	29.4
S10b	28.8
S27	28.2
M23	27.7
M 5	27.6

The matching procedures have produced the following results for sample 29284007

Community code	co-efficient	
M10	36.3	3 subcommunities.
M11	35.8	2 subcommunities.
M37	32.2	0 subcommunities.
M38	27.4	0 subcommunities.
M29	23.0	0 subcommunities.
M13	22.9	3 subcommunities.
SD13	22.1	2 subcommunities.
M 9	22.1	2 subcommunities.
M14	20.8	0 subcommunities.
M12	20.2	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10	36.3
M11	35.8
M11b	34.6
M11a	33.7
M10a	33.6
M37	32.2
M10b	31.5
M10c	30.1
M38	27.4
M13b	26.7

The matching procedures have produced the following results for sample 29284008

Community code	co-efficient	
M10	37.9	3 subcommunities.
M11	34.6	2 subcommunities.
M 9	32.1	2 subcommunities.
M13	30.7	3 subcommunities.
M29	28.8	0 subcommunities.
M24	28.4	3 subcommunities.
M 6	28.1	4 subcommunities.
M38	27.8	0 subcommunities.
M 8	26.9	0 subcommunities.
M25	26.1	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10	37.9
M10a	36.8
M11	34.6
M11a	34.4
M10b	33.3
M 6b	32.4
M 9	32.1
M13	30.7
M13c	29.9
M24b	29.8

The matching procedures have produced the following results for sample 29284009

Community code	co-efficient	
M10	35.1	3 subcommunities.
M11	32.3	2 subcommunities.
M38	27.5	0 subcommunities.
M26	27.0	2 subcommunities.
M13	26.6	3 subcommunities.
SD14	26.3	4 subcommunities.
M29	25.8	0 subcommunities.
M37	25.2	0 subcommunities.
M22	23.8	4 subcommunities.
M24	22.3	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10	35.1
M11a	32.6
M11	32.3
M10b	32.2
M10a	31.5
M11b	29.4
M26b	28.8
M13b	28.7
M22b	27.9
M38	27.5

The matching procedures have produced the following results for sample 29284010

Community code	co-efficient	
M 4	45.7	0 subcommunities.
S 9	35.2	2 subcommunities.
M 6	31.4	4 subcommunities.
M23	31.3	2 subcommunities.
S27	27.9	2 subcommunities.
M 5	27.7	0 subcommunities.
MG13	26.8	0 subcommunities.
MG10	26.7	3 subcommunities.
W 4	26.1	3 subcommunities.
S19	25.1	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M 4	45.7
S 9	35.2
S27a	33.3
M 6c	33.1
M23a	31.7
W 4b	31.6
MG10a	31.5
M 6	31.4
M 6d	31.4
M23b	31.4

The matching procedures have produced the following results for SNAPER FARM MEADOWS sample 29283001

Community code	co-efficient	
SD14	35.0	4 subcommunities.
M13	34.5	3 subcommunities.
M11	31.9	2 subcommunities.
M10	31.3	3 subcommunities.
M38	30.5	0 subcommunities.
SD15	30.1	4 subcommunities.
M 9	28.3	2 subcommunities.
SD17	27.2	4 subcommunities.
M37	26.9	0 subcommunities.
M26	26.3	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
SD14b	39.0
SD14c	36.8
M13c	36.3
SD14a	35.8
M13b	35.2
SD14	35.0
M10b	34.5
M13	34.5
SD17d	34.0
M10c	33.8

The matching procedures have produced the following results for sample 29283002

Community code	co-efficient	
M13	37.0	3 subcommunities.
M10	36.4	3 subcommunities.
M22	33.7	4 subcommunities.
M26	32.7	2 subcommunities.
SD14	30.5	4 subcommunities.
M 9	30.0	2 subcommunities.
M38	29.2	0 subcommunities.
M11	26.8	2 subcommunities.
M24	26.2	3 subcommunities.
SD17	25.4	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	42.4
M10b	39.8
M22b	39.0
M13	37.0
M10	36.4
M13c	36.4
M10a	34.4
M22	33.7
M26b	33.3
M26	32.7

The matching procedures have produced the following results for STONY MOOR SIKE sample 29276001

Community code	co-efficient	
M10	47.0	3 subcommunities.
M13	40.7	3 subcommunities.
M26	36.8	2 subcommunities.
M 9	35.1	2 subcommunities.
M11	34.2	2 subcommunities.
M38	32.2	0 subcommunities.
M24	30.7	3 subcommunities.
M 8	28.7	0 subcommunities.
M22	26.3	4 subcommunities.
H 5	25.0	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	52.2
M10	47.0
M13b	46.7
M10a	43.9
M13c	41.7
M13	40.7
M26a	37.4
M 9a	37.0
M26	36.8
M 9	35.1

The matching procedures have produced the following results for sample 29276002

Community code	co-efficient	
M13	37.8	3 subcommunities.
M 9	35.8	2 subcommunities.
M22	35.5	4 subcommunities.
M26	34.2	2 subcommunities.
M10	32.4	3 subcommunities.
M24	31.8	3 subcommunities.
M38	29.9	0 subcommunities.
SD15	29.0	4 subcommunities.
SD14	28.9	4 subcommunities.
SD17	27.1	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	39.7
M13a	38.5
M13	37.8
M22b	37.8
M10b	37.5
M13c	37.1
M 9b	36.4
M 9	35.8
M22	35.5
M26b	34.9

The matching procedures have produced the following results for sample 29276003

Community code	co-efficient	
M10	41.4	3 subcommunities.
M13	38.1	3 subcommunities.
M11	32.0	2 subcommunities.
M 9	30.2	2 subcommunities.
M24	26.3	3 subcommunities.
SD14	25.6	4 subcommunities.
SD15	25.1	4 subcommunities.
M26	25.1	2 subcommunities.
M29	23.9	0 subcommunities.
M22	22.9	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M10b	43.3
M10	41.4
M13b	40.7
M13c	38.4
M13	38.1
M10a	37.7
M11b	32.8
M11	32.0
M 9	30.2
M11a	29.5

The matching procedures have produced the following results for sample 29276004

Community code	co-efficient	
M29	28.8	0 subcommunities.
M37	28.6	0 subcommunities.
M35	26.0	0 subcommunities.
M11	25.6	2 subcommunities.
SD13	24.8	2 subcommunities.
M32	23.9	2 subcommunities.
M10	23.9	3 subcommunities.
SD14	21.2	4 subcommunities.
M 1	19.2	0 subcommunities.
M38	18.9	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M29	28.8
M37	28.6
SD13b	27.1
M35	26.0
M11b	25.7
M11	25.6
SD13	24.8
SD14c	24.0
M32	23.9
M10	23.9

The matching procedures have produced the following results for sample 29276005

Community code	co-efficient	
M 6	46.8	4 subcommunities.
M 4	37.0	0 subcommunities.
M29	34.9	0 subcommunities.
M 7	33.6	2 subcommunities.
M 5	29.2	0 subcommunities.
M23	25.2	2 subcommunities.
M25	24.1	3 subcommunities.
M 8	23.6	0 subcommunities.
W 4	23.5	3 subcommunities.
M21	23.5	2 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M 6a	47.5
M 6	46.8
M 6c	46.2
M 6b	46.2
M 6d	39.7
M 4	37.0
M 7a	36.3
M29	34.9
M 7	33.6
M 7b	32.6

The matching procedures have produced the following results for sample 29276006

Community code	co-efficient	
M 9	32.2	2 subcommunities.
M13	28.2	3 subcommunities.
M22	27.7	4 subcommunities.
SD15	26.3	4 subcommunities.
W 3	24.5	0 subcommunities.
M 5	22.9	0 subcommunities.
SD14	21.3	4 subcommunities.
M24	20.8	3 subcommunities.
S27	20.6	2 subcommunities.
SD17	19.8	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M 9b	36.0
M 9	32.2
M13c	31.2
M13	28.2
M13b	28.1
M22	27.7
M22c	27.6
M 9a	27.5
M22d	27.5
M22a	26.6

The matching procedures have produced the following results for TROUTSDALE sample 29247001

Community code	co-efficient	
M13	48.1	3 subcommunities.
M10	43.5	3 subcommunities.
M26	35.2	2 subcommunities.
H 5	34.2	2 subcommunities.
M24	33.8	3 subcommunities.
M11	31.8	2 subcommunities.
M38	28.2	0 subcommunities.
M22	27.6	4 subcommunities.
M 9	27.6	2 subcommunities.
M14	23.4	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	53.9
M10b	50.0
M13c	49.2
M13	48.1
M10	43.5
M10a	42.3
M13a	36.3
M11b	35.2
M26	35.2
M26a	35.0

The matching procedures have produced the following results for sample 29247002

Community code	co-efficient	
M13	50.4	3 subcommunities.
M10	40.3	3 subcommunities.
M24	33.8	3 subcommunities.
M22	33.5	4 subcommunities.
M26	32.1	2 subcommunities.
M11	31.8	2 subcommunities.
M 9	31.0	2 subcommunities.
H 5	29.4	2 subcommunities.
M38	28.8	0 subcommunities.
SD14	28.5	4 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	53.4
M13c	53.3
M13	50.4
M10b	45.9
M13a	41.7
M10	40.3
M10a	38.6
M22b	35.2
M11b	34.4
M24b	34.3

The matching procedures have produced the following results for sample 29247003

Community code	co-efficient	
M22	39.6	4 subcommunities.
W 3	32.8	0 subcommunities.
M13	31.1	3 subcommunities.
SD17	30.6	4 subcommunities.
SD15	29.8	4 subcommunities.
M24	29.8	3 subcommunities.
M26	29.5	2 subcommunities.
M 9	29.1	2 subcommunities.
MG10	27.7	3 subcommunities.
MG 8	27.5	0 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M22b	42.8
M22a	41.2
M22	39.6
M22c	34.2
M13a	34.2
M 9b	33.6
M22d	33.1
W 3	32.8
SD15d	32.1
SD17b	31.7

The matching procedures have produced the following results for sample 29247004

Community code	co-efficient	
M13	45.3	3 subcommunities.
M10	35.6	3 subcommunities.
M 9	34.8	2 subcommunities.
M22	32.5	4 subcommunities.
M24	30.9	3 subcommunities.
M26	30.6	2 subcommunities.
M11	29.3	2 subcommunities.
M38	25.5	0 subcommunities.
SD14	24.5	4 subcommunities.
M25	22.3	3 subcommunities.

Matches against sub-communities.

Community code	co-efficient
M13b	45.7
M13	45.3
M13c	44.9
M10b	40.8
M13a	39.2
M10	35.6
M 9	34.8
M 9a	34.2
M10a	33.1
M22b	32.7

10. ANNEX 3: ECOHYDROLOGICAL OBSERVATIONS AT BISHOP MONKTON INGS SSSI, NORTH YORKSHIRE

See separate document

11. ANNEX 4: HYDRO-GEOLOGICAL INFORMATION

See separate document

Further information

Natural England evidence can be downloaded from our **Access to Evidence Catalogue**. For more information about Natural England and our work see **Gov.UK**. For any queries contact the Natural England Enquiry Service on 0300 060 3900 or e-mail **enquiries@naturalengland.org.uk** .

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