HIGHWAYS AGENCY

An Executive Agency of THE DEPARTMENT OF TRANSPORT

A259 Bexhill and Hastings Western Bypass

Environmental Statement Volume 2 (Reports)

Part 1 of 3

Grasslands and Invertebrates - Combe Haven SSSI
Birds - Combe Haven SSSI
Shadow Modelling - Combe Haven Viaduct
Vegetation
Aquatic Invertebrates

September 1994

cba
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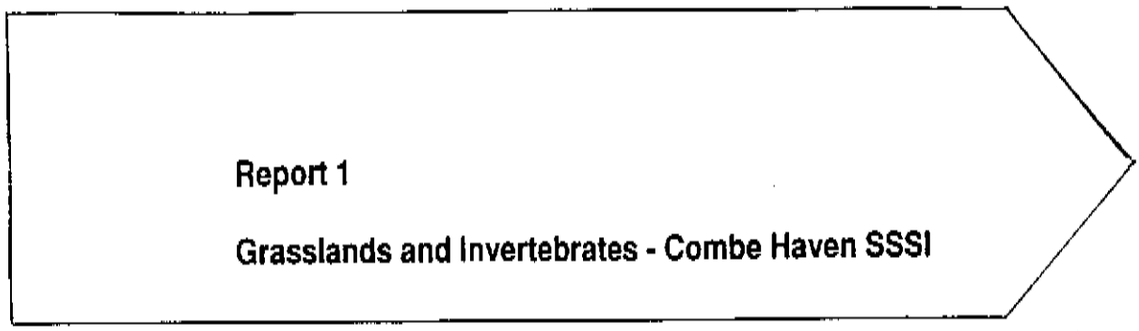
Mott MacDonald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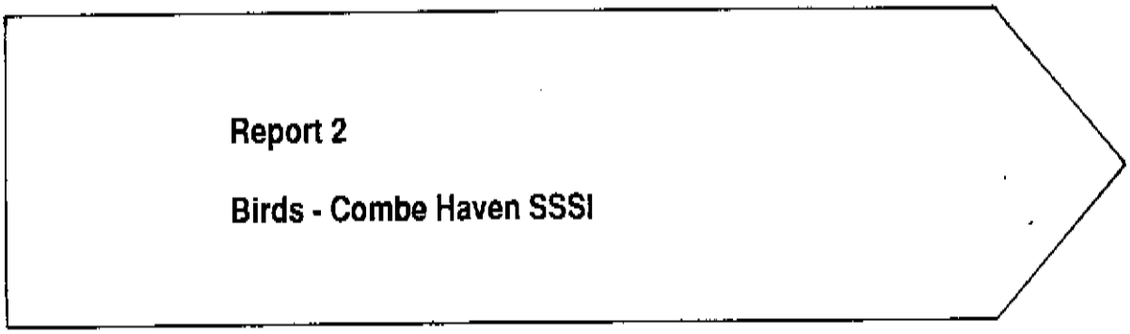
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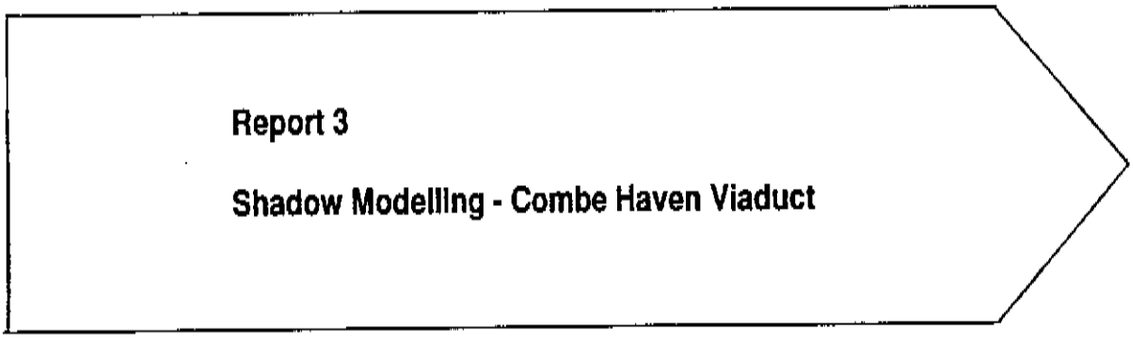
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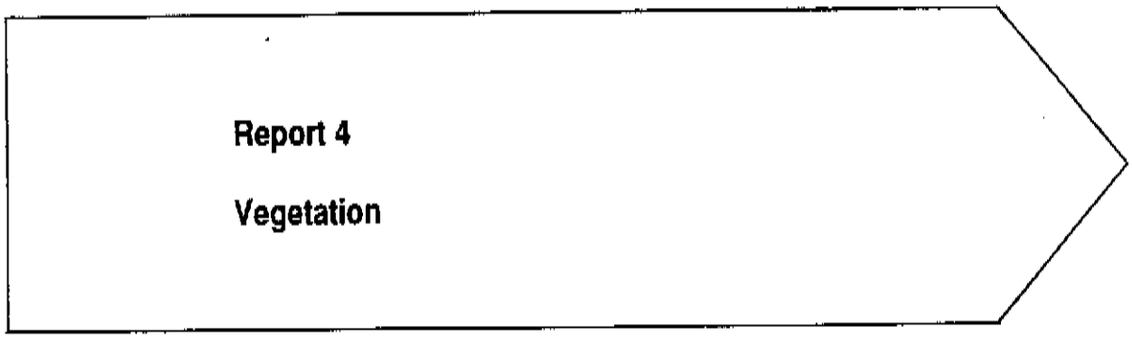
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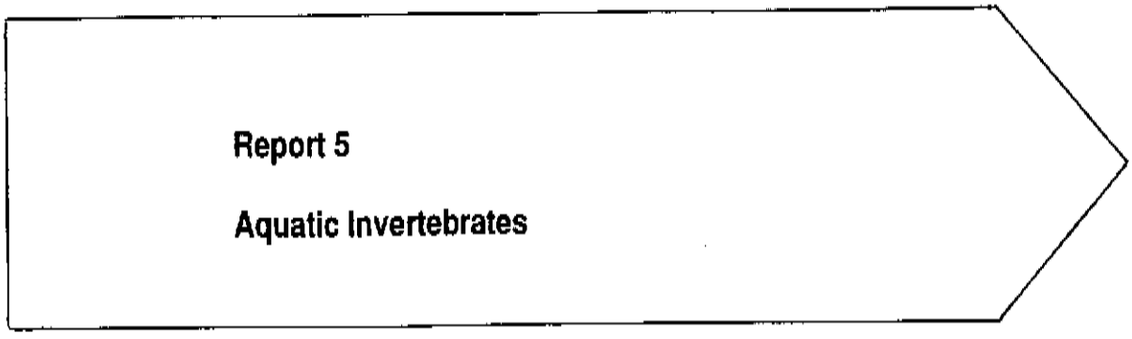
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Report 1

Document Ref 10059/RC/047/1/A
September 1994

REPORT 1

GRASSLANDS AND INVERTEBRATE SURVEY
COMBE HAVEN SSSI

May 1994

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APPENDICES

1.0 INTRODUCTION

1.1 This report has been prepared by Chris Blandford Associates (CBA) to describe the vegetation and invertebrate communities within the wetland part of Combe Haven Site of Special Scientific Interest (SSSI) that could be affected by the viaduct crossing for the A259 Bexhill and Hastings Western Bypass, and to assess the impact of the crossing.

1.2 The invertebrate and vegetation interest of the SSSI is identified in the SSSI schedule (Appendix 1) and this interest was confirmed by a preliminary CBA survey (Appendix 2) in 1988. In order to assess the precise vegetation types present, transects across the line of the route were surveyed in Spring 1991. A survey of the invertebrate fauna of the ditches crossed was carried out at the same time. The vegetation has been classified according to the National Vegetation Classification (Appendix 3) and the invertebrates ranked according to Red Data Book and Nationally Notable Status (Appendix 4).

1.3 The following two sections assess the impact of the viaduct on the vegetation and invertebrates and should be read in conjunction with Report 3 on Analysis of Light Levels under Combe Haven Viaduct. The survey results are described and discussed in sections 4.0 and 5.0 and the significance of the habitats and species present has been evaluated in section 6.0. Further information on the impact of the viaduct on nature conservation, was obtained during the bird survey undertaken at Combe Haven and set out in Report 2.

2.0 GENERAL SITE DESCRIPTION

2.1 Site Location

2.1.1 The Combe Haven SSSI is located in the county of East Sussex to the north of Pebsham. The grid reference for the proposed crossing point of the preferred route is TQ 765103. Figure 1 shows the site context. Appendix 1 gives the SSSI schedule and map.

2.2 Physical Description

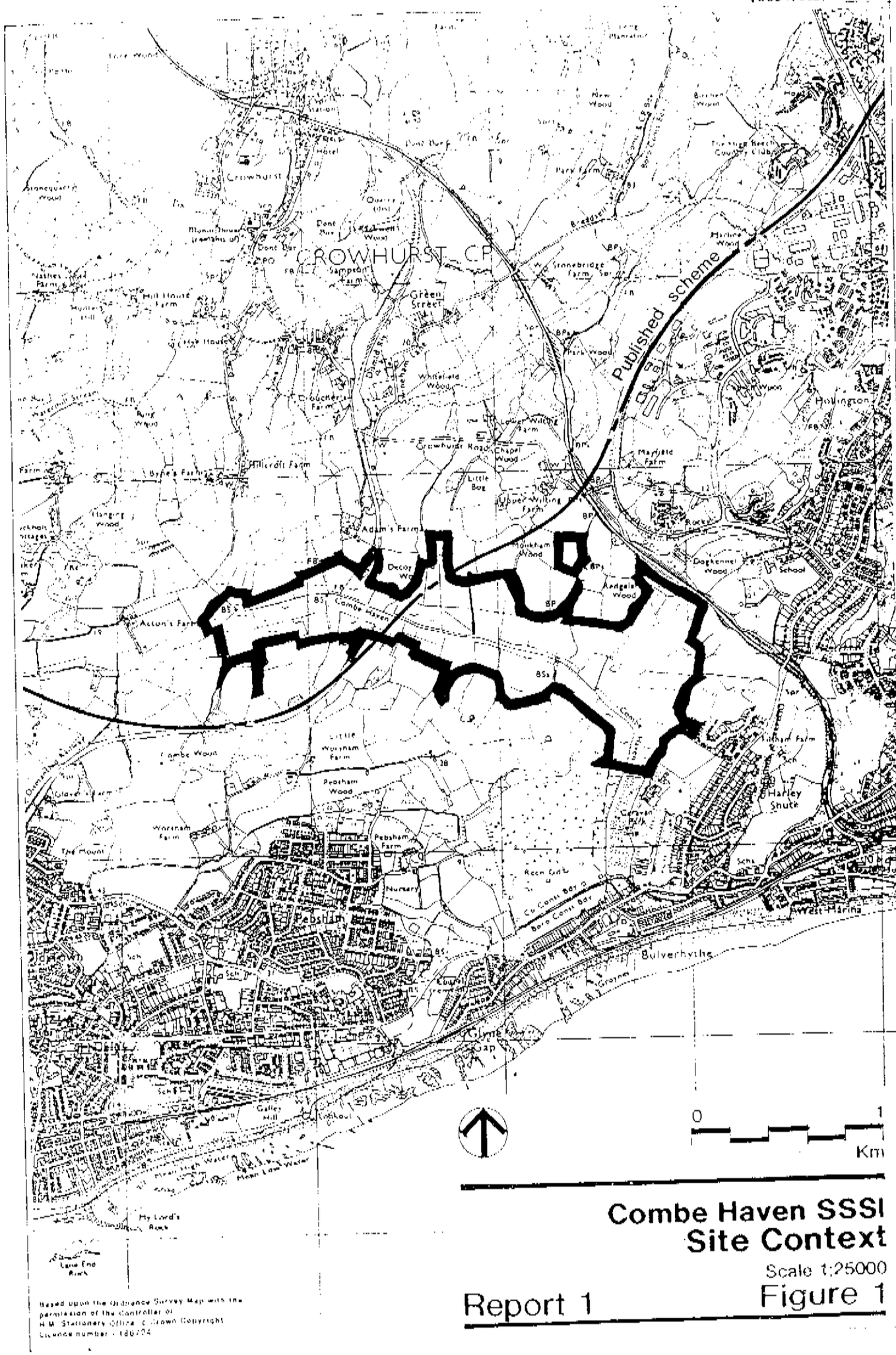
2.2.1 The study area is about the mid part of a wide valley where the valley floor is at approximately 3 m Above Ordnance Datum (AOD). The soil is mainly of alluvial and colluvial origin with alluvial silt and silty clay being most common. These deposits and their origin are discussed in detail by Scaife and Burrin (1983 pp.1-10).

2.2.2 The site has a high water table and is prone to inundation from over-topping of the Combe Haven river. In some areas of the valley floor this flooding can take some time to disperse. A network of ditches within and between the fields drain the land into the river.

2.3 Recent History

2.3.1 Just to the north west of the proposed crossing, the abutments of a railway viaduct which was demolished in 1969 are still apparent. Most of the spoil from the demolition was removed from the site but a small amount was spread out across the line of the old viaduct. The rubble can still be seen on, or just below the surface in some places. The area that lay underneath the old viaduct has now re-vegetated.

2.3.2 The larger ditches within the study area have old sluice gates present, but these are no longer in use. The gates probably date from the last century and would have been used to control the water levels within the wetland.



Combe Haven SSSI
Site Context

Scale 1:25000

Report 1

Figure 1

3.0 SURVEY AND ANALYSIS METHODS

3.1 Vegetation

3.1.1 The survey area is shown in Figure 2.

Grassland Survey

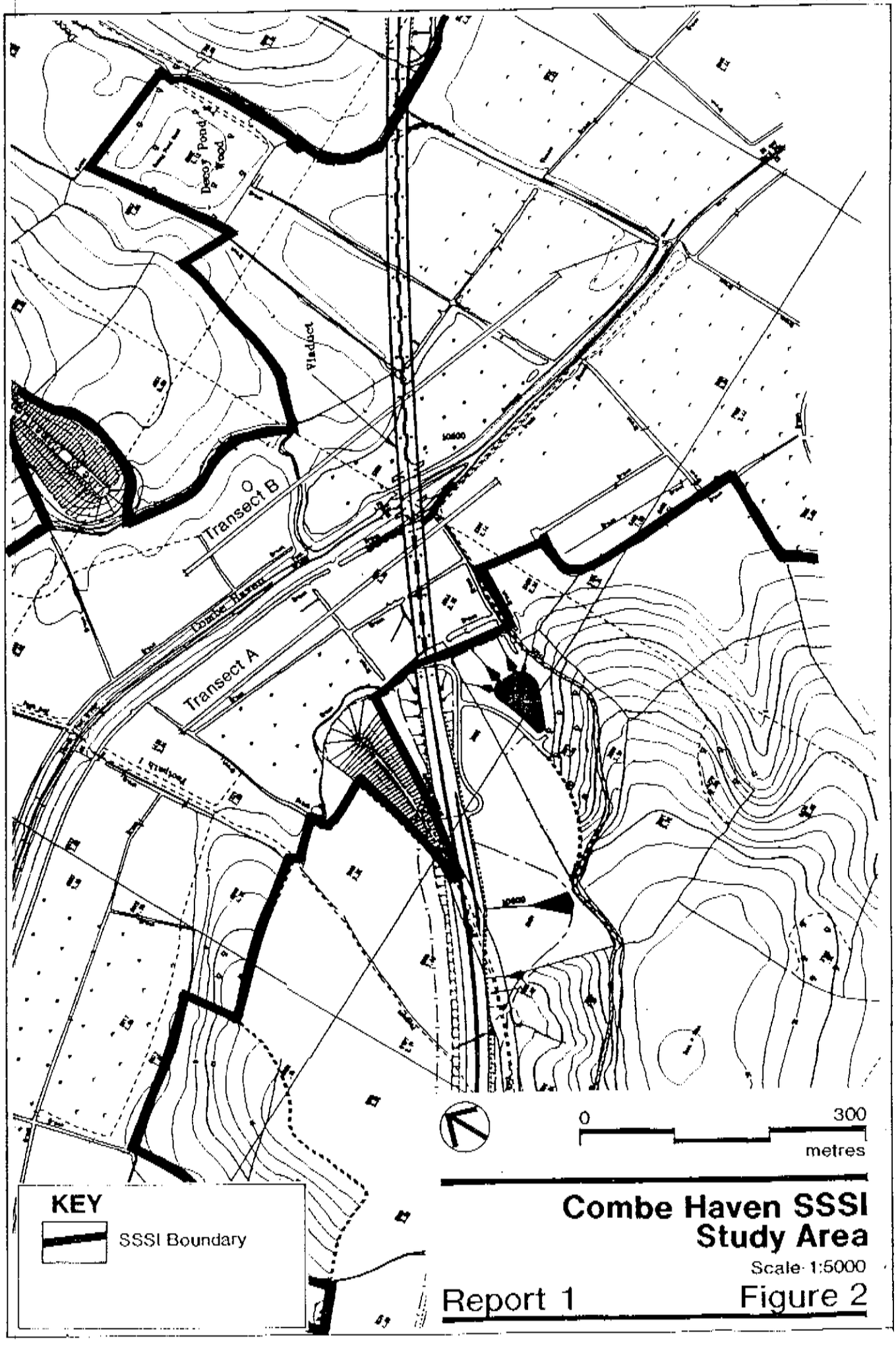
3.1.2 Two transects, running roughly parallel to the Combe Haven river were laid out. Transect A was situated on the southern side of the river with transect B on the northern side. A 2 m x 2 m quadrat size was used for sampling the grassland. Samples were taken at 10 m intervals, transect A having 41 samples and B 49 samples. The orientation of the transect lines and their extent were chosen to enable examination of possible changes in vegetation composition across the line of the old railway viaduct and across the line of the proposed new viaduct. Other areas of grassland were examined by a walkover survey.

3.1.3 In addition to the transect samples, five quadrat samples were taken in field 1 (Figure 3). The locations were chosen as representative of the main vegetation types present in accordance with standard NVC field survey practice. These samples were classified using MATCH (Malloch 1990).

3.1.4 The species present in each quadrat were recorded and an estimate of the percentage cover of each species was made.

3.1.5 In order to identify the principal factor (or factors) determining the vegetation pattern, the samples were analysed using the DECORANA programme (part of the VESPAN II computer package, Malloch 1988). The programme takes the most dissimilar samples and scores the remaining samples in relation to the two extremes. This is expressed as a numerical score so that on Figure 4, axis 1, sample 26 (0) and sample 2 (300) are the most dissimilar (i.e. they have the least species in common). This axis accounts for the greatest variation in the data; axis 2 accounts for the second greatest amount of variation in the data.

3.1.6 The range of scores (i.e. 0-400) is normally called a 'gradient' since it can be usually related to increasing/decreasing levels of major environmental factors such as nutrients or moisture. This is best illustrated by axis 1 on Figure 6 where there is a gradient from the wet communities scoring between 0 and 100 and the bank top community scoring 400.



Combe Haven SSSI
Study Area

Scale 1:5000

Report 1 Figure 2

3.1.7 The samples were also analysed using the TWINSPAN programme in the VESPAN II package, which groups the samples into a hierarchical classification, the most similar samples being grouped together. These groups can then be compared with the National Vegetation Classification (NVC, Appendix 2) using the MATCH programme to identify their similarity to known NVC communities. The similarity is expressed as a coefficient which generally falls within the range of 40-60% for an acceptable 'match'.

Ditch Survey

3.1.8 The ditches were surveyed using an adaptation of a standard Nature Conservancy Council method (Alcock and Palmer, 1985). For ditches crossed by the two transects, 10 m either side of the transect line were surveyed. For other ditches a representative 20 m section was surveyed. Vegetation was separated into four groups: floating, submerged, emergent and bank. These samples were analysed using TWINSPAN and the resultant sub-groups matched to NVC type using MATCH. Ditches sampled are shown in Figure 8. Other swamp types were noted from a walkover survey.

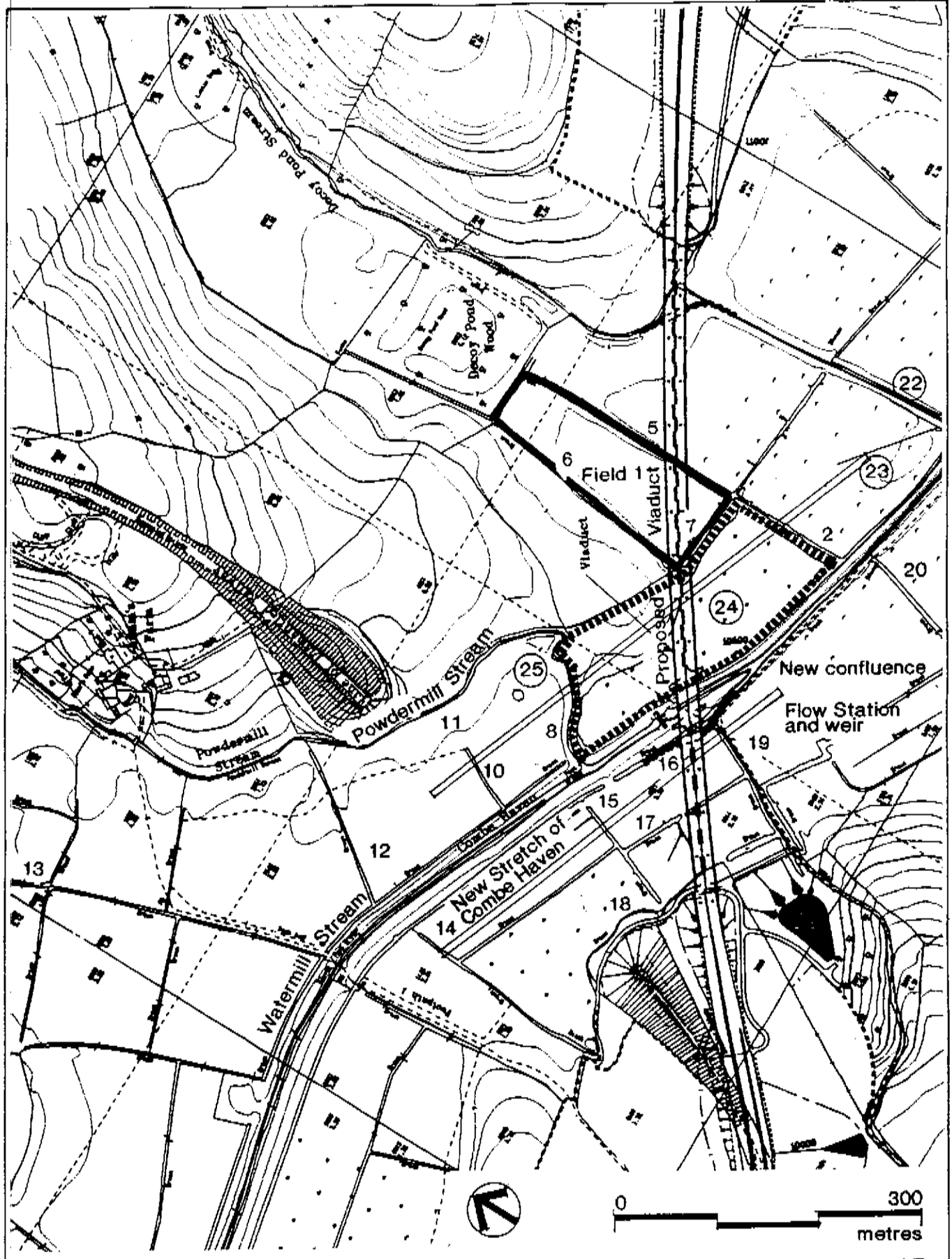
3.1.9 The areas were re-examined in August 1993 to update the vegetation types after Combe Haven recovered from the summer flood of June 1991.

3.2 Invertebrate Survey

3.2.1 The aquatic *Coleoptera* (beetles) have been surveyed in detail since they are generally accepted as indicators of the nature conservation significance of the ditches. Many of the species are sensitive to pollution or to environmental change resulting from ditch clearance.

3.2.2 The sampling programme extended from mid-June to the end of July 1991. Sampling was conducted on four occasions at the points shown in Figure 3 using nets. Terrestrial sampling was carried out by the selection of sites by an experienced entomologist and a routine checking of cow dung was also conducted.

3.2.3 In late June 1991 heavy rainfall caused the Combe Haven river to overflow on both sides. This caused a disruption to the sampling programme and had two main effects. Firstly, the sampling of some of the ditches after the flood was not possible or the results were distorted. Secondly, the flood caused the death of large numbers of terrestrial subterranean invertebrates: these were scooped off the water surface, giving a unique sampling opportunity.



KEY

(21) Location of Terrestrial sample sites (see Table 1-3)

8 Location of Aquatic sample sites (see Table 1-3)

Levee (see text)

Invertebrate Survey Sample Points

Scale 1:5000

Report 1 Figure 3

4.0 RESULTS

4.1 Grasslands

4.1.1 Figures 4 and 6 show the results of the DECORANA analysis for grassland transects A and B. The principal groups of samples have been marked and are discussed in section 4.2 and 4.3 respectively. The TWINSPAN diagrams showing the sub-division of groups of samples are given in Figures 5 and 7 for transects A and B, respectively.

4.2 Grassland Transect A

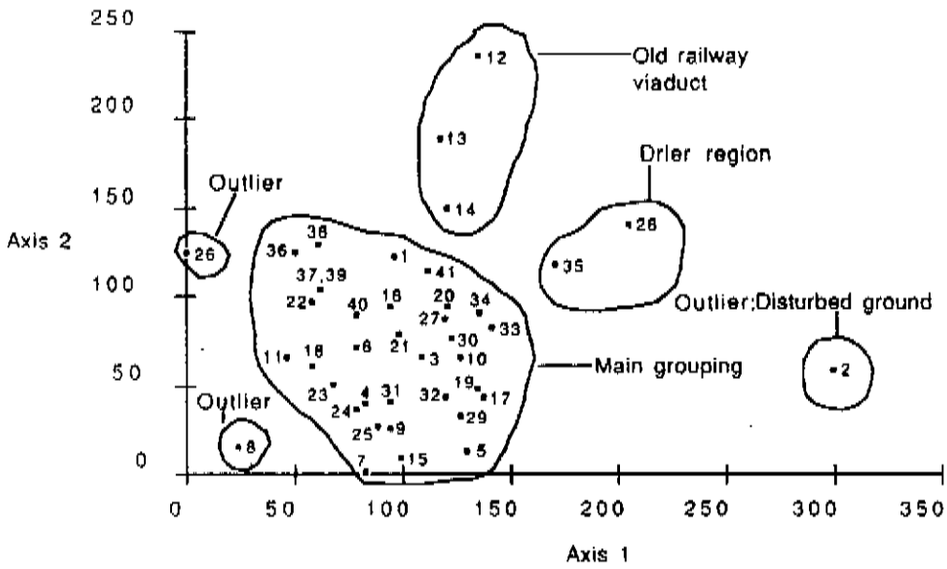


Figure 4. Two Way DECORANA Ordination of Transect A

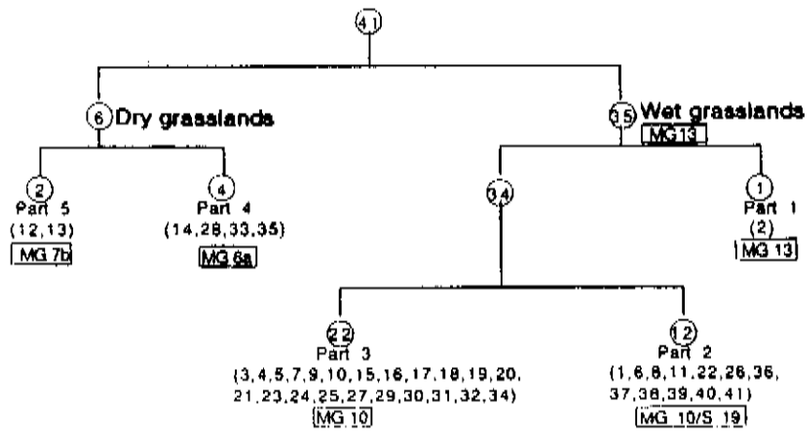


Figure 5. TWINSPAN Diagram for Transect A

4.2.1 For transect A, Figure 4 shows one major cluster of samples, although there may be a separation of 12 samples which lie in the bottom left hand section of the large cluster. Examination of the TWINSPAN results for transect A (Figure 5) shows that there is no pattern of separation of these samples using this analysis. Furthermore, the MATCH programme does not indicate that these 12 samples represent a distinctly different vegetation type. The large cluster has, therefore, not been further sub-divided.

4.2.2 The remaining samples on Figure 4 contains three outliers. These are single samples which are separated from the main groupings. Sample 2 is on disturbed ground, but no explanation for the other two outliers is apparent. The other groupings represent the vegetation underneath the line of the old railway viaduct (samples 12, 13, and 14) and two samples from drier areas (28 and 35). These may be from the tops of ditch banks where spoil has been deposited during dredging.

4.2.3 Figure 5 also shows the results of the MATCH analysis. It is divided into parts, each part represents a final grouping: the part numbers are given on the Figure. The numbers in brackets below the part number refer to the sample numbers. The final information is the NVC type. The letters 'MG' and 'S' stand for mesotrophic grassland and swamp communities, respectively. The numbers refer to the main community type and the lower case letters refer to sub-community types. Appendix 3 gives a fuller description of the NVC types found within the survey site.

4.2.4 Parts 1, 2 and 3 of Figure 5 all tend towards type MG13, creeping bent (*Agrostis stolonifera*) - marsh foxtail (*Alopecurus geniculatus*) inundation grassland. However, minor local modifications appear to exist with some tendency towards MG10a, which is Yorkshire fog (*Holcus lanatus*) - soft rush (*Juncus effusus*) rush pasture typical sub-community. In some places (part 2) a tendency towards a wetter community is exhibited, this being common spike-rush (*Eleocharis palustris*) swamp (NVC type - S19). This latter community is normally found around large lakes, small ponds and along stream sides. Of the samples within this group, only four samples would fall into the S19 category, and these appear to have been taken close to ditch edges.

4.2.5 Parts 4 and 5 include samples which are more typical of improved drainage. Three of these samples; (12, 13 and 14) are clearly distinguished in Figure 4 and are from the area underneath the railway viaduct. In the TWINSPAN, samples 12 and 13 are separated from the other four but the MATCH programme suggests that there is little variation in the NVC type of these samples. Where the viaduct rubble was left (Part 5: samples 12 and 13) the NVC type is probably MG7b, rye-grass (*Lolium perenne*) - rough meadow-grass (*Poa trivialis*) ley. The samples in part 4 are very similar but the closest sub-community match is MG6a, rye grass - crested dog's-tail (*Cynosurus cristatus*) pasture typical sub-community (Samples 14, 28, 33, 35).

4.2.6 Part 1 of Figure 5 contains a single sample which is probably a disturbed form of MG13, common bent - marsh foxtail inundation grassland.

4.2.7 In general, transect A samples can be taken as representing an area of MG13 common bent - marsh foxtail inundation grassland, with some local variations resulting from changes in drainage conditions.

4.3 Grassland Transect B

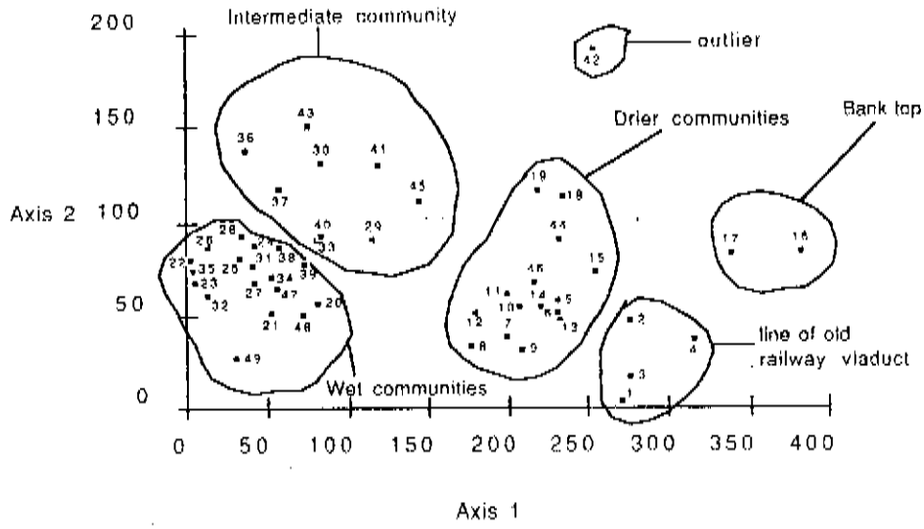


Figure 6. Two Way DECORANA Ordination of Transect B

4.3.1 Transect B appears to show less homogenous vegetation than transect A. Figure 6 shows six clear groupings of samples and Figure 7 indicates seven TWINSPAN groupings.

4.3.2 Figure 6 shows a gradient from wet to dry communities along axis 1 which is also reflected in Figure 4.

4.3.3 Parts 1 and 2 of Figure 7 show a strong affinity to NVC type S22c, the marsh foxtail sub-community of flote-grass (*Glyceria fluitans*) swamp. In addition part 3 is also matched to S22c. These samples are probably S22c but occur in a transition zone to drier ground type. The five samples in part 4 are difficult to ascribe accurately to NVC type: the MATCH coefficients for sub-communities MG13 and S19a being 38.6 and 38.4 respectively. The main community match gives a

slight preference to MG13, creeping bent - marsh foxtail inundation grassland. S19a is common spike-rush swamp. This, as stated earlier, may occur alongside the ditches or in seasonally wet drains.

4.3.4 Parts 5 and 6 indicate better drained ground. They are both classed as NVC type MG10, the Yorkshire fog - soft rush pasture.

4.3.5 Part 7 represents two samples from bank tops. These samples are classed as type MG7b, the rye-grass, rough meadow-grass ley sub-community of rye grass leys.

4.3.6 In general, transect B moves from communities on better drained soil at the west of the transect towards wetland communities at the eastern end. Like transect A, some local variations are observed but the trend from dry to wet vegetation types is much stronger in transect B than transect A. The results suggest that the northern side of the Combe Haven is generally wetter and/or less heavily grazed.

4.3.7 The gross vegetation types along the two transects in 1991 are shown in Figure 8.

4.4 Other Grasslands

4.4.1 The five samples taken in field 1 indicate that the vegetation is classed as NVC type MG9a, Yorkshire fog - tufted hair-grass (*Deschampsia cespitosa*) grassland, rough meadow-grass sub-community. This is a community of drier soils than any of the grassland along transects A and B. Some soft rush clumps were present possibly indicating recent invasion onto the site. The field appears to be better drained than other areas. It is also slightly higher than transects A and B and probably less frequently inundated.

4.4.2 One area of MG10b Yorkshire fog-soft rush pasture hard rush sub-community occurred on the old railway viaduct on disturbed soils on the south side of Combe Haven.

4.4.3 Large stands of S5 reed sweet-grass swamp were found in the grassland north east of the Weir in 1993. It is unusual to have the vegetation type in fields as it is usually susceptible to grazing.

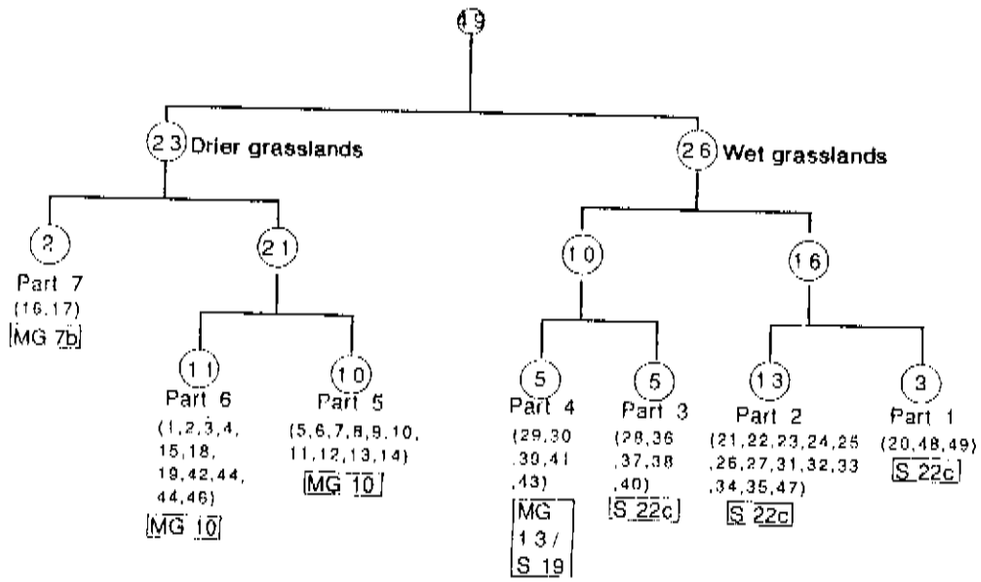
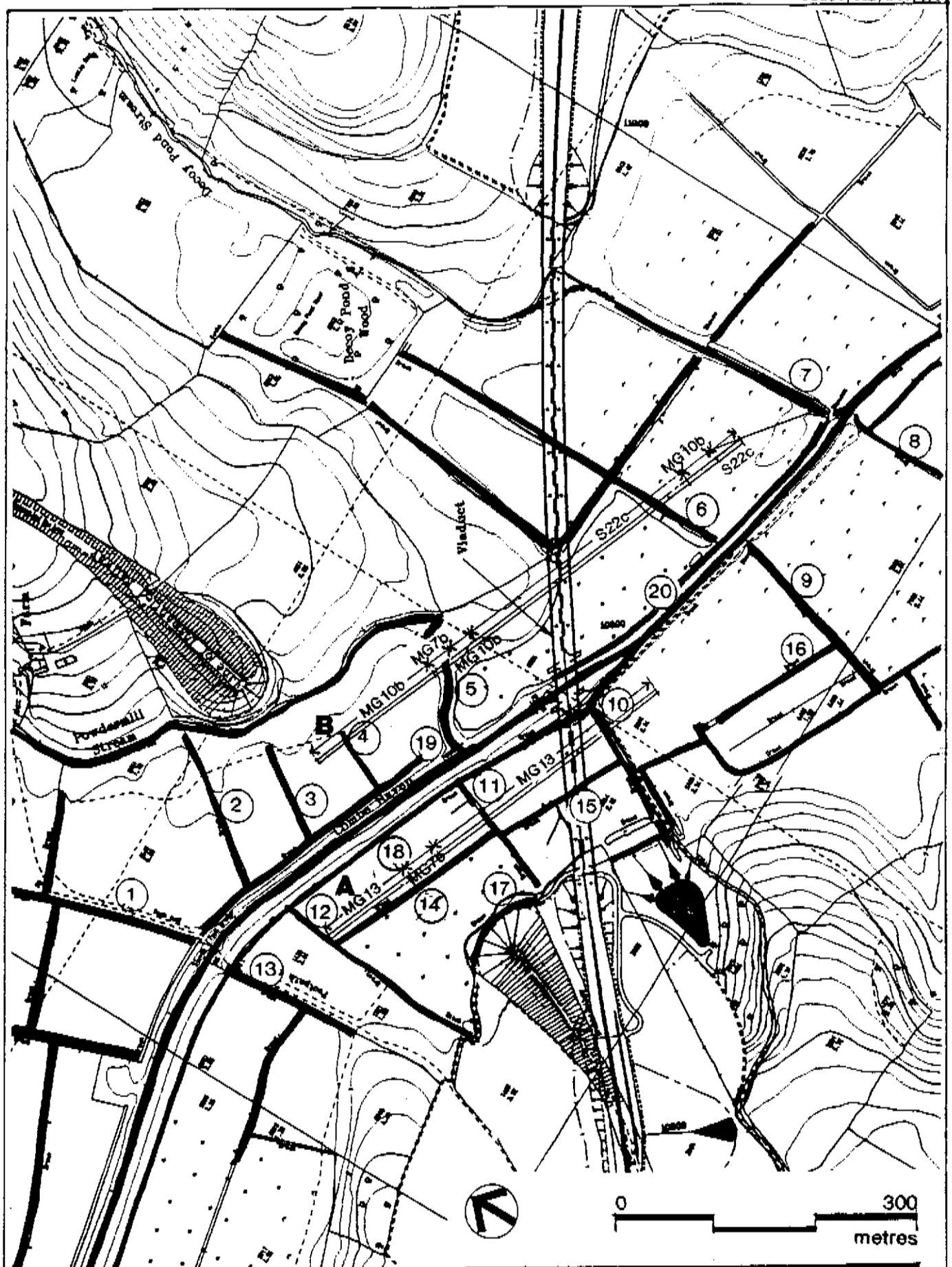


Figure 7. TWINSPAN Diagram for Transect B

NVC community

Number of samples

The figure shows clusters of most similar samples related to their NVC type



KEY

Transect

Ditch with sample number

MG10b NVC community

Gross Vegetation Types
Location of ditch samples

Scale 1:5000

Report 1 Figure 8

4.5 Ditches

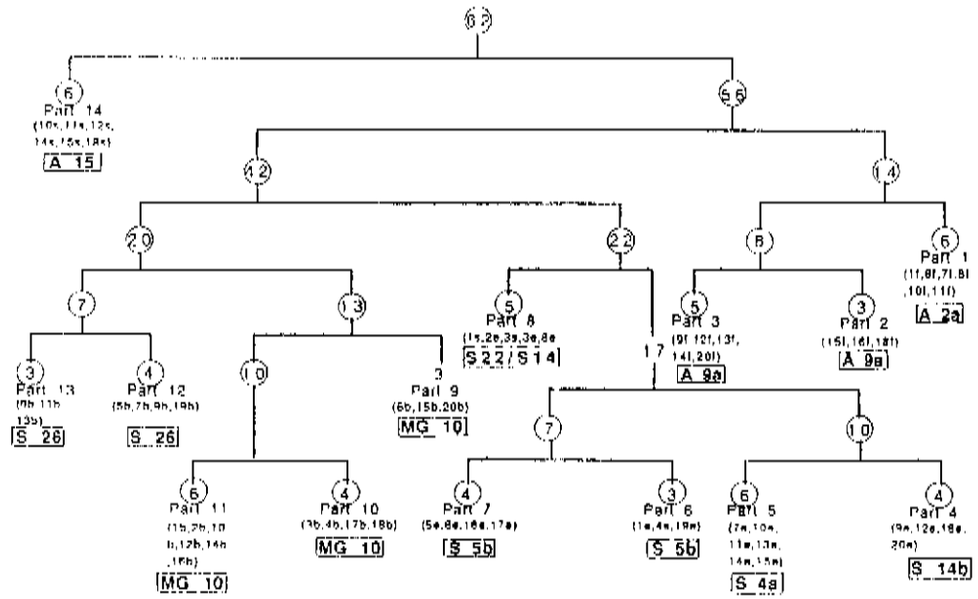


Figure 9. TWINSPAN Diagram of Ditch Samples

KEY

NVC community

Number of samples

f=floating

b=bank

s=submerged

e=emergent vegetation

The figure shows clusters of most similar samples related to their NVC type

4.5.1 The ditch data were separated into the four types surveyed: submerged, floating, emergent and bank vegetation. Figure 9 shows the resultant TWINSPAN diagram. In general, the analysis corresponds to these four main types with a fifth group, part 8, being composed of submerged and emergent element. The ditch communities were matched to NVC type, these are also shown in Figure 9.

Floating Vegetation

4.5.2 Parts 1, 2 and 3 of Figure 9 represent two main NVC types, these are NVC type A2a (A = Aquatic) and A9a . The A2a represents the typical sub-community of the common duckweed (*Lemna minor*) community. This is found in very slow moving or standing water with a moderate to high nutrient content (mesotrophic to eutrophic). Ditches 1, 6, 7, 8, 10 and 11 have this vegetation type.

4.5.3 The NVC type A9a is a species-poor sub-community of the broad-leaved pondweed (*Potamogeton natans*) community. This is a typical community of moderate to nutrient-poor water and is found in standing to moderately fast-flowing water conditions. Ditches 9, 12, 13, 14, 15, 16 and 20 have this community present. Seven of these lie on the southern side of the Combe Haven. The other sample (ditch 20) is from the Combe Haven river downstream of the National Rivers Authority's (NRA) flow monitoring station and weir.

4.5.4 In August 1993, the A1 fat duckweed aquatic community occurred in the Combe Haven river west of the river.

Emergent Vegetation

4.5.5 Parts 4-7 on Figure 9 represent the majority of the emergent vegetation. Part 4, ditches 9, 12, 18 and 20 are matched to NVC types S14b or S8b, the former being branched bur-reed (*Sparganium erectum*) swamp of water plantain (*Alisma plantago-aquatica*) sub-community, the latter is common club-rush (*Scirpus lacustris*) swamp, branched bur-reed sub-community. The MATCH coefficient is marginally better for S14b. This factor, coupled with the absence of common club-rush from the current survey and past records, suggests S14b to be the closest NVC type. These ditches also lie on the southern side of the Combe Haven, or in the case of sample 20 the Combe Haven river, below the weir.

4.5.6 Part 5 contains six ditch samples: 7, 10, 11, 13, 14 and 15. It most closely resembles the NVC type S4a, common reed (*Phragmites australis*) swamp and reed bed, common reed sub-community. This community type is mainly found in standing or slow-moving water with low nutrient input.

4.5.7 Parts 6 and 7 are classed as reed sweet-grass (*Glyceria maxima*) swamp (NVC type S5) with part 7 showing a tendency towards a sub-community containing water plantain and branched bur-reed (S5b). Ditches 1, 4, 5, 6, 16, 17 and 18 are classed as containing this vegetation type.

4.5.8 Part 8 contains a mixture of submerged and emergent vegetation samples from ditches 1, 3 and 8. This is most closely matched to NVC type S22, flote-grass swamp, but also closely resembles S14 branched bur-reed swamp. With the number of samples used it is not possible to distinguish for

certain the closest affinity to the NVC type. Some sections of ditch had frequent spike rush and may be the S19c spike rush swamp, spike rush sub-community.

4.5.9 One stand of the S12c greater reedmace (*Typha latifolia*) swamp water plantain sub-community occurred at the bottom of the southern embankment.

4.5.10 Some ditch sides had stands of reed canary-grass (*Phalaris arundinacea*), which were referred to the S28a reed canary-grass swamp, reed canary-grass sub-community.

4.5.11 One stretch of the Decoy Pond stream had a variable community of reed canary-grass, fool's water-cress, great willowherb (*Epilobium hirsutum*) and nettle. This was referred to the S28b reed canary-grass swamp, great willowherb - nettle sub-community.

4.5.12 Along many of the ditch sides there were narrow strips of greater pond-sedge (*Carex riparia*) which may not have been separated during the original sampling. These were referred to the S6 Greater pond-sedge swamp. There were some small stands of another vegetative sedge, possibly lesser pond-sedge (*Carex acutiformis*), to the west of the railway embankment on the south side of Combe Haven.

Bank Vegetation

4.5.13 For the bank vegetation (parts 9-13) two main vegetation types are present, these are MG10 and S26. The MG10 is represented by parts 9, 10 and 11. MG10 represents Yorkshire fog-soft rush pasture and in most cases is an extension of the adjacent field vegetation. S26 is common reed - nettle (*Urtica dioica*) fen. Parts 12 and 13 can be classed as closely resembling this NVC community. The S26 common reed - nettle fern was confined to banks of the Combe Haven river and Decoy Pond stream, possibly where there was local nutrient enrichment from imported sediment. This was transitional to the emergent vegetation.

Submerged

4.5.14 Part 14 represents the submerged vegetation communities. These were recorded from ditches 10, 11, 12, 14, 15 and 18 (ditches 1 and 3 also contained submerged vegetation, see part 8). The vegetation within these ditches is matched to NVC community A15, Canadian pondweed (*Elodea canadensis*) community though the actual species present is Nuttall's pondweed (*Elodea nuttallii*). This is normally present in stagnant to slow running waters. The ditches with this community are found on the southern side of the Combe Haven. An alternative, and probably more appropriate treatment is to include these as the A9b broad-leaved pondweed aquatic community, Canadian pondweed sub-community.

4.6 August 1993 Survey

4.6.1 An NVC map showing the distribution of communities in August 1993 is given in Figure 10. Many of the differences between this and previous surveys are a result of the June 1991 flood.

4.7 Invertebrates

4.7.1 A full list of species recorded during the sampling programme is given in Appendix 3, which contains brief notes on the uncommon species. Tables 1 and 2 summarise the aquatic *Coleoptera* (beetles) and aquatic *Hemiptera* (plant bugs) present. This information is summarised in table 3 which also provides information on Red Data Book and Notable species. Red Data Book species are those listed by Shirt (1987) and are species that are considered rare and/or endangered. Nationally Notable species are listed by Ball (1986) and are graded into Notable a (Na) and Notable b (Nb) the former being classed as species occurring in fewer than 30, 10 km squares within the British Isles and Nb being recorded in 31 to 100, 10 km squares.

4.7.2 In total, two Red Data Book species were recorded, three Na species and 29 Nb species.

4.8 General Site Information

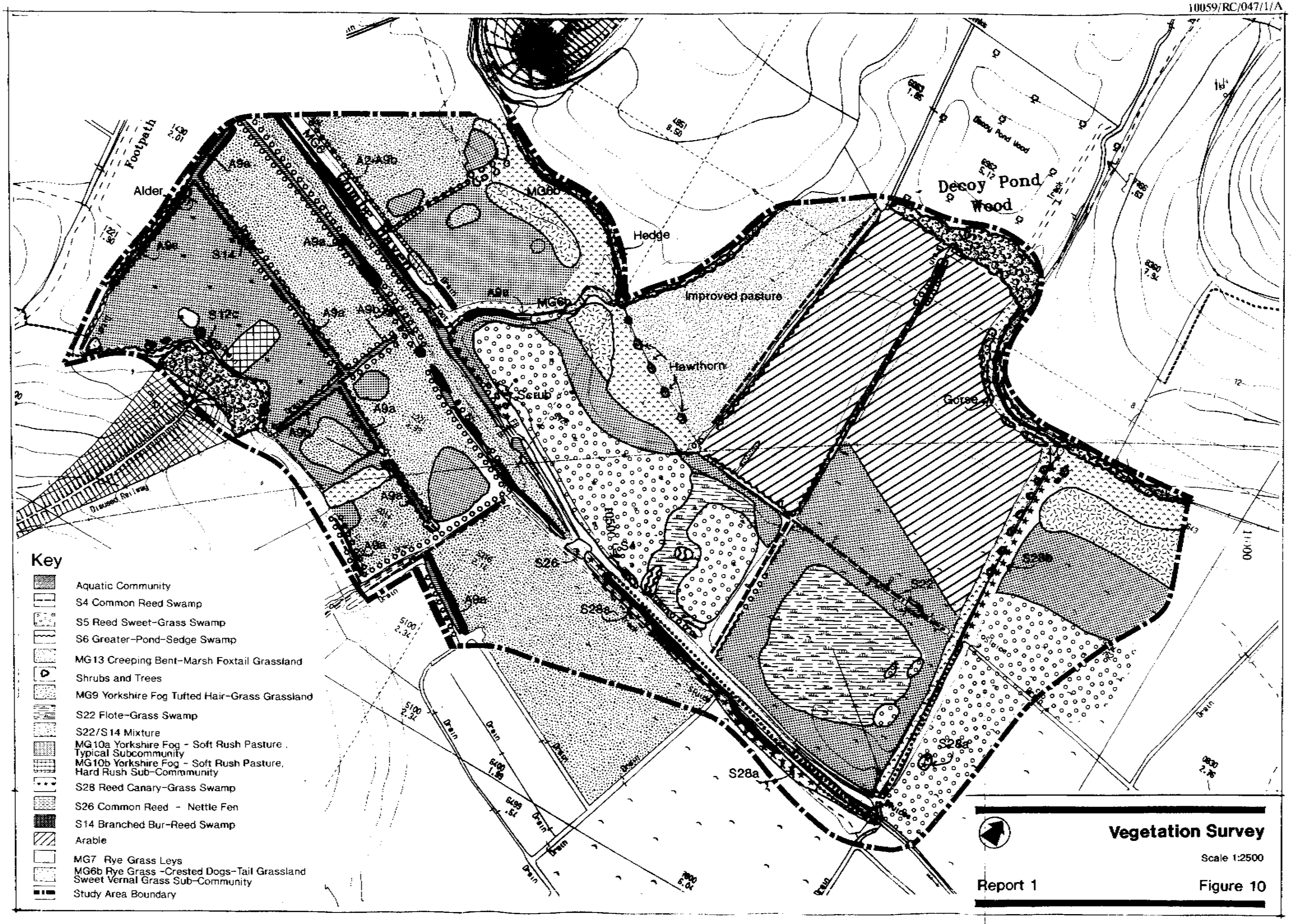
Management

4.8.1 The surveyed section of the Combe Haven SSSI is grazed by sheep and cattle. Discussions with a local farmer suggest that artificial fertilisers have not been used within the site in recent years. The south side is more heavily and more consistently grazed than the north side. By August 1993, two fields on the north side by Decoy Pond Wood, including field 1, had been ploughed.

4.8.2 The control of the water regime within the Combe Haven is much less regulated than in the recent past. The sluices present are now unusable, but in the past it seems water levels were more actively managed. Ditches would have been better maintained and sluice gates used to regulate water levels.

Drainage

4.8.3 In 1969 the water authority for the area constructed a weir and flow station within the study area. In addition a new channel was constructed; this moved the confluence of the Combe Haven river with Watermill Stream to below the flow monitoring station (Figure 3). This new section does not have high levees and is therefore prone to over-topping. However, when flooding occurs the period of inundation is short since the water can run back into the Combe Haven river unimpeded.


Footpath
Alder
A9e
A2/A9b
MG6b
Hedge
A9a
S14
S12c
A9b
Improved pasture
Hawthorn
Scrub
Gorse
Decoy Pond Wood
Decoy Pond
Wood
Disused Railway
S26
S28b
S28a
Drain
Key
Aquatic Community
S4 Common Reed Swamp
S5 Reed Sweet-Grass Swamp
S6 Greater-Pond-Sedge Swamp
MG13 Creeping Bent-Marsh Foxtail Grassland
Shrubs and Trees
MG9 Yorkshire Fog Tufted Hair-Grass Grassland
S22 Flote-Grass Swamp
S22/S14 Mixture
MG10a Yorkshire Fog - Soft Rush Pasture . Typical Subcommunity
MG10b Yorkshire Fog - Soft Rush Pasture, Hard Rush Sub-Commmunity
S28 Reed Canary-Grass Swamp
S26 Common Reed - Nettle Fen
S14 Branched Bur-Reed Swamp
Arable
MG7 Rye Grass Leys
MG6b Rye Grass -Crested Dogs-Tail Grassland Sweet Vernal Grass Sub-Community
Study Area Boundary
Vegetation Survey
Scale 1:2500
Report 1
Figure 10

4.8.4 The land to the north of the Combe Haven river has a different flooding regime. The development of large machinery for cleaning the ditches has produced the ability to form large levees. Parts of the northern side have become surrounded by high banks (Figure 3). This has had the effect of reducing the frequency of flooding but increasing the period of inundation because the surface water is retained within the bunded area. At present only one small outlet for this water is present. This is slightly higher than the soil surface, so some water is unable to flow away.

Aerial Photographs

4.8.5 The 1987 aerial photographs of the site show the vegetation on the southern side of the Combe Haven as lusher than the northern side. Evidence from a 1945 aerial photograph suggests that both sides were similar in appearance, although even at that time the northern side appears to have been wetter. The 1945 photograph shows field 1 as a mown field or possibly an arable field (the photograph definition is not adequate for certain identification). However, this suggests that the field is now much wetter than it was in 1945.

Water Quality

4.8.6 Water quality for the Combe Haven area is discussed in Report 9. The nearest permanent monitoring station is at Crowhurst on Watermill stream. This shows elevated levels of nitrates and orthophosphates, calculated over a 10 year period from NRA figures. This level entering the grassland and ditches would cause local nutrient enrichment encouraging species such as rye grass.

5.0 DISCUSSION OF RESULTS

5.1 Vegetation

5.1.1 The fields on the south side of Combe Haven are dominated by MG13 creeping bent - marsh foxtail inundation grassland. This is a typical community of silty soils which are neither strongly acidic or alkaline, and which are kept moist or waterlogged by periodic inundation by fresh water. The NVC describes this community as being common in lowland eastern England but often fragmented, occurring alongside streams and rivers. It is more common along transect A, with small patches present in transect B.

5.1.2 Transect B, on the northern side of the Combe Haven contains plant communities favouring wetter conditions. Here the MG13 creeping bent - marsh foxtail community grades into flote grass swamp, which has a meadow foxtail sub-community (NVC S22c). This community is typical of wet alluvial meadows with shallow water-levels. The resurvey in 1993 showed large areas of the north side were MG10 Yorkshire fog - soft rush pasture and S5 reed sweet-grass swamp.

5.1.3 The analysis of the samples for both transects showed that the vegetation of the old railway viaduct is clearly different from the surrounding area. The surface at this point is slightly higher than the surrounding land and is formed mainly from brick rubble. These two factors have enabled vegetation types of drier soil to develop. The community on one side of the Combe Haven is different from the other. This may reflect a difference in restoration strategies by different landowners or be a further example of the northern side's tendency to wetter conditions.

5.1.4 Variation in the vegetation is explained by local topographical changes. The spoil alongside the main ditches is generally more freely draining and supports a more species-rich community, thus samples 16 and 17 for transect B are clearly separated by DECORANA.

5.1.5 The grasslands show marked transitions related to soil wetness, the sequence being as follows with increasing wetness:

MG6b rye grass - crested dog's-tail grassland

MG9 Yorkshire fog - tufted hair-grass grassland

MG10 Yorkshire fog - soft rush pasture

MG13 creeping bent - marsh foxtail inundation grassland

S22 flote -grass swamp

5.1.6 The most notable result of the survey is the clear variation between the two sides of the Combe Haven, with the northern side being wetter. The vegetation types present reflect this variation in wetness.

5.1.7 The vegetation types present within the ditches are common. There appears to be a variation in the two sides of the Combe Haven, although this is less distinct than in the terrestrial vegetation. The vegetation in the ditches on the southern side appear to be more typical of stagnant or slow moving waters, such as the A9b broad-leaved pondweed community Canadian pondweed sub-community. S14b branched bur-reed - water plantain sub-community is also mainly found in ditches in the southern side of the valley. Generally, however, the species present within the ditches are tolerant of a fairly wide range of conditions.

5.1.8 Some of the variation in ditch vegetation can be related to management. Communities with common reed and reed canary-grass tend to occur in places where there is light grazing only. In contrast, the greater pond sedge and branched bur-reed tend to occur in heavily grazed situations. Reed sweet-grass and flote grass tolerate some, but not heavy, grazing.

5.1.9 There are more areas of open ditch with aquatic vegetation on the south side of Combe Haven, possibly related to clearance. There were only very small areas of aquatic vegetation on the north side where the ditches have dense swamp vegetation.

5.1.10 There is also a clear distinction between the swamp vegetation of the ditches and of the streams. The latter tend to support vegetation more characteristic of nutrient-enriched sites (eg. S26 common reed - nettle fen) probably resulting from imported sediment and nutrients.

5.2 Invertebrates

5.2.1 The survey results have confirmed the significance of the site for aquatic *Coleoptera* and thus probably for aquatic invertebrates generally. Table 4 showed the relationship of the current survey findings with records from five other wetland areas in Sussex. The Combe Haven appears to compare favourably in terms of total number of species. The figures for other sites are produced by an individual surveyor and have been gathered over a number of years. When this and the fact that the Combe Haven data are based upon sampling of a relatively small area are taken into account, the ditches within the survey area must be species-rich.

5.2.2 Table 3 shows that in general the ditches to the north of the Combe Haven contain more species of aquatic *Coleoptera* and *Hemiptera* than those on the southern side. Eutrophication of the ditches from arable field run-off may be responsible.

5.2.3 The particular features of interest are the high species numbers of ditches 5, 6 and 7 and the presence of the Red Data Book (RDB) species *Hydrochus ignicollis*. This is designated RDB3, a rare species.

5.2.4 The terrestrial insects recorded during the survey are of equal interest. The hoverfly *Anasimyia interpuncta* is a RDB2 species, described as vulnerable. Little is known about its ecology but its larval stages are aquatic: the margins of ditches and ponds provide breeding sites. In 1987 the Red Data Book lists only four breeding sites in Britain although it has subsequently been recorded from Pevensey Levels in East Sussex. A more recent review of the species status by Falk (1991) proposes that it be downgraded to RDB3. Combe Haven is known to be important for dragonflies and it is probable that several species of those discovered in the 1988 survey (Appendix 2) are present within the study area.

5.3 The July 1991 Flood

5.3.1 Extensive flooding of the Combe Haven in early July 1991 occurred one week after completion of the vegetation survey. This inundation lasted for several weeks. Much of the vegetation appeared to have been killed, with marsh thistle (*Cirsium palustre*) invading the bare areas. By 1993, large areas were S5 reed sweet-grass swamp showing how quickly wet grassland vegetation can re-establish itself.

6.0 EVALUATION

6.1 The grasslands and swamps affected are typical examples of species-poor, nationally common communities, although extensive areas of the nationally uncommon reed sweet-grass swamp types cited in the SSSI schedule are also present. The ditches contain species-rich communities of vegetation types which are generally nationally widespread but localised in distribution.

6.2 The assemblages of *Hemiptera* and *Coleoptera* in the ditches are of at least regional importance and compare favourably with known sites of high value such as Pevensey Levels. They indicate that the ditches are probably of at least regional importance for nature conservation. Wet areas within the fields are also of significant interest.

6.3 The combination of large areas of wet grassland and ditch systems supporting a range of wetland plants and animals confirms that the site is of national importance as a Site of Special Scientific Interest.

7.0 IMPACT OF THE PROPOSED VIADUCT

7.1 A corridor through the wetland part of the SSSI 29 m wide and about 600 m long would be required for construction. Most of this landtake could be returned to grassland, while a width of about 3 m would be maintained as an access track for occasional vehicle use to inspect and maintain the viaduct structure.

7.2 The route attempts to minimise the impact by taking the least possible area of wet grassland by crossing Combe Haven at a narrow point, and crossing arable land within the SSSI.

7.3 During the construction process the ditches crossed would be culverted or bridged and on completion the sections to be crossed would be culverted by the 5m wide access track.

7.4 In addition to the direct loss of habitat, impacts would arise from the effect of shadow (Report 3) and other changes to microclimate. Localised nutrient enrichment and release of nutrients from soils being removed for reinstatement would be inevitable.

7.5 The microclimate barrier would apply both to the grassland and the ditches.

7.6 Overall the effect of the crossing of the Combe Haven SSSI would be a moderate impact on the site of national importance.

8.0 MITIGATION

8.1 In selecting the height of the viaduct, the microclimate effect of shadow and humidity on the vegetation has been taken into account. The higher the viaduct, the less the effect.

8.2 The topsoil of the area to be used for construction would be covered by geotextile before being covered by granular material to form a firm working surface. At the completion of the works, the hard standing and geotextile would be removed. The existing ground would be decompacted and allowed to colonise naturally. Hand weeding of injurious or invasive weeds could be necessary in the early stages of establishment. The area would be fenced until a proper sward has been established. The track underneath the viaduct would be constructed of a neutral material to avoid localised enrichment with calcium etc. likely to arise with conventional roadstones. This, too, would be allowed to develop a naturally regenerated vegetation.

8.3 Ditches would be reinstated to wide shallow profiles where temporarily affected by the works and, in consultation with English Nature and the NRA, consideration would be given to widening them and lowering areas that are presently grassland to create appropriate wetland habitats.

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TABLE 1 Aquatic Coleoptera Recorded During Survey Programme (see text for explanation of abbreviations).

SPECIES	SAMPLE SITE																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
AQUATIC COLEOPTERA																									
Haliplidae																									
Nb *Peltodytes*				+						+															
Haliplus lineatocollis					+				+																
H. ruficollis			+	+		+	+		+	+				+	+		+	+	+	+					
Hygrobiidae																									
Hygrobia hermanni																				+					
Noteridae																									
Noterus clavicornis			+	+		+	+			+			+		+	+	+	+	+	+					
Dytiscidae																									
Laccophilus hyalinus					+			+								+	+			+					
Hyphydrus ovatus		+		+	+	+	+	+	+	+			+	+	+	+	+	+	+	+					
Guignotus pusillus					+																				
Nb *Hygrotus decoratus*							+																		
H. inaequalis			+	+	+	+	+		+	+					+				+	+					
Coelambus impressopunctatus																					+				
Hydroporus angustatus	+	+		+		+	+		+			+						+				+			
H. erythrocephalus				+		+				+		+	+					+							

TABLE 1 Aquatic Coleoptera (contd..)

SPECIES	SAMPLE SITE																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
H. palustris	+		+	+	+	+	+					+	+	+				+	+						
H. planus				+	+		+			+								+							
H. pubescens	+	+			+	+	+	+				+										+			
H. tessellatus			+			+	+	+										+							
Graptodytes pictus				+	+									+				+							
Porhydrus lineatus				+	+				+											+					
Potamonecter depressus s. elegans											+														
Copelatus haemorrhoidalis	+	+	+	+	+	+			+	+		+	+					+				+			
Agabus bipustulatus	+		+			+	+		+	+		+	+												
Agabus melanocornis	+			+			+																		
A. paludosus																		+							
A. sturmi	+		+	+		+																			
Ilybius ater			+	+		+	+		+				+		+			+							
I. fuliginosus	+		+			+			+	+		+	+		+					+					
I. quadriguttatus						+	+		+				+	+	+	+		+	+						
Nb *Rhantus grapii*									+																
Nb *Suturalis*					+					+			+	+											
Colymbetes fuscus	+		+				+		+			+													

TABLE 1 Aquatic Coleoptera (contd..)

SPECIES	SAMPLE SITE																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Nb *Hydaticus seminiger*						+	+											+							+
Dytiscus marginalis																		+							
D. semisulcatus	+																								
Gyrinidae																									
Gyrinus marinus																				+					
G. substriatus								+								+									
Hydrophilidae																									
Nb *Hydrochus angustatus*	+	+	+	+	+	+				+		+	+												
RDB3 *H. ignicollis*														+											
Helophorus aequalis	+		+	+						+		+										+			
H. brevipalpis				+	+	+	+			+	+	+	+	+			+			+		+			
H. grandis						+				+															
H. minutus			+					+		+		+													
Na *H. nanus*	+																					+			
H. obscurus	+														+			+							
Coelostoma orbiculare																									+
Nb *Cercyon convexiusculus*			+			+							+										+		
Nb *C. tristis*																							+		

TABLE 1 Aquatic Coleoptera (contd..)

SPECIES	SAMPLE SITE																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Nb *C. ustulatus*													+											+	
Hydrobius fuscipes	+		+		+	+	+			+		+	+					+				+			
Nb *Anacaena bipustulata*					+			+	+					+											
A. limbata	+	+		+	+	+	+					+	+			+						+			
A. lutescens					+																	+			
Laccobius bipunctatus	+					+		+																	
Nb *Helochares lividus*																									
Nb *Enochrus coarctatus*	+		+	+			+		+									+				+			
Nb *E. melanocephalus*										+															
Nb *E. ochropterus*										+												+		+	
E. testaceus			+			+			+																
Cymbiodyta marginella	+		+			+						+						+				+			
Hydraenidae																									
Ochthebius dilatatus																							+		
O. minimus			+		+	+	+																		
Hydraena riparia	+	+				+									+			+							
Nb *H. testacea*		+			+	+	+						+												

TABLE 1 Aquatic Coleoptera (contd..)

SPECIES	SAMPLE SITE																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Elmidae																									
Elmis aenea											+														
Limnius volckmari											+														
Oulimnius tuberculatus								+			+														

TABLE 2 Aquatic Hemiptera Recorded During Survey Programme

SPECIES	SAMPLE SITE																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
AQUATIC HEMIPTERA																									
Hydrometridae																									
Hydrometra stagnorum					+	+												+							
Gerridae																									
Gerris lecustris	+																								
Nepidae																									
Nepa cinerea	+			+			+			+			+			+									
Naucoridae																									
Ilyocoris cimicoides							+							+	+	+	+		+	+					
Notonectidae																									
Notonecta glauca			+							+							+		+						
Pleidae																									
Plea minutissima								+	+										+						
Corixidae																									
Hesperocorixa sahlbergi													+												

TABLE 3 Summary of Aquatic Species by Sample Site, Red Data Book and National Status

SUMMARY OF AQUATIC SPECIES	SAMPLE SITE																				TOTAL SPECIES
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
AQUATIC COLEOPTERA	20	8	20	20	20	28	22	9	16	19	5	15	18	8	9	6	5	20	6	10	66
AQUATIC HEMIPTERA	2	-	1	1	1	1	2	1	1	2	-	-	2	1	1	2	2	1	3	1	7
RED DATA BOOK SPECIES	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
NATIONALLY NOTABLE (Na)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
NATIONALLY NOTABLEd (Nb)	2	2	3	3	3	4	4	1	4	5	-	1	6	1	-	-	-	2	-	-	15
TOTAL SPECIES	22	8	21	21	21	29	24	10	17	21	5	15	20	9	10	8	7	21	9	11	73

TABLE 4 Comparison of Survey Area Aquatic Coleoptera with five other Sussex wetlands

Aquatic Coleoptera	Arun Level	Lewes Level	Pevensey Level	Combe Haven	Pett Level	Walland Marsh
RDB species	-	6	5	1	2	4
Na species	-	2	6	1	3	3
Total species	63	70	96	66	58	79

APPENDIX 1

SSSI SCHEDULE

File Ref: TQ/70-2

COUNTY: **EAST SUSSEX**

SITE NAME: **COMBE HAVEN**

BOROUGH/DISTRICT: **HASTINGS; ROTHER**

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

Local Planning Authority: **HASTINGS BOROUGH COUNCIL; ROTHER DISTRICT COUNCIL**

National Grid Ref: TQ 770102

Area: 156.1 (ha) : 385.7 (acres)

Ordnance Survey Sheets 1:50,000: 199

1:10,000: TQ 71SE TQ 70NE

Date notified (under 1949 Act): -

Date of last revision: -

Date notified (under 1981 Act): 1985

Date of last revision: -

Other Information: Filsham Reed Bed is a Local Nature Reserve declared by Hastings Borough Council and managed by the Sussex Trust for Nature Conservation. This is a new site.

Reasons for Notification:

This extensive site contains a rich diversity of habitat types. Alluvial meadows dominate much of the site and a nationally uncommon grassland type is present. Filsham reed bed is the largest reed bed in East Sussex and carries a rich community of breeding birds. Blocks of ancient woodland add to the site's interest. The range of habitat types is responsible for the wide diversity of plant, invertebrate and bird life at the site.

The alluvial meadows and the drainage ditches which dissect them are the remnants of a once much more extensive marshland which developed on river alluvium over Ashdown sandstones. Filsham reed bed has colonised poorly drained, ungrazed marsh and a small lagoon is present within the bed. Two areas of mixed tall fen communities are also present within the site. Woodlands have developed on higher ground over Wadhurst Clay and support several unusual plants. The whole site, but particularly the reed bed, is valuable for breeding, wintering and passage birds. The invertebrate fauna includes two notable dragonflies and important butterfly populations.

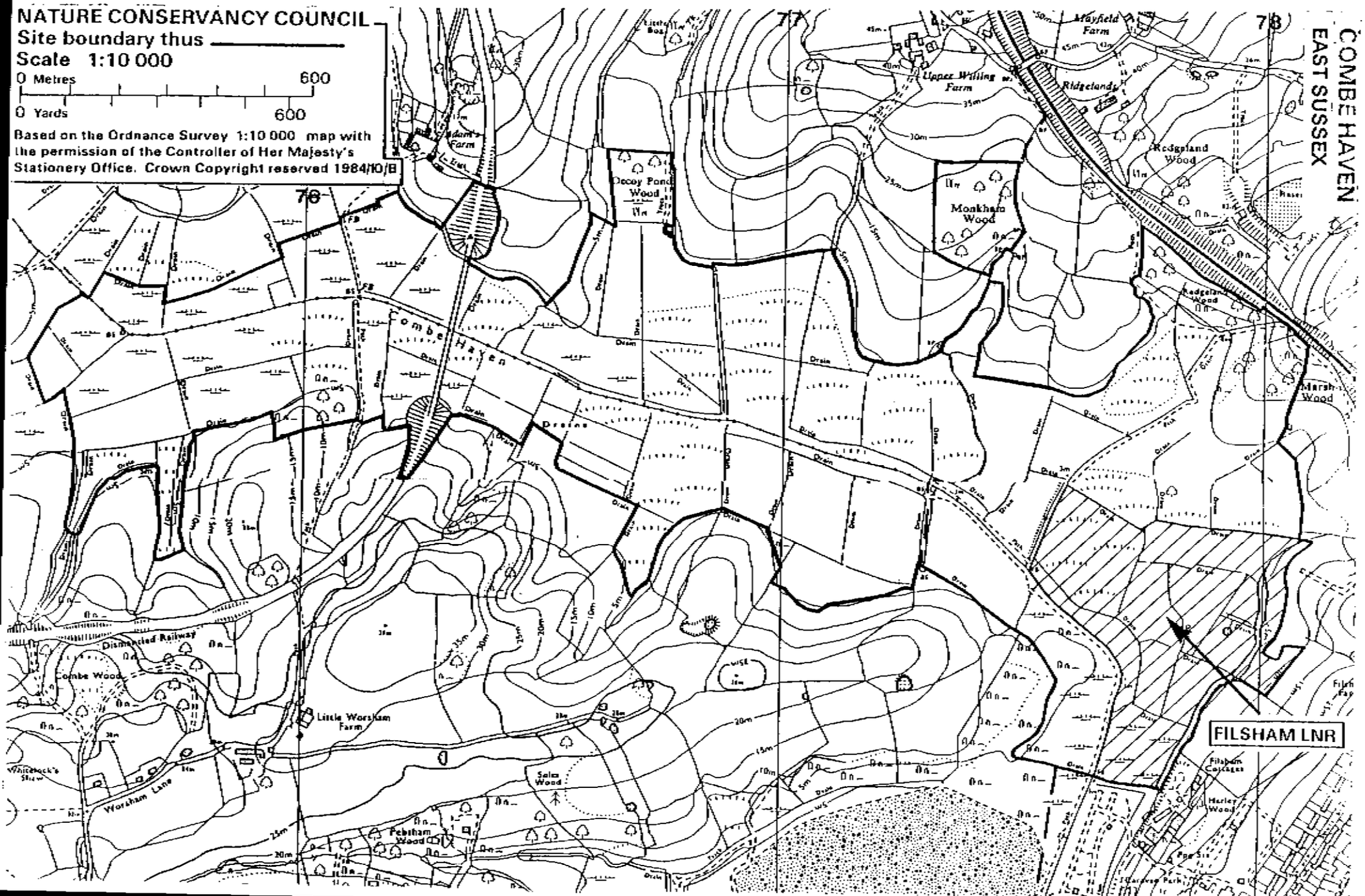
ALLUVIAL MEADOWS The meadows vary in composition and most are poorly drained. Reed sweet grass Glyceria maxima dominates large areas and its association with reed canary grass Phalaris arundinacea and marsh bedstraw Galium palustre is a nationally uncommon grassland type. Tussock grass Deschampsia cespitosa, rushes Juncus species and creeping bent grass Agrostis stolonifera occur commonly in the sward but corky fruited water-dropwort Oenanthe pimpinelloides and common meadow rue Thalictrum flavum are two unusual species. The ditches dissecting the meadows have a rich flora which includes several uncommon plants such as marsh violet Hottonia palustris, arrowhead Sagittaria sagittifolia, frogbit Hydrocharis morsus-ranae and flowering rush Butomus umbellatus.

FEN COMMUNITIES Common reed Phragmites australis dominates Filsham reed bed although open water and ditches within the bed are richer in plant life. Two areas of mixed tall fen (at TQ 777095 and TQ 778103) contain common reed, reed sweet grass, gipsywort Lycopus europaeus, yellow flag Iris pseudacorus and purple loosestrife Lythrum salicaria. Alder Alnus glutinosa and sallow Salix cinerea fringe parts of the reed bed and the tall fen community.

WOODLAND Variation in past management and in local drainage conditions have resulted in a range of woodland types. Redgeland Wood consists of hazel Corylus avellana coppice below standards of ash Fraxinus excelsior and pedunculate oak Quercus robur; notable plants of the shrub and ground layers include butcher's broom Ruscus aculeatus, Midland hawthorn Crataegus laevigata and bird's-nest orchid Neottia nidus-avis. Marsh Wood is another oak-hazel-ash wood but with field maple Acer campestre present above a ground flora which includes wood speedwell Veronica montana and goldilocks Ranunculus auricomus. Monkham Wood is coppice-with-standards woodland with oak and ash standards above coppiced hazel, hornbeam Carpinus betulus and sweet chestnut Castanea sativa. Decoy Pond Wood has developed on wet ground around a pond which is drying up; white willow Salix alba, crack willow Salix fragilis, alder Alnus glutinosa and sallow Salix cinerea occur above a ground flora of cyperus sedge Carex pseudocyperus, wood bittercress Cardamine flexuosa, yellow flag Iris pseudacorus and purple loosestrife Lythrum salicaria. Ash, oak and English elm Ulmus procera occur on the drier margins of this wood and early purple orchid Orchis mascula and twayblade Listera ovata occur in the ground flora.

RAILWAY EMBANKMENT A dense scrub of hawthorn Crataegus monogyna, wild privet Ligustrum vulgare, gorse Ulex europaeus, broom Cytisus scoparius, oak and sallow dominates much of this area. Open patches include fenland species such as the purple small-reed Calamagrostis canescens, and species associated with the chalk substrate used in the construction of the embankment; the latter group includes mullein Verbascum thapsus, bladder campion Silene vulgaris and wild mignonette Reseda lutea.

FAUNA Breeding birds associated with the reed and fen include reed warbler, moorhen, coot, sedge warbler and water rail. Other breeding birds from the whole site include grasshopper warbler, yellow wagtail and cuckoo. Wintering birds such as lapwing, teal and snipe are found on the alluvial meadows and the site is important for passage birds including large flocks of thrushes, finches, warblers and buntings. There is also a rich dragonfly fauna which includes the uncommon species Coenagrion pulchellum and Brachytron pratense. A good variety of butterflies are present including orange tip, holly blue, red admiral and purple hairstreak.


NATURE CONSERVANCY COUNCIL
Site boundary thus
Scale 1:10 000
0 Metres 600
0 Yards 600
Based on the Ordnance Survey 1:10 000 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1984/10/B
COMBE HAVEN
EAST SUSSEX
FILSHAM LNR
Combe Haven
Drain
Decoy Pond Wood
Monkham Wood
Redgeland Wood
Ridgelands
Upper Willing Farm
Mayfield Farm
Adam's Farm
Little Worsham Farm
Combe Wood
Dismantled Railway
Worsham Lane
Pebsham Wood
Salts Wood
Marsh Wood
Hurlet Wood
Filsham Cottages
77
78

APPENDIX 2

1988 SURVEY

A259 BEXHILL AND HASTINGS WESTERN BYPASS

Biological Survey of North Eastern End of Combe Haven SSSI

August 1988

CHRIS BLANDFORD ASSOCIATES
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CONTENTS PAGE

FIGURES

1.0 INTRODUCTION

1.1 This report comprises the results of a biological survey of the north western part of the Combe Haven Site of Special Scientific Interest (SSSI) undertaken by Chris Blandford Associates (CBA) for the Department of Transport South East Regional Office.

1.2 The study area is shown on Figure A2/1. It is that part of the SSSI that would be affected by the Red, Orange, and Blue Route options of the proposed A259 Bexhill and Hastings Western Bypass.

1.3 Combe Haven was designated an SSSI in 1985 because of its rich diversity of semi-natural habitats which include alluvial meadows, fen communities, woodland, reedbed and species-rich wet ditches. The SSSI boundary and schedule are given in Appendix 1 of this report.

1.4 Fieldwork was carried out between June and August 1988. During this period the flora of each ditch and field within the study area was recorded on a presence/absence basis within each unit. In all, 44 ditches and 24 fields were examined. All vertebrates and invertebrates seen during this survey were recorded and a particular study was made of the dragonflies (*Odonata)* in August.

1.5 In describing the character of the vegetation in this report the terms dominant, abundant, frequent, occasional and rare are sometimes used. These are broadly descriptive and should not be taken as referring to exact ranges of cover.

2.0 GENERAL DESCRIPTION OF THE STUDY AREA

2.1 The study area comprises the north-eastern end of Combe Haven SSSI, which is a shallow wide valley with a high watertable (Figure A2/1.) Most of the land lies below 5m OD. Combe Haven stream runs through the site from west to east, eventually passing under the A259 at Bulverhythe.

2.2 The area is predominantly very wet grassland with many fields under low density grazing. However, several were not grazed during 1988 and judging from the density of rushes (*Juncus* spp) and similar plants, have not been grazed for several years. A few fields are cut for hay. The edges of the fields are defined by substantial ditches, almost all with at least 450mm of water, even during summer. These ditches drain into the main channel of Combe Haven stream.

2.3 There are networks of minor wet and dry ditches within the fields, and abandoned sluice gates on some of the larger ditches. It appears that water levels were once controlled to a greater extent, and at some period in the fairly recent past all areas would have been managed for grazing or hay.

2.4 The soil appears to be mainly peaty. It overlies alluvial silt and silty clay, which changes to clay and clay-loam on the higher ground.

2.5 The ditches and fields form sharply-defined units which are described in sections 3 and 4 and illustrated in Figures A2/2 and A2/3.

3.0 VEGETATION OF THE DITCHES

3.1 General character

3.1.1 The ditches contain a wide variety of marginal and floating aquatic plants, of which the following were present in every ditch examined.

Water plantain	*(Alisma plantago aquatica)*
Bladdersedge sedge	*(Carex vesicaria)*
Water horsetail	*(Equisetum fluviatile)*
Flote grass	*(Gyceria fluitans)*
Reed grass	*(Glyceria maxima)*
Reed canary grass	*(Phalaris aundunacea)*
Common reed	*(Phragmites australis)*

3.1.2 Two uncommon plants, water violet *(Hottonia palustria)* and frog bit *(Hydrocharis morus-ranae)* are present in many ditches. Less frequent uncommon plants include wood club rush *(Scirpus sylvaticus)*, pondweeds *(Potamogeton brechtoldii* and *Potamogeton acutifolius)* and the water milfoil *(Myriophyllum verticillatum)*.

3.1.3 There are three principal types of ditches:

(a) Species -diverse ditches with open water.

These have marginal vegetation together with open areas of standing water. They contain the greatest variety of species.

(b) Reed sweet-grass dominated ditches.

These are dominated by reed sweet-grass to the exclusion of many other species.

(c) Overgrown ditches.

These are overhung with scrub and plant characteristic of wet shady places, and may or may not have standing water.

This classification is approximate, and there is a continuous gradient spanning the three types, representing a succession from open water to dryer ground. From the soil mounds at the sides of ditches it appears that they are dredged fairly regularly so that those that have become choked with vegetation will eventually be cleared to become the early stages of the open water type.

3.2 Ditches with Open Water

3.2.1 In addition to the species universally present listed in 3.1.1. these ditches have a high frequency of the following marginal plants:

Arrowhead	*(Saggitaria saggitifolia)* (especially in the west)
Water dropworts	*(Oenanthe aquatica, O. crocata, O. fistulosa)*
Bur-reeds	*(Sparganium erectum, S. emersum)*
Purple loosestrife	*(Lythrum salicaria)*

3..2.2. The floating plants are principally

Water violet	*(Hottonia palustris)*
Canadian pondweed	*(Elodea canadensis)*
Water milfoil	*(Myriophyllum verticillatum)*
Frogbit	*(Hydrocharis morsus-ranae)*
Pondweeds	*(Potamogeton brechtoldii, P. natans, P. obtusifolius)*
Duckweed	*(Lemna minor)*

These very species-rich ditches, of which there are 23, generally lie in the western half of the study area, as can be seen from Figure A2/2.

3.3 Reed Sweet-Grass-Dominated Ditches

These contain some of the marginal plants of the open water ditches, but in much smaller quantities.

3.4 Shaded Ditches

These tend to have fewer marginal plants, and an abundance of non-aquatics typical of scrub such as :

Bramble	*(Rubus fruticosus)*
Blackthorn	*(Prunus spinosa)*
Hawthorn	*(Crataegus monogyna)*
Bittersweet	*(Solanum dulcamara)*
Nettle	*(Urtica dioica)*

4.0 VEGETATION OF THE FIELDS

4.1 General Character

A complex vegetation is present in the fields ranging from dry closely-grazed turf with red fescue *(Festuca rubra)*, yarrow *(Achillea millefolium)* and similar species through damp grassland with abundant meadow grasses *(Poa trivialis* and *Poa pratensis)* and meadow foxtail *(Alopecurus pratensis)* to very wet land dominated by either marsh foxtail *(Alopercurus pratensis)* or reed sweet-grass *(Glyceria maxima)*. Several of the fields can be divided into different vegetation types within this range.

With such a complex mosaic of vegetation, any classification must be approximate and partly arbitrary. Seven groups have been identified and are described below and shown in Figure A2/4.

4.2 Dry Grassland

This comprises a mixture of dominant grass species, principally smooth stalked grass *(Poa pratensis)*, sweet vernal grass *Anthoxanthum odoratum)*, crested dog's-tail *(Cynosurus cristatus)*, rye grass *(Lolium perenne)* and meadow foxtail. The broadleaf plants are typical of neutral grassland and include clovers *(Trifolium sp.)* birdsfoot trefoil *(Lotus corniculatus)*, meadow buttercup *(Ranunculus acris)* and creeping thistle *(Cirsium arvense)*. There are patches of rush (principally *Juncus effusos*)) as the areas merge into wetter ones, or where grazing is light, together with marsh foxtail. The presence of meadow barley *(Hordeum secalinum)* is of particular interest since this species is mainly restricted to areas which have been pasture or meadow for a long time.

4.3 Meadow Foxtail and Meadow Grass Grassland

These areas are dominated by either the two species together or singly, clovers, field buttercup, tufted hair grass *(Deschampsia cespitosa)*, docks *(Rumex crispus* and *R. acetosa*), cuckoo flower *(Cardamine pratensis)*, and lesser stitchwort *(Stellaria graminea)* are characteristic.

4.4 Wet Grassland with Flote Grass, Rush and Creeping Buttercup

This is a very broad category which covers many of the wetter fields. They are generally grazed in patches with abundant rush on the ungrazed area. Common sedge *(Carex nigra)*, marsh bedstraw *(Galium palustre)* and lesser spearwort *(Ranunculus flammula)* are among the characteristic species, but a wide range of other species is present, including both the foxtails, ragged robin *(Lychnis flos-cuculi)*, skullcap *(Scutellaria galericulata)* and, in field 12, the uncommon hairy buttercup *(Ranunculus sardous.)*

4.5 Rush-Dominated Wetland

The rush dominated vegetation which forms islands in several of the other types described, forms extensive stands in fields 4 and 7. Reed grass and meadow foxtail are the principal associated species.

4.6 Marsh Foxtail Grassland

This is dominated by marsh foxtail, often forming pure stands, but also with grassland species like rye grass, hammer sedge *(Carex hirta)* and tufted hair grass mixed with weed species like knotweed *(Polygonum aviculare)* and fat hen *(Chenopodium album)*.

4.7 Reed Grass Wetland

These areas are more or less completely dominated by ungrazed reed grass *(Glyceria maxima)*.

4.8 Unvegetated Area

Area 9A is devoid of vegetation.

5.0 THE VEGETATION OF THE COMBE HAVEN STREAM

5.1 The stream appears to be dredged quite frequently in order to maintain a substantially open channel. Nevertheless, it has quite a varied marginal flora that includes the following plants:

Branched bur-reed	*(Sparganium erectum)*
Flotegrass	*(Glyceria fluitans)*
Reed sweet-grass	*(Glyceria maxima)*
Water forget-me-not	*(Myosotis scorpioides)*
Bittersweet	*(Solanum dulcamara)*
Marsh horsetail	*(Equisetum palustre)*
Reed canary grass	*(Phalaris arundinacea)*
Water mint	*(Mentha aquatica)*
Soft rush	*(Juncus effusus)*
Fool's watercress	*(Apium nodiflorum)*
Hard rush	*(Juncus inflexus)*
Pondweed	*(Potamogeton natans)*

5.2 The dry flood banks at the side of the stream have the following flora:

Rough stalked meadow grass	*(Poa trivialis)*
Hemlock water dropwort	*(Oenanthe crocata)*
Hawksbeard	*(Crepis sp)*
Yorkshire fog	*(Holcus lanatus)*
Wavy hair grass	*(Deschampsia cespitosa)*
Yarrow	*(Achillea millefolium)*
Common thistle	*(Cirsium vulgare)*
Curled dock	*(Rumex crispus)*
Sow thistle	*(Sonchus oleraceus)*
Bramble	*(Rubus fruticosus)*
Rye grass	*(Lolium perenne)*
Teasel	*(Dipsacus fullonum)*

A small amount of great yellow cress *(Rorippa amphibia)* was also found on the bank above the stream.

6.0 INVERTEBRATES

6.1 Scope of Survey

A detailed inspection was made for two groups: dragonflies *(Odonata)* and grasshopper and crickets *(Orthoptera)*. These are indicators of the quality of wetland and grassland habitats respectively. Dragonflies are territorial, so that a particular note was made of any territorial behaviour which would indicate that the species was definitely breeding in the area. Where only males of a particular species were seen and these were not exhibiting territorial behaviour their presence cannot be taken as evidence that the species breeds on the site.

6.2 Dragonflies

6.2.1 Emperor dragonfly *(Anax imperator)*

Several males were seen guarding territory, especially against male brown hawker *(Aeshna grandis)* throughout the area. Two females were seen egg laying.

6.2.2. Brown hawker *(Aeshna grandis)*

This is the commonest species in the site. Males were seen holding territory throughout, but especially in the south eastern part of the area. Several females were observed egg laying.

6.2.3. Hairy Hawker *(Brachytron pratense)*

A male was recorded in poor weather in June.

6.2.4. Broadbacked chaser *(Libellula depressa)*.

One was seen in a ditch near the wooded section of the disused railway embankment to the south of the site.

6.2.5. Four-spotted chaser *(Libellula quadrimaculata)*..

This is a species that emerges from its larval stage very early, so that the two individuals seen in August may represent a substantial population.

6.2.6. Ruddy darter *(Sympetrum sanguineum).*

This is a scarce species which has become very much rarer in recent years. It was found in quantity, especially in the central, southern and south eastern parts of the site. The ruddy darter's habitat requirements are quite precise in that it occurs only in well-vegetated wetland with abundance reed-mace and bur-reed.

6.2.7. Common darter *(Sympetrum striolatum).*

Only three individuals were seen, and only one mature male.

6.2.8. Large red damselfly *(Pyrrhasoma nymphula).*

One male of this common species was seen in June.

6.2.9 Blue-tailed damselfly *(Ischnura elegans).*

This is the species most tolerant of water enrichment. It is abundant throughout the site.

6.2.10. Azure damselfly *(Coenagrion puella).*

This abundant throughout the site.

6.2.11. Red-eyd damselfly *(Erythroma najas).*

One female was seen to the south of the Combe Haven channel in June.

6.3 Grasshoppers and Crickets

6.3.1. *Chorthippus brunneus.*

This is abundant throughout the site. It is normally a species of dry, dusty, often acid habitats.

6.3.2. *Chrthippus parallelus.*

This is also abundant throughout the site. It is an extremely common meadowland species.

6.3.3. *Pholidoptera griseoptera.*

Although this is normally a common species of late summer in bushes, it was recorded in the denser rushes in the central-southern section of the site.

6.3.4. *Conocephalus discolor.*

This species has been spreading rapidly east from its original centre of popultion in the Bournemouth area. It is present in the longest rushes with *Pholidoptera.* In 1987, this species had reached the lanes south of Ripe, so Combe Haven could be its most easterly site in the British Isles.

6.3.5. *Conocephalus dorsalis.*

This species has become rarer in recent years. It is typical of rushy, damp places on rather base poor soils. It was recorded more or less throughout the site, especially in the south.

6.4 Butterflies and Moths

The following butterflies and moths were recorded:

Large white	*(Pieris brassicae)*
Small white	*(Pieris rapae)*
Green veined white	*(Pieris napi)*
Meadow brown	*(Maniola jurtina)*
Gatekeeper	*(Pyronia ithonus)*
Small heath	*(Coenonympha pamphilus)*
Small copper	*(Lycaena phlaeas)*
Small tortoiseshell	*(Aglais urticae)*
Painted lady	*(Vanessa cardui)*
Small skipper	*(Tymelicus sylvestris)*
Large skipper	*(Ochodes venata)*
Essex skipper	*(T. lineola)* - one in extreme east
Speckled wood	*(Pararge aegeria)*
Blood vein	
Silver Y	

6.5 Other Invertebrates

The giant lacewing *(Osmylus fulvicephalus)* is found on the site and its location is given on Figure A2/3, as is that of the scarce bombylid fly *(Thyridonthrax fenestratus).*

7.0 VERTEBRATES

The following birds were seen:

Mute swan	(breeding)
Whimbrel	
Pochard	
Moorhen	(breeding)
Great tit	
Lapwing	(breeding)
Blackcap	
Skylark	(breeding)
Sedge warbler	(breeding)
Reedbunting	(breeding)
Green Sandpiper	

Minnows, pike, common and edible frog are present in the ditches.

APPENDIX 3

THE NATIONAL VEGETATION CLASSIFICATION

THE NATIONAL VEGETATION CLASSIFICATION

British Plant Communities (also known as the National Vegetation Classification, NVC) is the first comprehensive, systematic description of vegetation in Britain. The classification of over 250 communities has been derived from an analysis of over 32,000 vegetation samples (quadrats) collected from throughout Britain. It covers the vegetation of all the major natural and semi-natural vegetation types in Britain.

The work is published in five volumes. The first two volumes, - 1. *Woodlands and scrub*, and 2. *Mires and heaths* were published in 1991, and the third volume 3. *Grasslands and montane communities* was published in 1992. The two remaining volumes, 4. *Aquatic communities, swamps and tall herb fens*, and 5. *Maritime and weed communities* are due to be published in 1994/1995, and with the exception of the weed chapter, are available in draft form.

The volumes consist of accounts of each community and their sub-communities as appropriate. The characteristics of each community is first described, and the characteristic species are listed in tables giving the constancy and Domin cover values. The communities are related to their environmental conditions, including soils, treatment (or management), climate and historical factors, and the distribution of each vegetation type is outlined, often with maps. The affinities with and relationships to other communities, including typical zonation and successions, are also described. Each vegetation type is given a unique code number composed of the main habitat type (e.g. W = woodland), the community number (e.g. 21) and the sub-community letter (e.g. a).

The classification offers a reliable framework for identifying the vegetation types, interpreting the ecological factors which control them, and assessing their importance in a national and local context. It is the standard phytosociological method in Britain.

The descriptions below are brief outlines of the main communities found within the present study.

MG = Mesotrophic Grassland
S = Swamp
A = Aquatic

Type MG6a *Lolium perenne - Cynosurus cristatus* pasture.
Found on moist but free draining substrates, the *Alopecurus geniculatus* variant is common within seasonally inundated areas of pasture alongside streams and ponds. May represent part of a transition to more regularly inundated areas.

MG7b *Lolium perenne* leys.

This *Lolium perenne - Poa trivalis* sub-community of the MG7 represents a version of the most common form of agricultural grassland. The community is found on moister sites.

MG9 *Holcus lanatus - Deschampsia cespitosa* grassland.

This is a coarse, rough, unimproved grassland of water-logged soils with tussocks of tufted hair-grass. It is widespread but locally distributed in lowland Britain.

MG10a *Holcus lanatus - Juncus effusus* pasture typical sub-community.

This grassland, with abundant rushes and coarse grasses, occurs widely in damp pasturres in Britain. It is virtually ubiquitous in suitable places.

MG10b *Holcus lanatus - Juncus effusus* rush pasture: *Juncus inflexus* community.

This sub-community is more typical of the south and east. It is characteristic of permanently moist sites. The most important condition for its maintenance is a consistently high soil moisture status.

MG13 *Agrostis stolonifera - Alopecurus geniculatus* inundation grassland.

A typical community of silty soils kept moist or water-logged by periodic inundation of fresh water.

S4a *Phragmites australis* swamp and reed bed.

Characterised by dominance of *Phragmites australis*. Common in permanently wet or periodically water-logged habitats of a wide variety of trophic states.

S5b *Glyceria maxima* swamp: *Alisma platago-aquatica - Sparganium erectum sub* community.

Occurs as a fringe to sluggish rivers, streams, ditches and canals. Requires a high nutrient demand.

S6 *Carex riparia* swamp.

Characterised by dominant greater pond-sedge. It occurs on the margins of ditches and streams in lowland Britain.

S12c *Typha latifolia* swamp, *Alisma plantago-aquatica* sub-community.

A species-rich sub-community of the greater reedmace swamp, occurring on nutrient-rich sites in shallow water or wet soils. It occurs in ditches and pond and lake margins.

S14b *Sparganium erectum* swamp: *Alisma plantago-aquatica* sub-community.

A community of shallow, mesotrophic to eutrophic waters with mineral substrates. Occurs widely and a common vegetation type. Develops best in waters with negligible flow.

S19 *Eleocharis palustris* swamp.

A swamp of standing or running waters up to 50 cm deep, alongside lakes, ponds and streams.

S22c *Glyceria fluitans* swamp: *Alopecurus geniculatus* sub community.

Occurs on wet alluvial meadows with shallow water around gently sloping silty margins of ponds and pasture hollows.

S26 *Phragmites australis - Urtica dioica* fen.

Characteristic of eutrophic to basic water margins kept moist throughout the year. May be related to local eutrophication due to agricultural run-off.

S28 *Phalaris arundinacea* swamp *Phalaris arundinacea* sub-community.

This sub-community, dominated by reed canary-grass, is widespread on river banks and ditches in lowland Britain.

S28b *Phalaris arundinacea* swamp *Epilobium hirsutum - Urtica dioica* fen.

This is a variable community of ditches and stream sides, with reed canary-grass, great willowherb and nettles, usually in soils which are nutrient-rich.

A1 *Lemna gibba* community.

A species-poor community dominated by a mat of fat duckweed, found in nutrient-rich water in lowland Britain.

A2a *Lemna minor* community.

A species-poor community consisting of a mat of *Lemna minor*. Found in standing or very slow moving mesotrophic to eutrophic water. Common throughout much of lowland Britain.

A9a *Potamogeton natans* community, species-poor sub-community

Typical of mesotrophic to nutrient poor waters. Found in standing to moderately fast flowing waters throughout most of Britain.

A9b *Potamogeton natans* community: *Elodea canadensis* sub-community.

This sub-community usually has submerged Canadian pondweed or Nuttall's pondweed under floating broad-leaved pondweed. It occurs in similar places to the A9a species-poor sub-community.

A15 *Elodea canadensis* community.

A community dominated by *Elodea canadensis* and found in stagnant to slow running waters.

APPENDIX 4

INVERTEBRATE SPECIES LIST

INVERTEBRATE SPECIES LIST

COLEOPTERA (Terrestrial species)

		Recording Sites
Carabidae (Ground beetles)		
	Notiophilus substriatus	25
	Clivina fossor	25
	Trechus micros (A subterranean species which is probably associated with nests of small mammals in wet places)	25
	T. quadristriatus	25
Nb	*Bembidion clarki* (Local in marshy places)	24, 25
	B. lunulatum	25
	B. properans	24, 25
	Pterostichus diligens	22
	P. madidus	25
	Calathus fuscipes	25
	Agonum obscurum	1, 18, 25
	A. piceum	2, 12
	Amara aulica	25
	A. convexior	25
	A. plebeja	25
	Harpalus rufipes	16
	H. affinis	24
	Acupalpus dubius	9, 24, 25
Nb	*A. exiguus* (Local in marshy places. Not uncommon in Sussex)	10, 24, 25
	Demetrias atricapillus	1, 25
Nb	*D. imperialis* (Local in wetland. Often associated with *Phragmites*)	1
	Microlestes maurus	6
	Metabletus obscuroguttatus	13,25
Hydrophilidae		
	Megasternum obscurum	24

Staphylinidae (Rove beetles)

	Platystethus alutaceus (A rather local wetland species)	23
	P. nitens	1
	Stenus binotatus	25
Nb	*S. carbonarius* (A very local wetland species)	25
	S. cicindeloides	1, 4
Nb	*S. fornicatus* (A local wetland species)	15
	S. fulvicornis	3,25
	S. juno	2
	S. latifrons	5, 12, 24
	S. ossium	6
	Paederus riparius	16, 22, 25
	Rugilus orbiculatus	25
	Lathrobium fulvipenne	25
	L. Longulum	25
	Othius angustus	24, 25
	Achenium depressum	24, 25
Nb	*A. humile* (Both *Achenium* species are adapted for living in very narrow cracks in clay banks, probably at margins of water and are seldom found other than in 'flood debris'. *A. humile* is by far the rarer of the two.)	24
	Philonthus cognatus	25
	P. micans	22
	P. quisquiliarius	25
	Ontholestes murinus	24
	Quedius nitipennis	25
	Q. semiobscurus	25
	Tachyporus obtusus	22
	Hygronoma dimidiata	13
	Aloconota gregaria	25
	Atheta (Philhygra) debilis (This is the only recent Sussex record for this tiny wetland species)	25
	Pachnida nigella	7
	Drusilla canaliculata	25
Nb	*Ilyobates subopacus* (Although this species is rarely discovered its status is not well known. Probably a subterranean beetle associated with ants. The only recent Sussex record.)	25

	Chiloporata longitarsis	18
	Aleochara curtula	24
	Oxypoda elongatula	24
	O. opaca	24

Pselaphidae

	Tychus niger	25

Scarabaeidae (Dung beetles)

	Aphodius granarius	25
	A. haemorrhoidalis	25

Scirtidae (soft-bodied beetles with aquatic larvae)

	Cyphon coarctatus	18
	C. hilaris	21
	C. palustris	18
	C. phragmiteticola	22

Elateridae (Click beetles)

Na	*Althous campyloides* (Although this species has a very restricted range in Britain being confined to a few counties in the south-east, it is not uncommon in East Sussex. A nocturnal beetle which is often attracted to light.)	25
	Agriotes lineatus	25
	A. sputator	24, 25.

Cantharidae (soldier beetles)

	Cantharis cryptica	7
Na	*C. figurata* (Local, chiefly in wetlands)	18
	C. lateralis	8, 18, 24, 25
	C. nigra	18, 22, 24
Nb	*C. thoracica* (A local wetland species)	8
	Rhagonycha fulva	22
Nb	*Silis ruficollis* (A local wetland species which is often associated with *Phragmites*)	22

Cleridae

Necrobia violacea	24

Nitidulidae

Brachypterolus pulicarius (Associated with *Linaria vulgaris*)	22

Cryptophagidae

Telmatophilus caricis	2, 3
Nb *Atomaria atra* (A very local wetland species which appears to be widespread in Sussex)	25
A. mesomela	1
Micrambe vini (Associated with *Ulex* (Gorse)	22

Phalacridae

Phalacrus caricis (Associated with "smutted" *Carex*)	7, 22

Coccinellidae (Ladybirds)

Coccidula rufa	2, 6, 7, 8, 10, 18, 22, 25
Nephus redtenbacheri	25
Anisosticta novemdecimpunctata	2, 6, 8, 9, 18, 22, 25
Tytthaspis sedecimpunctata	1, 2, 4, 11, 16, 18, 22, 25
Coccinella septempunctata	18
Caluia quattuordecimpunctata	8,11,18,25

Lathridiidae

Corticaria impressa	25

Scraptiidae

Anaspis pulicaria	22

Oedemeridae

Oedemera nobilis	11

Cerambycidae (Longhorn beetles)

Strangalia maculata	22
Leiopus nebulosus	22

Chrysomelidae (leaf beetles)

	Donacia marginata (Associated with *Sparganium erectum*)	2, 8, 12, 15
	D. simplex (Associated with *Sparganium*, *Carex*, etc)	8
	Oulema melanopa (Associated with grasses)	11, 25
	Galerucella calmariensis (Associated with *Lythrum salicaria*)	21
	Phyllotreta exclamationis (Associated with *Cruciferae* in marshy places)	25
	Altica lythri (Associated with *Epilobium hirsutum*)	11, 25
	Crepidodera transversa (Associated with thistles)	25
	Chalcoides plutus (Associated with *Salix fragilis*)	6, 22
	Chaetocnema concinna	3, 25

Apionidae (weevils)

	Apion curtirostre (Associated with *Rumex* sp	3
Nb	*A. cruentatum* (Rather local; associated with *Rumex acetosa*)	25
	A. hydralapathi (Associated with *Rumex* sp)	25
	A. frumentarium (= *A.miniatum*) (Associated with *Rumex* sp.)	6
	A. sicardi (Associated with *Lotus uliginosus*)	22
	A. trifoli (Associated with *Trifolium pratense* and *T. medium*)	25
	A. violaceum (Associated with *Rumex* sp.)	22
	Nanophyes marmoratus (Associated with *Lythrum salicaria*)	18, 21

Curculionidae (Weevils)

	Phyllobius pyri (On a variety of trees)	18
	Barypeithes araneiformis	25
	Hypera adspersa (Associated with aquatic Umbelliferae)	8
	Dorytornus taeniatus (Associated with *Salix* sp.)	18

	Notaris acridulus	1, 2, 8, 10, 13, 15, 18, 25
	N. scirpi	13
	Thryogenes nereis	1
	Cidnorhinus quadrimaculatus (Associated with *Urtica dioica*)	22
	Ceutorhynchus melanostictus (Associated with *Mentha aquatica*)	1, 11
	Rhinoncus pericarpius (Associated with *Rumex* sp)	25
Nb	*Baris lepidii* (Associated with Cruciferae in marshy places, probably often with *Rorippa sylvestris*. Local but difficult to discover being mostly found at plant roots)	25
	Gymnetron antirrhini (Associated with *Linaria vulgaris*)	22

HEMIPTERA (Terrestrial species)

Gydnidae (Shield-bugs)

	Legnotus limbosus (Associated with bedstraws, local)	25

Lygaeidae (Ground-bugs)

	Heterogaster urticae (Associated with *Urtica dioica*)	8
	Ischnodemus sabuleti	1, 3, 4
	Peritrechus geniculatus	22
	Scolopostethus affinis	22

Miridae (Capsid bugs)

	Plagiognathus arbustorum	22
	Dicyphus epilobii (Associated with *Epilobium hirsutum*)	8
	Asciodema obsoletum (Associated with *Ulex* (Gorse) and *Sarothamnus* (Broom)	22
	Cyrtorhinus caricis (Associated with *Carex* sp.)	24
	Pithanus maerkeli (Associated with grasses)	22, 25
	Calocoris norvegicus	22
	Stenotus binotatus (Associated with grasses)	22
	Miridius quadrivirgatus (Associated with grasses)	22

	Stenodema trispinosum (Associated with wetland grasses and sedges, often near the coast)	8, 22
	Teratocoris antennatus (Associated with rushes, mainly near the coast)	22
	Leptoterna dolabrata (Associated with grasses)	22

DIPTERA

Stratiomyidae (Soldier-flies)

	Beris clavipes (A widely distributed but local wetland species. Appears to be rare in Sussex)	18
	Chloromyia formosa	22

Tabanidae (Horse-flies)

	Chrysops viduatus	22

Asilidae (Robber-flies)

	Leptogaster cylindrica	22

Empididae (Dance flies)

	Rhamphomyia barbata (Local in wetlands, adults often rest on Salix etc)	18
	Hilara nigrina	18
	H. quadrivittata	18
	Clinocera (Hydrodromia) stagnalis	11

Dolichopodidae (Long-legged flies)

Nb	*Hercostornus chalybeatus* (A local wetland species which is widespread in Sussex)	21
	Campsicremus curvipes	19
	Dolich opus latelimbatus	

Syrphidae (Hover-flies)

	Metasyrphus corollae	22
	Scaeva pyrastri	22
	Episyrphus balteatus	22
	Sphaerophoria scripta	22
	S. taeniata	22

	Platycheirus clypeatus	8
	Lejogaster metallina	22
	Neoascia tenur	22
	Helophilus pendulus	18, 22
	H. trivittatus	22
RDB2	*Anasimyia interpuncta* (Also recorded from Pevensey Levels in Sussex, this species is known from a few scattered wetland sites.	22
	Eristalis arbustorum	22
	E. intricarius	22

Tephritidae (Picture-winged flies)

	Urophora stylata (Associated with *Cirsium vulgare*)	22
	Terellia ruficauda (Associated with *Cirsium* sp)	22
	Tephritis cometa (Associated with *Cirsium arvense*)	22

Otitidae (Picture-winged flies)

	Meleria crassipennis	22

Sciomyzidae (Snail-killing flies)

	Elgiva cucularia (Larvae are predators of aquatic pulmonate snails)	18
	Ilione albiseta (Larvae are probably predators of aquatic pulmonate snails)	22
	Sepedon sphegea (Larvae are predators of aquatic snails)	8

Scathophagidae (Dung flies, etc)

	Norellisoma spinimanum (A wetland species)	22

NEUROPTERA (Lacewings)

Osmylidae

Nb	*Osmylus fulvicephalus* (Britains largest lacewing. A local species which is found beside shaded streams)	

ODONATA (Dragonflies)

Coenargriidae

Coenagrion puella (Azure Damselfly)

Pyrrhosoma nymphula (Large Red Damselfly)

Aeshnidae

Aeshna grandis (Brown Hawker)

Anax imperator (Emperor Dragonfly)

Libellulidae

* *Sympetron striolatum* (Common Darter)
(* Provisional determination - distant sighting only (could be *S.sanguineum*))

ORTHOPTERA (Grasshoppers and Crickets)

Tettigoniidae

Conocephalus dorsalis (Short-winged Cone-head)

Acrididae

Chorthippus albomarginatus (Lesser Marsh Grasshopper)

LEPIDOPTERA (Moths)

Tortricidae

Cydia aurana 22
(A small brown and orange moth which breeds in the flower head of *Heracleum sphondylium* (Hogweed))

LEPIDOPTERA (Butterflies)

Hesperiidae

Thymelicus lineola (Essex skipper)

Pieridae

Pieris brassicae (Large White)

Nymphalidae

Vanessa atalanta (Red Admiral)

Anglais urticae (Small Tortoiseshell)

Polygonia c-album (The Comma)

Satyridae

Maniola justina (Meadow Brown)

Coenonympha pamphilus (Small Heath)

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September 1994

REPORT 2

BIRD STUDIES

COMBE HAVEN SSSI

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1.0 INTRODUCTION

1.1 Early discussion with English Nature identified Combe Haven (Sites of Special Scientific Interest) SSSI as a key issue in the assessment of the proposed scheme. On the basis of these consultations, this project was designed to monitor and quantify the following features of the ornithological interest of Combe Haven SSSI:

(a) bird species present;

(b) seasonal use of the site;

(c) local and strategic movements of birds at the site;

(d) identification of the potential level of impact of the road and the proposed viaduct for the A259 Bexhill and Hastings Western Bypass.

Appendix 1 presents the monitoring protocol which was developed for this project.

1.2 A review of existing information from the literature described in Appendix 1 showed that the site is considered of importance to the following species or groups :

(a) Breeding - water rail, grasshopper warbler, yellow wagtail, snipe, redshank, lapwing, cuckoo, sedge warbler, reed warbler;

(b) Winter - snipe, jack snipe, redshank, lapwing, hen harrier, various wildfowl and other waders;

(c) Passage migration and as a landfall site - thrushes, finches, warblers, buntings, raptors, wildfowl and waders.

There was some inconsistency between those species noted in the SSSI notification and those recorded in the county bird reports, thus supporting the need for better and standardised evaluation.

1.3 Combe Haven provides important habitat at different times of the year for different species and groups of birds. It was considered important, therefore, to monitor throughout one annual cycle. This was achieved through bi-weekly visits, which enabled all but the rarest vagrant species to be recorded during the period February 1992 - January 1993.

2.0 THE SITE

2.1 Combe Haven SSSI is a relatively large area (156.1 ha) containing a rich diversity of habitat types, principally alluvial meadows and associated drainage ditches (covering approximately 116 ha), Filsham reedbed (the largest in East Sussex at approximately 30 ha), and some scattered ancient semi-natural woodland (covering approximately 10 ha). The wet meadows and fen are considered the most important for bird communities. The northern side of the Combe Haven river, being slightly lower than the southern side, is noted for the length of time standing water remains on the surface following wet weather. It has been known to remain flooded in summer periods. The whole site, lying close to the coast and with some higher ground on both sides of the site, offers a natural flight-line for a variety of migrant birds.

2.2 The site is strategically placed, being part of a series of important breeding and wintering sites including Pevensey Levels, Rye Harbour, Pett Levels, Brede Levels, Dungeness and Walland Marsh. The degree of movement of birds between these sites is poorly understood and remains difficult to investigate without the costly marking of individual birds.

3.0 IMPORTANT FEATURES TO BE CONSIDERED

3.1 The site is noted for wintering, migrant and breeding bird species. It therefore required year-round monitoring to catch the fluxes at particular times of year. From the SSSI notification, a knowledge of habitat types, and the review of existing information presented in Appendix 1, the following groups and/or species were considered to be of importance for assessing during the breeding season: water rail and grasshopper warbler (considered important by the Nature Conservancy Council (NCC), but not substantiated by county bird reports); yellow wagtail, snipe and redshank (not important according to county bird reports); lapwing, cuckoo, sedge warbler and reed warbler. The winter list included snipe, jack snipe, redshank, lapwing, hen harrier, wildfowl (principally wigeon, teal and shoveler), other waders and water pipit. Four groups in particular were considered important during spring and autumn passage migration: passerines (particularly thrushes, finches, warblers and buntings), raptors, wildfowl and waders.

3.2 The topography suggests the site could be an important flight or leading line for local movements of birds. Particular emphasis was therefore given to measuring local movements up and down the valley crossing the location of the proposed viaduct. Both local and strategic movements were assessed.

3.3 The method of work took account of the fact that the site could be a significant landfall habitat for migrants. It was considered necessary to look at the woodland on higher ground monthly during the year in order to detect any passerine passage migration periods. This was augmented by using timed observation points.

4.0 OBJECTIVES

4.1 The objectives of the study were as follows:

(a) to identify species present at the whole site and to locate key habitats within the site;

(b) to identify the degree of local and strategic movement of birds on the site, their direction (being principally west-east), and its seasonal nature;

(c) to measure seasonal use of the site;

(d) to assess the site's strategic importance in relation to neighbouring sites and to use these data to assess the likely overall impact of the proposed viaduct.

4.2 Strategy

4.2.1 Table 1 gives the bird species of most importance, together with the most appropriate method of recording them. Bird communities were sampled by a combination of these methods (Bibby, Burgess and Hill 1992).

Table 1: A summary of the methods used to census the most important species and bird groups at three periods of the year.

Breeding (B), winter (W), passage migration (P). The methods are discussed further in the text.

Species	Season	Method
Water rail	B	Calls mapped
Water rail	W	Feeding birds and some calls
Grasshopper warbler	B	Calling males mapped
Sedge warbler	B	Calling males mapped
Reed warbler	B	Calling males mapped
Yellow wagtail	B	Register all birds and sex
Snipe	B	Displaying/ drumming male
Snipe	W	Individuals birds scanned
Redshank	B	Flying bird showing alarm
Redshank	W	Individual birds scanned
Lapwing	B	Incubating birds scanned
Lapwing	W	Individual birds scanned
Cuckoo	B	Calling males mapped

Table 1 contd..

Water pipit	W	Individuals mapped on transect
Passerines	P	Observation points and registration mapping outside breeding season
Raptors	P	Observation points
Wildfowl	P	Observation points
Waders	P	Observation points
Wildfowl general	W	Direct counts feeding or roosting
Waders general	W	Direct counts feeding or roosting
Roost movements (all appropriate species)	B, W, P	Observation points

4.3 Specific Methods

4.3.1 The methods employed fall into two categories: spatial data, and temporal movements. Spatial data methods (such as registration mapping and territory mapping) identify the numbers of each species of interest during breeding and winter periods. Temporal movements data are obtained from observation points in order to indicate movement patterns and direction.

Spatial data - registration mapping

4.3.2 Registration and territory mapping was conducted bi-weekly across the whole site, using methods identified in Table 1. The technique relies on species being territorial and/or visible during the breeding season. Especially among passerines, territories are often marked by conspicuous song, display and periodic disputes with neighbours. Mapped registrations of birds fall into clusters approximately coinciding with territories. The mapping approach relies on locating all the territorial signs on a series of visits and using them to estimate locations and numbers of clusters or territories. It can also be used for gathering information on passerines outside the breeding season. The important visits for most resident species fall in the first half of the year. Later-arriving migrants are recorded in the latter half of the season. On the maps the standard bird species codes (see Bibby, Burgess and Hill 1992) are used to mark individuals, groups and sex where these can be determined. This method was used throughout the year.

4.3.3 At Combe Haven registrations of birds were mapped at a scale of 1:2500 from early-morning bi-weekly visits. A first route through the reedbed was established in February prior to sampling, although high water made access to the centre of the reedbed difficult or impossible on many occasions. However, most activity appears to have been on the edge of the reedbed rather than the very centre, probably as a result of greater management of this area in comparison with the older reed in the middle. Routes and start directions were varied between visits in order to reduce any tendency for a particular part of the area to be visited later or earlier in the day. Ten week periods for seasonal representation of the data were used. Visits were not made during periods of inclement weather since this reduces the precision of the method. Particular attention has been paid to simultaneous registrations since these are most important in determining clusters.

4.3.4 The field maps generated for each 10-week visit period were converted into visit summaries and used to calculate mean and maximum numbers over the period. Non-overlapping ellipses containing registrations were used to assess the number of territories. For periods outside the breeding season, the number of registrations was used to assess the most important areas and the relative abundance of species, although relative abundance estimates are dependant on the detectability of the species. It was also necessary to deal with observations of species which are not strictly territorial. These included non-breeders of many species, including finches, corvids and hirundines.

4.3.5 The alluvial meadows were included in the area being counted bi-weekly through the year by walking slowly along the length of the central part of the site, deviating randomly to complete total site coverage. The method outlined in the protocol report was modified to allow the observer to cover more ground rather than to adhere to a strict transect approach. Consequently registration mapping was extended to the whole site. All individuals and flocks were marked on a map of scale 1:2500, a separate one for each visit. Wader species of importance for which particular emphasis was given included snipe, jack snipe, redshank and lapwing.

4.3.6 The counting unit in breeding snipe is the displaying (drumming) male. They are counted within three hours of dawn or dusk. The true nesting population is calculated by doubling the mean number of counts per visit of drumming birds from visits made between April and May.

4.3.7 The counting unit in breeding redshank is the flying bird showing alarm, best counted when the birds have young (late May - early June), between 0900 hrs and 1700 hrs BST. At this time both parents mob an observer traversing a field or walking set transects, and are easily counted. The mean number of redshank recorded during the recommended period equates to the maximum number of nests present.

4.3.8 The counting unit in breeding lapwing is the incubating bird. Counts were conducted when the birds were sitting on eggs (late March - late April). Later counts were used to take account of juveniles, finished and failed breeders occurring in flocks. Incubating birds were located by carefully scanning the alluvial meadows while walking through the central part between 0900 and 1200 BST (during which time activity is most stable). The maximum of a series of counts made during the period when most pairs are incubating gives a good estimate of the number of birds breeding.

4.3.9 Breeding wildfowl are difficult to count without labour-intensive nest searching which can cause the nests to be deserted. By registering all birds seen on the transect scans each visit, and by separately registering guarding males (which are more prominent than the camouflaged females) and broods, it is possible to identify species use of the site and the extent to which the duck breeding season is extended by comparison with some other groups of birds.

4.3.10 Monkham, Decoy Pond and Redgeland woods are considered to be of less importance to birds than the alluvial meadows and reedbed, since they are relatively small. Sparrowhawks may breed in them and they may be important sites for migrants during periods of landfall, being on slightly higher ground. The most effective method of surveying them was to pay regular but infrequent search visits. They were therefore visited monthly, either in a morning or just before dusk, to locate the more important species and landfall migrants.

Temporal Movements

4.3.11 The methods described in 4.3.1 refer to recording information on the ground. It is also important to identify the pattern and nature of movements of birds across the site in view of its strategic position in relation to surrounding sites. This was achieved by using five observation points orientated north-south traversing the site at 500 m intervals across its length. The approximate locations of the five transects is shown on Figure 17.

4.3.12 The observer conducted a watch along the length of each of these traversing transects for a 30 minute period, extending either side to a distance of approximately 500 m, after which he moved to the next point. The start point, where practicable, was chosen at random. This avoided the same observation point being watched at the same time of day on each visit. Observation points were sampled bi-weekly. All individuals, and estimates of flock sizes, were recorded for each observation point, together with direction of movement, the side of Combe Haven over which the birds were seen flying, and the height at which they were flying. Flying heights were assessed in three categories: below 10 m; between 10 m and 30 m; and above 30 m. This provided useful information on seasonal changes in heights at which birds fly. The height data can be compared for each transect to identify any trends in heights based on location up the valley. The standard recording form is given in Appendix 2. A data abstraction form is given in Appendix 3.

4.4 Sampling Design

The following summarises the sampling design in relation to the three main compartments of work:

Work compartment		Sampling Design
(a)	Filsham reedbed	Registration mapping (1:2500), breeding and migrant landfalls. One visit every two weeks. Route changed on subsequent/alternative visits.
(b)	Alluvial meadows	Breeding random-walk transect through low-lying part, registering all species on map (1:2500). One visit/week. Start point of route alternated between visits. Selective scans for redshank, snipe and lapwing.
(c)	Directionality/roost movements	Series of morning or afternoon/dusk 30 minute watches at observation points from site boundary separated by 500 m distance along long axis of site. Alternate start point and direction for proceeding between points. One set of watches every two weeks. Map species, flock size, direction of movement, height and north or south of Combe Haven river.
(d)	Monkham and Decoy Pond Woods	Monthly (one morning or dusk) look-see visits, locating more important species and landfall migrants.

5.0 RESULTS

5.1 Registration Mapping

5.1.1 Results are presented here for the whole period February 1992 - January 1993. They are presented on the basis of 10-week periods as described above and as outlined in Appendix 1.

5.1.2 Data are presented as the mean number of birds registered per visit, together with the maximum count on any one visit. The former values are converted to relative abundances to enable comparison with results from transect counts for specific groups of birds: ie. the relative contribution to the total bird community made by gulls and corvids (principally rooks and carrion crows). The data are also split into six sections (5,4,3,2,1,1A) corresponding with the position of transects from west to east (Figure 17). Section 5 is therefore for the area to the west of transect 5, section 4 is the area to the west of transect 4 and east of transect 5 etc. Section 1A corresponds to the area north of Filsham reedbed. Data for Filsham reedbed are shown for the reedbed as a whole . Data for the periods late winter - early spring (17 February - 29 April), late spring - early summer (18 May - 17 July), late summer - early autumn (11 August - 14 October), late autumn - early winter (26 October - 25 January) are given (dates in brackets show the exact start and end dates of surveys in each period). Rather than simply presenting data in spring, summer, autumn, winter, these seasonal divisions result from the start and end times of the project.

Bird communities late winter - early spring

5.1.3 Table 2 shows the mean number of birds registered per visit, together with the maximum count, from registration mapping for the late winter - early spring period. A total of 69 species was registered. Fourteen of these species are considered of some nature conservation significance at this site during this period: mute swan, shelduck, teal, hobby, water rail, lapwing, jack snipe, snipe, long eared owl, stonechat (passage migration), fieldfare (passage migration), redwing (passage migration), bearded tit, and reed bunting. These 14 species only comprised 7.2% of the bird community in this period, although the site is good for snipe (2.3% of the total abundance). The community is dominated by corvids (26.9%), chaffinch (8.7%) and woodpigeon (10.0%). The dominant corvid was carrion crow which comprised 17.5% of the total bird community abundance.

Table 2: Summaries of species abundances (mean per visit and maximum for all visits) **and relative abundances** (using the mean values) **from registration mapping during the late winter - early spring 1992.**

Species	Mean number registered per visit and maximum (in brackets)	Relative abundance
Little grebe	0.2 (1)	0
Grey heron	0.6 (1)	0.1
Mute swan	1.6 (2)	0.3
Shelduck	0.4 (2)	0.1
Teal	8.6 (23)	1.4
Mallard	10.2 (21)	1.7
Sparrowhawk	0.2 (1)	0
Kestrel	1.8 (3)	0.3
Hobby	0.2 (1)	0
Pheasant	1.0 (2)	0.2
Water rail	1.0 (4)	0.2
Moorhen	1.8 (4)	0.3
Coot	0.4 (2)	0.1
Lapwing	1.2 (2)	0.2
Snipe	13.8 (41)	2.3
Jack snipe	1.0 (5)	0.2
Woodcock	0.2 (1)	0
Black headed gull	41.0 (205)	6.7
Common gull	6.4 (32)	1.1
Lr. black backed gull	1.6 (8)	0.3
Herring gull	40.0 (200)	6.6
Gt. black backed gull	0.6 (3)	0.1
Stock dove	0.8 (4)	0.1
Woodpigeon	61.0 (122)	10.0
Cuckoo	0.2 (1)	0
Long eared owl	0.2 (1)	0
Green woodpecker	1.0 (2)	0.2
Great spotted woodpecker	1.0 (2)	0.2
Skylark	2.3 (4)	0.4
Swallow	0.6 (3)	0.1
House martin	1.2 (6)	0.2
Meadow pipit	9.0 (17)	1.5
Yellow wagtail	0.2 (1)	0

Table 2 contd...

Pied wagtail	0.2 (1)	0
Wren	24.4 (38)	4.0
Dunnock	5.4 (13)	0.9
Robin	12.0 (21)	2.0
Stonechat	0.8 (2)	0.1
Blackbird	16.4 (27)	2.7
Fieldfare	0.4 (2)	0.1
Song thrush	3.6 (7)	0.6
Redwing	1.2 (4)	0.2
Mistle thrush	1.0 (4)	0.2
Sedge warbler	1.6 (8)	0.3
Lesser whitethroat	0.2 (1)	0
Whitethroat	1.8 (9)	0.3
Blackcap	0.6 (2)	0.1
Chiffchaff	2.6 (7)	0.4
Willow warbler	0.4 (2)	0.1
Bearded tit	0.6 (2)	0.1
Long tailed tit	5.0 (9)	0.8
Coal tit	0.4 (2)	0.1
Blue tit	18.6 (36)	3.1
Great tit	11.0 (19)	1.8
Treecreeper	2.2 (8)	0.4
Jay	2.0 (5)	0.3
Magpie	11.8 (17)	1.9
Jackdaw	20.4 (77)	3.4
Rook	23.2 (52)	3.8
Carrion crow	106.2 (210)	17.5
Starling	24.6 (59)	4.1
House sparrow	0.2 (1)	0
Chaffinch	53.0 (220)	8.7
Greenfinch	4.6 (21)	0.8
Goldfinch	9.2 (35)	1.5
Linnet	12.0 (31)	2.0

Table 2 contd...

Bullfinch	0.8 (2)	0.1
Yellowhammer	5.6 (10)	0.9
Reed bunting	12.2 (21)	2.0
Total (69 species)	**607.5 (1712)**	

Bird communities late spring - early summer

5.1.4 Table 3 shows the mean number of birds registered per visit, together with the maximum count, from registration mapping for the late spring - early summer period. A total of 65 species was registered (four less than late winter - early spring). Seventeen of these species are considered of some nature conservation significance at this site during this period. These are mute swan (pair (pr)), water rail (1+prs) lapwing (1 pr), snipe, redshank (1 pr)), little owl, swift (60+ feeding), skylark (6 prs), house martin (58+ feeding), whinchat, Savi's warbler (male in Filsham reedbed), sedge warbler (6+ prs), reed warbler (26+ prs), lesser whitethroat, whitethroat, hawfinch and reed bunting (approximately 13 prs). Bearded tit was breeding in Filsham reedbed. Hawfinch was found in Monkham Wood, and is included in these summaries. The most important are water rail, Savi's warbler and bearded tit (all in Filsham reedbed). The redshank and lapwing which appeared to prospect for nests in this period failed to make a breeding attempt.

5.1.5 The 17 species described above comprised 29.9% of the bird community in this period, with particularly high occurrences of sedge warbler, reed warbler and reed bunting (15.3% in total). The community is dominated by corvids (13.1%) of which the carrion crow component had declined from the winter period to 3.1%, together with starling (8.1%) and woodpigeon (4.8%). The major difference between the bird community in this period and the earlier period was the abundance of migratory groups such as warblers and hirundines and the reduced contribution from corvids in the later period.

Table 3: Summaries of species abundances (mean per visit and maximum for all visits) **and relative abundances** (using the mean values) **from registration mapping during the late spring - early summer 1992.**

Species	**Mean number registered per visit and maximum (in brackets)**	**Relative abundance**
Grey heron	0.2 (1)	0.1
Mute swan	0.8 (1pr)	0.2
Mallard	4.8 (9)	1.3
Sparrowhawk	0.4 (1)	0.1

Table 3 contd...

Kestrel	1.0 (3)	0.3
Pheasant	1.4 (2)	0.4
Water rail	0.6 (2)	0.2
Moorhen	1.0 (2)	0.3
Lapwing	0.8 (1pr)	0.2
Snipe	0.2 (1)	0.1
Redshank	0.2 (1pr)	0.1
Black headed gull	1.6 (8)	0.4
Stock dove	1.6 (6)	0.4
Woodpigeon	18.2 (30)	4.8
Turtle dove	0.6 (3)	0.2
Cuckoo	1.2 (3)	0.3
Little owl	0.2 (1)	0.1
Swift	23.4 (60)	6.1
Green woodpecker	1.0 (2)	0.3
Great spotted woodpecker	1.0 (2)	0.3
Skylark	3.8 (6prs)	1.0
Sand martin	1.2 (6)	0.3
Swallow	5.6 (21)	1.5
House martin	12.8 (58)	3.3
Tree pipit	0.2 (1)	0.1
Meadow pipit	0.6 (2prs)	0.2
Wren	23.5 (34)	6.1
Dunnock	3.0 (7)	0.8
Robin	10.3 (26)	2.7
Whinchat	0.2 (1)	0.1
Blackbird	16.8 (39)	4.4
Song thrush	1.0 (2)	0.3
Mistle thrush	1.2 (4)	0.3
Savi's warbler	0.4 (1)	0.1
Sedge warbler	6.0 (12)	1.6
Reed warbler	26.0 (50)	6.8
Lesser whitethroat	1.8 (5)	0.5
Whitethroat	9.5 (13)	2.5
Garden warbler	0.4 (2)	0.1

Table 3 contd...

Blackcap	1.6 (5)	0.4
Chiffchaff	2.8 (5)	0.7
Willow warbler	1.0 (2)	0.3
Spotted flycatcher	0.2 (1)	0.1
Bearded tit	0.2 (1)	0.1
Long tailed tit	6.0 (10)	1.6
Marsh tit	0.4 (1)	0.1
Coal tit	0.2 (1)	0.1
Blue tit	16.0 (30)	4.2
Great tit	10.0 (14)	2.6
Treecreeper	0.4 (2)	0.1
Jay	2.4 (7)	0.6
Magpie	9.8 (18)	2.6
Jackdaw	5.0 (25)	1.3
Rook	21.2 (70)	5.5
Carrion crow	12.0 (23)	3.1
Starling	30.8 (93)	8.1
House sparrow	0.4 (1)	0.1
Chaffinch	15.5 (38)	4.1
Greenfinch	8.4 (25)	2.2
Goldfinch	3.2 (9)	0.8
Linnet	11.8 (16)	3.1
Bullfinch	0.6 (2)	0.2
Hawfinch	0.2 (1)	0.1
Yellowhammer	11.5 (17)	3.0
Reed bunting	26.5 (28)	6.9
Total (65 species)	**382.6(876)**	

Bird communities late summer - early autumn

5.1.5 Table 4 shows the mean number of birds registered per visit, together with the maximum count, from registration mapping for the late summer - early autumn period. A total of 83 species were registered (18 more than late spring - early summer). A total of 28 of these species are considered to be of some nature conservation significance at this site during this period. These are: wigeon, gadwall, sparrowhawk, kestrel, hobby, snipe, jack snipe, kingfisher, wryneck, sand martin, swallow, house martin, tree pipit, yellow

wagtail, redstart, whinchat, stonechat, wheatear, sedge warbler, reed warbler, lesser whitethroat, whitethroat, blackcap, large number of chiffchaff, spotted flycatcher, pied flycatcher, brambling and reed bunting. The most important are: hobby, snipe (33+), wryneck (1 individual), whinchat (65+), and stonechat (21).

5.1.6 The 28 species comprised 24.9% of the bird community in this period. The site is significant for migrant passerines, especially warblers, whinchat and stonechat. The community is dominated by corvids (16.9%) with jackdaw making up 8.4% and carrion crow 5.4%, together with woodpigeon (10.4%). The major difference between the bird community in this period and the earlier periods was the abundance of passerines on migration.

Table 4: Summaries of species abundances (mean per visit and maximum for all visits) **and relative abundances** (using the mean values) **from registration mapping during the late summer - autumn 1992.**

Species	Mean number registered per visit and maximum (in brackets)	Relative abundance
Grey heron	1.0 (3)	0.1
Mute swan	0.6 (1)	0.1
Wigeon	0.4 (2)	0
Gadwall	0.4 (2)	0
Teal	0.6 (3)	0.1
Mallard	54.0 (100)	6.4
Sparrowhawk	1.2 (3)	0.1
Kestrel	3.4 (4)	0.4
Hobby	0.2 (1)	0
Pheasant	1.6 (4)	0.2
Moorhen	0.6 (2)	0.1
Snipe	10.6 (33)	1.2
Jack snipe	0.6 (3)	0.1
Black headed gull	3.4 (10)	0.4
Herring gull	28.0 (140)	3.3
Gt. black backed gull	1.0 (5)	0.1
Woodpigeon	88.8 (103)	10.4
Collared dove	0.6 (3)	0.1
Turtle dove	0.2 (1)	0

Table 4 contd...

Cuckoo	0.2 (1)	0
Tawny owl	0.2 (1)	0
Swift	3.8 (18)	0.5
Kingfisher	0.2 (1)	0
Green woodpecker	3.0 (7)	0.4
Great spotted woodpecker	0.6 (2)	0.1
Wryneck	0.2 (1)	0
Skylark	0.2 (1)	0
Sand martin	3.2 (10)	0.4
Swallow	58.4 (180)	6.9
House martin	22.2 (40)	2.6
Tree pipit	0.4 (2)	0
Meadow pipit	21.0 (49)	2.5
Yellow wagtail	2.4 (11)	0.3
Grey wagtail	0.4 (1)	0
Pied wagtail	0.2 (1)	0
Wren	28.4 (42)	3.3
Dunnock	8.8 (15)	1.0
Robin	34.8 (58)	4.1
Redstart	0.4 (1)	0
Whinchat	22.4 (65)	2.6
Stonechat	5.8 (21)	0.7
Wheatear	1.0 (3)	0.1
Blackbird	32.2 (104)	3.8
Fieldfare	0.2 (1)	0
Song thrush	9.0 (36)	1.1
Redwing	0.4 (2)	0
Mistle thrush	2.4 (9)	0.3
Sedge warbler	8.4 (26)	1.0
Reed warbler	6.0 (21)	0.7
Lesser whitethroat	9.0 (28)	1.1
Whitethroat	9.6 (40)	1.1
Garden warbler	1.0 (3)	0.1
Blackcap	6.8 (20)	0.8
Chiffchaff	22.8 (71)	2.7

Table 4 contd...

Willow warbler	7.2 (28)	0.8
Goldcrest	8.2 (34)	1.0
Spotted flycatcher	0.8 (3)	0.1
Pied flycatcher	0.2 (1)	0
Long tailed tit	12.0 (28)	1.4
Marsh tit	0.8 (2)	0.1
Willow tit	0.6 (1)	0.1
Coal tit	2.6 (4)	0.3
Blue tit	44.2 (62)	5.2
Great tit	14.4 (22)	1.7
Nuthatch	0.2 (1)	0
Treecreeper	3.8 (5)	0.5
Jay	8.2 (14)	1.0
Magpie	18.0 (20)	2.1
Jackdaw	71.4 (350)	8.4
Rook	0.4 (2)	0
Carrion crow	46.0 (120)	5.4
Starling	14.4 (47)	1.7
House sparrow	1.2 (4)	0.1
Tree sparrow	1.0 (5)	0.1
Chaffinch	12.0 (28)	1.4
Brambling	0.8 (2)	0.1
Greenfinch	6.6 (14)	0.8
Goldfinch	16.6 (33)	1.9
Siskin	0.8 (4)	0.1
Linnet	7.4 (20)	0.9
Bullfinch	6.8 (9)	0.8
Yellowhammer	4.2 (6)	0.5
Reed bunting	16.2 (27)	1.9
Total (83 species)	**850.2 (2211)**	

Bird communities late autumn - early winter

5.1.7 Table 5 shows the mean number of birds registered per visit, together with the maximum count, from registration mapping for the late autumn - early winter period. A total of 74 species was registered (nine less than the late summer - autumn period). Twenty one of these species are considered to be of some nature conservation significance at this site during this period, either because the species are relatively uncommon and/or because they occur in large numbers. These are: wigeon, gadwall, teal, shoveler, water rail (maximum of 12 birds in Filsham reedbed), lapwing, snipe (245), jack snipe, redshank, little owl, kingfisher, water pipit, stonechat, Cetti's warbler, Dartford warbler, dusky warbler, (passage vagrant 1 bird only), bearded tit (maximum of 14 birds in Filsham reedbed), brambling, reed bunting and large numbers of pied wagtail and blackbird. The most important are water rail, lapwing, snipe, (for which the site is particularly important), water pipit, Cetti's warbler, Dartford warbler, dusky warbler and bearded tit.

5.1.8 The 21 species comprised 17% of the bird community in this period, with large numbers of some passerines in the process of migration, such as pied wagtail and blackbird. Two species of particular note are Cetti's and Dartford warbler. The community is heavily dominated by gulls (47.3%) of which black headed (30.8%) and herring (14.6%) were the most important. This community also included starling (6.3%), and most importantly snipe (6.1%). The major difference between the bird community in this period and the earlier periods was the abundance of migratory groups such as warblers and hirundines, the increased contribution by gulls and the reduced contribution by corvids in the later period.

Table 5: Summaries of species abundances (mean per visit and maximum for all visits) **and relative abundances** (using the mean values) **from registration mapping during the late autumn - early winter 1992.**

Species	Mean number registered per visit and maximum (in brackets)	Relative abundance
Grey heron	0.9 (2)	0.1
Mute swan	1.9 (4)	0.1
Wigeon	1.6 (4)	0.1
Gadwall	5.0 (22)	0.3
Teal	11.6 (28)	0.7
Mallard	16.3 (56)	1.0
Shoveler	2.3 (10)	0.1
Sparrowhawk	0.5 (2)	0
Kestrel	1.5 (4)	0.1
Pheasant	1.7 (5)	0.1
Water rail	5.6 (12)	0.3
Moorhen	5.3 (11)	0.3

Table 5 contd...

Coot	0.2 (1)	0
Lapwing	30.2 (75)	1.8
Snipe	103.9 (245)	6.1
Jack snipe	0.2 (1)	0
Woodcock	0.1 (1)	0
Redshank	0.3 (2)	0
Black headed gull	521.6 (1600)	30.8
Common gull	26.5 (110)	1.6
Lr. black backed gull	5.3 (20)	0.3
Herring gull	247.1 (508)	14.6
Gt. black backed gull	30.3 (51)	1.8
Woodpigeon	52.2 (139)	3.0
Little owl	0.5 (1)	0
Kingfisher	0.2 (1)	0
Green woodpecker	2.1 (4)	0.1
Great spotted woodpecker	1.3 (4)	0.1
Lr. spotted woodpecker	0.2 (1)	0
Skylark	0.9 (3)	0
Meadow pipit	34.7 (69)	2.1
Water pipit	3.7 (6)	0.2
Pied wagtail	10.9 (44)	0.6
Wren	60.6 (98)	3.6
Dunnock	7.7 (14)	0.5
Robin	26.4 (62)	1.6
Stonechat	6.2 (15)	0.4
Blackbird	73.7 (171)	4.4
Fieldfare	1.3 (6)	0
Song thrush	20.6 (36)	1.2
Redwing	3.1 (5)	0.2
Mistle thrush	2.2 (5)	0.1
Cetti's warbler	0.2 (1)	0
Dartford warbler	1.0 (4)	0
Blackcap	0.2 (1)	0
Dusky warbler	0.2 (1)	0
Chiffchaff	0.9 (2)	0

Table 5 contd...

Goldcrest	7.0 (12)	0.4
Bearded tit	6.3 (14)	0.4
Long tailed tit	19.5 (57)	1.2
Marsh tit	1.0 (3)	0
Willow tit	0.5 (2)	0
Coal tit	2.2 (9)	0.1
Blue tit	34.6 (60)	2.0
Great tit	7.6 (10)	0.5
Treecreeper	1.9 (4)	0.1
Jay	5.7 (16)	0.3
Magpie	14.2 (22)	0.8
Jackdaw	4.1 (21)	0.2
Carrion crow	54.9 (94)	3.2
Rook	6.6 (35)	0.4
Starling	106.1 (250)	6.3
House sparrow	0.7 (5)	0
Tree sparrow	2.0 (10)	0.1
Chaffinch	21.4 (50)	1.3
Brambling	0.3 (2)	0
Greenfinch	32.1 (25)	1.9
Goldfinch	8.0 (10)	0.5
Siskin	2.1 (13)	0.1
Linnet	42.6 (10)	0.2
Redpoll	0.2 (1)	0
Bullfinch	6.3 (16)	0.4
Yellowhammer	3.9 (7)	0.2
Reed bunting	12.4(21)	0.7
Total (71 species)	**1695.1 (4365)**	

Key habitats late winter - early spring

5.1.9 The numbers of species and individuals recorded by registration mapping in the late winter - early spring period are shown in Table 6, together with notable species attributed to each section. In this period there was more variation in the number of species recorded per section. Section 4 (to the west of the proposed

viaduct route) had the greatest number of species, but section 5 (at the western-most end of the study area), had the most individuals, as a result of high numbers of woodpigeon and corvids. Filsham reedbed had high species diversity with three notables species; water rail, bearded tit and stonechat (on passage). Snipe occurred in sections 5, 3 and 2. The location of long-eared owl in the hedgerow abutting the southern end of section 5 was a particularly important find. Although it was not recorded in later visits, it is believed that it was breeding in the small outcrop of trees and bracken adjacent to section 5. Section 3 had the lowest number of species but sections 2, 1 and 1A the lowest mean numbers of individuals.

Table 6: The mean number of species and individuals recorded per visit by registration mapping in each of seven sections in late winter - early spring 1992.

	Section						
	5	**4**	**3**	**2**	**1**	**1A**	**Filsham reedbed**
Mean no. species	14.0	19.5	10.5	13.0	16.5	11.5	16.0
Maximum no. species	17	23	15	10	17	13	16
Mean no. individuals	122.5	65.5	49.5	32.0	40.0	20.5	40.5
Maximum no. individuals	148	105	80	35	46	25	42
Notable species	Snipe Woodcock Long-eared owl	Goldfinch flock Kestrel Redwing	Snipe Linnet flock	Snipe Lapwing	Kestrel Lapwing Yellow wagtail		Water rail Bearded tit Stonechat

Key habitats late spring - early summer

5.1.10 The number of species and individuals recorded by registration mapping in the late spring - early summer period are shown in Table 7, together with 'notable' species attributed to each section. In this period there was less variation in the number of species recorded per section with Filsham reedbed marginally having the greatest number of species, followed by sections 4 and 1. Section 2 had the most individuals, as a result of high numbers of gulls feeding at the tip on one visit. Filsham reedbed had eight notable species, kestrel, sparrowhawk, reed warbler, sedge warbler, Savi's warbler, water rail, turtle dove and bearded tit. Sedge warbler numbers were also high in sections 5 and 2, and the record of hobby occurred in section 3. Section 5 had the lowest number of species and individuals.

Table 7: The mean number of species and individuals recorded per visit by registration mapping in each of seven sections in late spring - early summer 1992.

	Section						
	5	**4**	**3**	**2**	**1**	**1A**	**Filsham reedbed**
Mean no. species	14.0	18.3	16.3	16.0	18.3	15.3	19.3
Maximum no. species	15	24	20	23	20	22	22
Mean no. individuals	35.8	48.7	125.0	197.7	91.0	33.0	80.0
Maximum no. individuals	99	84	199	518	134	51	121
Notable species	Sedge warbler Lapwing	Lapwing	Hobby	Sedge warbler Linnet flock Kestrel	Whinchat		Kestrel Reed warbler Sedge warbler Savi's warbler Water rail Bearded tit Turtle dove Sparrowhawk

Key habitats late summer - early autumn

5.1.11 The number of species and individuals recorded by registration mapping in the late spring - early summer period are shown in Table 8, together with 'notable' species attributed to each section. In this period sections 4 and 5 had more species than the rest, with Filsham reedbed having the least number of species. Sections 3 and 4 were particularly good because of the number of different migrant species attracted to them. Section 2 again had the most individuals as a result of high numbers of gulls feeding at the tip. Section 5 had the largest number of 'notable' species. The large number of whinchat (with a maximum of 65 recorded in mid September) shows the particular importance of the site to this species prior to its migration across the English Channel. The rarest species recorded was one wryneck to the north of Filsham reedbed; this could be a traditional stop-over site for this species.

Table 8: The mean number of species and individuals recorded per visit by registration mapping in each of seven sections in late summer - early autumn 1992.

	Section						
	5	**4**	**3**	**2**	**1**	**1A**	**Filsham reedbed**
Mean no. species	23.8	24.8	18.8	20.4	19.0	14.0	14.0
Maximum no. species	31	31	24	25	24	21	18
Mean no. individuals	143.0	157.8	91.2	235.9	162.4	55.0	52.8
Maximum no. individuals	235	289	179	500	286	111	70
Notable species	Heron Whinchat Blackcap Lesser whitethroat Chiffchaff Stonechat Jack snipe Snipe	Heron Cuckoo Whinchat Redstart Brambling Redshank	Reed bunting Stonechat Whinchat Heron	Kestrel Reed warbler Whinchat Sparrow hawk Stonechat	Kestrel Reed warbler Kingfisher Stonechat Linnet flock Tree sparrow	Whinchat Kestrel Stonechat Wryneck	Reed warbler Gadwall Wigeon Bearded tit

Key habitats late autumn - early winter

5.1.12 The numbers of species and individuals recorded by registration mapping in the late autumn - early winter period are shown in Table 9, together with 'notable' species attributed to each section. In this period there was much variation in the number of species recorded per section with section 2 having the most species and the most individuals (because of large numbers of gulls). The area to the north of Filsham reedbed was particularly species-poor. Section 4. had the second largest number of individuals and species of all sections. Snipe were abundant across the whole site and all sections apart from section 5, and the Filsham reedbed held stonechat. Bearded tit occurred in section 2 and Filsham reedbed and a rare palearctic vagrant, dusky warbler, was recorded in section 4. In contrast to the late summer - early autumn period, no migrant passerines were recorded in this period; birds of a similar number of species occurred but were generally more abundant than in the previous period.

Table 9: The mean number of species and individuals recorded per visit by registration mapping in each of seven sections in the late autumn - early winter 1992/3.

	Section						
	5	**4**	**3**	**2**	**1**	**1A**	**Filsham reedbed**
Mean no. species	15.5	23.6	17.7	26.1	18.4	10.4	18.9
Maximum no. species	29	31	25	31	25	14	23
Mean no. individuals	144.5	255.4	216.6	791.4	179.4	39.9	195.0
Maximum no. individuals	337	694	498	2211	381	66	513
Notable species	Little owl Water rail Snipe	Snipe Stonechat Water rail Dusky warbler Lapwing Siskin Water pipit Kingfisher	Stonechat Kingfisher Water pipit Snipe Redshank Lapwing	Stonechat Brambling Water rail Snipe Water pipit Kingfisher Bearded tit Lapwing	Stonechat Dartford warbler Snipe Water rail	Stonechat Snipe	Bearded tit Water rail Snipe Gadwall Teal

Key species in Decoy Pond, Monkham and Redgeland Woods

5.1.13 These woods were found not to be especially good for the expected community of birds. There was no evidence of these woods being used by large numbers of migrant passerines, although monthly visits could have missed peak periods.

5.1.14 However, the woods did have some important species. Decoy Pond Wood held a rookery of in excess of 20 pairs (and in the spring large numbers used the wood in association with spending time feeding in the pasture). A pair of both great spotted and lesser spotted woodpeckers were present, the latter being of particular conservation importance regionally. Monkham Wood held a pair each of great spotted and green woodpeckers, a pair of hawfinches, spotted flycatcher, sparrowhawk, cuckoo and marsh tit. Within Redgeland Wood, green woodpecker, nuthatch and lesser whitethroat were present.

5.2 Transects

Temporal changes in bird species and numbers

5.2.1. The first transect observation counts began on 10 February 1992 and were conducted at bi-weekly intervals. The data for the full observation period of February - January are reported here. Figure 1 shows the significant non-linear increase and plateau in the number of bird species recorded on all transects individually during this period. The period of most rapid increase, during February - April, corresponded with the peak time for migrant movements, that is the movement south of wintering birds and movement into Britain of breeding migrants from southern Europe and Africa. During late May-June the relationship between number of species and date reached a plateau with the maximum number of species seen on any transect being 18. The number of species seen on transects was, on average, about 11-12, a quarter of the average of 43 recorded by registration mapping. This is to be expected in view of the fact that sedentary skulking species (such as dunnock) are rarely recorded on transects, whereas they are on registration mapping. Many species do not make flights which would enable them to be included on transect counts.

5.2.2 From November onwards there was evidence of the beginning of a decline in the number of species recorded on transects to levels recorded at the beginning of the studies in February 1992.

5.2.3 Whilst the number of species increased during the late winter - early spring period, the total number of birds recorded declined (Figure 2). The large records of over 1000 birds recorded in March were of winter flocks of starlings and herring and black-headed gulls. The latter tend to feed on, and adjacent to, the refuse tip just on the boundary of the south-eastern most corner of the study site. Large winter flocks of gulls and carrion crows, both particularly influenced by artificially high food supplies at the tip, accounted for the main aspects of the decline in total bird abundance through the summer. It is clear that the bird community at Combe Haven is dominated by the presence of food from the refuse tip. This was evident both from the transect observations on flight direction and heights and from the data on spatial distribution described above. In late summer-autumn, total numbers were again high, due largely to flocks of migrating hirundines, principally swallows, on their way south, and to increased use of the site by black-headed and herring gulls. Combe Haven appears to be an important final staging area for hirundines before they make their sea crossing to the continent.

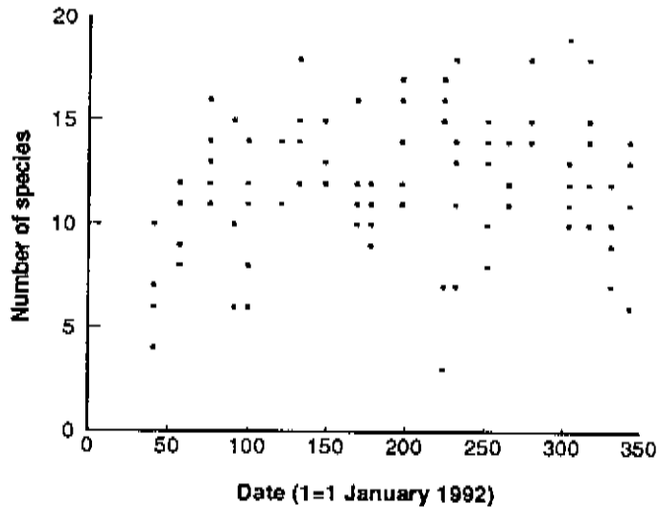

Figure 1: The non-linear increase in the number of bird species recorded on individual transects during February 1992 - January 1993.

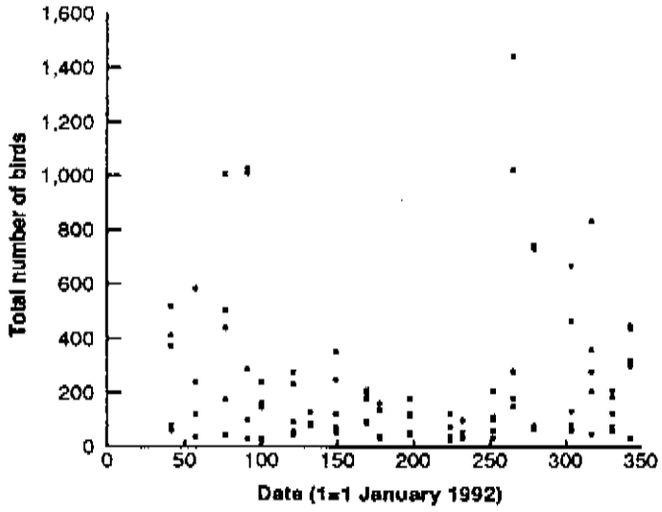

Figure 2: The change in total birds recorded on individual transects during the period February 1992 - January 1993.

5.2.4 In terms of the contribution of individual species and groups to the total numbers, gull numbers rarely exceeded 200 birds and only the winter transects (February, March, November) produced high numbers (Figure 3). This trend was repeated in the registration mapping data. The numbers of rooks counted was particularly variable between transects, although most individuals were counted on transects 3 and 4, since there is a rookery in Decoy Pond Wood. They were observed feeding in pasture fields and were regularly counted flying from flocks either to the tip or to fields north of transect 5. There was some evidence of a decline in the total numbers of rook counted over the observation period (Figure 4), a trend repeated in the registration mapping data.

5.2.5 The numbers of hirundines (swallow, swift, house martin and sand martin) increased, beginning in late April with the arrival of swallow, followed by swift and house martin by mid-May (Figure 5). Peak counts per transect were made of nearly 40 hirundines making local flights over the transects, with some evidence of strategic movements of birds as they migrated northwards up through the southern counties of England. The feeding activity of these birds made it difficult to distinguish between the birds which were on their northward migration and those breeding in the area, since hirundines can travel substantial distances from their nest-site to feeding areas. It is clear, however, that Combe Haven is a significant stop-over area for this group of birds, as it is probably the first place in which they feed after leaving France, or having followed the coast of northern France. A repeat influx of hirundines into the Haven was experienced in September, with a maximum of 1390 swallow observed in a half hour period moving south and out to sea on their migration back to Africa. The different heights at which hirundines were observed flying in relation to the season is discussed in Sections 5.2.15 - 5.2.21.

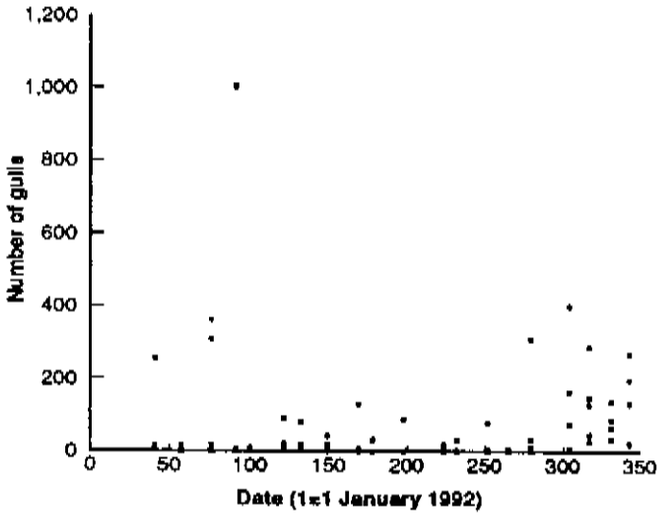

Figure 3: The number of gulls (black-headed, herring, greater and lesser black-backed) **recorded on individual transects during February 1992 - January 1993.**

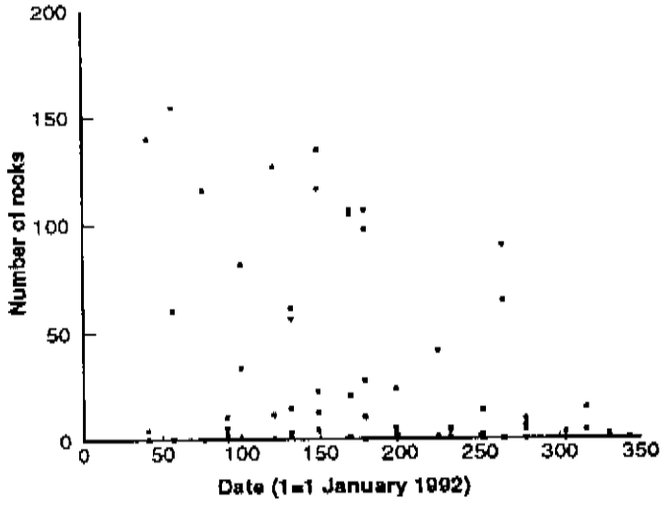

Figure 4: The number of rooks recorded on individual transects during February 1992 - January 1993.

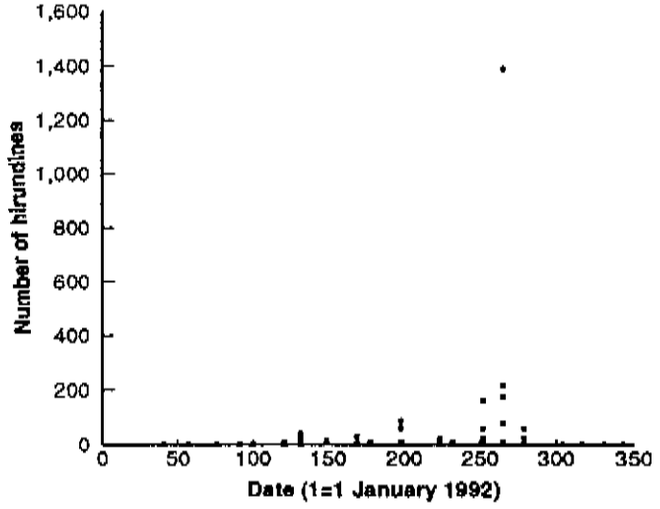

Figure 5: The number of hirundines (total of swallow, swift, house martin, sand martin) **recorded on individual transects during February 1992 - January 1993.**

Species and individuals per transect

5.2.6 There was a significant increase in the total numbers of birds (mean per visit) recorded from west to east down the length of Combe Haven (Figure 6, Table 10). Transect 5, near the head of the valley, had fewer active birds recorded than did the rest. Transect 2, closely followed by transect 3, had the most birds. In general results were similar between registration mapping in late winter-early spring and transect counts, with some differences for the rest of the year. Transect 5 was the most variable (as shown by the coefficients of variation in Table 10), whereas transect 4 was the least variable. On average, for the year, transect 4 had the largest number of species, although there was no significant difference in number of species recorded on transects 2-5; transect 1, on average, recorded fewer (Figure 7, Table 8).

5.2.7 Since birds were recorded as being either on the ground or at three different height categories, the differences between transects becomes apparent in the following sections. However, the dominance of gulls and corvids in the bird community for the whole area, together with their extensive use of the refuse tip, was the reason why most birds were recorded on transects 2 and 3. The presence of the tip was of over-riding importance to the local movement of birds. Consequently, for the period reported here, the smallest number of birds recorded were using flight lines close to the route of the proposed viaduct. However, black-headed gulls and corvids are the least conservationally significant of the birds occupying the site.

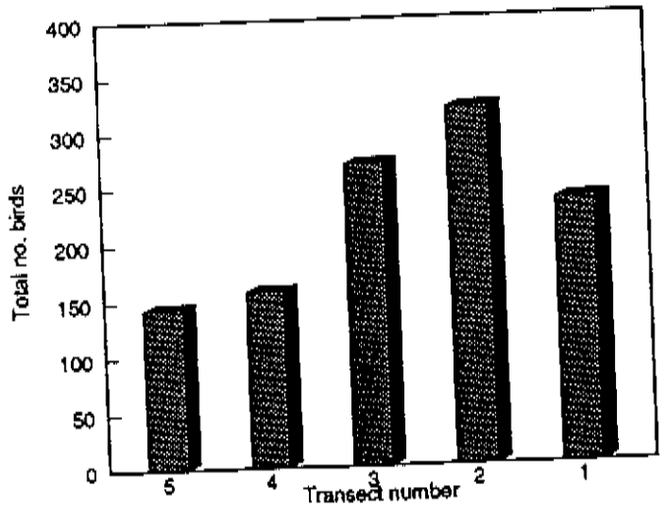

Figure 6: The increase in the mean number of individual birds recorded per visit in relation to transect number (data from Table 10). This shows that more individuals were recorded further east. The position of the route of the proposed viaduct runs approximately between transects 3 & 4.

Table 10: Mean number of individuals and species recorded per transect visit for February 1992- January 1993, together with standard errors (and median, maximum values in brackets).

TRANSECT	5	4	3	2	1
Total birds per visit	143.1 ± 49.5 (66,1020)	157.8 ± 27.3 (126,448)	269.4 ± 71.2 (150,1442)	318.3 ± 76.6 (163,1008)	235.2 ± 59 (146,1030)
Coefficient of variation in totals	1.55	0.77	1.18	1.08	1.12
Numbers of species	11.5 ± 0.6 (11.5, 16)	13.2 ±0.8 (13.5, 18)	12.5 ± 0.6 (12,18)	12.2 ± 0.9 (12, 19)	10.8 ± 0.7 (11.5, 14)

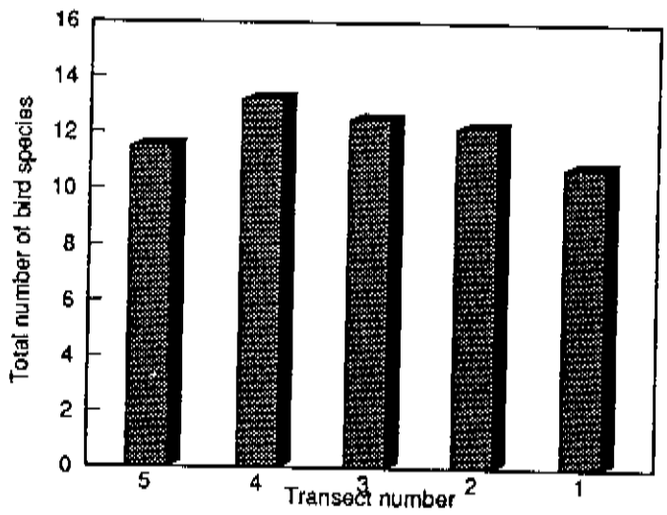

Figure 7: The mean number of bird species recorded per visit in relation to transect number. The number of species recorded at each transect was not statistically significantly different. The position of the route of the proposed viaduct runs approximately between transects 3 & 4.

Flight directionality

Late winter - early spring

5.2.8 The proportions of the major directional movements differed with location in the valley (Figure 8). In late winter-early spring, the majority of birds in transects 3, 4 and 5 were flying up (east - west) or down (west - east) the valley, with few flying north - south or south - north. Transects 1 and 2 did not follow this pattern, having relatively large movements north-south and east-west.

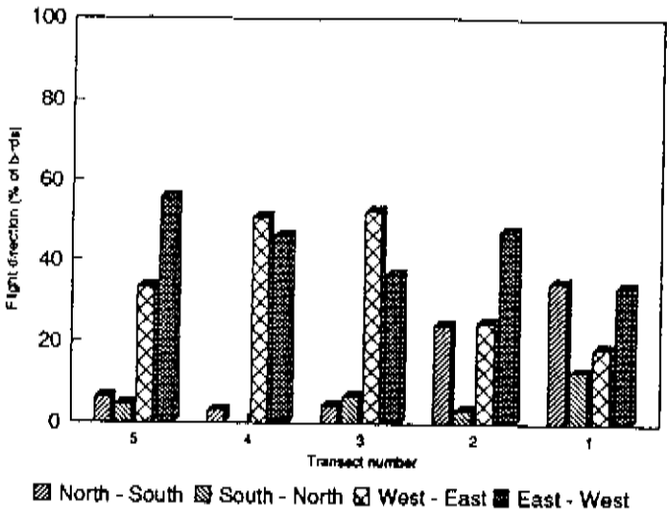

Figure 8: The percentage of flying birds observed moving in each of four directions at each transect location during late winter - early spring 1992.

5.2.9 Birds on transect 5 flew predominantly up the valley to exploit food resources in arable and pasture fields, particularly in the case of flocks of rooks and lapwings. Birds on transect 4 flew equally up and down the valley. This is significant in assessing the impact of the proposed viaduct. Birds on transect 3 flew predominantly down the valley, particularly in the case of rooks and carrion crows flying to the refuse tip in the early morning.

5.2.10 Generally there were predominantly west - east or east - west movements of birds at transects 3, 4 and 5. Movements at transects 1 and 2 were more equally divided between the four recorded directions as a result of both local and strategic movements of birds constituting the recorded directions. At transects 1 and 2, local movements to and from the tip were of over-riding importance.

Late spring - early summer

5.2.11 In late spring - early summer, the majority of birds were either flying up the valley (transects 5, 4 and 2), or down the valley (transects 1 and 3, Figure 9). The proportions recorded in the different directions were generally similar to those found in the late winter - early spring period with the exception of transect 4 in which the majority of birds (70%) were moving up the valley in an east - west direction. In the earlier period movements west - east and east - west were more even. This change resulted from both more local activity and the movement of some migratory species, particularly hirundines.

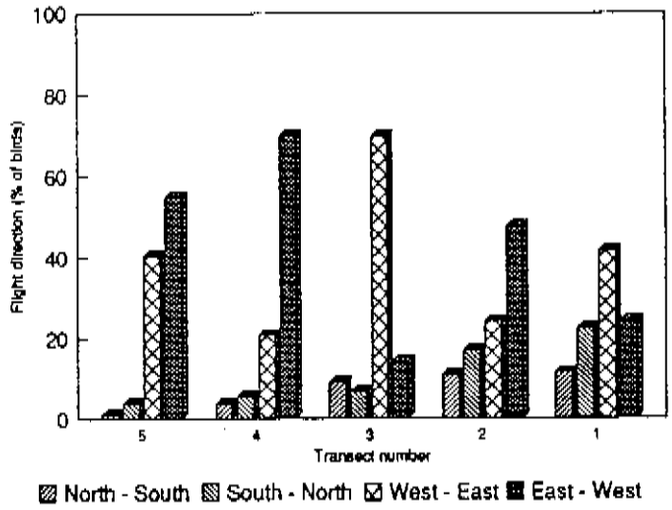

Figure 9: The percentage of flying birds observed moving in each of four directions at each transect location during late spring - early summer 1992.

5.2.12 More of the north-south and south-north movements were attributed to transects 1 and 2 than to any of the others, again reflecting the importance of the refuse tip to local movements of birds.

Late summer - autumn

5.2.13 In late summer - autumn, the majority of birds were either flying up the valley (transects 5, 4 and 1), or down the valley (transects 2 and 3, Figure 10). The proportions recorded going either up or down the valley were similar. A greater proportion of birds in transects 1, 2 and 3 were observed flying north - south probably because of the increased use of the refuse tip by gulls and corvids at this period. A major difference in flight directions at transect 4 between this period and the late spring - summer period is the switch from predominantly flying up the valley in summer, to an increase in flying down the valley in autumn. This was largely due to strategic movements by hirundines on their southward migration.

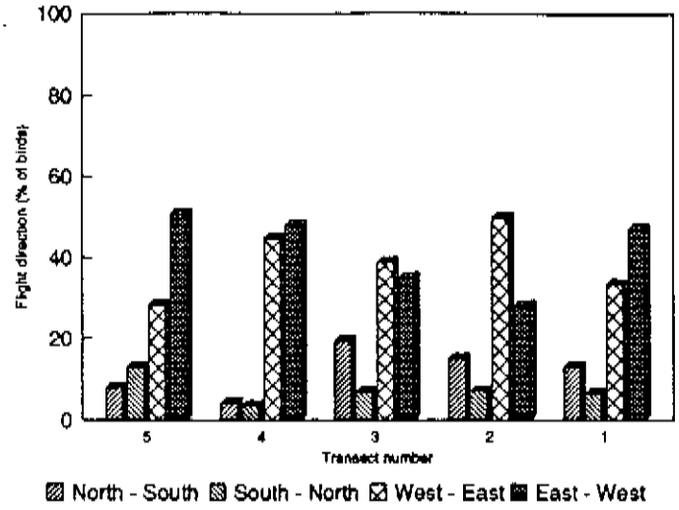

Figure 10: The percentage of flying birds observed moving in each of four directions at each transect location during late summer - autumn 1992.

Early winter

5.2.14 In the early winter period, the majority of birds were flying up the valley (transects 5, 4, 3 and 1). This can be attributed to local movements of large numbers of gulls (Figure 11). A greater proportion of birds on transect 2 were flying west-east down the valley, attributed largely to feeding trips to the tip by gulls. Again a greater proportion of birds on transect 1 was observed flying north - south, attributed to the increased use of the refuse tip by gulls and corvids at this period.

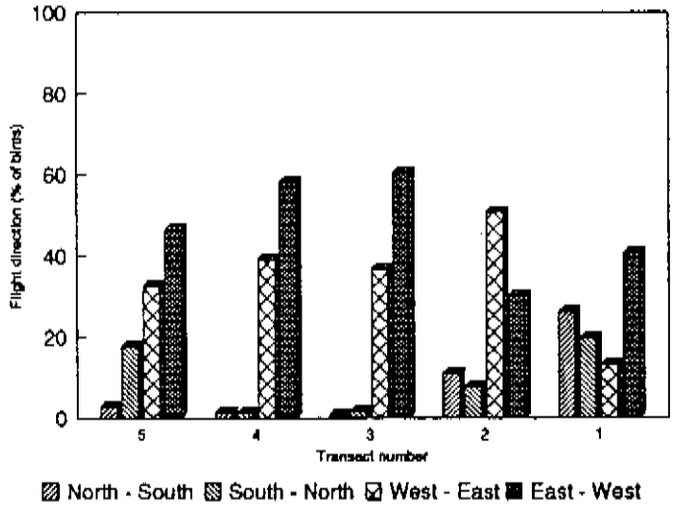

Figure 11: The percentage of flying birds observed moving in each of four directions at each transect location during early winter period 1992/3.

Heights of flying birds

5.2.15 Figure 12 shows a summary of the height bands at which birds were observed flying for all four seasons covering the period February-December 1992. During the winter - early spring periods, most birds were observed on the ground or in trees rather than in flight. In spring - summer, a greater proportion of birds flew above 30 m than at other times of the year. In late summer - autumn, most birds flew at height bands of 0-10 m or 10-30 m. In general, therefore, there was a shift from sedentary behaviour in winter to increased flying activity in spring and summer as a result of both increased activity from local birds and strategic movements of migratory birds. The specific findings at each of the transect locations is considered in the next sections.

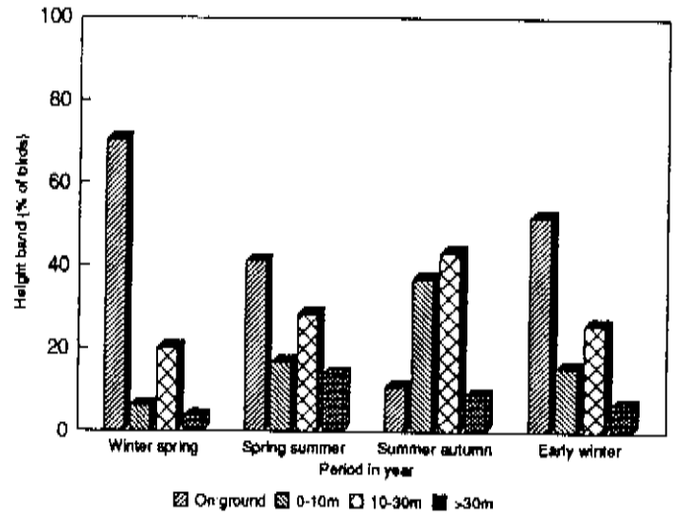

Figure 12: The percentage of all birds observed either on the ground or flying in one of three height band categories for each season during the whole study period February 1992 - January 1993.

5.2.16 Late winter - early spring

The majority of birds across all five transects were either on the ground or flying at a mid-range height of 10-30 m in the late winter-early spring period (Figure 13). This was particularly so for transects at the western-most part of the site, that is transects 3, 4 and 5. Most birds recorded on the ground on transects 1 and 2 were associated with the refuse tip. They were not recorded flying at a height of more than 30 m during this period, although about 15% of records on transect 4 (the site of the route of the proposed viaduct) were flying at greater heights since they had to fly over the old railway embankments.

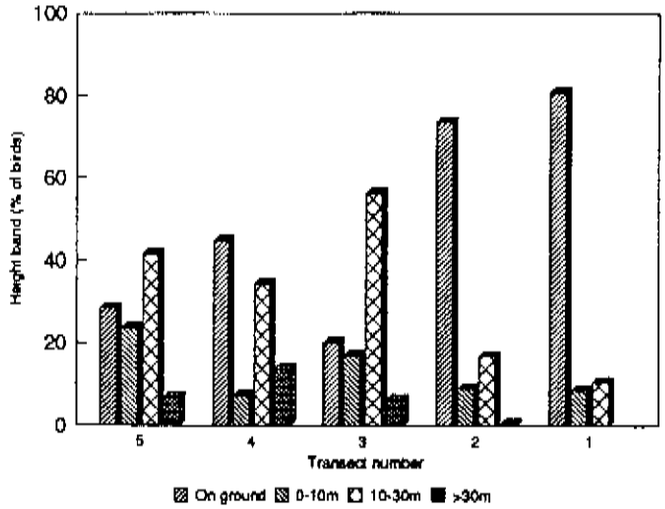

Figure 13: The percentage of all birds observed either on the ground or flying in one of three height band categories at each transect location during late winter - early spring 1992.

5.2.17 Late spring - early summer

Apart from transects 1 and 2, flying birds most frequently used the height band of 10-30 m. At transects 1 and 2 approximately 57% and 35% of birds were recorded on the ground, associated with feeding at the refuse tip or 'loafing/roosting' within the Combe Haven site adjacent to the tip. A similar proportion of birds at all transects used the 0-10 m high band, the average being about 15% (Figure 14).

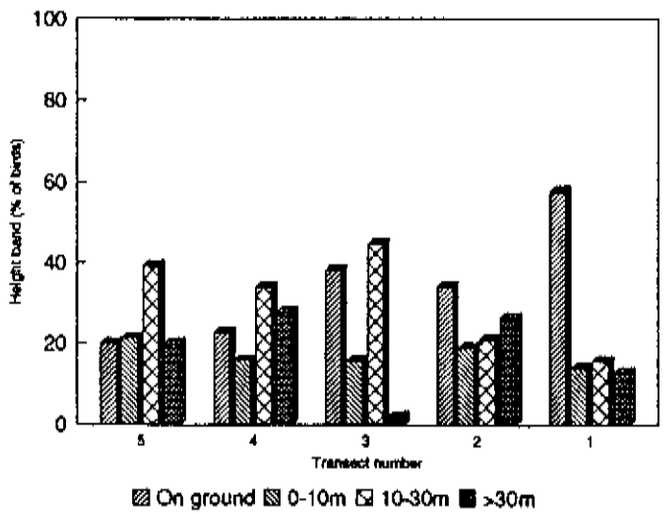

Figure 14: The percentage of all birds observed either on the ground or flying in one of three height band categories at each transect location during late spring - early summer 1992.

Late summer - autumn

5.2.18 Apart from transect 5, flying birds most frequently used the height band of 10-30 m. At transect 5 approximately 40% of birds were flying in the 0-10 m category. At transect 4, 29% of birds flew above 30 m, with only 12% flying below 10 m, both of which are consistent with the previous periods (Figure 15).

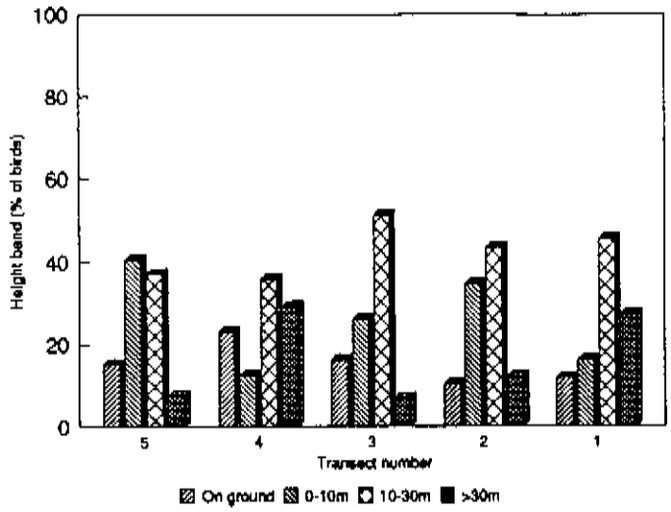

Figure 15: The percentage of all birds observed either on the ground or flying in one of three height band categories at each transect location during late summer - autumn1992.

Early winter

5.2.19 Apart from transect 2, flying birds most frequently used the height band of 0-30 m. At transect 2 approximately 69% of birds were on the ground or in trees. Similarly, 37% of birds at transect 1 were on the ground, roosting or loafing. Most birds at transect 4 were flying in the 0-10 m (33%) or 10-30 m (51%) height band and only 8% flew higher than 30 m. The highest flying birds occurred at transect 3 where 13% were observed in this height band, dominated by gulls (Figure 16).

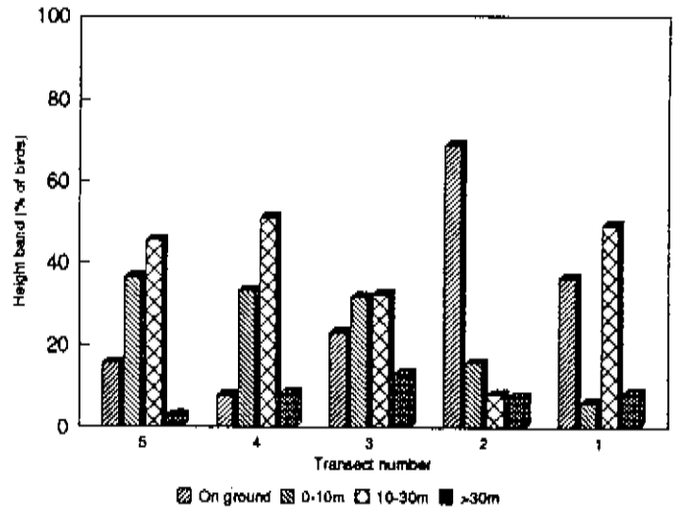

Figure 16: The percentage of all birds observed either on the ground or flying in one of three height band categories at each transect location during late autumn - early winter 1992/3.

5.2.20 On the whole, flying birds in late spring - early summer flew higher than birds in winter. This was particularly evident when comparing the proportion of birds flying at heights of over 30 m: a greater proportion used this height band in late spring-early summer than did those in winter. This was most probably associated with warmer weather and thermal effects of warm air rising from the ground in spring/summer, together with a greater abundance of aerial insects on which some species feed at this time. The major high flyers were hirundines (particularly swifts), black-headed gulls, herring gulls, jackdaws and rooks. The first two species were seen feeding on aerial insects on the early summer transects.

5.2.21 The seasonal variation in heights used by flying birds differs significantly. At the site of the route of the proposed viaduct (transect 4), a mean total (mean calculated on the arcsine transformed percentages) of about 79% of all birds recorded in flight were flying at a height of 10 m and above, with the 95% confidence range being 70-86%, with 20% flying at a height not less than 30 m.

'Notable' species recorded on transects or supplementary records

5.2.22 In addition to the set registration mapping and transects, additional information from supplementary records and species of conservation significance has been obtained. This information is presented here (Table 11)

Table 11: Records of uncommon species or large numbers of common species recorded on transects or supplementary observations, together with those noted as making mainly strategic and migratory movements rather than local ones.

Species	Date recorded	Transect number	Direction	Height band
White fronted goose (4)	05-02-92	3	-	0
Fieldfare (50)	26-02-92	5	E-W	2
Stone curlew (1)	16-03-92	4	-	0
Starling (800)	16-03-92	2	-	0
Redshank (1)	16-03-92	1	E-W	2
Long-eared owl	28-03-92	5	-	0
Fieldfare (40)	31-03-92	4	-	0
Green sandpiper (1)	31-03-92	4	E-W	2
Teal (6)	31-03-92	3	W-E	2
Shoveler (1)	31-03-92	3	W-E	2
Cuckoo (1)	30-04-92	4	-	0
Whimbrel (4)	30-04-92	5	-	0
Savi's warbler (1)	18-05-92	1	-	0
Savi's warbler (1)	31-05-92	1	-	0
Turtle dove (1)	28-05-92	3	E-W	2
Curlew (1)	28-05-92	3	-	0
Lapwing (8)	17-06-92	2	-	0
Lapwing (5)	17-06-92	4	W-E	2-3
Sand martin (20)	17-06-92	1	-	1-2
Hobby (1)	17-06-92	4	-	0
Green woodpecker (family of c.5)	16-07-92	4	-	0
Lapwing (18)	16-07-92	2	E-W	2
Whimbrel (3)	11-08-92	3	E-W	2
Green sandpiper (2)	19-08-92	3	E-W	2
Lapwing (18)	19-08-92	3	E-W	2
Whinchat (31)	31-08-92	n	-	0
Whinchat (9)	8-09-92	3	-	0
Whinchat (65)	18-09-92	n	-	0
Pied flycatcher (1)	18-09-92	1	-	0

Table 11 contd...

Swallow (c1000)	21-09-92	5	-	0
Whinchat (2)	21-09-92	5	-	0
Wheatear (1)	21-09-92	3	-	0
Hobby (1)	21-09-92	3	W-E	2
Wryneck	30-09-92	1	-	0
Golden plover (2)	5-10-92	3	W-E	3
Dusky warbler (1)	26-10-92	5	-	0
Bar-tailed godwit (1)	30-10-92	2	N-S	2
Water pipit (2)	5-11-92	2	-	0
Dartford warbler (4)	5-11-92	n	-	0
Water pipit (6)	16-11-92	2	-	0
Snipe (29)	26-11-92	1	-	2
Water pipit (6)	4-12-92	2	-	0
Cetti's warbler (1)	4-12-92	1	-	0
Merlin (1)	8-12-92	1	-	1
Snipe (35)	18-12-92	1	-	2
Bearded tit (4+)	All year	1	-	0

Height bands : 0 = on ground; 1 = 0-10 m; 2 = 10-30 m; 3 = >30 m. n = seen at more than one location.

5.2.23 Of particular significance are the records of white fronted goose (wintering), fieldfare (migrating), stone curlew (migrating), green sandpiper (migrating), whimbrel (migrating), curlew (migrating), lapwing (migrating), hobby (probable breeding), dusky warbler (a rare Siberian vagrant), whinchat (migrating), wryneck (migrating), Dartford warbler (local influxes), water pipit (continental movements), Cetti's warbler (local movements and probable breeder), Savi's warbler (probable breeder) and bearded tit (resident breeder possibly enlarged by regional influxes). Twelve (28%) of the 43 records attributed to specific transect sections were made on or adjacent to transect 3. Seven (16%) of the significant records were made at or adjacent to transect 4.

6.0 EVALUATION

6.1 Significance of the Combe Haven site

6.1.1 In general the Combe Haven site has a rich and diverse avifauna, associated mostly with the alluvial meadows and reed bed, though the boundary fringes of woodland provide habitat for a further community of species.

6.1.2 The results have shown a number of interesting and important features. First, it is clear that the site is important for the diversity of birds it holds, with a greater number of species in the breeding period than in winter. A total of 113 species were recorded on the whole site during the study period. Species of particular conservation interest are sparrowhawk, hobby (RD), water rail, lapwing (CRD), jack snipe, snipe (CRD), redshank (CRD), long-eared owl, bearded tit (RD), turtle dove (CRD), Cetti's warbler (RD), Savi's warbler (RD), dartford warbler (RD)*, green sandpiper, stone curlew (RD)*, whimbrel (RD), wryneck (RD), whinchat (CRD), stonechat (CRD) and dusky warbler (rare vagrant), although as expected all these occur in small numbers. Some of these species are single visitors, recorded as supplementary records outwith standard methods; these include white-fronted goose (RD), stone curlew, green sandpiper, whimbrel, wryneck and dusky warbler. Reed warbler and sedge warbler numbers are high, as identified from the county bird reports, with large concentrations in Filsham reedbed which is the most diverse area. (Note : RD = listed as a Red Data Bird; CRD = listed as a Candidate Red Data Bird. Those marked with an asterisk are on Annex I of the EC Wild Birds Directive). A total of 21 Red Data Birds and 18 Candidate Red Data Birds were recorded at Combe Haven.

6.2 Scope of survey and results

6.2.1 This report describes the results of a 12 month ornithological field-based survey assessment of the potential impact of the proposed road and viaduct on the A259 Bexhill and Hastings Western Bypass at Combe Haven, East Sussex. A monitoring protocol for the study was submitted in January 1992. This would result in production of the following: identification of key species and habitats, species abundances, flight-line directionality diagrams, seasonal variation in site use, strategic relationship to other sites (Appendix 1).

6.2.2 Combe Haven is strategically placed, being part of a series of important breeding and wintering sites along the Sussex Kent coasts, including Pevensey Levels, Rye Harbour, Pett Levels, Brede Levels, Dungeness and Walland Marsh.

6.2.3 A review of existing information showed that the site is considered of importance to the following species or groups:

(a) Breeding - water rail, grasshopper warbler, yellow wagtail, snipe, redshank, lapwing, cuckoo, sedge warbler, reed warbler;

(b) Winter - snipe, jack snipe, redshank, lapwing, hen harrier, various wildfowl and other waders;

(c) Passage migration and as a landfall site - thrushes, finches, warblers, buntings, raptors, wildfowl and waders.

There was some inconsistency between those species noted in the SSSI notification and those recorded in the county bird reports, which supports the need for better and standardised evaluation.

6.2.4 Two categories of sampling were undertaken relating to the collection of :

(a) spatial data: bi-weekly registration mapping of Filsham reedbed, biweekly registration mapping and field scanning for selected species on the alluvial meadows, monthly 'look-see' searches in the two small woodlands;

(b) temporal movement data: using five transects traversing the site north-south, visited biweekly and recorded from a stationary position for a 30 minute period, recording all individuals, estimating flock sizes and noting direction of movement and height.

6.2.5 A total of 69 species was recorded in the late winter - early spring period. The abundance of the 14 most conservationally important comprised 7.2% of the bird community, which was dominated by corvids and gulls in this period.

6.2.6 A total of 65 species was recorded in late spring - early summer. The abundance of the 17 most conservationally important comprised about 30% of the breeding bird community, with large numbers of sedge and reed warblers and reed buntings, particularly in Filsham reedbed. The contribution made by corvids declined during the summer, as did total bird abundance. The major difference between this and the earlier period was the abundance of migratory groups such as warblers and hirundines for which the Combe Haven site appeared important.

6.2.7 A total of 83 species was recorded in late summer - autumn. The abundance of the 28 most conservationally important comprised approximately 25% of the bird community, being particularly inflated by large numbers of whinchat, stonechat, warblers and other passerines on migration south to their winter quarters. Corvid numbers increased in this period.

6.2.8 In early winter a total of 74 species was recorded. The abundance of the 21 most conservationally important species comprised 17.3% of the bird community, which included large numbers of migrant passerines and wintering wildfowl. The bird community was heavily dominated by gulls, which used the site as a roost and fed on the adjacent tip.

6.2.9 The site sections surveyed differed in their bird importance in different seasons. In late winter more species and individuals occurred further up the valley, although Filsham reedbed maintained a high species diversity throughout the year. It was used by different species at different times of the year to make up the high diversity. In late spring - early summer this pattern was reversed. In late summer - early autumn and late autumn - early winter section 2 held the highest number of individuals, largely because of the dominance of roosting gulls. Generally in these periods, the number of species was highest in sections 4 and 5. The route of the proposed viaduct would run across section 3, the area between transects 3 and 4. Species of particular interest which occurred near the route of the proposed viaduct, recorded by registration mapping or as supplementary records, included snipe, hobby, stone curlew, whimbrel, green sandpiper and dusky warbler; all were passage visitors. Long eared owl were believed to have bred close to the dismantled railway to the north of Combe Wood.

6.2.10 The transect observation counts identified an increase and levelling off in the number of bird species recorded through February and October, with a decline through November and December and an average of 11-12 species seen on the transects. The number of individual birds recorded flying declined on the site through the season as a result of less flying activity but increased again in September and October. This was due to the decline in large flocks of starlings, herring and black-headed gulls and corvids (principally rooks and carrion crows) during the late winter - spring period and later in the year an increase in large local flocks of these species in addition to passage migration of hirundines. Combe Haven appears to provide an important final staging area and flight line for hirundines, principally swallow and house martin.

6.2.11 There was little difference in species numbers between the 5 transects, although transect 4 had the most species. Most movements through the year were local in nature rather than strategic, although strategic movements were detectable in hirundines and certain migrant passerines. The site appears to be used by these groups as a leading line towards the coast, whereas other groups such as wildfowl principally exploit the wetlands it contains rather than for using it in strategic aspects of migration.

6.2.12 The bird community at Combe Haven appears to be dominated by the presence of the refuse tip which has an over-riding effect on local movements. The majority of movements by the larger species such as gulls and corvids were as a result of feeding trips to the tip. Most movements in late winter - early spring were either up or down the valley. At transects 1 and 2 in particular local movements to and from the tip were of over-riding importance. In late spring - early summer movements at transects 5, 4 and 2 were predominantly up the valley. Those at 1 and 3 were down the valley. There was some evidence of strategic

use of the site by hirundines moving up the valley in this period and down the valley after the summer.

6.2.13 In late winter - early spring, most birds flew at a height between 10-30 m, particularly on transects 5, 4 and 3. At transect 4, 15% of birds flew at a height of more than 30 m; in the late spring - early summer period this increased to 30% of birds. On the whole, flying birds in late spring - early summer flew higher than birds in late winter - early spring. This was probably a result of warmer weather conditions creating thermals which also carried airborne insects on which many bird species were observed feeding (particularly swift, swallow, sand martin, house martin and black-headed gull). At the site of the proposed viaduct, about 79% of all birds recorded in flight during the year, flew at a height of 10 m and above, with a 95 confidence range being 70-86%, with 20% overall flying at above 30 m. This is particularly important for considering the implications of the height of the proposed viaduct.

6.2.14 Unexpectedly, there was no evidence of breeding waders on the alluvial meadows. In particular there was no evidence of breeding lapwing, snipe or redshank on the site (after some initial 'prospecting' by these species) although the habitat appeared wet and tussocky enough for all species north of the Haven; south of the Haven the grassland appeared drier. There are two possible explanations. Firstly, the bird community of the whole site is dominated by corvids and gulls at most times of the year, and certainly in winter and early spring; the latter period is when breeding waders would be expected to be displaying and laying eggs. Numbers of corvids and gulls are held artificially high at this time of the year by the presence of substantial food supplies from the refuse tip on the boundary of the site. Corvid numbers declined over the period, but remained high, with extensive use of the site by roaming flocks of carrion crows which in itself is unusual and presumably occurring in response to abundant food supplies), at the very time when waders would be laying or incubating eggs. Consequently the site's attractiveness to breeding waders must be substantially reduced with such a high risk of egg and chick predation. Secondly, many people used the site for walking. They follow a route through the centre of the site from west to east and many have dogs which roam loose. Recreation disturbance of this nature is known to reduce both the density and diversity of breeding birds and could be a significant factor in the observed absence of breeding waders.

6.2.15 Decoy Pond Wood held a pair of lesser spotted woodpeckers, which is a regionally important record.

7.0 IMPACT ASSESSMENT

7.1 The main consideration of this assessment is the impact of the viaduct across Combe Haven SSSI. This includes the assessment of the effects of different heights of viaduct as well as the severance impact. The possible disturbance effect of the bypass to the west of the viaduct, where it would pass close to the SSSI boundary, has also been considered.

7.2 The data relevant to the area crossed by the viaduct come from transects 3 and 4 and from section 3, which is the area between these transects. Transect 4 had fewer flying birds than transects 3, 2 or 1, but more than transect 5. It also had the most species apart from Filsham reedbed, which is a Local Nature Reserve. Transect 3 had the second greatest number of species and individual birds, which reflected the proximity of the refuse tip which attracts flocks of gulls and corvids. Section 3 was usually in the middle range of the seven sections in terms of mean number of species and mean number of individuals. Notable conservationally important species included species such as hobby, reed bunting, stonechat and snipe. In total at transect 4 there were seven records of notable conservationally important species (16% of such records). At transect 3, 28% of the records of notable conservationally important species were made.

7.3 A pair of lesser spotted woodpecker, a species of regional importance, was recorded in Decoy Wood Pond Wood in section 3. During the migration and breeding periods the most significant species in this area in terms of abundance is rook, as there is a rookery at Decoy Wood Pond in section 3. Hirundines (swallow, house martin, sand martin and swift) are also relatively important in this area since the Haven valley appears to provide an important staging area in spring and autumn.

7.4 The area which would be crossed by the viaduct is therefore assessed as having a locally and probably regionally important bird community.

7.5 In the area of the proposed viaduct 79% of birds throughout the year were flying higher than 10 m, 20% flying at over 30 m. Birds generally flew higher in the late spring - early summer period than in other periods, and in winter birds were generally flying lower. The height of the viaduct is therefore an important consideration in terms of bird flight lines, both local and strategic (migratory). The key species of concern apart from rooks (local movements), are occasional waders such as green sandpiper, stone curlew, whimbrel and hirundines.

7.6 This appears to suggest that a low viaduct may have less impact on birds generally. However, taking into account the annual changes in the heights at which birds fly, there are advantages to a higher viaduct. Hirundines in particular, and some other species, would fly underneath a higher viaduct. A higher viaduct would lead to less habitat change than would a lower viaduct as the effects of shading would be less.

7.7 A further consideration to the height of the viaduct is the route and its physical presence. Putting a road across the area would divide it into two. One of its main ecological attractions is its size; if this were divided the sum of the parts would be lass than that of the whole. However, in comparison with a solid embankment the viaduct would reduce habitat severance. This benefit has to be weighed against the inhibiting effect which a structure such as a viaduct may have on feeding and breeding birds. However, the species which are most sensitive to these types of developments, such as breeding waders, no longer appear to breed on the site. Waders such as lapwing and some wildfowl may be inhibited from feeding within 100-200 m of the road. Geese, which occasionally visit the site, may be inhibited at distances of up to 500 m from the viaduct.

7.8 The use by passage species, in particular waders, is likely to be determined more by any indirect hydrological impacts caused by the road rather than by the presence of the road itself.

7.9 There is a possibility that the traffic on the viaduct would lead to an increase in mortality through collisions with birds. The combined height above ground level of the viaduct and a high-sided vehicle would be 14.5 m. Whilst most bird activity in the spring and summer is above this height, in winter some birds fly at this level and may be affected by the viaduct. However, it is considered that in large part most birds are likely to avoid flying into vehicles on the viaduct and the overall impact would be minimal.

7.10 The route of the proposed road to the west of the viaduct and north of Combe Wood would lead to disturbance effects on the area of trees at the southern end of transects 4 and 5. The breeding long-eared owl recorded in this part of section 5 is of major significance. The road would probably cause this species to abandon the site. This is also the area where dusky warbler was recorded, but since the is a vagrant, this impact can be considered insignificant.

8.0 MITIGATION

8.1 During the detailed design stage English Nature would be consulted on the possible incorporation of mitigation measures such as the construction of ledges and nesting sites for species such as house martin under the viaduct and the practicalities of avoiding disturbance to long-eared owl and other conservationally important species.

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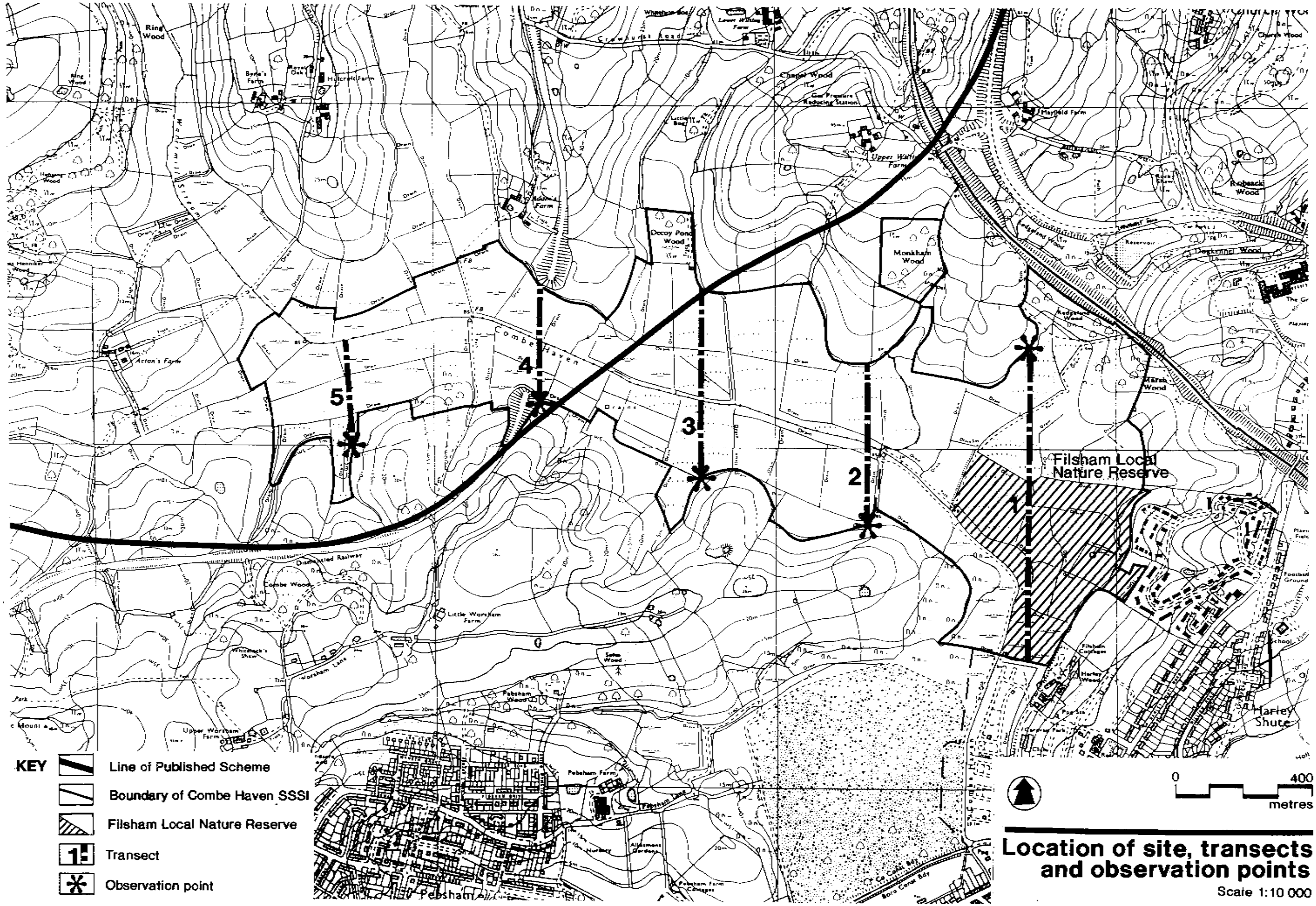

Location of site, transects and observation points

Scale 1:10 000

Report 2 Figure 17

APPENDIX 1

MONITORING PROTOCOL
PROPOSED VIADUCT AT COMBE HAVEN AND THE IMPACT ON BIRDS

January 1992

CONTENTS PAGE

EXECUTIVE SUMMARY

S.1 This report describes the establishment of a monitoring protocol for the assessment of bird species, seasonal abundances, local and strategic bird movements and potential level of impact from the proposed construction of a viaduct at Combe Haven, East Sussex. The reasons for the need for monitoring, particularly relating to disturbance impact (and respective legislation - Annex 1), are given.

S.2 Combe Haven is strategically placed, being part of a series of important breeding and wintering sites including Pevensey Levels, Rye, Pett Levels, Brede Levels, Dungeness and Walland Marsh.

S.3 A review of existing information (Annex 2) showed that the site is considered of importance to the following species or groups : Breeding water rail, grasshopper warbler, yellow wagtail, snipe, redshank, lapwing, cuckoo, sedge warbler, reed warbler; Winter - snipe, jack snipe, redshank, lapwing, hen harrier, various wildfowl and other waders; Passage migration and as a landfall site - thrushes, finches, warblers, buntings, raptors, wildfowl and waders. There is some inconsistency between those species noted in the SSSI notification and those recorded in the County bird reports, hence supporting the need for better and standardised evaluation.

S.4 Two categories of sampling are proposed, relating to collection of (a) spatial data (weekly registration mapping of Filsham reed bed, weekly walked transect with field scanning for selected species on the alluvial meadows, and monthly 'look-see' searches in the two small woodlands); (b) temporal movement data (using 5 transects traversing the site north-south, visited weekly and recorded from a stationary position for a 30 minute period), recording all individuals, estimating flock sizes and noting direction of movement. Attention will be paid to precision of the counts (time of day, weather, switching the start position for routes), and constraining analysis to appropriate time compartments through the year. Details of how (a) and (b) will be conducted on the ground, using both visit maps and observation point recording sheets, are given in the text.

S.5 The work will produce the following products : Identification of key species and habitats, species maps and abundances, flight-line directionality diagrams, seasonal variation in site use, strategic relationship to other sites.

1.0 INTRODUCTION

1.1 This project is designed to provide the basis for establishing a monitoring protocol for the quantification of :

(a) bird species present
(b) seasonal use of the site
(c) local and strategic movements of birds at the site
(d) identification of potential level of impact

1.2 The monitoring programme outlined here will provide data prior to any development being undertaken, that is it will provide the base-line against which any changes, both during and after any development, can be assessed.

1.3 National, European and International legislation regarding the conservation of species and habitats, requires professional statements to be made in respect of land use change, as, for example, illustrated by developments such as that proposed at Combe Haven. This is because some developments cause either a removal or reduction of a species' habitat, or disturbance which makes the site less attractive to wildlife. In the case of the proposed viaduct at Combe Haven, the essential criteria relate to whether the construction and positioning of the viaduct will affect bird movements and its current level of use. From this perspective, the role of disturbance is more important than direct habitat loss. The legislative requirements for assessments pertaining to disturbance is given in Annex 1.

1.4 Knowledge of the way in which species respond to disturbance has been fragmented, yet is an important consideration in environmental impact assessments. A recent review of industrial disturbance impacts on birds, which has relevance to the proposed monitoring requirements, highlighted four main effects: (a) direct loss of habitat, (b) disturbance through the presence of humans during the construction process, (c) structures causing fragmentation of large landscapes, and (d) the presence of artificial light used to illuminate construction sites. On estuaries for example, engineering operations should avoid the proximity to established roost sites of wading birds because they disturb them, making large areas of habitat unusable by them. Further, a number of studies of wading birds have shown increased vigilance (and hence reduced feeding time) in flock members feeding near structures probably because their vision of the approach of potential predators is impeded.

1.5 It is important to discriminate between the four disturbance factors described above in the context of long-term damage. The loss of habitat (e.g. through the siting and building of a new industrial plant or road) represents irreparable damage to the birds concerned, whereas the loss of access to an otherwise good habitat as a result of some level of disturbance might be reduced to tolerable levels by mitigating

practices. Any environmental impact assessment should consider the implications of disturbance. In order to make these considerations an adequate monitoring programme is required to provide data before, during and immediately after the development in order to assess the likely impact and to provide recommendations for reducing it.

2.0 THE SITE

2.1 Combe Haven was notified as an SSSI in 1985 under section 28 of the Wildlife and Countryside Act 1981. It is a relatively large area (156.1 ha) containing a rich diversity of habitat types - principally alluvial meadows and associated drainage ditches (c.116 ha), Filsham reed bed, the largest in East Sussex (c. 30 ha), and some scattered ancient semi-natural woodland (c.10 ha). The wet meadows and fen are considered the most important for bird communities. The northern side of the river, being slightly lower than the southern side, is noted for the length of time standing water remains on the surface following wet weather. It has been known to remain flooded in summer periods. Further, the whole site, lying close to the coast and with some higher ground on both sides of the site, offers a natural flight-line for a variety of migrant birds.

2.2 The site is strategically placed being part of a series of important breeding and wintering sites including Pevensey Levels, Rye, Pett Levels, Brede Levels, Dungeness and Walland Marsh. The degree of movement of birds between these sites is likely to be poorly understood and remains difficult to investigate without the costly marking of individual birds (not proposed in this study). However, it is important to place Combe Haven into its strategic context in relation to numbers of individual species on these neighbouring sites.

3.0 IMPORTANT FEATURES CONSIDERED IN THE PROTOCOL

3.1 The site is noted for wintering, migrant and breeding bird species, which therefore necessitates year-round monitoring in order to catch the fluxes at particular times of year. Under SSSI notification, from a knowledge of habitat types, and from the review of existing information presented in Annex 2, the following groups and/or species are considered of importance during the breeding season : water rail, grasshopper warbler (by NCC but not substantiated by county bird reports - see Annex 2), yellow wagtail, snipe, redshank (not in county bird reports), lapwing, cuckoo, sedge warbler, reed warbler. During winter the list would include snipe, jack snipe, redshank, lapwing, hen harrier, wildfowl (principally wigeon, teal and shoveler), other waders and water pipit. Four groups in particular may be important during passage migration (spring and autumn) : passerines (particularly thrushes, finches, warblers and buntings), raptors, wildfowl and waders.

3.2 The topography suggests it could be an important flight or leading line for local movements of birds. Existing data available locally from other wetland sites within a 10 km radius, together with that from those mentioned under (2), should be identified and collated outwith that given in Annex 2, and collected at the same time as the monitoring programme at Combe Haven in order to make comparisons, particularly in respect of monthly waterfowl numbers.

3.3 That the site could be a valuable landfall habitat for migrants is an important consideration. It will be necessary to look at higher-ground areas during the passerine passage migration periods using timed observation points.

3.4 The site is relatively large and has SSSI status. The data in this assessment need to be collected under as sound and cost-effective a monitoring protocol as possible. The monitoring protocol has been designed to produce the required data, considering the above three features, through a year-round period using the most cost-effective methods whilst maintaining a rigorous sampling procedure.

4.0 MONITORING PROTOCOL

4.1 Objectives:

(a) To identify species present at the whole site and to locate key habitats within the site;

(b) To identify the degree of movement of birds on the site, their direction i.e. principally west-east, and its seasonal nature;

(c) To measure seasonal use of the site;

(d) To assess the site's strategic importance in relation to neighbouring sites and to use these data to assess the likely overall impact of the proposed viaduct.

4.2 Strategy

4.2.1 The table gives the suite of bird species of most importance, together with the most appropriate method of censusing them. Bird communities will be sampled by a combination of these methods.

Table 1. A summary of the methods used to census the most important species and bird groups at three periods of the year - breeding (B), winter (W), passage migration (P). The methods are discussed further in the text.

Species	Season	Method
Water rail	B	Calls mapped
Water rail	W	Feeding birds and some calls
Grasshopper warbler	B	Calling males mapped
Sedge warbler	B	Calling males mapped
Reed warbler	B	Calling males mapped
Yellow wagtail	B	Register all birds and sex
Snipe	B	Displaying/ drumming male
Snipe	W	Individuals birds scanned
Redshank	B	Flying bird showing alarm
Redshank	W	Individual birds scanned
Lapwing	B	Incubating birds scanned
Lapwing	W	Individual birds scanned
Cuckoo	B	Calling males mapped

Table 1 contd...

Water pipit	W	Individuals mapped on transect
Passerines	P	Observation points and registration mapping outside breeding season
Raptors	P	Observation points
Wildfowl	P	Observation points
Waders	P	Observation points
Wildfowl general	W	Direct counts feeding or roosting
Waders general	W	Direct counts feeding or roosting
Roost movements (all)	B, W, P	Observation points appropriate species)

4.3 Specific methods

4.3.1 The methods employed fall into two categories - spatial data and temporal movements. Spatial data identify the numbers of each species of interest during breeding and winter periods. Temporal movements data are obtained from observation points in order to indicate movement patterns and directionality.

Spatial data - Registration mapping

4.3.2 The registration and territory mapping technique relies on species being territorial during the breeding season. Especially among passerines, territories are often marked by conspicuous song, display and periodic disputes with neighbours. Mapped registrations of birds fall into clusters approximatelycoinciding with territories. The mapping approach relies on locating all the territorial signs on a series of visits and using them to estimate locations and numbers of clusters or territories. It can be used for gathering spatially referenced data on passerines outside the breeding season.

4.3.3 At Combe Haven (Filsham reed bed) it is proposed, within the protocol, to map registrations of birds throughout the year from early-morning weekly visits at a scale of 1:2500. A first route through the reed bed will be established in early April prior to sampling. Routes and start directions will vary between visits in order to reduce any systematic tendency for any particular part of the reed bed to be visited later or earlier in the day, on average. The route will approach within 50m of every point on the plot. Ten

visits (ie. spanning 10 weeks) will be used to identify seasonal periods from which seasonal use will be determined, although the sampling will be conducted through the year. Visits will not be made during periods of inclement weather since this reduces the precision of the method. The important visits for most resident species will fall in the first half of the programme. Later arriving migrants will not be recorded until the latter half of the season. The site will be walked at a slow pace so that all birds detected can be identified and located. On the maps, the standard BTO species codes will be used to mark individuals, groups, sex and age where these can be determined, with particular attention paid to simultaneous registrations which are most important in determining clusters.

4.3.4 The field maps so generated above for each 10-day visit period will be converted into species maps, with visits identified by letter. Non-overlapping elipses encompassing registrations will be used to assess the number of territories. Further, for periods outside the breeding season, the number of registrations will be used to assess the most important areas and the relative abundance of species (identifying of course that relative abundance estimates rely on the detectability of the species). It will also be necessary to deal with observations from species which are not strictly territorial and which therefore violate a major assumption of the mapping method. These include non-breeders of many species, finches, corvids and hirundines.

Breeding waders and wildfowl

4.3.5 The alluvial meadows will be counted weekly through the year by walking slowly along the length of the central part of the site. The two sample periods April-October (breeding/passage migration) and November-March (autumn/winter) will be used. Any fields which cannot be counted will be visited additionally on the same day. This is likely to be particularly the case during summer when vegetation height will conceal some ground-nesting species. All individuals and flocks will be marked on a map of scale 1:2500, a separate one for each visit (hence called a visit map). Wader species of particular importance will include snipe, redshank and lapwing.

4.3.6 The counting unit in snipe is the displaying (drumming) male. These will be counted within 3 hours of dawn or dusk. The true nesting population can be calculated by doubling the mean number of counts per visit of drumming birds from visits made between April and May.

4.3.7 The counting unit in redshank is the flying bird showing alarm, best counted when the birds have young (late May - early June), between 0900 hrs and 1700 hrs BST. At this time both parents will mob an observer traversing a field or walking set transects, and can be easily counted. The mean number of redshank recorded during the recommended period equates to the maximum number of nests present.

4.3.8 The counting unit in lapwing is the incubating bird. Counts will be conducted when the birds are sitting on eggs (late March - late April). Later counts will be used to take account of juveniles, finished and failed breeders occurring in flocks. Incubating birds will be located by carefully scanning the alluvial meadows during walking through the central part between 0900 and 1200 BST when activity is most stable. The maximum of a series of counts made during the period when most pairs are incubating gives a good estimate of the number of birds breeding.

4.3.9 Breeding wildfowl can be difficult to count without labour-intensive nest-searching which can be undesirable by causing greater nest desertion. By registering all birds seen on the transect scans each visit, and by separately registering guarding males (which are more prominent than cryptically plumaged females), and broods, it will be possible to identify species use of the site and the extent to which the duck breeding season is extended (some breed very early, others late), by comparison with some other groups of birds.

Winter waders and wildfowl

4.3.10 This will be an extension of 4.3.5 for the November-March period, paying particular attention to counting and mapping feeding and roosting waders and wildfowl. Direct counting along the transect and transfer of registrations to maps of scale 1:2500 will be used. For large concentrations a portable telescope will be set up from which flock members will be counted. If large roost concentrations are observed it will be necessary to count them coming into roost.

Other species in winter

4.3.11 The other groups which may be of interest from records of the site will be winter-visiting raptors and movements of flocks of passerine birds. Both these groups will be counted during the November-March weekly transect scans as in 4.3.10 above, specifically raptors whilst flying or hunting over the low-lying ground and passerine flocks whilst either feeding on the ground or during movements between feeding sites. All sightings will be recorded on the visit maps.

Monkham and Decoy Pond woods

4.3.12 It is likely that these sites, by nature of their small size, will be of little importance to resident species. However, it is important to determine whether sparrowhawk breed in them and whether they are important sites for migrants during periods of landfall, being on slightly higher ground. The most cost-effective method of surveying them is to pay regular but infrequent look-see visits to them. It is proposed that these woods should be visited monthly either in a morning or just before dusk, to locate the more important species and landfall migrants.

Temporal movements

4.3.13 The methods detailed in 4.3.1 refer to spatially-referencing bird information on the ground. It is also important to identify periods of, direction, and species contributing to movements of birds across the site in view of its strategic position in relation to surrounding sites. This will be achieved by establishing 5 observation points traversing the site at 500 m intervals across its length, in a north-south orientation as identified in Figure 17. The exact location of the position of the observation points will be determined upon a further site visit.

4.3.14 The observer will conduct a watch along the length of each of these traversing transects for a 30min period after which the observer will move to the next point. The start point will be chosen at random as will the direction for proceeding to the next point. This will avoid the same observation point being watched at the same time of day on each visit. Observation points will be sampled weekly, either before or after the visits to Filsham reed bed and alluvial meadows, allowing for a settlement period to enable birds to adjust to any short-term disturbance effects of these sampling procedures. All individuals, and estimates of flock sizes, will be recorded for each observation point, together with direction of movement.

4.4 Sampling design

The following summarises the sampling design in relation to the three main compartments of work - Filsham reed bed, alluvial meadows, observation points/directionality :

Work compartment	April-October	November-March
Filsham reed bed	Registration mapping (1:2500), breeding and migrant landfalls. 1 visit/week. Route changed on subsequent/alternate visits	Registration mapping (1:2500), residents, flocks, autumn migrants. 1 visit/week. Route changed on subsequent/alternate visits
Alluvial meadows	Breeding transect through low-lying part, registering all species on map (1:2500). 1 visit/week. Start point of route alternated between visits. Selective scans for redshank, snipe and lapwing.	Winter transect through central low-lying part, registering all species on map (1:2500). 1 visit/week. Start point of route alternated between visits. Scans for feeding and roosting waders and wildfowl, hunting raptors, passerine flocks.

Sampling design contd..

Directionality/roost movements	Series of morning or afternoon/dusk 30min watches at observation points from site boundary separated by 500m distance along long axis of site. Alternate start point and direction for proceeding between points. 1 set of watches/week. Map species, flock size, direction of movement.	Series of morning or afternoon/dusk 30min watches at observation points from site boundary separated by 500m distance along long axis of site. Alternate start point and direction for proceeding between points. 1 set of watches/week. Map species, flock size, direction of movement.
Woods - Monkham and Decoy pond	Monthly (1 morning or dusk) look-see visits, locating more important species and landfall migrants.	Monthly (1 morning or dusk) look-see visits, locating more important species and landfall migrants.

5.0 OUTPUTS

The following outputs will be produced :

- Identification of key species
- Identification of key habitats
- Species maps and abundances
- Flight-line directionality diagrams
- Seasonal variations in site use
- Strategic relationship to other sites

1.0 ANNEX 1: The importance of quantifying disturbance in impact assessments

1.1 Britain has a well developed set of policies on the countryside and nature conservation, which have been the subject of a recent white paper entitled 'This Common Inheritance - Britain's Environmental Strategy' (HMSO 1990). The emphasis of these policies is to integrate environmental and economic activity in rural areas; conserve and improve the landscape and encourage opportunities for recreation: provide extra protection to areas of special value; conserve the diversity of Britain's wildlife, particularly by protecting habitats; provide scientific monitoring and research to support these aims.

1.2 Within the strategy, special attention is focused on a variety of groups, and in particular there is discussion of the special requirements of 'birdlife' and the measures which require implementation for its protection. Essentially, birds have been given special treatment over other taxa, largely because ofpolitical lobbying, and because more is known about them.

1.3 Such a commitment has been strengthened during the last decade by the passing of nature conservation legislation and through the signing of a number of national initiatives (Wildlife & Countryside Act 1981) and international conventions (Council Directive on the Conservation of Wild Birds, the Ramsar Convention 1971 and the Bonn Convention). These have extended greatly the legal protection given to birdlife within Britain and Europe and also to the protection of the habitats upon which they are dependant, particularly wetlands. Member State governments are committed to taking appropriate steps to avoid (a) pollution or deterioration of habitats and (b) any disturbances affecting birds. 'Wise-use' of the land is therefore promoted.

1.4 Under these legislative systems, conflicts of interest are often raised by developments when commercial, industrial, agricultural and recreational activities are at odds with the former land use. This is particularly the case for developments that require a statutory Environmental Assessment. Since 1988 specific types of development as classified in Annex 1 of the Council Directive (85/337/EEC) on the assessment of the effects of certain public and private projects on the environment, are subject to a mandatory environmental assessment. The legislation places the onus on developers to assemble and publish the available information about the likely environmental effect of the proposal.

1.5 In certain circumstances the issues to be weighed are clear cut and may involve total habitat loss by land-take or similar major impact. However, having dealt with relatively straightforward situations where the proposed development would have direct effects upon populations, the professional judgement becomes more subjective as either indirect or less well documented effects are considered.

1.6 The effects of disturbance on communities and their population processes, interactions and dynamics fall into these latter categories as reviewed by Hockin et al (submitted). Planning applications which

would have significant impacts on bird populations through disturbance must be carefully weighed. Interpreting the ecological significance of a predicted impact to fit the legal context is still subjective and difficult. Disturbance issues continue to be grey areas in planning debates because of the subjectiveness that is still apparent in interpretation. It is important, therefore, that quantitative study, often involving monitoring, should be part of the portfolio of impact work.

1.7 Taking a more specific approach to disturbance, it has been defined as: 'Any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment' (White & Pickett, 1985). Disturbances are responsible for a change in the state of a system, and systems that are not in equilibrium may therefore be disturbed just as readily as those that are. Disturbance can be either natural, such as that caused by fires, avalanches which remove tracts of forest, or floods, or man-induced such as that caused by industrial developments, public recreation and access.

1.8 Generally, rare, less opportunistic species are less tolerant of disturbance than commoner ones, often because they have less exposure to disturbance and less capacity therefore to habituate to it. Disturbed birds that move elsewhere to feed or roost may do so into less favourable or sub-optimal conditions. As such, the degree of compensation afforded by moving may be slight, and at present is poorly understood, as are the density dependent responses of most bird species, and hence their ability to compensate for disturbance impacts at the population level. The best studied examples are of waders, in which models of the density dependent responses of birds through mutual interaction whilst feeding, is being used to predict the population effect of habitat loss as a result of tidal barrage construction (Goss-Custard 1977, 1979, 1987, Goss-Custard & Charman 1976, Goss-Custard & Durell 1990).

1.9 With respect to new constructions of industrial plants or similar, the actual structures can play a significant role in reducing the attractiveness of a feeding area to waders and wildfowl. Wildfowl appear less tolerant of these than do waders. If their view of the approach of potential predators (and the proximity of neighbours with which they compete in the case of many waders) is impeded, it appears that such feeding and roosting grounds may become sub-optimal, perhaps causing birds to move elsewhere (Lazarus 1978, Metcalf 1984). This has been considered in some detail with respect to ecological impact assessments, using estuary wading birds as a model (Goss-Custard & Durell 1990). However, the carrying capacity of the habitat is likely to vary between sites so that responses by birds might also differ. Further, habitat exploitation and carrying capacity has been more fully researched for waders than for wildfowl. In general 'good' feeding and roosting sites of large wader and wildfowl flocks need to be large open expanses.

1.10 Most studies have concentrated on the effects of disturbance to feeding birds outside the breeding season. Some of the material quoted suggests a disturbance effect of roads and building construction on breeding birds. eg. loons and waders. In most studies such disturbance has been shown to have a negative effect on reproductive output, and in some cases bird density. The ability of birds to habituate to disturbance is important and requires consideration however. If human activity at industrial plants remains concealed, for example, it is quite possible that some species of birds could habituate to the disturbance. In a number of cases in the literature, eg. least terns on harrier jet pads, habituation and acceptance of the disturbance is rapid.It is well known for breeding birds generally that tolerance of disturbance during breeding increases with the progression of the breeding period. Incubating birds are much less likely to desert their clutch than birds which are laying. Further, colonial breeding species may be more likely to tolerate higher levels of disturbance than solitary breeding individuals purely because they live in groups and are therefore afforded some protection by the usual vigilance which prevails when compared to solitary breeders. The classic example of noise habituation is exemplified by tolerance to bird scarers whether used to protect agricultural crops or to disperse birds from airports. Habituation is common to disturbance (particularly noise) that is repeated with reinforcement by the presence of a human.

1.11 Attraction of migrants to artificial light sources, eg. lighthouses during cloudy nights or as a new moon approaches, is reasonably well known. Such instances are reduced under full moon conditions. A number of studies in the literature have reported first-year juveniles of some seabirds, notably petrels, being attracted to street lighting. This problem has been reduced significantly by shielding artificial street lights along coastal fronts. Consequently such shielding should be incorporated into constructions of new roads which are close to bird breeding areas, although the benefits to waders and wildfowl are likely to be less evident than was the case with first-year petrels. It is anticipated that some nocturnal feeding may be permitted under road-light illumination of adjacent wader and wildfowl feeding grounds, as has been documented in a a number of cases.

1.12 Finally, the success of many nature reserve designs has centred on the ability to allow large-scale public access to the site without disturbing the very birds people come to see. As outdoor recreational pursuits continue to gain popularity, it is even more important to manage visitors properly. Public access, adjacent to sites of importance for wildfowl and waders, can be a very serious disturbing factor, reducing the sites value to the birds. Likewise, an industrial plant adjacent to such an area, which may be creating a low-level, continuous form of disturbance such as noise, will be more disturbing to birds if people are not screened than if their presence is concealed. The same type of people management which nature reserve managers have practised for some time could be used effectively in sensitive developments which are sited adjacent to important wildlife sites. One mitigating practice could be to 're-site' the wildlife site some distance from the industrial plant. Usually this is impractical and serious effort should be devoted to screening and reducing all sources of disturbance, as well as avoiding siting the plant between the birds

feeding and roosting sites.

1.13 Consequently, the impact of disturbance from new developments, such as the proposed viaduct at Combe Haven, is a complex and important issue. In order to assess such impacts therefore, it is equally important to have in place a tailored experimental or monitoring protocol to generate the required data for assessment. Techniques exist within the discipline of ecological research to allow the design of such a protocol, as reported in the first sections of this document.

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ANNEX 2. An ornithological assessment of Combe Haven, East Sussex, and its strategic status.

1.0 INTRODUCTION AND METHODS

This assessment is based entirely on records from the annual bird reports of the Sussex Ornithological Society for the years 1984 to 1990. Note that these reports cover both East Sussex and West Sussex, and were thoroughly searched for records relating to Combe Haven. Many records were located by this method but several factors necessitate their being treated with some caution, and hence confirming the requirement for the collection of data under standard methodology :

(a) As is commonly the case with county bird reports the commoner species receive summarised and selective accounts. This is due to the bulk of records and limitations of space. Except where the more exceptional records are concerned it is usually not possible to attribute records to specific sites.

(b) Records of scarce breeding species are often not attributed to particular sites in order to protect those species from disturbance.

(c) Differences in the degree of coverage from season to season and from year to year are evident. For example, there were no records for the site in the 1989 or 1990 reports.

(d) It is not possible to assess the reliability of the data. Most records for this period appear to have come from two observers and many figures appear to be 'guesstimates' (eg. 500 chiffchaffs, 500-1000 yellow wagtails).

2.0 RESULTS

2.1 A number of Combe Haven records were found in the reports for 1984 to 1988. All species recorded as using the site, not merely flying over, are mentioned in the following sections. The most significant of these are tabulated.

2.2 Winter birds

2.2.1 Table 1 shows the peak counts of selected species during the five winters 1984/85 - 88/89. Included are those species for which at least one sizeable count or records in two or more winters exist.

Table 1. Peak winter counts of selected species at Combe Haven. Note that '-' = no data.

Winter	84/85	85/86	86/87	87/88	88/89
Bittern	1	1	2	1	0
Wigeon	-	200	-	-	-
Teal	250	300	-	-	-
Shoveler	68	50	-	-	-
Hen harrier	2	3	1	-	-
Water rail	50	30	-	-	-
Jack snipe	10	7	5	3	-
Snipe	100	320	130	100	150
Curlew	61	-	-	-	-
Green sandpiper	2	1	1	-	-
Water pipit	24	13	4	6	12
Pied wagtail	120*	150*	-	-	-
Wren	-		-	200	200
Fieldfare	700	-	-	-	-
Redwing	-	1500	-	-	-
Linnet	-	-	-	-	150
Redpoll	-	154	117	-	-
Yellowhammer	-	80	-	-	-

* = winter roost count

2.2.2 Other species recorded during these winters included pintail ('small numbers' 12/86), goldeneye (two 1/86), smew (one 1/86), goshawk (one 2/85), peregrine (one 10-11/85), common sandpiper (two 2/85), chiffchaff (two 1/88), firecrest (two 1/85), hawfinch (singles 1 & 12/86) and snow bunting (one 1/85).

2.3 Breeding birds

Table 2 shows all data (breeding 'pairs') that could be located for the breeding period. Clearly this is incomplete.

Spring/summer	84	85	86	87	88
Little grebe	-	-	3	-	-
Coot	-	-	4	-	-
Snipe	-	3	4	1	3
Yellow wagtail	5-6	-	-	-	-

Table 2 contd...

Sedge warbler1	-	-	50	-	-
Reed warbler1	-	-	185	-	-
Whitethroat	-	-	34	-	30
Lesser whitethroat	-	-	-	-	10
Reed bunting	-	36	-	-	-

1 Data from countrywide survey in 1986/87 (Prater 1987).

Other species recorded during the breeding season included cuckoo (up to 8 birds 5-6/84), meadow pipit (said to have decreased in 1985) and mistle thrush (24 8/88).

2.4 Passage birds

2.4.1 Clearly, a large amount of passage occurs although, as with other times the available data are incomplete. Table 3 shows the records to be of greatest significance between 1984 and 1988.

Table 3. Birds recorded at Combe Haven on spring (S) and autumn (A) passage.

Year	1984		1985		1986		1987		1988	
	S	A	S	A	S	A	S	A	S	A
Garganey	1	-	-	-	2	-	1	1	-	-
Marsh harrier	-	-	-	-	-	-	-	-	2	-
Black-tailed godwit	-	-	5	-	-	-	-	-	-	-
Whimbrel	-	-	18	-	-	-	-	-	-	-
Swift	-	-	-	1700	-	-	-	-	-	-
Meadow pipit	-	1000	-	-	-	-	-	-	-	-
Yellow wagtail	-	1000*	-	60	-	-	-	-	-	300*
Swallow	-	-	-	3000*	-	-	-	-	-	-
Black redstart	-	-	1	-	-	-	-	-	-	7
Whinchat	-	-	-	-	-	-	-	25	-	-
Stonechat	-	-	-	12	-	-	-	-	-	-
Wheatear	-	-	38	60	-	-	-	-	-	-
Sedge warbler	-	-	-	-	-	<200	-	<400-		-
Reed warbler	-	-	-	-	-	100	-	<100-		-
Whitethroat	-	-	-	-	-	70	-	-	-	50

Table 3 contd...

Willow warbler	-	-	-	-	-	100	-	-	-	-
Chiffchaff	-	-	-	-	-	-	-	-	-	500
Siskin	-	-	-	111	-	-	-	-	-	-

* = roost count

2.4.2 Many other species have been recorded during migration at Combe Haven. These include purple heron (one 5/85), white stork (one 6/86), osprey (singles 5/84 & 9/87), buzzard (one 4/86), spotted crake (one 9/85), little ringed plover (occasional singles), wood sandpiper (singles), long-eared owl (one 4/85), wryneck (one 8/85), tree pipit (two 10/88), Richard's pipit (one 9/88), ring ousel (one-two occasional), grasshopper warbler (singles 10/87 & 9/88), aquatic warbler (one 9/87) and firecrest (one-two occasional).

2.4.3 Several other species are recorded as flying overhead on visible passage including tawny pipit (8 & 9/88), chaffinch, brambling, crossbill ((8/86) and ortolan bunting (8/87 & 9/88). This indicates that the site has a significant amount of passage migration activity.

3.0 ASSESSMENT

3.1 Despite the paucity of the data Combe Haven is clearly important to birds at all seasons.

3.2 The main criteria used to evaluate the data extracted from the county reports is that of population size. Any count of a species equal to or exceeding 1% of its county, regional or national population is deemed important at the appropriate level. Combe Haven is strategically placed to be one of a suite of sites attractive to wetland and migrant birds. Collation of data for the other sites, Pevensey Levels, Rye, Pett Levels, Brede Levels, Dungeness and Walland Marsh, is within the scope of the full study proposed but is outside that considered in this review of Combe Haven. However, the total counts for the county of Sussex include those from the above sites appropriate to Sussex, so the expression of the percentage of the county population estimated to use Combe Haven shows the relative importance of the Combe Haven site.

3.3 Winter birds

3.3.1 Table 4 shows the minimum number of individuals of selected species in East and West Sussex during each of the five winters 1984/85 - 1988/89 and the mean for the period. Also shown is the mean at Combe Haven during the same period. Note that the incompleteness of site data makes comparison difficult. For those species where site data exist in fewer than the five winters the mean of the years of occurrence

are compared with the county mean of the corresponding winters. For example, hen harrier was recorded as present in the first three winters only. The mean of that figure is compared with the county mean for the same three winters. It is likely that the species also occurred at Combe Haven in the subsequent two winters but the reports do not specify this.

Table 4. Important wintering species at Combe Haven. The table shows annual minimum numbers for the county together with the mean for Combe Haven, and its relative contribution.

	84/85	85/86	86/87	87/88	88/89	County mean	Site mean	% ofmean county popn
Bittern	8	5	5	2	0	4.0	1.0	25
Hen harrier1	38	15	36	5	9	20.6	(2.0)	7
Water rail2	74	45	69	83	66	67.4	(40.0)	67
Jack snipe3	25	10	31	12	11	89.0	(6.3)	8
Snipe	3000	1500	600	1400	650	1430.0	160.0	11
Water pipit	34	13	7	11	13	15.6	11.8	76

1 = site counts for three years only

2 = site counts for two years only

3 – site counts for four years only

3.3.2 The six species shown in Table 4 are selected because their populations are of county importance (>1% criterion). It is possible that the water rail population is also of regional importance (ie. south-east England). In the three winters following 1985-86 high water rail numbers are attributed to an unnamed site in eastern East Sussex, quite possibly Combe Haven. Batten et al (1990) gives an estimated British winter population of c.100 water pipits. Thus the Combe Haven mean of 11.8 is clearly of national importance. The British wintering bittern population is estimated at between 50 and 150 and any site regularly holding one or more birds is nationally of value to the species.

3.4 Breeding birds

3.4.1 Despite the lack of breeding data three species are present at levels of county importance. These are snipe and reed and sedge warblers.

3.4.2 Snipe is a declining species in south-east England and very few now attempt to breed in East and West Sussex. The mean number of 'territories' in the two counties between 1984 and 1988 was 8.1. No data exist for Combe Haven in 1984 but the mean number of 'territories' between 1985-88 was 2.75, more than 32% of the county total.

3.4.3 Prater (1987) surveyed the reed and sedge warbler breeding populations of East and West Sussex and considered Combe Haven to be one of the most important sites for these species in East Sussex. The sedge warbler population was estimated as 477 in East Sussex, 775 in East and West Sussex combined, compared to 50 (10%) at Combe Haven. The reed warbler population was estimated as 1532 in East Sussex, 2478 in East and West Sussex combined, compared to 185 (12%) at Combe Haven.

3.4.4 An additional point is that the county reports do not name sites for scarce breeders such as water rail, kingfisher and bearded tit, merely stating the number of sites and the estimated numbers of pairs. Occasional breeding season spotted crakes, a nationally rare breeding species, also occur at unspecified sites.

3.5 Passage birds

3.5.1 In view of the tendency of county reports to remark in detail on the unusual and summarise the usual, the large number of records of scarce migrants at Combe Haven clearly indicate that significant numbers of birds of a diversity of species use the site during the migration periods.

4.0 REFERENCES

Batten, L.A., Bibby, C.J., Clement, P., Elliot, G.D. & Porter, R.F. (1990). *Red data birds in Britain.* T & A D Poyser. Calton.

Prater, A. J. (1987). 'The breeding population of reed and sedge warblers in Sussex'. *Sussex Bird Report No. 40.* 1987. Sussex Ornithological Society.

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APPENDIX 2

TRANSECT VISIT RECORDING FORM

TRANSECT VISIT RECORDING FORM (For recording species, numbers, flight direction and flight height at Combe Haven.)

TIMED OBSERVATION RECORDING SHEET

PROJECT: COMBE HAVEN

Date: Transect No: Weather:

Time	Species	Valley side	Height	Direction

APPENDIX 3

A SAMPLE OF THE ABSTRACTED DATA SHEET FOR EACH TRANSECT-VISIT

A SAMPLE OF THE ABSTRACTED DATA SHEET FOR EACH TRANSECT-VISIT). Used for the computation of Figures 1-11.)

ANALYSIS OF TRANSECT DATA : DIRECTIONALITY

PROJECT: COMBE HAVEN

Date	Trans. No.	Nospp	Gulls	RO	CC	SI	HM	SL	TOT	-	NS	SN	WE	EW	0	1	2	3	

APPENDIX 4

SCIENTIFIC AND ENGLISH NAMES OF SPECIES MENTIONED IN THE TEXT.

SCIENTIFIC AND ENGLISH NAMES OF SPECIES MENTIONED IN THE TEXT. Those species marked RD are red data birds in Britain (from batten *et al* 1990). See the publication for the specific categories of relevance.

Little grebe	*Tachybaptus ruficollis*
Heron	*Ardea cinerea*
Mute swan	*Cygnus olor*
White-fronted goose (RD)	*Anser albifrons*
Shelduck (RD)	*Tadorna tadorna*
Wigeon (RD)	*Anas penelope*
Gadwall (RD)	*Anas strepera*
Teal (RD)	*Anas crecca*
Mallard	*Anas platyrhynchos*
Shoveler (RD)	*Anas clypeata*
Sparrowhawk	*Accipiter nisus*
Kestrel	*Falco tinnunculus*
Merlin (RD)	*Falco columbarius*
Hobby	*Falco subbuteo*
Pheasant	*Phasianus colchicus*
Water rail	*Rallus aquaticus*
Moorhen	*Gallinula chloropus*
Coot	*Fulica atra*
Stone curlew (RD)	*Burhinus oedicnemus*
Golden plover (RD)	*Pluvialis apricaria*
Lapwing	*Vanellus vanellus*
Jack snipe	*Lymnocryptes minimus*
Snipe	*Gallinago gallinago*
Woodcock	*Scolopax rusticola*
Bar tailed godwit (RD)	*Limosa lapponica*
Whimbrel (RD)	*Numenius phaeopus*
Curlew (RD)	*Numenius arquata*
Redshank (RD)	*Tringa totanus*
Green sandpiper	*Tringa ochropus*
Black headed gull	*Larus ridibundus*
Common gull	Larus canus
Lesser black backed gull	*Larus fuscus*
Herring gull	*Larus argentatus*

SCIENTIFIC AND ENGLISH NAMES OF SPECIES contd..

Great black backed gull	*Larus marinus*
Stock dove	*Columba oenas*
Woodpigeon	*Columba palumbus*
Collared dove	*Streptopelia decaocto*
Turtle dove	*Streptopelia turtur*
Cuckoo	*Cuculus canorus*
Little owl	*Athene noctua*
Tawny owl	*Strix aluco*
Long-eared owl	*Asio otus*
Swift	*Apus apus*
Kingfisher	*Alcedo athis*
Green woodpecker	*Picus viridis*
Great spotted woodpecker	*Dendrocopus major*
Lr. spotted woodpecker	*Dendrocopus minor*
Wryneck (RD)	*Jynx torquilla*
Skylark	*Alauda arvensis*
Sand martin	*Riparia riparia*
Swallow	*Hirundo rustica*
House martin	*Delichon urbica*
Tree pipit	*Anthus trivialis*
Meadow pipit	*Anthus pratensis*
Water pipit	*Anthus spinoletta*
Yellow wagtail	*Motacilla flava*
Grey wagtail	*Motacilla cinerea*
Pied wagtail	*Motacilla alba*
Wren	*Troglodytes troglodytes*
Dunnock	*Prunella modularis*
Robin	*Erithacus rubecula*
Redstart	*Phoenicurus phoenicurus*
Whinchat	*Saxicola rubetra*
Stonechat	*Saxicola torquata*
Wheatear	*Oenanthe oenanthe*
Blackbird	*Turdus merula*
Fieldfare (RD)	*Turdus pilaris*
Song thrush	*Turdus philomelos*
Redwing (RD)	*Turdus iliacus*

SCIENTIFIC AND ENGLISH NAMES OF SPECIES contd..

Mistle thrush	*Turdus viscivorus*
Cetti's warbler (RD)	*Cettia cetti*
Savi's warbler (RD)	*Locustella luscinioides*
Sedge warbler	*Acrocephalus schoenobaenus*
Reed warbler	*Acrocephalus scirpaceus*
Dartford warbler (RD)	*Sylvia undata*
Lesser whitethroat	*Sylvia curruca*
Whitethroat	*Sylvia communis*
Garden warbler	*Sylvia borin*
Blackcap	*Sylvia atricapilla*
Dusky warbler	*Phylloscopus fuscatus*
Chiffchaff	*Phylloscopus collybita*
Willow warbler	*Phylloscopus trochilus*
Goldcrest	*Regulus regulus*
Spotted flycatcher	*Muscicapa striata*
Pied flycatcher	*Ficedula hypoleuca*
Bearded tit (RD)	*Panurus biarmicus*
Long tailed tit	*Aegithalos caudatus*
Marsh tit	*Parus palustris*
Willow tit	*Parus montanus*
Coal tit	*Parus ater*
Blue tit	*Parus caeruleus*
Great tit	*Parus major*
Nuthatch	*Sitta europaea*
Treecreeper	*Certhia familiaris*
Jay	Garrulus glandarius
Magpie	*Pica pica*
Jackdaw	*Corvus monedula*
Rook	*Corvus frugilegus*
Carrion crow	*Corvus corone corone*
Starling	*Sturnus vulgaris*
House sparrow	*Passer domesticus*
Tree sparrow	Passer montanus
Chaffinch	Fringilla coelebs
Brambling (RD)	*Fringilla montifringilla*
Greenfinch	*Carduelis chloris*

SCIENTIFIC AND ENGLISH NAMES OF SPECIES contd..

Goldfinch	*Carduelis carduelis*
Siskin	*Carduelis spinus*
Linnet	*Carduelis cannabina*
Redpoll	*Carduelis flammea*
Bullfinch	*Pyrrhula pyrrhula*
Hawfinch	*Coccothraustes coccothraustes*
Yellowhammer	*Emberiza citrinella*
Reed bunting	*Emberiza schoeniclus*

Report 1

Grasslands and Invertebrates - Combe Haven SSSI

Report 2

Birds - Combe Haven SSSI

Report 3

Shadow Modelling - Combe Haven Viaduct

Report 4

Vegetation

Report 5

Aquatic Invertebrates

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September 1994

REPORT 3

SHADOW MODELLING - COMBE HAVEN VIADUCT

A Report by Building Research Establishment
and Chris Blandford Associates

CONTENTS

1.0 INTRODUCTION

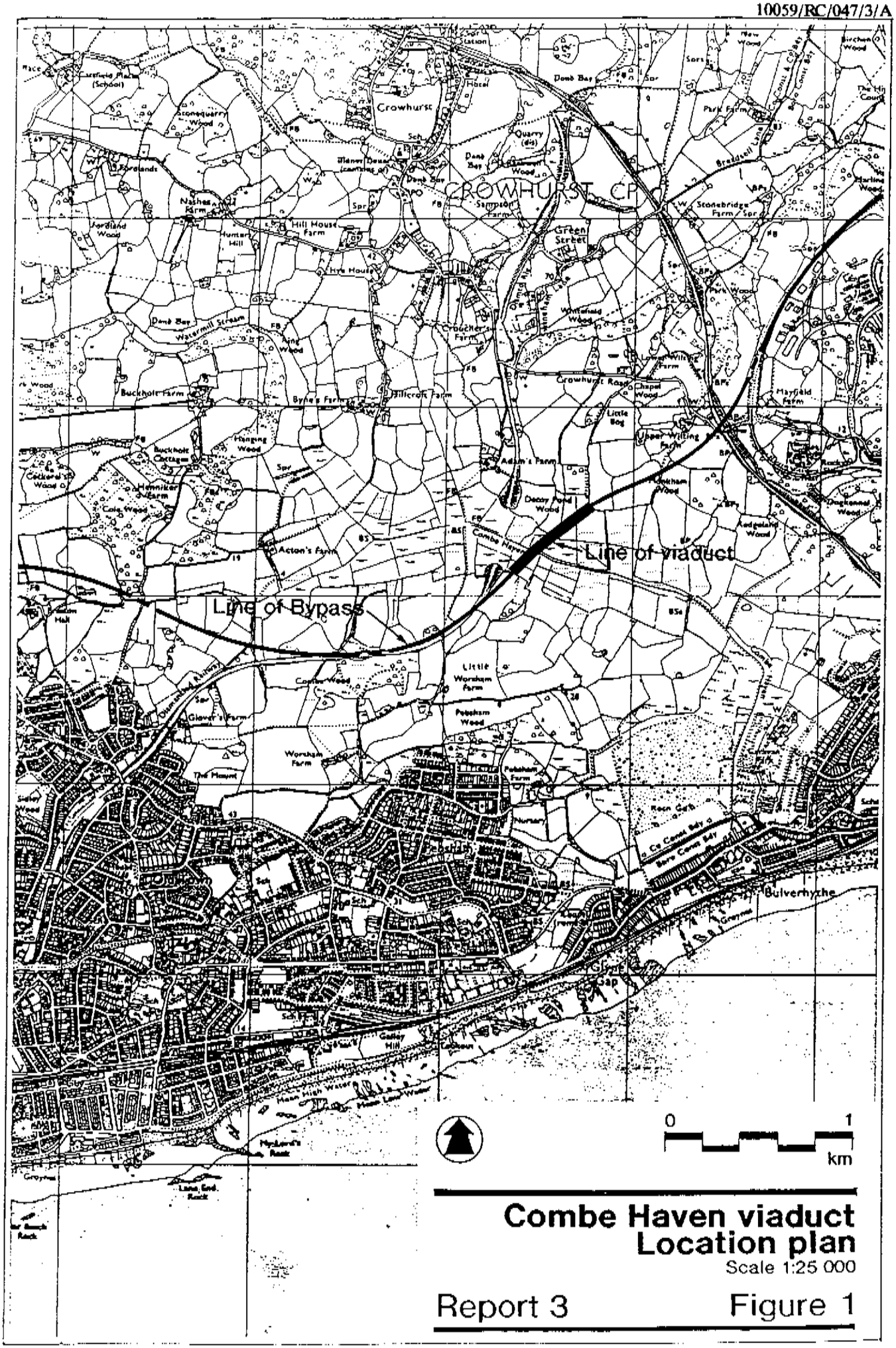
1.1 Combe Haven Viaduct forms part of the proposed A259 Bexhill and Hastings Western Bypass. It would cross the Combe Haven Site of Special Scientific Interest. The Building Research Establishment (BRE) was commissioned to carry out an analysis of light levels and shadow under the viaduct, to aid ecological studies of the impact of the viaduct on plant life below. In particular, the effect of changing viaduct height was to be examined. Three heights were considered: 5 m, 8 m and 12 m to the underside (soffit) of the viaduct, which corresponds to a road height of 7 m, 10 m and 14 m respectively. (In this report 'viaduct heights' refers to height of soffit). A location plan is given at Figure 1.

2.0 CALCULATION METHOD

2.1 Daylight illuminances (i.e. total light including direct sunlight and diffuse sky radiation) and sunlight availability were calculated at a series of points on the ground under the proposed viaduct. These points were 3 m apart, and extended 21 m on plan either side of the centre line of the road. As the viaduct would be 22.1 m wide, only seven of the points were directly underneath it; the remaining eight were situated either side of the viaduct but would still potentially be affected by its shadow at certain times of the day.

2.2 The viaduct was assumed to be straight, flat and very long compared to its width. The surrounding ground was assumed to be completely flat; as Combe Haven is a very flat area these assumptions should result in only small inaccuracies in predicted daylight illuminances, except near the ends of the viaduct where the ground rises. The effects of supporting pillars and ribs were ignored; again this assumption should result in only small inaccuracies except near the bases of the pillars where daylight levels would be lower and shadowed areas greater. The bearing of the road was taken to be 55° from due north.

2.3 A computer program specially written by BRE performed the calculations. It included a sun position routine to determine which points on the ground would be in shade at any time. This was coupled to a sky luminance model, validated for south east England, which predicts the average sky conditions for each month and hour of the year. By integrating over the areas of sky visible from each point it was possible to calculate the average illuminance under the proposed viaduct for each time of day and year. These illuminances include a time-averaged sunlight component. Light reflected off the ground then back down again off the viaduct was not included in the calculation; this would contribute only around 2% of unobstructed horizontal illuminance at most. Calculations were carried out for the actual latitude and longitude of the site (51°N, 0°W).



Combe Haven viaduct
Location plan
Scale 1:25 000

Report 3 Figure 1

3.0 RESULTS

3.1 The data from which the Tables are derived are held in archive and are available for purchase upon request together with a full explanation of calculations.

3.2 Table 1 summarises the annual average percentage of total daylight available beside and under the viaduct, calculated from a combination of diffuse and direct sunlight, for three different heights of viaduct. For comparison purposes, a plant against an east-facing or west-facing wall would receive about 50% of total daylight; against a north-facing wall it would receive about 27% of daylight.

3.3 Table 2 gives sunlight availability for each point underneath the proposed viaduct, expressed as a percentage of annual probable sunlight hours. This latter quantity is the length of time sunlight would shine on unobstructed ground given average levels of cloudiness for the year. For comparison purposes, a plant next to an unobstructed east or west facing wall would receive around 50% of probable sunlight hours; against a north facing wall around 12% of probable sunlight hours.

4.0 DISCUSSION

4.1 Light Regime

4.1.1 Under overcast sky conditions, the daylight levels (from diffuse sky radiation alone) under the viaduct would vary smoothly with distance from the centreline. The point underneath the centre of the would receive least light.

4.1.2 When the sun shines this situation would change due to the addition of direct sunlight. The viaduct would cast a shadow of width equal to itself; the position of the shadow would vary with the time of day and year. For most of the day the shadow would lie towards the north west of the viaduct. During the afternoon there would be a time when the shadow lies directly underneath the viaduct, and in the late afternoon the shadow would lie towards the south east of the viaduct. Thus overall the points which would receive least sunlight lie under the north western carriageway, between the centre line and edge of the viaduct. As the viaduct height increases, the shadow is more likely to fall some way from the viaduct rather than beneath it.

4.1.3 The total light regime then needs to be calculated from a combination of diffuse and direct light.

4.1.4 In analysing the impact of viaduct height, it is important to realise that the viaduct would still block the same total amount of light whatever its height. However, the light loss would be spread over a wider area; instead of a small zone with severe light loss, with a high viaduct a larger area would experience a smaller reduction in ambient light.

4.1.5 The proposed viaduct at Combe Haven would be 8 m high, corresponding to a road surface height of 10 m. The worst lit point under the viaduct would be 3 m north west of the centre line (Table 1). The area receiving less than a quarter of annual daylight would be 10 m wide (Table 1). This compares favourably with a width of 15 m for a 5 m high viaduct.

4.1.6 With an 8 m high viaduct the worst lit point would receive 17% of total daylight (Table 1) and 26% of annual sunlight hours (Table 2). Most of the sunlight received at this point would be in the winter months when the sunlight received would be at low solar altitude. This compares favourably with a 5 m high viaduct, where the worst lit point would receive only 8% of the total daylight (Table 1) and only 14% of annual sunlight hours (Table 2).

4.1.7 For the viaduct height of 12 m, every point underneath it would receive at least 31% of the total daylight (Table 1) and 39% of the annual probable sunlight hours (Table 2). The point receiving least sunlight would be almost directly under the north west edge of the viaduct. This point could receive sun all day in the winter months, until mid-morning and in late afternoon in spring and autumn, and from mid afternoon in summer. A viaduct of 12 m is approximately equivalent to a north-facing wall.

4.1.8 It can be seen that minimum light levels under the viaduct would increase substantially as viaduct height increases. However, there are other factors such as engineering design,visual factors and cost which have to be taken into account in the selection of viaduct height.

4.2 Effects of Reduced Light Levels on Plants

4.2.1 Light is important for plant growth in two ways. First, it provides the energy for photosynthesis, the basic metabolic reaction by which plants grow. Second, it regulates plant growth and development (eg. flowering). Photosynthesis is primarily dependant on light quantity (i.e. amount of light). Below about one third of normal daylight the amount of light limits the rate of photosynthesis, but above this level light is generally not limiting (though this is variable between species). Plant growth and development is generally regulated by the light quality, especially the proportions of red and far red light and the amount of blue light.

4.2.2 The viaduct would affect the amount of light reaching a plant, but would not significantly affect the quality of the light. The main effects of the viaduct would, therefore, be on photosynthesis. Experience of bridges and vegetation elsewhere in Britain suggests that there would be little direct effect of shade from a 12 m viaduct on vegetation, except immediately adjacent to the viaduct itself. Secondary effects such as increased grazing and trampling of stock whilst sheltering under the viaduct may be more significant than those from shade itself. The modelled light values suggest that there may be significant effects of shade from the 5 m and 8 m viaducts. The precise effects are difficult to

predict, but possible changes of the grasslands, swamps and aquatic communities present at Combe Haven are included below.

4.2.3 The grasslands contain a mixture of species some of which are tolerant of shade, and some of which are not. Of the species present at Combe Haven, the ones most likely to persist in conditions of reduced light are soft rush (*Juncus effusus*), rough meadow-grass (*Poa trivialis*), tufted hair-grass (*Deschampsia cespitosa*) and Yorkshire fog (*Holcus lanatus*); these are species often found in shaded woodlands. Species more adapted to open conditions such as common bent (*Agrostis capillaris*) and rye grass (*Lolium perenne*) are likely to disappear. Herbaceous plants such as lesser spearmint (*Ranunculus flammula*) would persist, but waterpepper (*Polygonum hydropiper*) and silverweed (*Potentilla anserina*) would not survive dense shade. Under the proposed 8 m high viaduct an area 16 m wide would receive less than 25% of annual total daylight. In this area the grasslands are likely to become more species-poor and dominated by coarser species.

4.2.4 Some swamp species are tolerant of lower light levels and may spread at the expense of species of open conditions. For instance, common reed (*Phragmites australis*), greater pond-sedge (*Carex riparia*), hemp agrimony (*Eupatorium cannabinum*), gypsywort (*Lycopus europaeus*) and wood clubrush (*Scirpus sylvaticus*) are all tolerant of shade and might spread at the expense of reed sweet-grass (*Glyceria maxima*), reed canary-grass (*Phalaris arundinacea*) and great willowherb (*Epilobium hirsutum*). This might also depend on grazing as few swamp species would survive heavy grazing and shade, and may open the more shaded ditches for submerged and aquatic species.

4.2.5 Some submerged and floating aquatic species present at Combe Haven are already capable of adapting to shade and can be found under tall emergent vegetation. The composition of the aquatic vegetation may therefore change. For instance, common duckweed (*Lemna minor*) is often found in shaded rivers and would persist in ditches under the viaduct, but fat duckweed (*Lemna gibba*) prefers open conditions and would not grow well. Other species tolerant of shade which are present are Nuttall's pondweed (*Elodea nuttallii*) and frogbit (*Hydrocharis morsus-ranae*). Overall, it is likely that aquatic communities would persist in areas shaded by the viaduct, but the structure of the vegetation would become more simple (i.e. either submerged species or floating species only, not both) and species-poor.

4.2.6 In conclusion, it can be seen that in general the higher the viaduct the less impact there would be on light levels. There would be little direct effect with a 12 m high viaduct, but noticeable effects on vegetation would occur with a viaduct 5 m or 8 m high. However, the width of the area receiving less than a quarter of annual total daylight would be 5 m less with an 8 m high viaduct than with a 5 m high viaduct, and the worst lit points would receive approximately double the total daylight and annual sunlight hours. The choice of an 8 m high viaduct is, therefore, a balance between nature conservation, visual factors and cost.

TABLE 1:

Annual average total daylight availability under the viaduct: % of annual probable daylight on unobstructed ground. Points on the north west side are given as a negative distance, those on the south east side a positive distance.

Distance (metres) from centreline	% of annual probable daylight		
	Height of soffit		
	5 m	8 m	12 m
-21	94	86	75
-18	87	75	65
-15	70	59	54
-12	42	41	44
- 9	21	28	36
- 6	11	20	31
- 3	8	17	31
0	8	19	35
3	12	26	43
6	23	40	52
9	49	57	64
12	74	74	74
15	88	85	81
18	94	90	88
21	98	94	90

TABLE 2:

Annual sunlight availability under the viaduct: % of annual probable sunlight hours on unobstructed ground. Points on the north west side are given as a negative distance, those on the south east side a positive distance.

Distance (metres) from centreline	% of annual probable daylight		
	Height of soffit		
	5 m	8 m	12 m
-21	84	70	60
-18	73	53	51
-15	47	39	44
-12	26	29	40
- 9	17	26	39
- 6	13	25	45
- 3	14	26	57
0	16	33	66
3	28	52	73
6	46	69	81
9	73	79	86
12	83	86	90
15	90	89	92
18	95	92	93
21	97	94	95

Report 1

Grasslands and Invertebrates - Combe Haven SSSI

Report 2

Birds - Combe Haven SSSI

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September 1994

REPORT 4

VEGETATION SURVEY AND ASSESSMENT

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1.0 INTRODUCTION

1.1 This report sets out the results of a survey and assessment of the vegetation within or adjacent to the highway boundary of the Published Scheme for the A259 Bexhill and Hastings Western Bypass (Figure 1). The study area excludes the wetland of the Combe Haven SSSI which is dealt with in Report 1. The survey dealt only with vegetation and no animal surveys have been included in this report. However, the species composition and structure of vegetation is generally accepted as indicative of its value for animals. This has been taken into account in the evaluation. This concept is expanded for invertebrates in Appendix 1.

1.2 The survey comprised two phases. First, an overall assessment was conducted, based on aerial photographs taken in 1987 and field visits. Broad physiognomic vegetation types were mapped. Second, areas of potential nature conservation interest identified in the first phase were surveyed in detail according to the National Vegetation Classification (see Section 2.0). The woodlands were surveyed in January and February 1992 (most were checked during subsequent visits in 1993 and 1994) and the other vegetation types in June - July 1992.

1.3 The location of the vegetation surveyed is shown on Figures 2 - 9. Figures 11 -31 within the body of the report give more detailed information on the character of individual woodlands.

1.4 Evaluation of the nature conservation significance has been based on the criteria published by the Nature Conservancy Council (NCC) in 1977 (Appendix 2). Each site has been assessed in relation to its local, county and national significance.

1.5 The basis for the impact assessment is discussed in sections 14 and 15.

2.0 SURVEY METHOD

2.1 The National Vegetation Classification

2.1.1 *British Plant Communities* (also known as the National Vegetation Classification, NVC) is the first comprehensive, systematic description of vegetation in Britain. The classification of over 250 communities has been derived from an analysis of over 32,000 vegetation samples (quadrats) collected from throughout Britain. It covers the vegetation of all the major natural and semi-natural vegetation types in Britain.

2.1.2 The work is published in five volumes. The first two volumes, - 1. *Woodlands and scrub,* and 2. *Mires and heaths* were published in 1991, and the third volume 3. *Grasslands and montane communities* was published in 1992. The two remaining volumes, 4. *Aquatic communities, swamps and tall herb fens,* and 5. *Maritime and weed communities* are due to be published in 1994/1995, and with the exception of the weed chapter, are available in draft form.

2.1.3 The volumes consist of accounts of each community and their sub-communities as appropriate. The characteristics of each community are first described, and the characteristic species are listed in tables giving the constancy and Domin cover values (Appendix 3). The communities are related to their environmental conditions, including soils, treatment (or management), climate and historical factors, and the distribution of each vegetation type is outlined, often with maps. The affinities with, and relationships to, other communities, including typical zonation and successions, are also described. Each vegetation type is given a unique code number composed of the main habitat type (e.g. W = woodland), the community number (eg. 21) and the sub-community letter (e.g. a).

2.1.4 The classification offers a reliable framework for identifying the vegetation types, interpreting the ecological factors which control them, and assessing their importance in a national and local context. It is the standard phytosociological method in Britain.

2.2 Woodlands

2.2.1 Woodland areas were examined for homogeneous stands of vegetation. Such stands were sampled by listing the species present, and for each new vegetation type using a 30m x 30m quadrat size for the canopy species, and a 10m x 10m quadrat for the shrub and ground layers. Estimates of percentage cover of the species were recorded using the Domin scale (Appendix 3). As much of the woodland as possible was walked and other species present were noted. Notes on the structure of the woodland, its

past and present management, and other features were made. The woodland quadrat information is given in Appendix 5. Canopy (c) and shrub layer (s) species are noted.

2.2.2 The smaller woodlands were given an overall search. The larger areas were, in general, surveyed in the sections lying adjacent to the line of the preferred route.

2.2.3 The *East Sussex Inventory of Ancient Woodland* (Whitbread *et al.*, 1989) lists woodland considered to be ancient. Ancient woodlands are defined in Appendix 7. Woodlands along the line of the preferred route listed in the Inventory are noted in this report. The Inventory only includes woodlands over 2 ha. It is therefore possible that some of the small woodlands are ancient but not listed. Where woodlands under 2 ha were present on Yeakell, Gardner and Gream's one inch to one mile map of 1795 (surveyed in 1783), and/or the First Edition One Inch Ordnance Survey Series of 1813, this is stated in the individual descriptions. This is not conclusive evidence that the sites are ancient woodland, but indicates that they may be.

2.3 Other vegetation

For vegetation other than woodland, each distinct type of vegetation was identified in the field. Quadrats were taken in each distinct vegetation type. The structure of the vegetation was briefly described and the principal higher plant species listed, together with their Domin cover values (Appendix 3). Bryophytes and lichens were only noted where of significance. The quadrat information is given in Appendix 6.

3.0 GENERAL CHARACTER OF THE VEGETATION

3.1 The study area comprises predominantly agricultural land. Some fields are in arable cultivation, but most areas are grassland, many of them agriculturally improved rye-grass (*Lolium perenne*) pasture. Areas of partly improved pasture are present within the agricultural land, but also on roadsides, neglected and unused land. Permanent grazing pasture is quite common and horse-grazed is frequent at the edges of settlement. Hay meadows are also quite common and some are moderately species-rich.

3.2 Marshy grassland is found mainly in the heavy clays and alluvium of valley bottoms. Small patches were associated with springs and flushes. Most wet grassland has probably been drained and reclaimed for agriculture.

3.3 Despite the occurrence of much acid sandstone in the area, acid grasslands are uncommon.

3.4 The woodlands are mainly small, less than 1.0 ha and generally consist of ash (*Fraxinus excelsior*), field maple (*Acer campestre*), or pedunculate oak (*Quercus robur*) as major trees. They are frequently abandoned hornbeam (*Corpinus betula*), sweet chestnut (*Castania sativa*) or hazel (*Corylus avellana*) coppice. Woodland dominated by willows (*Salix* sp, mainly *Salix fragilis*) is frequent in the wet valley bottoms.

3.5 Hedges are frequently, but generally of moderate species diversity with abundant hawthorn and there are areas of hawthorn - dominated scrub on neglected land. Wide, old, wooded, field boundaries - intermediate between hedges and woodland - are common. They are known locally as shaws and often contain remnants of ancient woodland.

4.0 MESOTROPHIC GRASSLAND : SURVEY AND ASSESSMENT

4.1 Grasslands of moderate to low species diversity developed on soils of moderate to high nutrient richness are known as mesotrophic grasslands. They are by far the commonest agricultural grasslands in lowland Britain. The following descriptions identify the areas of each of the seven types of mesotrophic grassland in the study area. Full descriptions of the characteristics of each type are given in Appendix 4.

4.2 Survey

4.2.1 MG1 False oat - grass (*Arrhenatherum elatius*) grasslands

These grasslands were found most frequently on the Wadhurst Clay but also occurred on the sandstones in more nutrient-rich places.

MG1a Red fescue (*Festuca rubra*) sub-community

This common sub-community was found frequently on roadsides and banks, especially at Queensway (Figures 8 and 9, Samples 96 and 97). The examples were variable, sometimes lacking false oat-grass as a dominant. Many may be of recent origin

MG1b nettle (*Urtica dioica*) sub-community

This sub-community was found occasionally on road verges on rich clay soils Figure 7, Sample 81, was typical of this nationally common vegetation type.

MG1e common knapweed (*Centaurea nigra*) sub-community

This sub-community was found on the dismantled railway line and on roadside near The Lamb (Figure 2, Sample 3; Figure 6, Sample 70). The areas present were small but fairly species-rich and typical of the sub-community. They are probably transitional to scrub communities due to lack of management. The examples on the railway may have resulted from the use of limestone ballast. Such vegetation would not be expected on the acidic soils of the Tunbridge Wells Sand.

4.2.2 MG5 crested dog's-tail (*Cynosurus cristatus*) - common knapweed meadow and pasture

Three sub-communities of this common but variable grassland were found in the study area.

MG5a meadow vetchling (*Lathyrus pratensis*) sub-community

This is the most variable of the sub-communities. It has often received some fertiliser or manure and it is common and widespread in Britain.

The sub-community was found to be widespread and quite variable within the study area (e.g. Figures 4, 5, 6, 8 and 9, Samples 22, 24, 32, 33a, 46, 56, 70, 86, 90, 98) ranging from species-rich examples (Figures 4, 5, 6, Samples 24, 33a, 46, 56) to more species-poor (eg. Figures 4, 5, Samples 22, 32). It occurred on both clay and sandstone soils.

MG5c heath grass (*Danthonia decumbens*) sub-community

One slightly atypical example of this locally-distributed sub-community was found at Thorne Crescent Recreation Ground (Figure 5, Sample 26). It had a fairly species-poor sward. The community was probably on acidic soil, derived from the Tunbridge Wells Sand.

4.2.3 MG6 rye grass - crested dog's-tail pasture

This is the commonest partly- improved grazing pasture in Britain. Three sub-communities are recognised in Britain, of which two were found in the study area. Species-poor, partly improved examples have not been ascribed to sub-communities (eg. Figures 4 and 5, Samples 20, 30)

MG6a typical sub-community

A number of examples were found within the study area (e.g. Figures 5, 6, Samples 47, 55). These had abundant rye grass, but still maintained a high crested dog's-tail component. They were more common on the soils derived from Wadhurst Clay, but also occurred elsewhere.

MG6b sweet vernal grass (*Anthoxanthum odoratum*) sub-community

This was found as partly improved pasture on the slightly acid soils of the Tunbridge Wells Sand and Ashdown Sands (eg. Figures 3, 5, 6, 7, Samples 14, 28, 35, 39, 66, 71, 77, 82). The pastures were quite variable, some species-rich, some poorer. Many of the better examples were pony-grazed, and probably unfertilised.

4.2.4 MG7 rye grass leys

Rye grass leys are the predominant, modern agricultural pasture in lowland Britain.

Six closely related leys are recognised in Britain, of which four were recorded on the survey. All were fairly typical examples. The more highly-improved examples have been recorded as improved or semi-improved pasture on the figures.

MG7a rye grass - white clover (*Trifolium repens*) ley

Several examples of this were seen along the line of the route (no samples).

MG7b rye grass - rough-stalked meadow-grass (*Poa trivialis*) ley

A number of examples of this type were seen in the survey, mainly improved pastures on the more acid soils of the sandstones (Figures 4, 5, Samples 23, 42).

MG7d rye grass - meadow foxtail (*Alopecurus pratensis*) meadow

This grassland was quite characteristic of highly improved meadows in the study area, especially on the clays (eg. Figure 7, Sample 76).

MG7e rye grass - plantain ley

Several examples of this were found in the survey on very open and trampled areas (eg. Figure 5, Samples 37, 45).

4.2.5 **MG9 Yorkshire fog (*Holcus lanatus*) - tufted hair-grass (*Deschampsia cespitosa*) grassland**

This species-poor coarse grassland occurs commonly throughout Britain. Two sub-communities are recognised, of which one was found.

MG9a rough-stalked meadow-grass sub-community

Several adjacent meadows with this community were found on the Barnhorn Level (Figure 3, Sample 5). They occurred on the seasonally-wet alluvial soils. All had probably received some improvement.

4.2.6 **MG10 Yorkshire fog - soft rush (*Juncus effusus*) pasture**

Three sub-communities of this grassland of poor, wet land are recognised in Britain, of which only one was seen in the study area.

MG10a Typical sub-community

Several examples were found, mainly associated with flushes (e.g. Figures 6, 8, Samples 67, 87) or on wet clay (Figure 8, Sample 94), or on damp alluvium in the valley bottoms (e.g. Figures 3, 6, Samples 15, 72).

MG10b hard rush sub-community grasslands occurred near the Lamb Inn (Figure 2, no sample) beyond the western limits of the scheme.

4.2.7 MG12 tall fescue (*Festuca arundinacea*) grassland

Two sub-communities of this grassland are recognised in Britain, of which only one was seen in the study area.

MG12a rye grass - Yorkshire fog sub-community

One small stand was found on the A259 road verge near New Lodge Farm (Figure 2, no sample). This was a fairly typical example.

4.3 Assessment

4.3.1 Introduction

In assessing the nature conservation significance of the mesotrophic grassland, reference was made to the criteria set out in Appendix 2 the relationship between vegetation and animal interest set out in Appendix 1 and to the NCC survey of unimproved neutral grasslands in East Sussex (Steven 1990). The NCC survey mainly concentrated on the Weald, often in a field by field search. No meadows in the Bexhill-Hastings study area were included in the register and wet meadows were poorly covered.

4.3.2 MG1 false oat-grass (*Arrhenatherum elatius*) grassland

In the study area, these grasslands occurred mainly on the roadsides and in neglected areas. They are often moderately species-rich, but are thought to be a considerably modified NVC type, with generally low botanical interest (Nature Conservancy Council, 1989). They are common in Britain and are of very limited nature conservation significance.

4.4 MG5 crested dog's-tail - common knapweed meadow and pasture

4.4.1 These are the commonest of the unimproved meadows in East Sussex (Steven 1990), and they are quite frequent nationally. There were many hay meadows of this type in the study area. Most examples were of the widespread MG5a meadow vetchling sub-community. They ranged from species-poor to more species-rich. The following five sites of significant interest were identified.

4.4.2 Jack O'Boreham's Wood, pasture (Sample 22) (Figure 4)

This was a large hay meadow with an interesting range of species, and a pond. Meadow barley (*Hordeum secalinum*) was locally frequent and it had probably been partly improved. It is of local interest but its value is increased by its position as part of a habitat mosaic that includes the woodland SSSI, shaws and hedges.

4.4.3 Thorne Crescent recreation field (Sample 26) (Figure 5)

This was a fairly uniform meadow of an uncommon vegetation type, the MG5c crested dog's-tail - common knapweed meadow, heath grass sub-community. This sub-community is uncommon in Sussex. It was not a very typical example, and the sward was fairly species-poor. It is of local interest.

4.4.4 Preston Paddock (Sample 46) (Figure 5)

This was a partly improved but very colourful meadow on a slope grazed by ponies. It is of local interest.

4.4.5 Oakfield Farm (Sample 56) (Figure 6)

This was a very species-rich hay meadow with abundant meadow barley, meadow foxtail and broad-leaved plants. The vegetation was fairly uniform in distribution. Thirty-eight species were recorded. This was probably the best MG5 crested dog's-tail - common knapweed meadow seen along the route. It is probably of better quality than the meadows at Marline Woods SSSI (see below) and is of local to county importance.

4.4.6 Marline Woods Meadow (Samples 86, 87, 90) (Figure 8)

These meadows were fairly species-rich MG5 crested dog's-tail - common knapweed meadows. The northern meadow has been partly improved. The southern meadow is probably unimproved, and includes a flush. There was some thistle invasion in places. The flora included adder's-tongue fern

(*Ophioglossum vulgatum*), dyer's greenweed (*Genista tinctoria*), quaking grass (*Briza minor*) and common spotted-orchid (*Dactylorhiza fuchsii*). Taking into account its continuity with the woodland SSSI, the grassland is of county importance.

4.5 MG6 rye grass - crested dog's-tail pasture

4.5.1 These grazing pastures are widespread in the study area and are common in Britain. Some unimproved examples were found in the study area. They are thought to be a considerably modified NVC type, and are generally of low botanical interest (Nature Conservancy Council 1989).

4.5.2 Little Worsham Farm (Samples 66, 67 and 68) (Figure 6)

This was a small unimproved, horse-grazed meadow with an MG6 rye grass - crested dog's-tail pasture and U4 sheep's fescue - common bent - heath bedstraw grassland (see section 5.0) on a bank. There was also a small flush. This meadow is of local interest for the variation in habitats, and the presence of the unusual acid grassland.

4.5.3 Upper Wilting Farm (Sample 77) (Figure 7)

This was a small unimproved, horse-grazed meadow with an MG6 rye grass - crested dog's-tail pasture. There were small banks, and a dry ditch, with old hedgerows. This meadow was of local interest.

4.6 MG7 rye grass leys

4.6.1 This group of closely-related grasslands are generally highly improved, species-poor, and intensively managed. This is considered to be a considerably modified NVC type, with generally low botanical interest (Nature Conservancy Council 1989). The areas examined in the study area are of very little nature conservation interest.

4.7 MG9 Yorkshire fog - tufted hair-grass grassland

The examples of this grassland type occurred on the seasonally-wet alluvium of the Barnhorn Level. This is an uncommon type of grassland in East Sussex. Steven (1990) only lists 0.3 ha as known, but his survey covered few wet grasslands. It is considered to be a considerably modified NVC type, with generally low botanical interest (Nature Conservancy Council 1989). The examples are probably improved, and are of limited local interest only.

4.8 MG10 Yorkshire fog - soft rush rush pasture

4.8.1 This is a considerably modified NVC type, with generally low botanical interest (Nature Conservancy Council 1989). The examples seen in the study area are generally of little or local interest only, with the exception of one at Longdown Farm.

4.8.2 Longdown Farm, wet meadow (Samples 14, 15) (Figure 3)

This was a large wet marshy grassland. It is largely MG10a Yorkshire fog - soft rush pasture typical sub-community, but is quite variable and has dry banks with unimproved MG6 rye grass - crested dog's-tail pasture. This is of local interest as an unimproved, wet meadow. Meadows of this extent are not common.

4.9 MG12 tall fescue grassland

This grassland type occurs widely inland on road verges, and sometimes as sown pastures. There is one small area of this grassland on a road verge near The Lamb. This is a very small area of limited local interest.

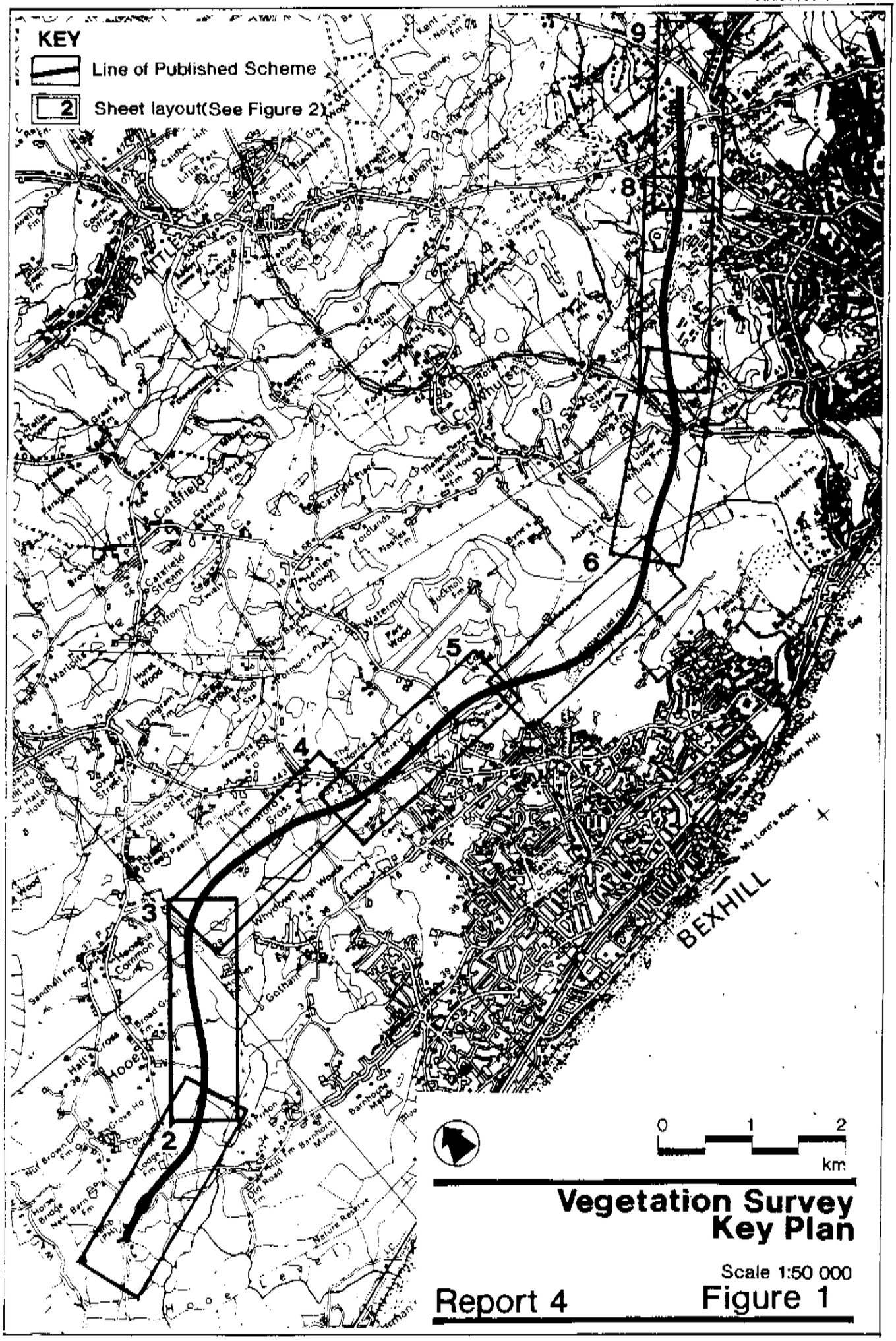
5.0 ACID GRASSLAND : SURVEY AND EVALUATION

5.1 Although there is much Tunbridge Wells Sand and Ashdown Sandstone along the line of the route, acid grasslands were rare as a result of agricultural improvement, and only one example was found.

5.2 **U4a sheep's fescue (*Festuca ovina*) - common bent (*Agrostis capillaris*) - heath bedstraw (*Galium saxatile*) grassland typical sub community**

A sloping field adjacent to the railway line at Little Worsham Farm (Figure 6, Sample 68) had this community. It was adjacent to a rye grass - crested dog's-tail pasture and appeared to be unimproved. Pignut (*Conopodium majus*) and bluebell (*Hyacinthoides non-scripta*) were present. The vegetation type is uncommon in East Sussex outside Ashdown Forest.

5.3 The total known area in East Sussex (excluding the extensive areas in Ashdown Forest or on other heathlands such as Chailey Common), is 7.5 ha. However, the area found is small and can be considered to be of local importance.

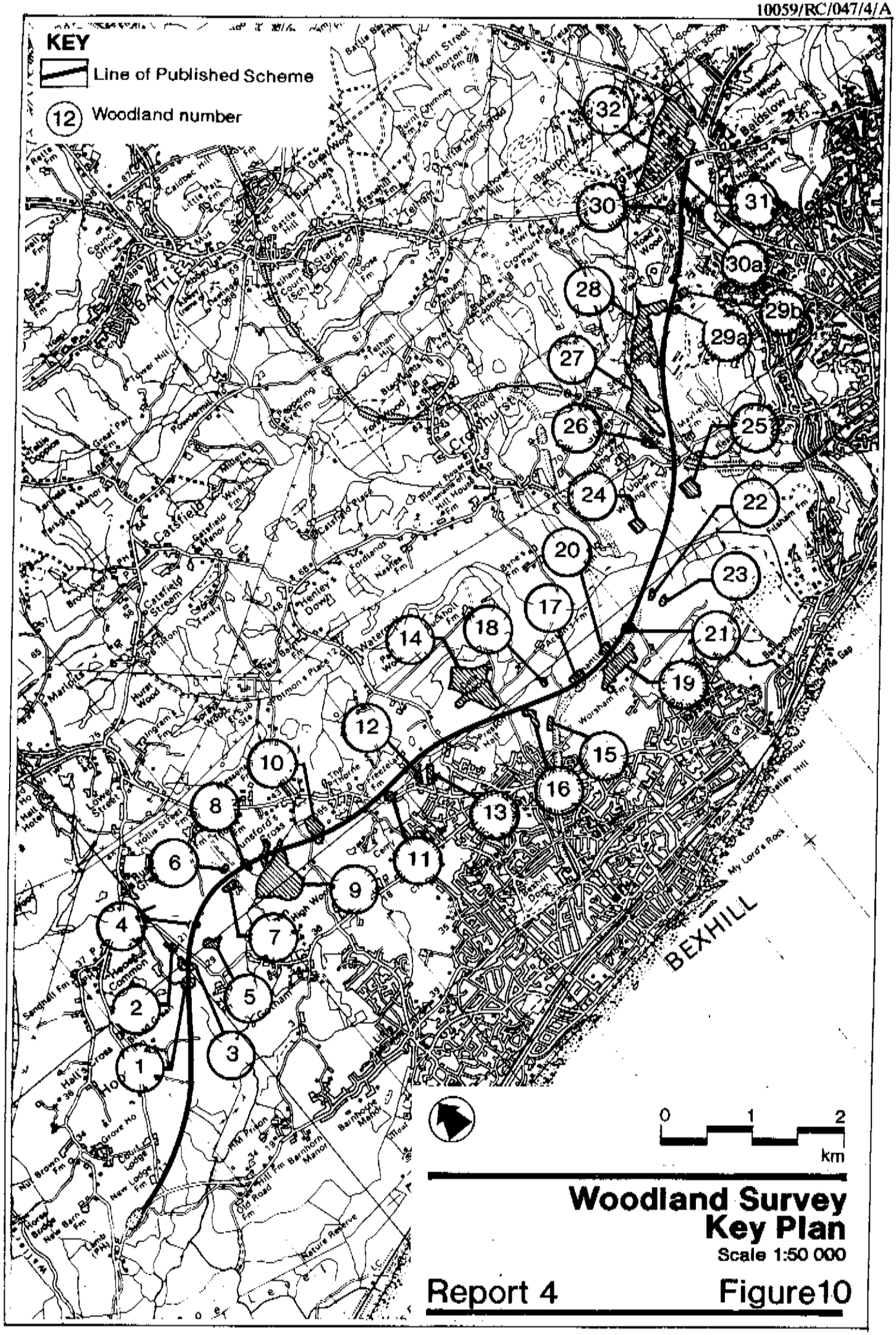


Vegetation Survey Key Plan

Scale 1:50 000

Report 4

Figure 1



Woodland Survey Key Plan

Scale 1:50 000

Report 4 Figure10

6.0 WOODLAND SURVEY AND EVALUATION

A key plan to woodlands surveyed is given in Figure 10. Table 1 shows how the sites have been evaluated using the standard criteria.

6.1 Woodland 1 Highfield Wood extension, 0.18 ha (Figure 12)

6.1.1 Access to this wood was denied by the landowners, so a full survey was not possible. The canopy appeared to consist of oak, ash and alder (*Alnus glutinosa*) standards with an understorey of willow (*Salix* sp.), hazel (*Corylus avellana*) and holly (*Ilex aquifolium*) (see Figure 12).

6.2 Woodland 2 Birchtree Wood, 1.0 ha (Figure 11)

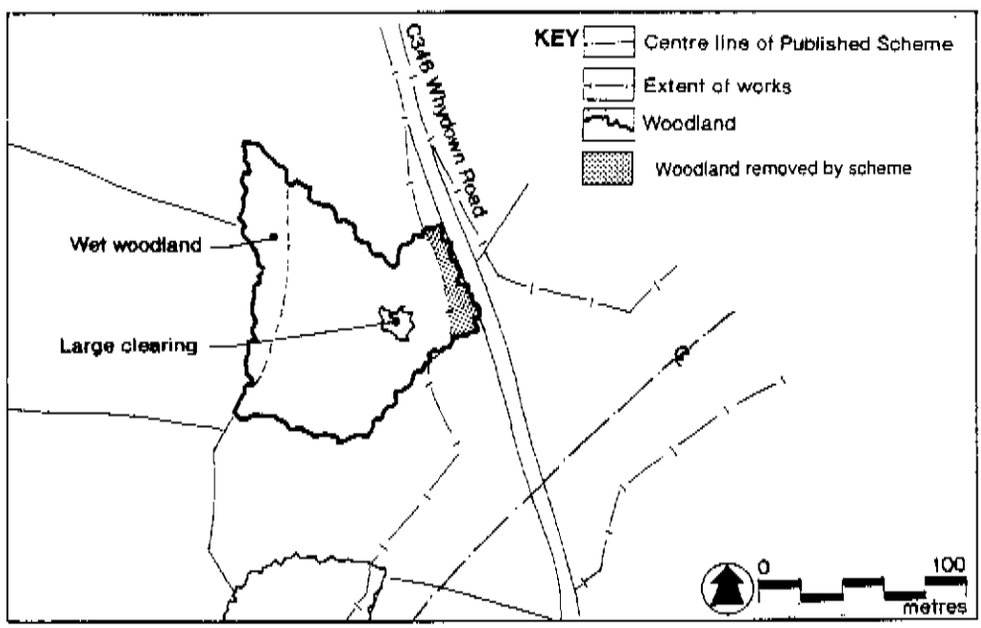


Figure 11. Woodland 2 Birchtree Wood

6.2.1 This woodland had a varied composition and structure. This variation is the result of a mosaic of dry areas and areas of impeded drainage. Wet soil conditions were recorded in the west, where the canopy was dominated by downy birch (*Betula pubescens*) and crack willow (*Salix fragilis*). The ground flora contained such open wet woodland species as bugle (*Ajuga reptans*), hemlock water dropwort (*Oenanthe crocata*) and soft rush.

6.2.2 The drier part had an open canopy consisting of oak standards and downy birch. A large clearing had been created by windblow and many trees were still present as fallen wood. The understorey consisted

of hazel and young aspen (*Populus tremula*). The regeneration and age of the trees indicate that the site will develop as oak/ash woodland.

6.2.3 The following NVC communities are present:

(a) W7 of the alder - ash - yellow pimpernel (*Lysimachia nemorum*) woodland, indeterminate sub-community.

(b) W10c ivy (*Hedera helix*) sub-community of the pedunculate oak - bracken (*Pteridium aquilinum*) - bramble (*Rubus fruticosus*) woodland.

(c) W25b wood sage (*Teucrium scorodonia*) sub-community of the bracken - bramble community.

6.2.4 None of these community types is uncommon (W7 is increasingly being found in S E England and is much more common that the NVC map indicates). The vegetation type in the clearing community appears to have recently developed from the main community. Overall, the woodland is of local nature conservation value.

6.3 Woodland 1 + Woodland 3 Highfield Wood, 1.38 ha (Figure 12)

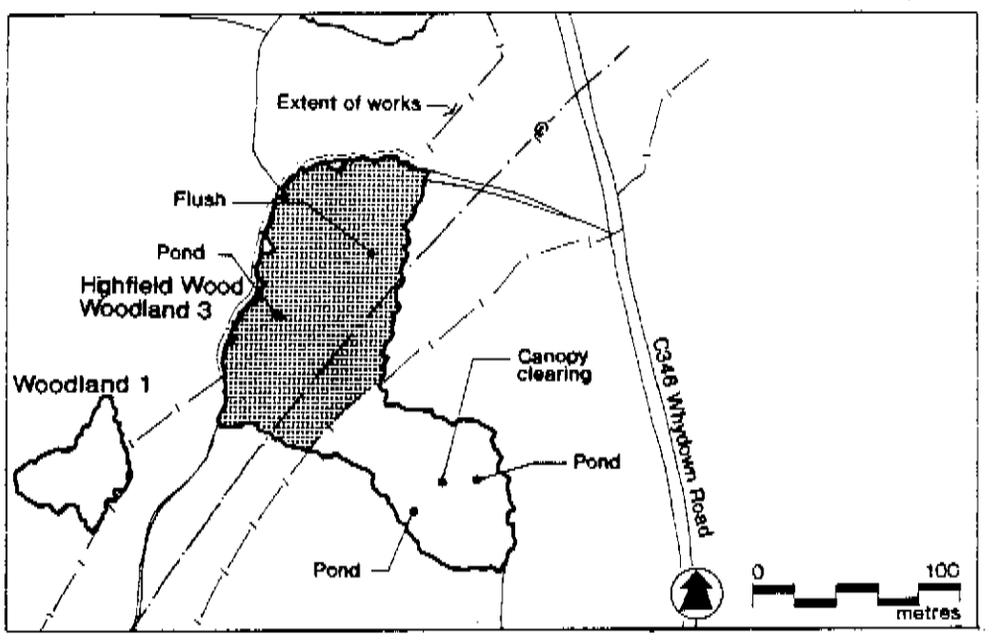


Figure 12. Woodland 1 + Woodland 3 Highfield Wood

6.3.1 This woodland consisted of abandoned hornbeam coppice with standards. Some of the hornbeams form part of the canopy.

6.3.2 The canopy was dominated by ash, with the occasional oak as a standard. The shrub layer included bramble, hazel, blackthorn (*Prunus spinosa*), holly and field maple. Sheep grazing had recently occurred. The ground flora included dog's mercury (*Mercurialis perennis*), bluebell, violets (*Viola riviniana*), primrose (*Primula vulgaris*) and yellow archangel (*Lamiastrum galeobdolon*).

6.3.3 The NVC type is W8d, ivy sub-community of ash - field maple - dog's mercury woodland. It is a common form of woodland Britain, and exhibits wide variation in species composition. The size of some of the coppice stools indicated that the woodland is old. It is, however, not shown on Yeakell and Gardner's map of 1795. Rodwell (1991) states that this community type can appear to be old, but may be the result of relatively recent invasion or planting.

6.3.4 Three heavily silted ponds are present. Two were shaded and had little aquatic vegetation. The third was more open with some marginal and aquatic vegetation.

6.3.5 Overall the woodland is of local value only.

6.4 Woodland 4 (Figure 4)

6.4.1 This woodland was present on the 1987 aerial photographs but has subsequently been grubbed out. Only a few trees around a pond remain. The area was not surveyed in detail (see Figure 4).

6.5 Woodland 5 Holmes Farm Wood, 2 ha (Figure 4)

6.5.1 This woodland appears on the *Inventory of Ancient Woodland*. Two distinct woodland vegetation types were present, separated by a wet clearing. The NVC types were as follows :

(a) W8 ash - field maple - dog's mercury woodland.

(b) W22 blackthorn - bramble scrub.

(c) W6b alder - nettle woodland crack willow sub-community.

6.5.2 The communities (a) and (b) are common. The alder nettle - sub-community crack willow sub-community is frequent on flood plains with nutrient-laden silts. The vegetation in the study area appears to have arisen on an area of impeded drainage enriched by run-off from the surrounding agricultural land.

6.5.3 The site is of local nature conservation value.

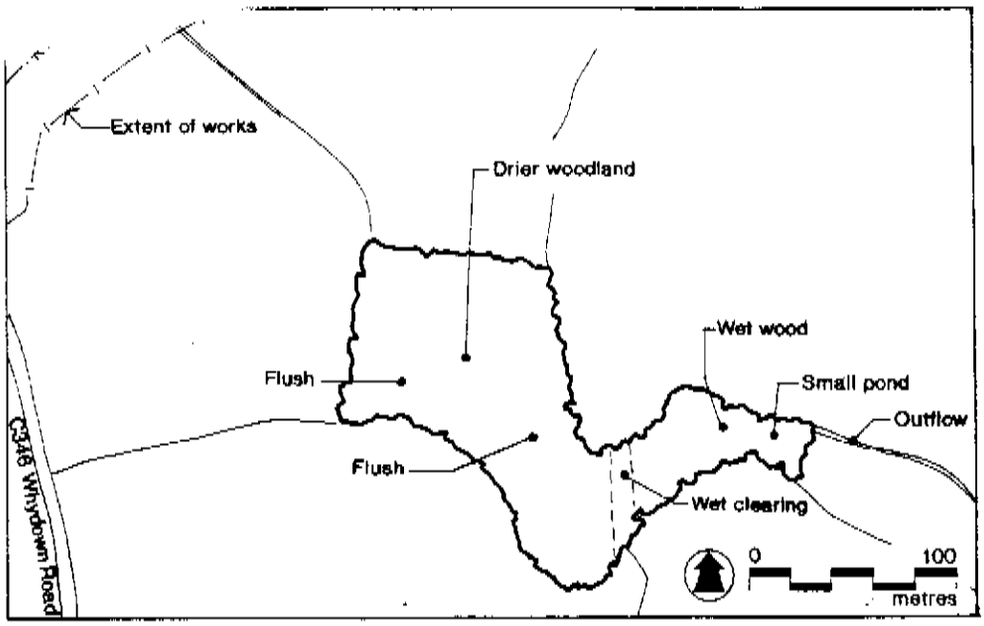


Figure 13. Woodland 5 Holmes Farm Wood

6.6 Woodland 6, 0.25 ha (Figure 14)

6.6.1 This was predominantly sweet chestnut coppice, under active management. Occasional young standards of birch, ash and oak were present. The coppice was dense and the ground flora was sparse as a result of the low light levels.

6.6.2 The NVC community is W10b, the wood anemone (*Anemone nemorosa)* sub-community of oak - bracken - bramble woodland. This is the typical sub-community associated with sweet chestnut plantations. It is characteristic of woodland on base-poor soils and is common throughout lowland southern Britain.

6.6.3 The nature conservation value of the wood is low.

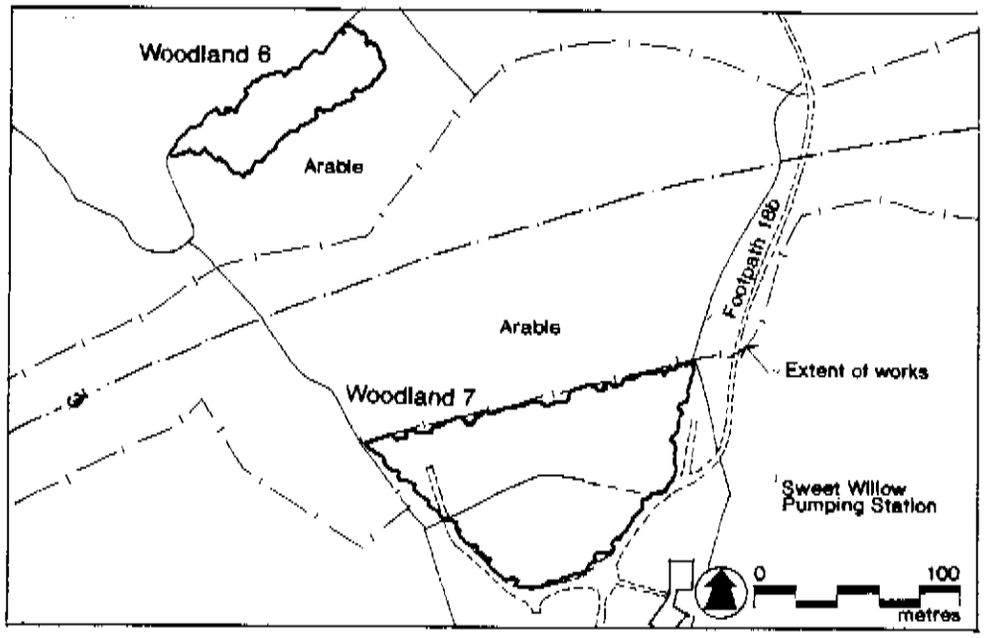


Figure 14. Woodlands 6 and 7

6.7 Woodland 7 (Sweet Willow Pumping Station), 1.0 ha (Figure 14)

6.7.1 This was an area of neglected coppice. The main tree species were hornbeam and oak, present as coppice and as standards. The shrub layer was sparsely distributed, but varied in species composition. The ground flora was also surprisingly rich for such a dense canopy cover. It included bluebell, wood avens (*Geum urbanum*), dog's mercury and violets.

6.7.2 The community is W8d or W8b, the ivy or wood anemone sub-community of the ash - field maple - dog's mercury woodland. Both forms are common in south east Britain and the clay soils of the Weald.

6.7.3 The site is of local nature conservation value overall.

6.8 Woodland 8, 0.7 ha (Figure 15)

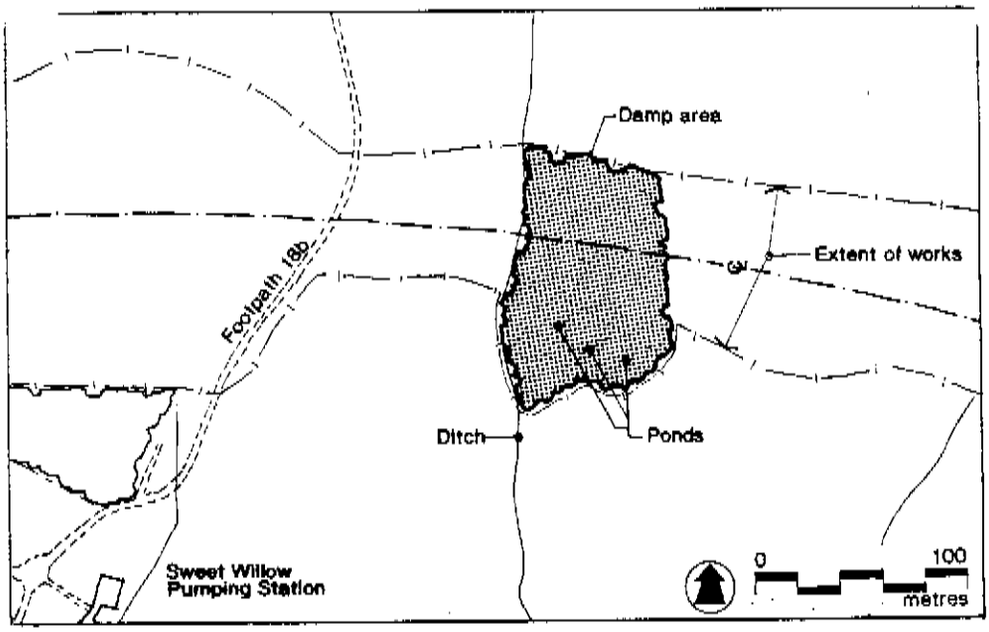


Figure 15. Woodland 8

6.8.1 This was broad-leaved woodland which covered a large pit containing three ponds. The woodland structure was high forest, with a dense canopy consisting of mature oak and ash. Occasional field maple trees were present. In wetter areas, alder was locally abundant.

6.8.2 The shrub layer was formed by bramble, hawthorn (*Crataegus monogyna*), hazel and holly. The ground flora varied with the soil moisture conditions. Dog's mercury was dominant in the drier parts. Hemlock water dropwort and nettles were common in wet areas.

6.8.3 The main community is W8d , the ivy sub-community of the ash - field maple - dog's mercury woodland. The wetter parts showed a tendency towards NVC type W6a, the typical community of the alder- nettle community. As discussed in 6.5.2 the latter community probably arises from nutrient enrichment.

6.8.4 Overall the woodland is of local nature conservation value.

6.9 Woodland 9 Jack O'Boreham's Wood, 50+ ha (Figure 16)

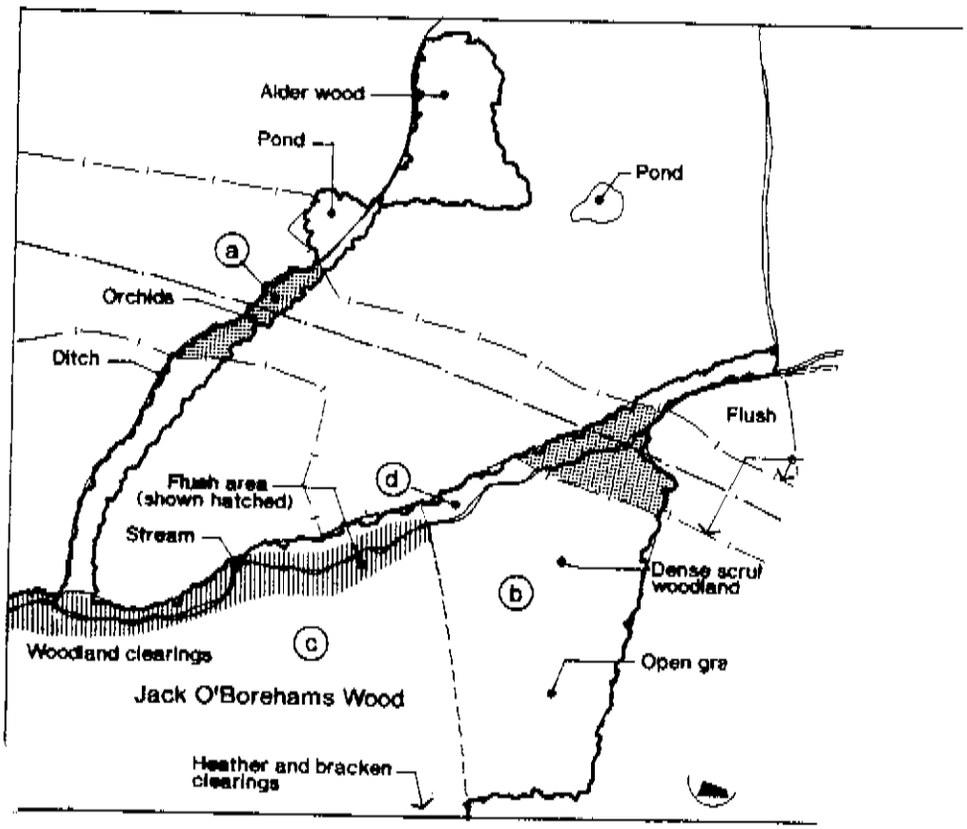


Figure 16. Woodland 9 Jack O'Boreham's Wood

6.9.1 Part of this wood is included in the High Woods Site of Special Scientific Interest (SSSI) (Appendix 1). The woodland, but not the shaws are identified as ancient woodland in the *Inventory of Ancient Woodlands*. However, the shaws show many of the vegetation characteristics of ancient woodland. These were surveyed, as was the northern part of Jack O'Boreham's Wood (Figure 16).

(a) The shaw comprised W8d, the ivy sub-community of the ash - field maple - dog's mercury woodland and W6a the typical community of the alder - nettle woodland.

(b) The eastern fringe had the W23c wood sage sub-community of the gorse (*Ulex europaeus*) - bramble scrub. This will probably develop into W16 oak - birch - wavy hair-grass woodland in time.

(c) The main block of the woodland to the west was the W10c ivy sub-community of the oak - bracken - bramble woodland.

(d) W7 alder - ash - yellow pimpernel woodland.

6.9.2 The main woodland block was varied in structure and species composition. The canopy was dominated by birch and oak and there were areas of sweet chestnut, hazel and hornbeam coppice. A clearing with dry heathland vegetation was present.

6.9.3 The shaw had a canopy cover dominated by ash and field maple. Willow was present in the wetter areas. The ground flora was patchily distributed but included common spotted orchid.

6.9.4 The narrow north easterly arm consisted of a narrow strip of wet woodland along the stream. The canopy was dominated by alder, with a shrub layer of hazel, bramble, red currant and honeysuckle.

6.9.5 The SSSI is, by definition, of national nature conservation interest. The two areas of woodland extending from the SSSI are of local to county intrinsic interest, but, taken with the interest of the meadow that they enclose (see 4.4.2 above), the vegetation north of the SSSI is of local to county interest. The nature conservation interest must also be considered in the light of the historic interest of this area (Report 8, Cultural Heritage survey and assessment) so that the overall environmental interest is high.

6.10 Woodland 10 Kiln Wood, 4 ha (Figure 17)

6.10.1 The canopy of this woodland which appears on the *Inventory of Ancient Woodland* was dominated by neglected sweet chestnut coppice, with occasional standards. In some areas birch invasion had occurred. Other tree species present were oak, beech (*Fagus sylvatica*) and hornbeam. The shrub layer was patchily distributed and included hazel, holly and rhododendron (*Rhododendron ponticum*).

6.10.2 The NVC type is W10b the wood anemone sub-community of the pedunculate oak - bracken - bramble woodland.

6.10.3 Approximately half of the sweet chestnut stools showed signs of die-back. Two clearings created by storm damage were present. One had been invaded by bramble, the other by rhododendron.

6.10.4 The site is of local nature conservation value.

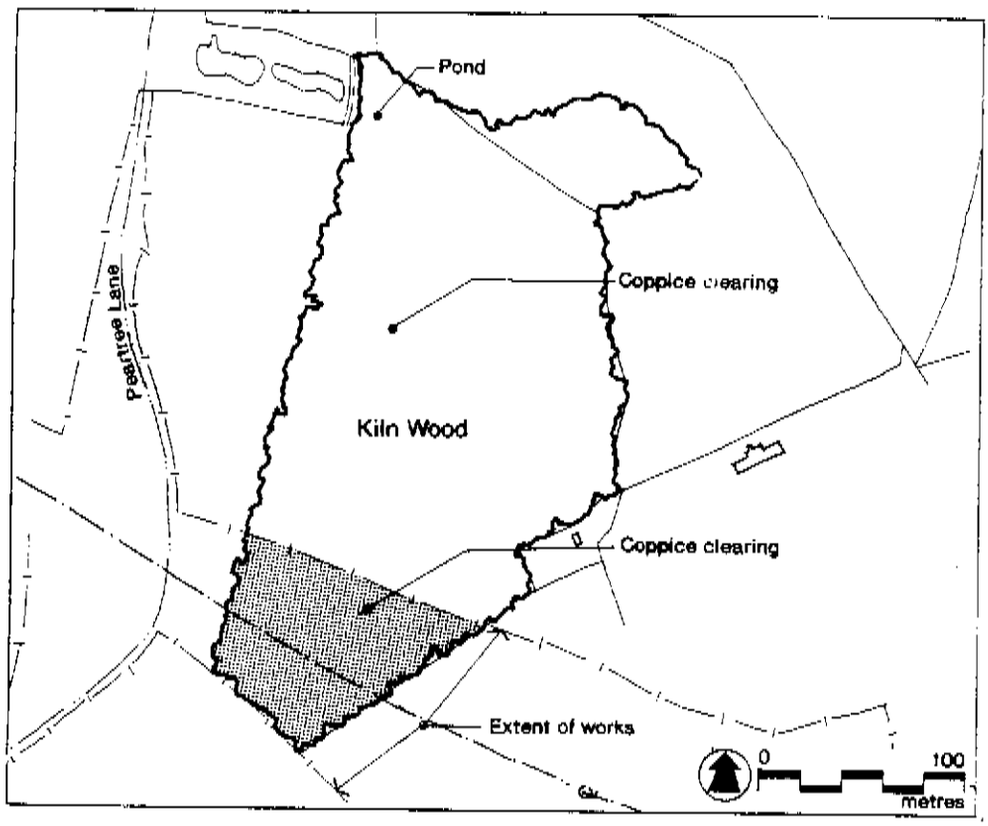


Figure 17. Woodland 10 Kiln Wood

6.11 Woodland 11, 1 ha (Figure 5)

This area was a conifer plantation. Some broad-leaved trees were present, including oak, birch and willow. The woodland is not of significant nature conservation interest and no further survey work was conducted.

6.12 Woodland 12 Bircham Shaw, 0.85 ha (Figure 18)

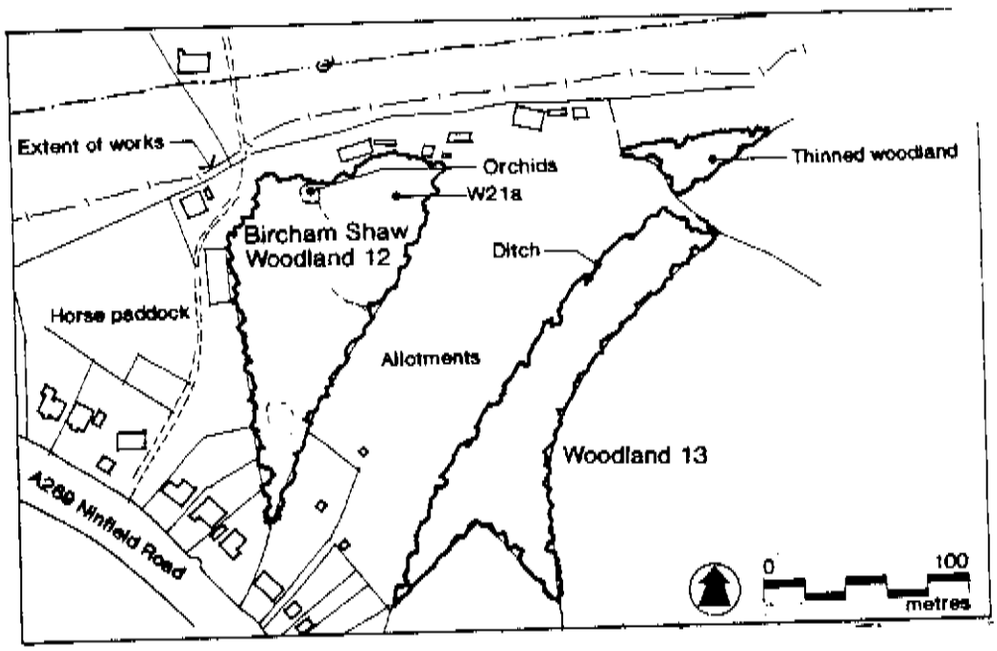


Figure 18. Woodland 12 Bircham Shaw + Woodland 13

6.12.1 This shaw consisted of abandoned sweet chestnut coppice. Birch was frequent throughout. The shrub and ground flora was patchily distributed. The former contained hazel, hawthorn, willow and locally dominant holly. The ground flora consisted of a scattering of ivy and bluebell.

6.12.2 The woodland type is W10b, the wood anemone sub-community of the pedunculate oak - bracken - bramble woodland.

6.12.3 The site is of local nature conservation value.

6.13 Woodland 13, 0.65 ha (Figure 18)

6.13.1 This woodland is separated from Bircham Shaw by allotments. It was abandoned sweet chestnut coppice lying on a steep, dry, south west facing slope. The main part of the woodland was W10b, the wood anemone sub-community of the pedunculate oak - bracken - bramble woodland.

6.13.2 At the base of the slope wetter soil conditions were present. The vegetation here was matched to the W6 alder - nettle woodland community.

6.13.3 The woodland is of local nature conservation interest.

6.14 Woodland 14 Cole Wood, 14 ha (Figure 19)

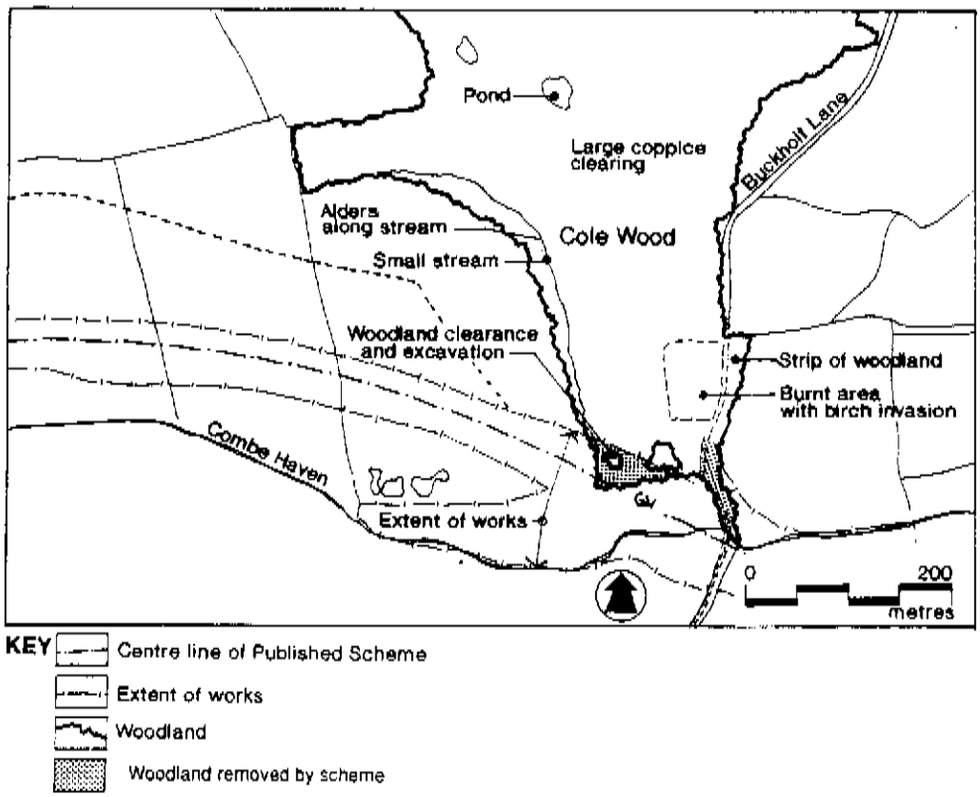


Figure 19. Woodland 14 Cole Wood

6.14.1 This woodland is listed on the *Inventory of Ancient Woodland*. It consisted of sweet chestnut and hazel coppice with oak standards. The south western corner of the woodland had been burnt and was being invaded by birch. The southern edge of the wood was being cleared at the time of the survey.

6.14.2 The main woodland area was matched to NVC type W10b, the wood anemone sub-community of the pedunculate oak - bracken - bramble woodland. A wetter strip along the stream is probably W7, the alder - ash - yellow pimpernel woodland.

6.14.3 The wood is of local nature conservation interest.

6.15 Woodlands 15, 16 and 17, 1 ha (Figures 20, 21, 22)

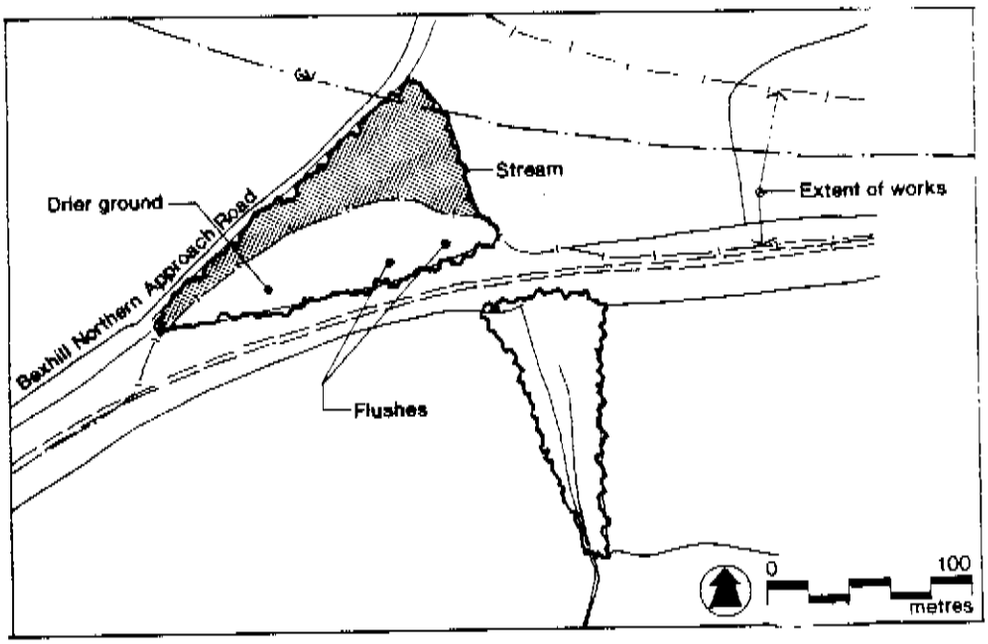


Figure 20. Woodland 15

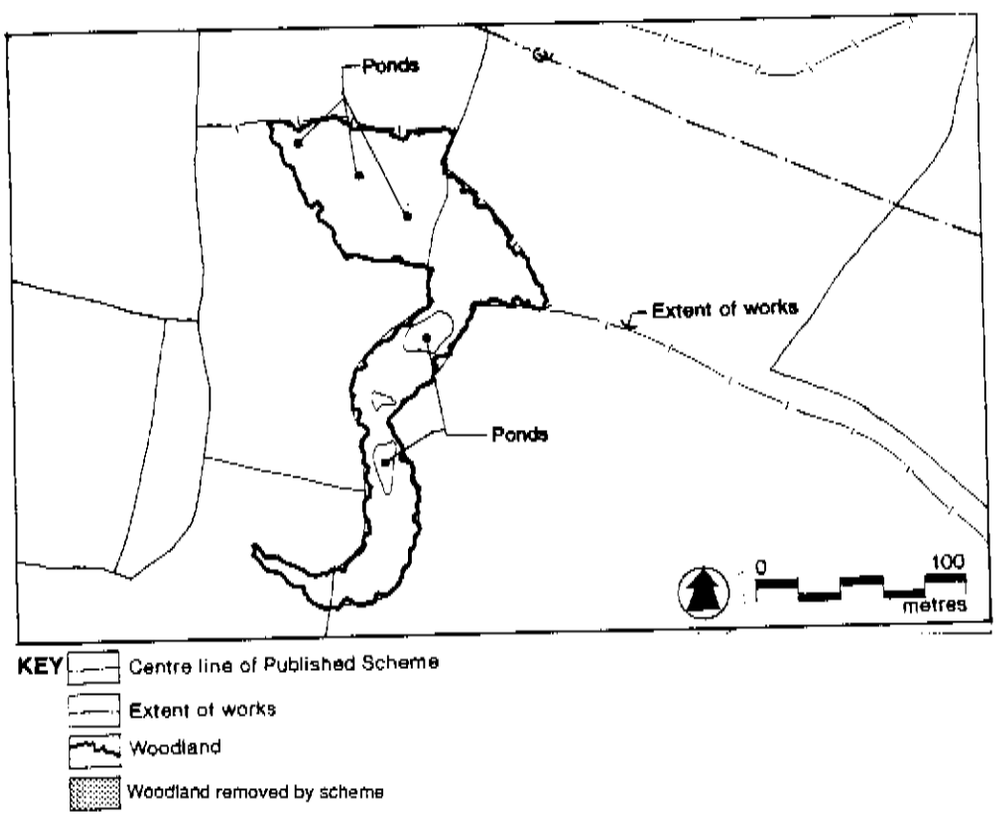


Figure 21. Woodland 16

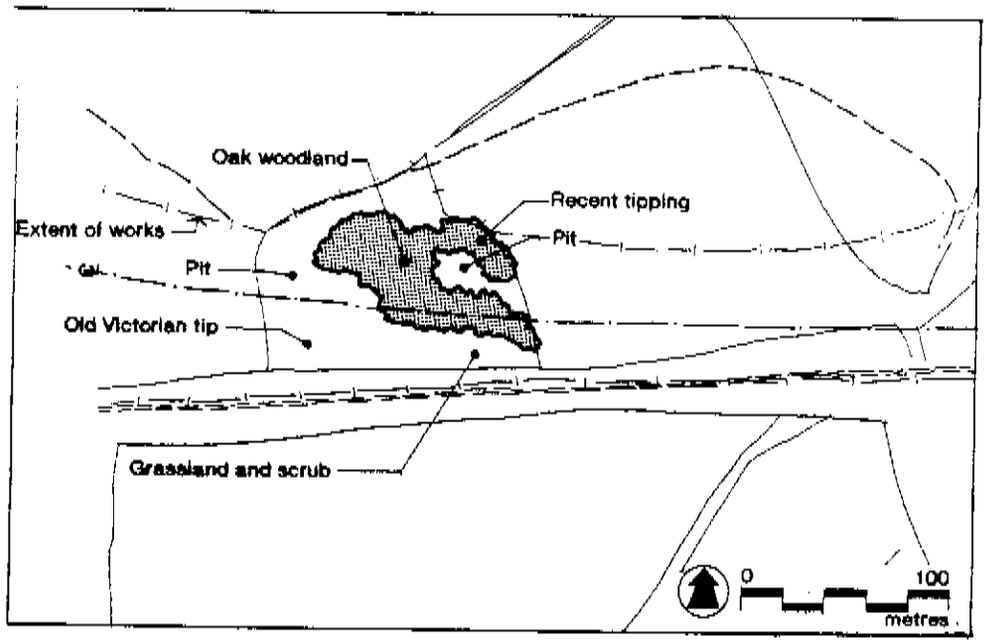


Figure 22. Woodland 17

6.15.1 Two of these three woodlands have developed alongside the former railway line. Woodland 15 was wet and belongs to W6, the alder - nettle woodland. The canopy was dense, consisting of alder, willow and birch.

6.15.2 Access to woodland 16 was denied.

6.15.3 Woodland 17 had a central area of oaks with surrounding scrub invasion. The site had previously been used as a rubbish tip. The NVC type was W21a, ivy - nettle sub-community of hawthorn - ivy scrub.

6.15.4 Sites 15 and 17 are of local nature conservation interest.

6.16 Woodland 18, 0.5 ha (Figure 23)

6.16.1 This small area of woodland was managed as coppice. The main species present were alder, hazel, ash and willow with some hawthorn, holly, spindle (*Euonymus europaeus*), and dog rose (*Rosa canina*). Wetter areas with alder were also present.

6.16.2 The small size of each vegetation type means that matching to NVC type was difficult. However, the dry zones were matched to W10c the ivy sub-community of pedunculate oak - bracken - bramble woodland. The wet areas were matched to W6a, the typical sub-community of the alder - nettle woodland.

6.16.3 The site is of local nature conservation interest.

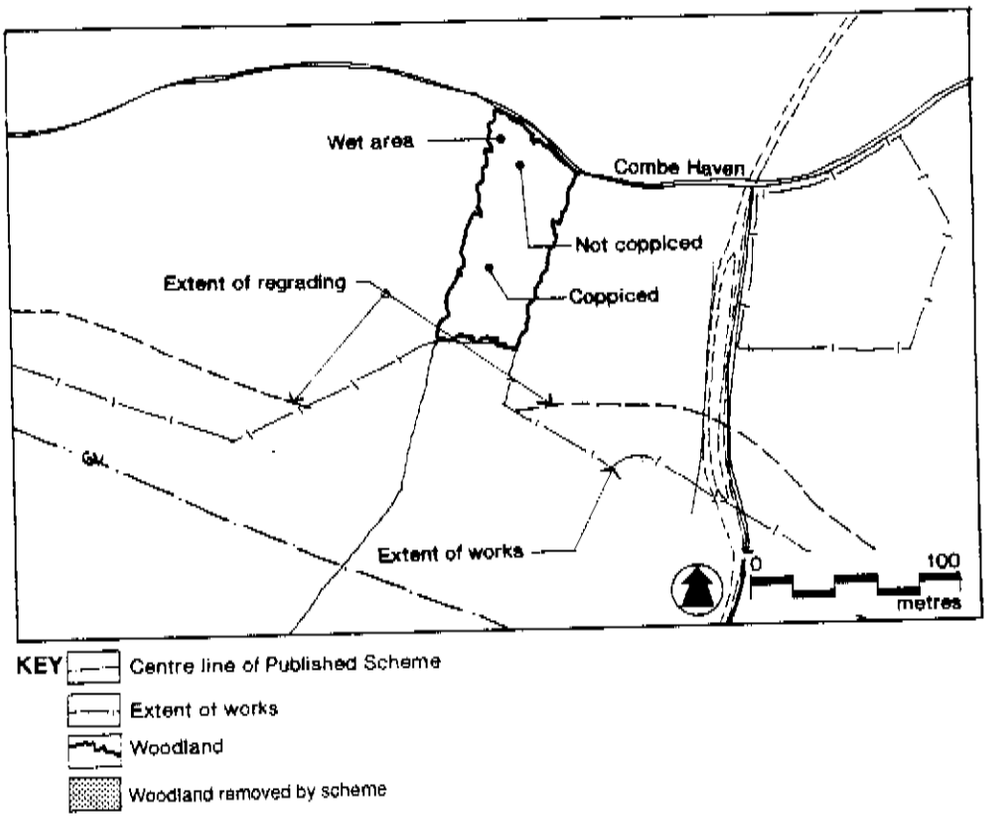


Figure 23. Woodland 18

6.17 Woodland 19 Combe Wood, 8.7 ha (Figure 24)

6.17.1 The woodland appears in the *Inventory of Ancient Woodland.* It was intensively managed and much of it was deer grazed.

6.17.2 The area to the west of the footpath (Figure 24) contained a diversity of habitats. These included open grassland, scrub and mature woodland. The woodland mainly comprised hornbeam coppice with oak standards. Other areas of sweet chestnut and hazel were present. Wet areas were dominated by alder and aspen. This area was W10b, the wood anemone sub-community of pedunculate oak - bracken - bramble woodland. The wet flush areas were matched to W7, alder - ash - yellow pimpernel woodland.

6.17.3 The area to the east of the footpath contained W10b woodland. Some of the areas were, however, not grazed. The main canopy species were oak, ash, birch, hornbeam and sweet chestnut. The shrub layer was dense and included holly, hazel, elder and bramble.

6.17.4 The woodland is of local nature conservation interest.

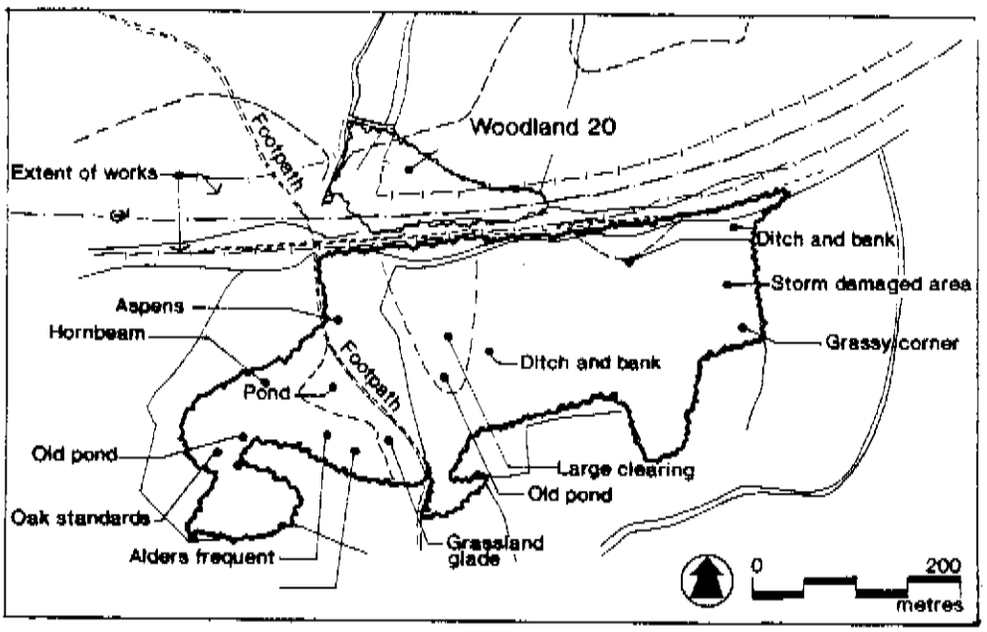


Figure 24. Woodland 19 Combe Wood

6.18 Woodland 20, 1.5 ha (Figure 6)

6.18.1 This woodland had two distinct areas. Hawthorn scrub was present in the west while the eastern section was abandoned ash, birch and hornbeam coppice. Oak, birch and field maple were present as standards. The shrub layer was poorly developed, though bramble, blackthorn, holly and gorse were present.

6.18.2 The scrub area was W21a, the ivy - nettle sub-community of hawthorn - ivy scrub. The woodland community was W8d, the ivy sub-community of the ash - field maple - dog's mercury woodland.

6.18.3 The woodland is of local significance for nature conservation.

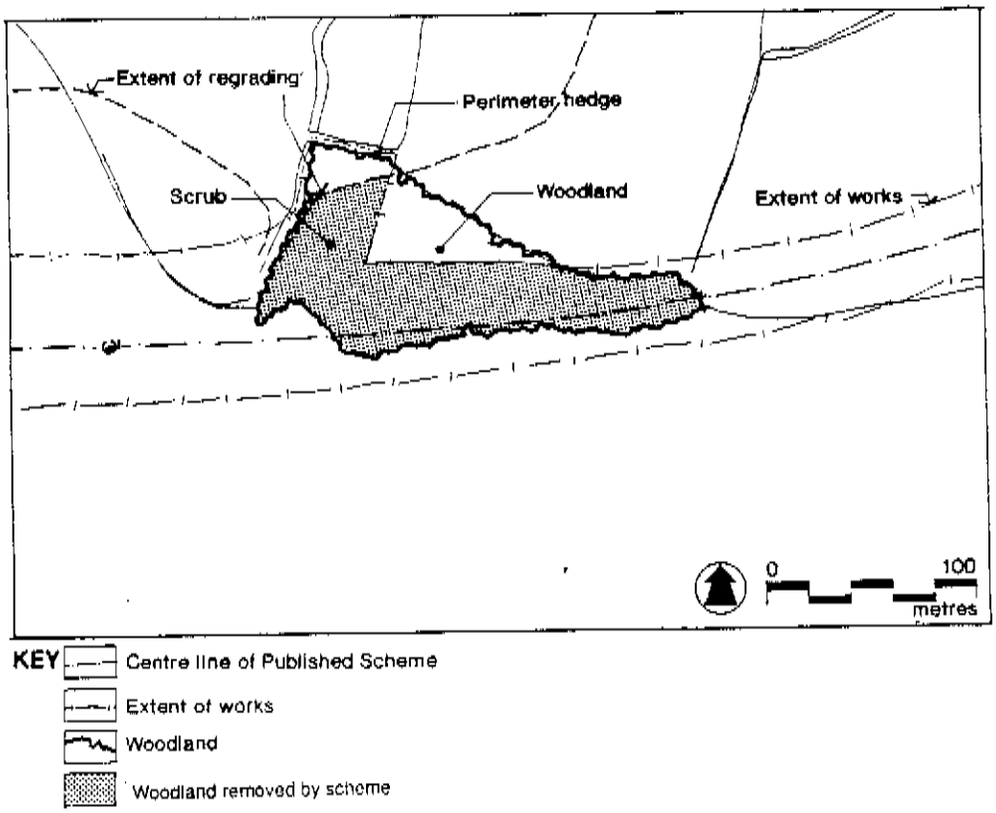


Figure 25. Woodland 20

6.19 Woodland 21, 0.5 ha (Figure 6)

6.19.1 This was an area of semi-natural high forest. The dense canopy comprised oak, hornbeam, ash and field maple, while the patchy shrub layer consisted of bramble and hazel.

6.19.2 The woodland was W8d, the ivy sub-community of the ash - field maple - dog's mercury woodland.

6.19.3 The wood is of local nature conservation interest (see Figure 6).

6.20 Woodland 22, 0.6 ha (Figure 6)

6.20.1 This was an area of woodland which had been largely cleared when surveyed. Only a few oak, ash and birch were present and no features of nature conservation interest were apparent. No further survey was conducted.

6.21 Woodland 23, 0.3 ha (Figure 6)

6.21.1 This was a copse dominated by birch and ash, with an understorey of abandoned hazel coppice. The ground flora contained primrose, bluebell, red campion and Yorkshire fog.

6.21.2 The match to an NVC type for this woodland was inconclusive. More detailed survey would resolve this position, but this was considered unnecessary since the wood is 200 m from the proposed road (see Figure 6).

6.2.1.3 This wood is of low nature conservation interest.

6.22 Woodland 24 Decoy Pond Wood, 2.25 ha (Figure 7)

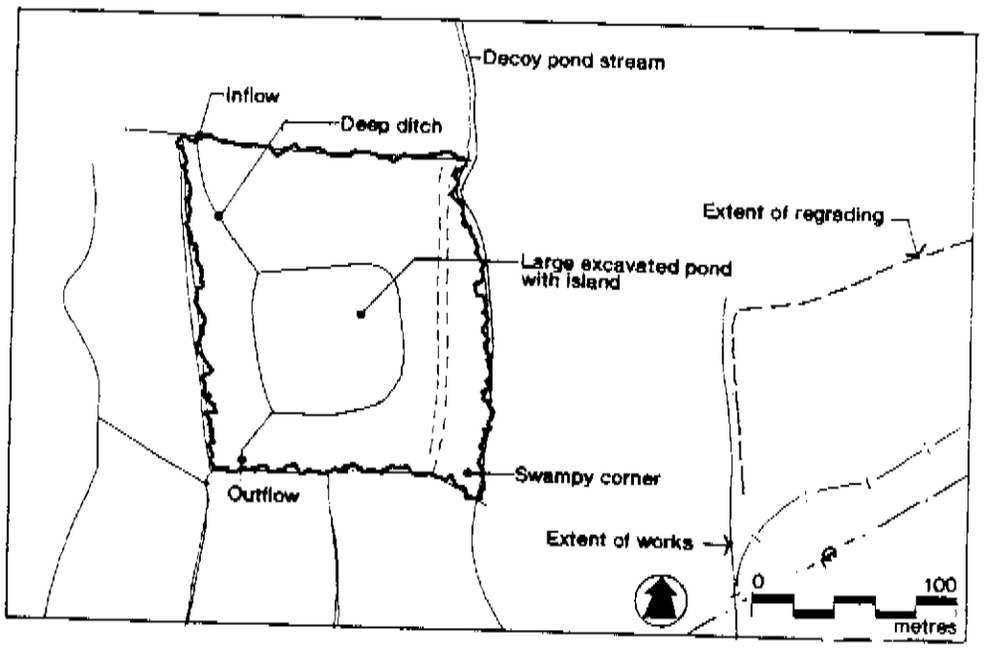


Figure 26. Woodland 24 Decoy Pond Wood

6.22.1 This woodland is included in the *Inventory of Ancient Woodland.* It forms part of the Combe Haven SSSI. The pond had been recently re-excavated and supported a quite rich marginal vegetation. The main section of the woodland comprised ash coppice with oaks and aspen locally common. This shrub layer was formed by bramble, hawthorn, holly and hornbeam.

6.22.2 The community type is W8 the ash - field maple - dog's mercury woodland.

6.22.3 As part of the SSSI, the site is of high, at least county and possibly of national importance.

6.23 Woodland 25 Monkham Wood, 4 ha (Figure 27)

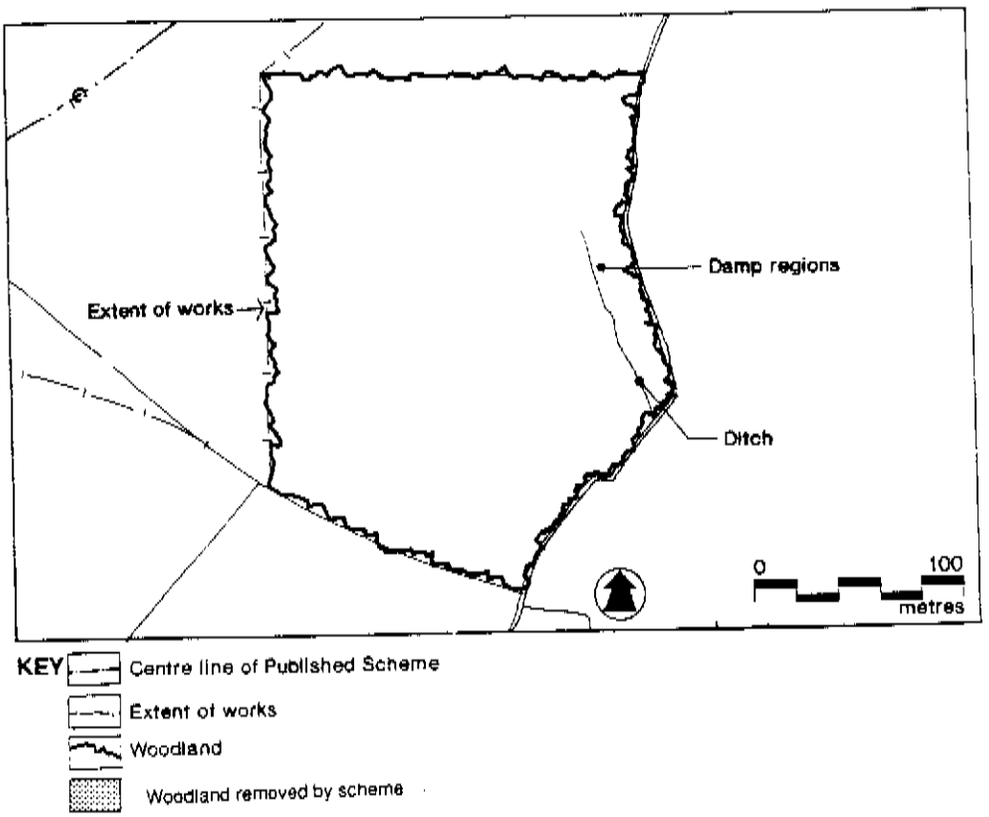


Figure 27. Woodland 25 Monkham Wood

6.23.1 This woodland is also part of the Combe Haven SSSI and appears on the *Inventory of Ancient Woodland*. It had a canopy cover of abandoned hornbeam coppice with oak standards. The shrub layer was poorly developed as a result of low light levels and grazing pressure. Scattered brambles, hazel, holly and sweet chestnut were present.

6.23.2 The community was W10c, the ivy sub-community of pedunculate oak - bracken - bramble woodland.

6.23.3 As part of the SSSI, the site is of high value.

6.24 Woodland 26, 0.82 ha (Figure 28)

6.24.1 There was a soil moisture gradient within the wood with increasingly wet conditions from east to west. The drier ground had a canopy of oak, hornbeam, sweet chestnut and ash. In the wetter areas alder was dominant, with some willow scrub. The ground flora in both parts was sparse, with a considerable amount of disturbed soil due to cattle grazing.

6.24.2 The dry area was W10, the pedunculate oak - bracken - bramble community. The wet area was difficult to classify because of the disturbance. It was either W6b, the crack willow sub-community of the alder - nettle woodland, or W7, the alder - ash - yellow pimpernel woodland.

6.24.3 The site is of local nature conservation interest.

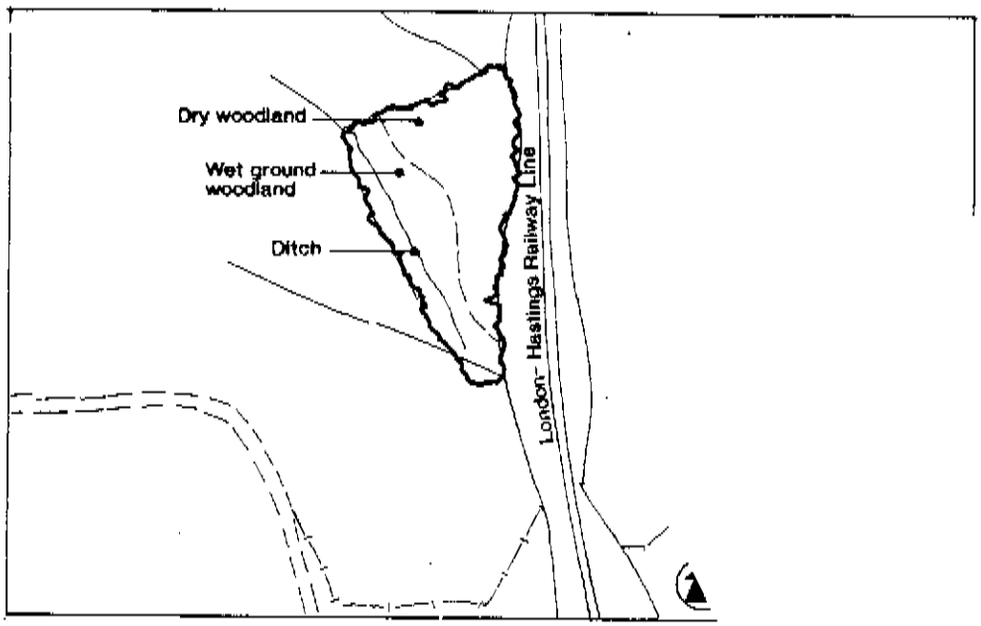


Figure 28. Woodland 26

6.25 Woodland 27 Park Wood, 9.0 ha (Figure 29)

6.25.1 This woodland is included within Marline Woods SSSI and is on the *Inventory of Ancient Woodland.*

6.25.2 Two distinct vegetation types appeared to be present. Closest to the preferred route the canopy was open. It comprised oak, ash, hornbeam, birch and field maple. The shrub layer was well developed with sweet chestnut, hazel, elder and hawthorn present. This woodland was W8, the ash - field maple - dog's mercury woodland.

6.25.3 Further into the woodland the canopy was denser. This area was W10c, the ivy sub-community of the pedunculate oak - bracken - bramble woodland. The canopy was hornbeam dominated with oak standards. The shrub layer was patchy and the ground flora restricted to a few bluebells and ferns.

6.25.4 The areas examined did not contain features of high nature conservation interest. However, they are an integral part of the SSSI and as such must be considered to be of high nature conservation value.

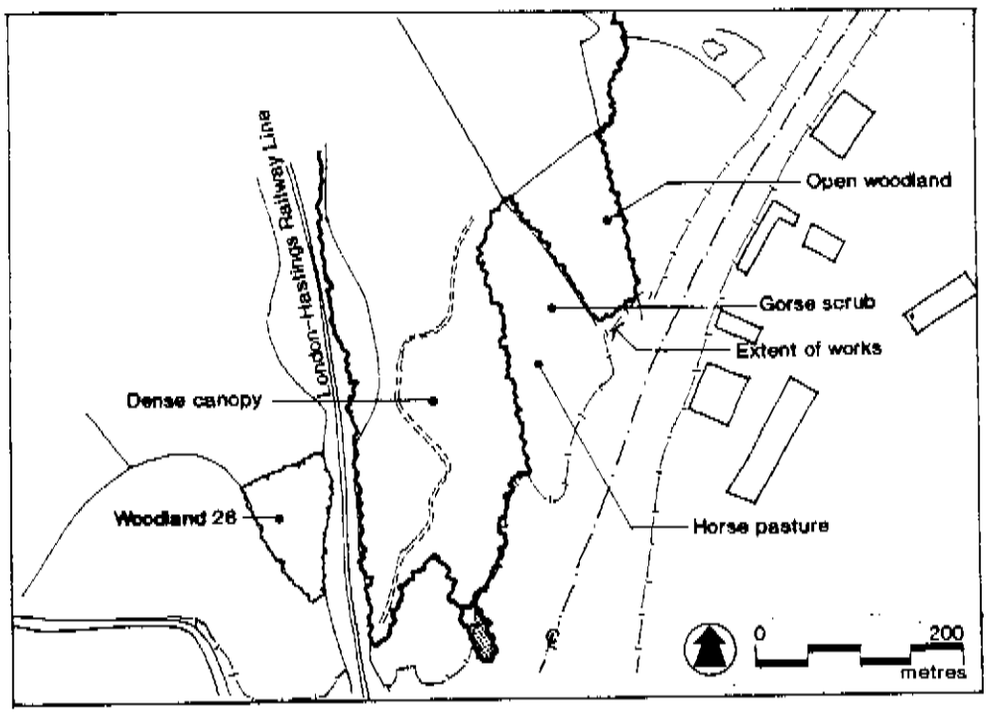


Figure 29. Woodland 27 Park Wood

6.26 Woodland 28 Marline Wood, 10 ha (Figure 30)

6.26.1 The two smaller arms of the wood were surveyed together with the northern section of the main woodland. These are part of the Marline Woods SSSI and are listed in the *Inventory of Ancient Woodland.*

6.26.2 The eastern arm contained three ponds. All were heavily silted and two were very shaded. They contained little aquatic vegetation. The third was dominated by great reedmace (*Typha latifolia*). The woodland canopy was dominated by oak with frequent ash and occasional field maple, sweet chestnut and alder. The shrub layer contained coppiced hazel, hornbeam and field maple. The NVC type was W8d, the ivy sub-community of the ash - field maple - dog's mercury woodland.

6.26.3 The western arm consisted of abandoned coppice of hornbeam and hazel. Oak standards were present, as was a wet flush dominated by alder was present. The NVC type was W10c, the ivy sub-community of pedunculate oak - bracken - bramble woodland.

6.26.4 The main section of woodland was dominated by abandoned hornbeam coppice with oak and ash standards. The shrub layer comprised hawthorn, holly and young ash and beech. The ground flora was notable for its fern assemblage which included hart's-tongue (*Phyllitis scolopendrium*), narrow buckler-fern (*Dryopteris carthusiana*) and male fern (*Dryopteris filix-mas*).

6.26.5 The areas surveyed contained no features of outstanding nature conservation interest, but are an integral part of the SSSI and as such are of high nature conservation interest.

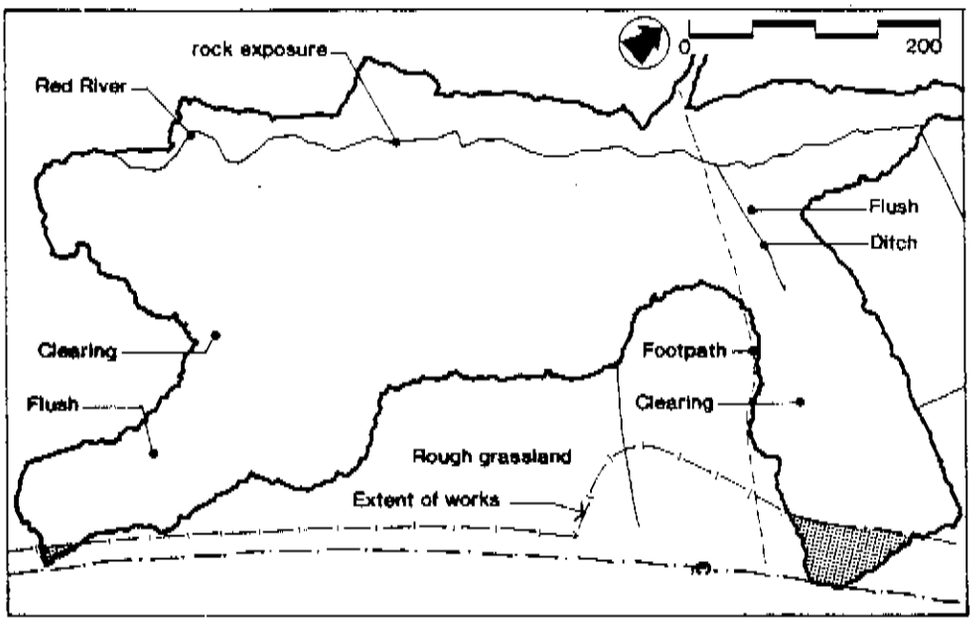


Figure 30. Woodland 28 Marline Wood

6.27 Woodland 29, 0.5 ha (Figure 8)

6.27.1 These areas consisted of two sections of woodland alongside the existing Queensway Road separated by about 250 m. Both had a canopy of abandoned hazel coppice with standards of oak and ash. Alder, sycamore and beech were present together with wild service-tree (*Sorbus torminalis*). The shrub layer consisted of hazel, field maple and sweet chestnut coppice with bramble, holly, blackthorn and ash saplings.

6.27.2 The vegetation has been matched W8d, the ivy sub-community of the ash - field maple - dog's mercury woodland, which also occurs on the adjacent Marline Woods.

6.27.3 The woods are of local nature conservation interest only.

6.28 Woodland 30, 1.02 ha (Figure 9)

This was a small fragment of woodland surviving from clearance for housing and is not of nature conservation significance.

6.29 Woodland 30A, 1.1 ha (Figure 9)

6.29.1 These are two small fragments of woodland either side of West Ridge path. The woodland to the north by Queensway has a canopy with pedunculate oak, ash, turkey oak and sweet chestnut and is grazed by horses, with a very poor ground flora of nettles and docks. It is not of nature conservation significance.

6.29.2 The woodland south of the track has a canopy of pedunculate oak and ash, with a dense shrub layer of cherry laurel. The ground flora is virtually absent. It is not of significance for nature conservation.

6.30 Woodland 31, 0.65 ha (Figure 31)

6.30.1 This woodland had a canopy of mature oak and ash. An area of Turkey oak (*Quercus cerris*), horse chestnut (*Aesculus hippocastanum*) and Scots pine (*Pinus sylvestris*) had been recently planted. Both areas were W8d, the ivy sub-community of the ash - field maple - dog's mercury woodland.

6.30.2 It is of low nature conservation significance.

6.31 Woodland 32 Beauport Park, 50+ ha (Figure 31)

6.31.1 This former parkland contains trees of considerable age with a mixture of natives and exotics. It is not ancient woodland but may contain areas of ancient wood pasture. Thirty hectares were surveyed.

6.31.2 The native species included oak, ash and small-leaved lime (*Tilia cordata*) with areas of ash coppice and birch and ash woodland present. The shrub layer was dominated by rhododendron and laurel (*Prunus laurocerasus*), with hazel, field maple, hornbeam and bramble also present. The ground flora consisted mainly of bluebell, dog's mercury and ivy, with little present where rhododendron and laurel (*Prunus laurocerasus*) were dominant.

6.31.3 The main woodland was matched to W8d, the ivy sub-community of ash - field maple - dog's mercury woodland. Beyond the scheme limit there is an area of W16a oak - birch - wavy hair-grass woodland pedunculate oak sub-community invading bracken near the caravans. Towards the pond by the A21, there is extensive sycamore coppice, giving way to mixed sweet chestnut - sycamore coppice to the north downslope. The sycamore coppice woodland can be treated as a W8 ash - field maple - dog's mercury woodland but is not typical.

6.31.4 From a brief inspection it is probable that within the rest of the park a number of other NVC types may be present but they would be at a considerable distance from the road.

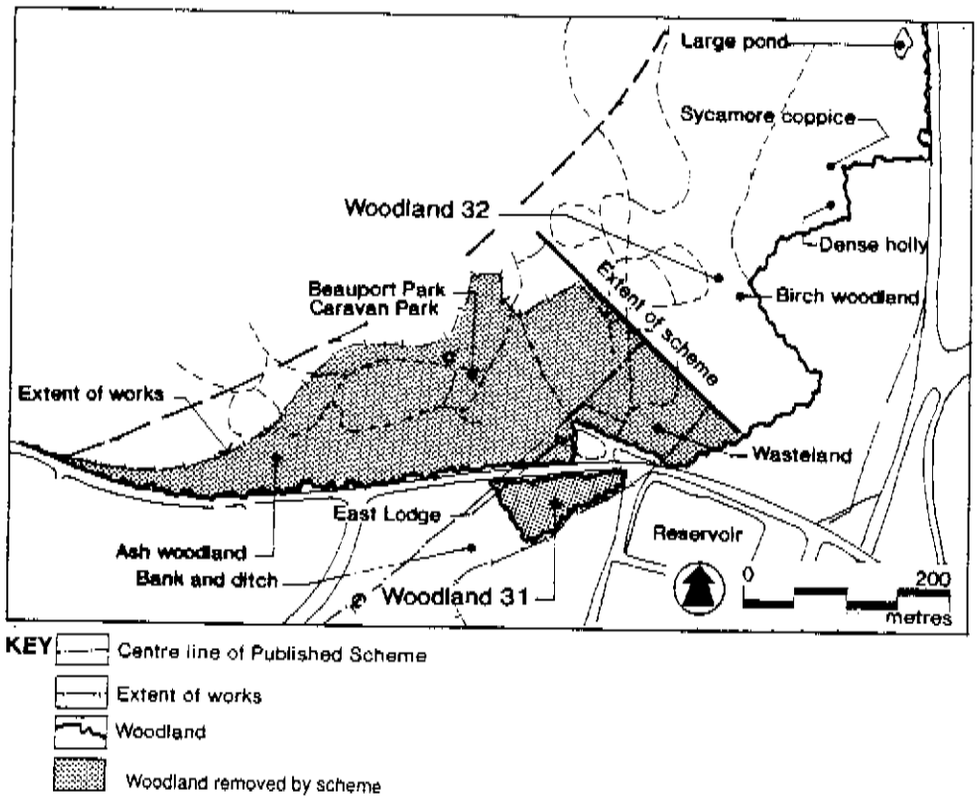


Figure 31. Woodland 31 + Woodland 32 Beauport Park

TABLE 1 : EVALUATION OF WOODLAND AREAS SURVEYED, USING NATURE CONSERVANCY COUNCIL CRITERIA

NAME	WOOD	GRID REF	ANCIENT WOODLAND	EVALUATION CRITERIA									
			INVENTORY	SIZE Ha	DIVERSITY	NATURALNESS	RARITY	FRAGILITY	TYPICALNESS	RECORDED HISTORY	POTENTIAL VALUE	INTRINSIC APPEAL	OVERALL ASSESSMENT
HIGHFIELD WOOD EXTENSION	1	TQ 698099	NO	0.18	-	-	-	-	-	-	-	-	FULL ACCESS DENIED
BIRCHTREE WOOD	2	TQ 699102	NO	1.0	MOD	LOW	LOW	MOD	HIGH	LOW	LOW	MOD	LOCAL
HIGHFIELD WOOD	3	TQ 699099	NO	1.38	LOW	MOD	LOW	LOW	HIGH	LOW	MOD	MOD	LOCAL
	4	TQ 703103	NO										NOW REMOVED
	5	TQ 703099	YES	2.0	MOD	MOD	LOW	MOD	HIGH	LOW	MOD	MOD	LOCAL
	6	TQ 707105	NO	0.25	LOW	LOW	LOW	LOW	HIGH	LOW	LOW	LOW	LOW
	7	TQ 708103	NO	1.0	MOD	LOW	LOW	LOW	HIGH	LOW	LOW	MOD	LOCAL
	8	TQ 712104	NO	0.7	MOD	MOD	MOD	MOD	HIGH	LOW	LOW	LOW	LOCAL
JACK O'BOREHAM	9	TQ 710100	YES	50 +	HIGH	MOD	MOD	MOD	HIGH	MOD (SSSI)	HIGH	HIGH	LOCAL TO COUNTY
KILN WOOD	10	TQ 719102	YES	4.0	LOW	LOW	LOW	LOW ?	HIGH	LOW	MOD	MOD	LOCAL
	11	TQ 728100	NO	1.0	LOW	LOW	LOW	LOW	-	LOW	LOW	LOW	LOW CONIFER PLANTATION

NAME	WOOD	GRID REF	ANCIENT WOODLAND	EVALUATION CRITERIA									
			INVENTORY	SIZE Ha	DIVERSITY	NATURALNESS	RARITY	FRAGILITY	TYPICALNESS	RECORDED HISTORY	POTENTIAL VALUE	INTRINSIC APPEAL	OVERALL ASSESSMENT
BIRCHAM SHAW	12	TQ 731100	NO	0.85	LOW	LOW	LOW	LOW	MOD	LOW	LOW	LOW	LOCAL
	13	TQ 733100	NO	0.65	MOD	LOW	LOW	MOD	MOD	LOW	LOW	MOD	LOCAL
COLE WOOD	14	TQ 740103	YES	14	MOD	LOW	LOW	MOD	MOD	LOW	MOD	MOD	LOCAL
	15	TQ 748096	NO	1.0	MOD	MOD	MOD	MOD	MOD	LOW	MOD	MOD	LOCAL
	16	TQ 745096	NO	0.36	-	-	-	-	-	-	-	-	ACCESS RESTRICTED
	17	TQ 751096	NO	0.8	MOD	LOW	LOW	LOW	MOD	LOW	LOW	MOD	LOCAL
	18	TQ 748098	NO	0.5	MOD	LOW	MOD	MOD	MOD	LOW	LOW	MOD	LOCAL
COMBE WOOD	19	TQ 755096	YES	7.0	HIGH	MOD	LOW	LOW	MOD	LOW	MOD	MOD	LOCAL
	20	TQ 757097	NO	1.15	MOD	LOW	LOW	LOW	MOD	LOW	MOD	MOD	LOCAL
	21	TQ 759097	NO	0.45	LOW	LOW	LOW	LOW	MOD	LOW	LOW	MOD	LOCAL
	22	TQ 763098	NO	0.6	-	-	-	-	-	-	-	-	LARGELY CLEARED
	23	TQ 764097	NO	0.3	LOW	LOW	LOW	LOW	MOD	LOW	LOW	MOD	LOCAL
DUCK DECOY POND	24	TQ 766105	YES	2.25	MOD	MOD	MOD	MOD	MOD	MOD (SSSI)	MOD	MOD	COUNTY

NAME	WOOD	GRID REF	ANCIENT WOODLAND	EVALUATION CRITERIA									
			INVENTORY	SIZE Ha	DIVERSITY	NATURALNESS	RARITY	FRAGILITY	TYPICALNESS	RECORDED HISTORY	POTENTIAL VALUE	INTRINSIC APPEAL	OVERALL ASSESSMENT
MONKHAM WOOD	25	TQ 773104	YES	4	LOW	MOD	LOW	LOW	MOD	MOD (SSSI)	MOD	MOD	COUNTY
	26	TQ 773112	NO	0.82	MOD	LOW	LOW	MOD	MOD	LOW	MOD	HIGH	LOCAL
PARK WOOD	27	TQ 775115	YES	9	MOD	MOD	LOW	MOD	MOD	MOD (SSSI)	MOD	MOD	COUNTY
MARLINE WOOD	28	TQ 780122	YES	18	MOD	MOD	LOW	MOD	MOD	MOD (SSSI)	MOD	HIGH	COUNTY
	29	TQ 785127	NO	0.25	LOW	LOW	MOD	MOD	MOD	LOW	LOW	LOW	LOCAL
	30	TQ 792132	NO	1.02	-	-	-	-	-	-	-	-	MOSTLY REMOVED FOR RESIDENTIAL DEVELOP-MENT
	30A		NO	1.10	-	-	-	-	-	-	-	-	LOW
	31	TQ 785133	NO	0.63	LOW	V.LOW	LOW	LOW	LOW	LOW	MOD	MOD	LOW
BEAUPORT PARK	32	TQ 785135	NO	50 +	MOD	LOW	LOW	LOW	LOW	LOW	MOD	MOD	LOCAL

7.0 HEDGES : SURVEY AND EVALUATION

7.1 General Character and Condition

7.1.1 The study area has a strong pattern of mixed-species hedges, which are predominantly those of pre-eighteenth century enclosure. In some cases, such as the shaws present at Samples 36 and 38 (Figure 5), they may be fragments of ancient woodland, and as such might be expected to have remnants of woodland ground flora. The significance of hedges as elements in the landscape history of the study area is described in more detail in Report 8, Cultural Heritage.

7.1.2 Within the study area, many hedges were associated with sharp changes in slope (eg. Figures 4, 5, 6, Samples 21, 33, 50, 58) and some have associated with ditches (eg. Figures, 3, 5, 6, Samples 9, 43, 57).

7.1.3 On some farms, hedges had been regularly cut to about 2-3 m high. Most were maintained as stock-proof hedges, sometimes supplemented with barbed wire fences. Some hawthorn hedges were not regularly cut, and were about 5 m tall. Other hedges were not managed and were grazed and open (eg. Figure 5, Sample 27). Relatively few hedges appear to have been removed in recent years. Some hedges have been 'double-planted' (eg. Figures 3, 5, 7, Samples 17, 40, 78); this is where one species was planted on one side of the hedge, and another planted on the other. A few examples of laid, or partly laid, hedges were seen (eg. Figure 7, Sample 75).

7.1.4 Hedges with trees were from 8-15 m high. The trees were usually regularly spaced standards, either of one species within a hedge (eg. pedunculate oak) or two species (eg. oak and field maple).

7.1.5 The hedges have been related to their nearest equivalent NVC communities. Hedges with trees, or those dominated by ash, field maple, oak or elm (*Ulmus* sp) were related to the nearest woodland community.

7.1.6 The hedges were quite variable in composition. The variety derives from the species planted (predominantly hawthorn, but also blackthorn and hazel), and the species that have invaded, which are a function of soil type, management practice and distance from woodland. Some hedges had been planted in combinations which could not be related to the NVC. Six main types were found.

7.2 Community Types Present

7.2.1 W8d ash - field maple - dog's mercury woodland ivy sub-community

In the study area, hedges belonging to this sub-community were quite frequent on the Wadhurst Clay. Field maple and oak were the most common trees, and ash was infrequent. In the field layer, ivy, cleavers (*Galium aparine*) and nettle were most characteristic, but dog's mercury was usually absent. Some stands could not be clearly placed to sub-community (eg. Figure 7, Sample 75).

7.2.2 W10c pedunculate oak - bracken - bramble woodland, ivy sub-community

In the study area, hedges of this type were quite frequent, and were the typical oak tree-dominated hedges (eg. Figure 5. Samples 33, 36, 38, 44). The occurred most frequently on the more acid sandstone soils. Some stands could not be clearly placed to sub-community (eg. Figures 5, 6, 7, Samples 41, 50, 53, 54, 74).

7.2.3 W21a hawthorn - ivy scrub, ivy-nettle sub-community

All hedges lacking trees and with frequent hawthorn were placed in this sub-community. They were the commonest type in the study area (e.g. Figures 2, 4-8. Samples 2, 19, 27, 40, 48, 49, 65, 69, 73, 78, 79, 84, 89). Some were species-rich with many woody species (eg. Figures 4, 6, 7, Samples 19, 65, 73), other were very poor (eg. Figures 6, 7. Samples 69, 78, 79). Most could be regarded as typical examples. Locally, some hedges were dominated by elm (Figure 3, Sample 13).

7.2.4 W21b hawthorn-ivy scrub, dog's mercury sub-community

Only one example of this hedge type was seen, on the east side of St Mary's Lane (Figure 5, Sample 29). Other examples could have been overlooked due to the dense canopies at the time of survey.

7.2.5 W22 blackthorn - bramble scrub

Hedges dominated by almost solely blackthorn were occasional in the study area (eg. Figures 3 and 8. Samples 9, 93). They occasionally had tree saplings and were generally species-poor. One hedge of blackthorn and privet (*Ligustrum vulgare*) is also included here (Figure 3, Sample 18). Hedges with abundant blackthorn and hedgerow trees or abundant hawthorn are included in the other communities.

7.2.6 Other Hedges

The following hedge types were also found. They were possibly deliberately planted in specific combinations and could not be clearly related to the NVC woodland and scrub communities.

Sallow and willow hedges

Several hedges were found dominated by common sallow (*Salix cinerea*) (Figure 3, Samples 12, 16). These were clearly different from the W1 common sallow - marsh bedstraw woodlands. Another hedge with planted osier (*Salix viminalis*), common sallow and hawthorn along a ditch was found on the eastern side of Watermill Lane (Figure 5, Sample 43). A hedge dominated by mixed common sallow and blackthorn was found on the north eastern side of a ditch at Broad Green Farm (Figure 3, Sample 11).

Hazel - blackthorn hedges

A few hedges dominated by mixed blackthorn and hazel were found (Figures 3, 6, Samples 10, 17, 58).

7.3 Evaluation

Individually none of the hedges is of other than local interest. However, where they occur next to woodland or grassland/scrub of nature conservation interest, their value is increased by their contribution to a mosaic of semi-natural habitats. These areas are identified in sections 15.3.2 and 15.4.2.

8.0 SCRUB : SURVEY AND EVALUATION

8.1 General

In the study area, scrub communities were not common. They were most frequent along the verges of Queensway, but were to be found in more neglected areas elsewhere. Five types of scrub were found.

8.2 W21 hawthorn - ivy scrub

Hawthorn - ivy scrub was frequent along the disused railway line and occasionally elsewhere (no samples). These were the W21a ivy-nettle sub-community, which is common throughout Britain.

8.3 W22 blackthorn - bramble scrub

In the study area, only one stand of this scrub was found which was not obviously hedgerow. This was at Preston Hall Farm (Figure 6, Sample 51), where it formed a dense fringe around damp grassland. This was a typical example of the W22a ivy - red campion sub-community.

8.4 W23 gorse-bramble scrub

Within the study area gorse-bramble scrub was occasional on the acidic soils of the Ashdown Beds and the Tunbridge Wells Sand. It usually occurred on road sides and in the corners of fields, and was particularly characteristic of the new verges at Queensway. All examples seen were the W23a sweet vernal-grass sub-community (Figures 5, 8. Samples 34, 89). This sub-community is widespread in Britain and is often characteristic of undisturbed habitats.

8.5 W24 bramble-Yorkshire fog underscrub

This community was uncommon within the study area, and was mainly found near Queensway (Figure 8, Sample 95) and along the old railway line (Figure 6, Sample 70). This was the W24b false oat-grass - hogweed (*Heracleum sphondylium*) sub-community, which is characteristic of sites where brambles have invaded pasture.

8.6 W25 bracken-bramble underscrub

Several stands of bracken and bramble were found along the route. They were the W25a bluebell sub-community which is widespread in Britain.

8.7 Evaluation

The areas of scrub examined were of low or local interest.

9.0 RECENT PLANTATIONS

In several places along Queensway and by the A259 near The Lamb, road-side banks had been planted with trees. These were recorded (Figures 2, 8, 9. Samples 1, 91, 92, 97) but not ascribed to NVC communities. They are not of nature conservation significance.

10.0 BRACKEN : SURVEY AND EVALUATION

Bracken stands were scattered along the line of the route. They usually occurred on steep banks, in neglected corners of pastures or invading from hedgerows. They tended to lack the associated characteristic species of the NVC types, but generally had a grassy component where they were invading pasture. Some stands had bluebells and other woodland broadleaved plants. They were all treated as the U20a bracken - heath bedstraw (*Galium saxatile*) fern community, sweet vernal-grass sub-community (Figures 5, 6, 7. Samples 25, 63, 83). None was of significant nature conservation interest.

11.0 WETLAND COMMUNITIES : SURVEY AND EVALUATION

11.1 General

This section describes only the vegetation of wetlands and its significance. Report 5 describes the invertebrate interest and its significance and Report 9 discusses flora and fauna of nature conservation interest in relation to water quality assessment.

11.2 Aquatic Communities

11.2.1 Although ponds were occasional along the line of the route, most were in woodland and shaded, with little or no vegetation. Some were filled with swamp vegetation (Section 11.3).

11.2.2 One pond at Little Bearsden had a true aquatic community. This was the A15 Canadian pondweed (*Elodea canadensis*) community, characterised by dominant Canadian pondweed (Figure 5, Sample 31). This community is widespread in Britain and the vegetation is not if significant nature conservation interest. However, the pond contains an uncommon number of invertebrates and its overall value is discussed in Report 5.

11.2.3 A man-made pond near New Lodge Farm (Figure 2) held areas of open water dominated by broad-leaved pondweed (*Potamogeton natans*), ivy-leaved duckweed (*Lemna trisulca*) and Nuttall's pondweed (*Elodea nuttallii*). This was referable to the A9b broad-leaved pondweed community

Canadian pondweed sub-community. The Canadian pondweed was here replaced by Nuttall's pondweed, as it is widely elsewhere in Britain. This community also occurred in the adjacent ditch between banks lined with reeds. These ditches are cleared out every year. It is of local interest.

11.3 Swamps

11.3.1 Swamp vegetation was found mainly on the Barnhorn Level. It is also present within the Combe Haven SSSI and is described in Report 1. However, there is one area of Combe Haven outside the SSSI which is discussed below.

11.3.2 S5c Reed sweet-grass (*Glyeria maxima*) swamp, water plantain (*Alisma plantago - aquatica*)-branched bur-reed (*Sparganium erectum*) sub-community

This community was found along the old East Stream on Barnhorn Level and in a pond and ditches (Figure 2 and 3).

11.3.3 S12a Great reedmace (*Typha latifolia*) swamp, great reedmace sub-community

There were large stands of great reedmace in the New Lodge Farm pond (Figure 2). Another stand is present near Ninfield (Figure 5).

11.3.4 S13 Lesser reedmace (*Typha angustifolia*) swamp

One small area of lesser reedmace had been deliberately planted at the southern end of the pond at New Lodge Farm (Figure 2).

11.3.5 S14c branched bur-reed swamp, water mint (*Mentha aquatica*) sub-community

Three examples of S14c branched bur-reed swamp water mint sub-community were found at Barnhorn Level in the drier ends of ditches (Figure 3, Samples 6, 7). The vegetation was quite variable. Some ditches had abundant branched bur-reed, another had abundant soft rush.

11.3.6 S26 common reed - nettle fen

Stands of the 26c common reed - nettle fen hemlock water-dropwort (*Oenanthe crocata*) sub-community was found near Court Lodge (Figure 3, Sample 4) and along Old East Stream.
One stand of the 26d great willowherb (*Epilobium hirsutum*) sub-community was seen on Glovers Farm (Figure 6, Sample 60).

11.3.7 S28 reed canary-grass (*Phalaris arundinacea*) swamp

One area of this swamp type, lacking reed canary-grass, was found on Glovers Farm (Figure 6, Sample 59). The stand was otherwise very similar to the S28b great willowherb - nettle sub-community and it is treated as such.

11.4 Evaluation

None of the wetland areas examined contains uncommon community types or species. They are typical of many lowland areas. The vegetation is generally of considerably lesser interest than the adjacent Pevensey Levels or Combe Haven. However, the ditches contain nationally rare species of invertebrates and an assessment of this aspect of their nature conservation significance is given in Report 5.

12.0 OTHER VEGETATION

12.1 The following stands are either difficult to classify in the NVC, or may be treated in the weed chapter (currently unavailable).

12.2 Hemlock water-dropwort stands

One large stand of hemlock water-dropwort was found in a ditch in an abandoned field near Ashdown Employment area (Figure 9, Sample 99). This may be changing following abandonment of grazing. The stand has affinities with the M28a yellow flag (*Iris pseudacorus*) - meadowsweet (*Filipendula ulmaria*) mire rush (*Juncus* species) sub-community of western Scotland. It lacks yellow flag and meadowsweet, but is otherwise remarkably similar.

12.3 Nettle Beds

Nettle beds are characterised by dominant nettle, often with cleavers and elder (*Sambucus nigra*). They occur on very rich, damp soils. One sample was found on Glovers Farm (Figure 6, Sample 62).

12.4 Pineappleweed community

Stands of pineappleweed are very typical of the areas around gates and heavily trampled disturbed ground. They will probably appear in the British Plant Communities Volume V - Maritime and Weeds, when published. This community was characteristic of gates and the middle of the old railway (Figure 6, Sample 70). Stands have not been marked individually.

12.5 Meadow foxtail - hairy sedge pasture

One pasture with hairy sedge (*Carex hirta*), meadow foxtail, rough stalked meadow grass and Yorkshire fog (Figure 6, Sample 52) could not be clearly classified. It occurred on a species-poor flood meadow pasture on clay soils and appeared to be intermediate between the MG13 creeping bent - marsh foxtail pasture and the MG9 Yorkshire fog - tufted hair-grass grassland. It may have been modified by past treatment.

13.0 ARABLE WEEDS

13.1 There were arable fields of wheat, flax, oil-seed rape, and barley along the line of the route, mainly near Hooe and at Combe Haven. The arable weed classification in the NVC is currently unavailable. Full lists of weed species were not compiled, some distinctive species are noted below.

In broad-leaved crops, the following species were seen:

Common orache	(*Atriplex patula*)
Fat hen	(*Chenopodium album*)
Many-seeded goosefoot	(*Chenopodium polyspermum*)
Sun spurge	(*Euphorbia helioscopa*)
Sharp-leaved fluellen	(*Kickxia elatine*)
Round-leaved fluellen	(*Kickxia spuria*)
Wild radish	(*Raphanus raphanistrum*)
Charlock	(*Sinapis arvensis*)
Corn Spurrey	(*Spergula arvensis*)
Field woundwort	(*Stachys arvensis*)

In the cereal fields the following were noted:

Soft-brome	(*Bromus hordeaceus*)
Rye brome	(*Bromus secalinus*)
Broad-leaved spurge	(*Euphorbia platyphyllos*)
Italian rye-grass	(*Lolium multiflorum*)

13.2 Rye brome (*Bromus secalinus*) is a rare, introduced arable weed. It is resistant to herbicides and is locally abundant in many arable fields on the edge of the Barnhorn Level. There are only five records for East Sussex in the *Sussex Plant Atlas* (Hall, 1980). It is regarded locally as a pest by the farmers.

13.3 Broad-leaved spurge (*Euphorbia platyphyllos*) is another rare arable weed with only 35 records in the last 30 years. It rarely persists for long. It was found near Sweet Willow Pumping Station.

13.4 Another rare arable weed, lesser quaking grass (*Briza minor*), was also reported from near Hooe recently along the line of the route. This may be the first record for East Sussex for 40 years.

14.0 GENERAL IMPACTS AND THEIR MITIGATION

14.1 The road would be likely to affect areas of nature conservation interest in a number of ways. The general principles of these impacts are briefly reviewed here, before dealing with specific impacts and their mitigation in section 15.

14.2 Habitat loss

14.2.1 Direct habitat loss as a result of land take would be of significance for areas of nature conservation interest. A secondary consequence of habitat loss would be that remaining portions of habitats may be severed from each other, so that species-turnover and migration would be limited. The remaining areas might be so small that populations of particular animals and plants die out as a result of natural population fluctuations, or they may be more vulnerable to change such as altered grazing regime.

14.2.2 The impact could be mitigated in two ways. Firstly, the route could be aligned to minimise the area of habitat lost. Secondly, some, but not all habitats could be re-developed through appropriate planting and management. This is the case, for instance, with the hedges, scrub and recent woodland where new planting as part of landscape measures would provide long-term replacement.

14.3 Changes in management

14.3.1 Some communities are dependent on management, and therefore changes in management can affect the composition of vegetation. Grasslands are amongst the most sensitive communities: for instance losses of species-rich hay meadows would result from introduction of permanent grazing. Short term changes in management imposed by construction of the road, such as the removal of grazing or absence of hay cutting for a year or two, are unlikely to have significant effects provided the original management is re-introduced following completion of the road. More significant changes in the long term may result from re-organisation of farms.

14.3.2 Since such long term changes in management are generally unpredictable, no account has been taken of them in this assessment. Where long term management is required for landscape objectives, land would either be acquired by the DoT or acquired under license and returned to the landowner.

14.4 Input of nutrients

14.4.1 Oxides of nitrogen are by-products of combustion contained in vehicle exhaust emissions. Wet or dry deposition of these gases and subsequent uptake by plants and vegetation can act as a nitrogenous fertiliser which can alter the growth rate of plants and favour the more vigorous species. Grasses in

particular are sensitive to nitrogen deficiency, and they respond proportionally more strongly to additional nitrogen input than herbaceous plants. For example, Bobbink (1991) has shown marked increases in tor-grass (*Brachypodium pinnatum*) in the Netherlands which was attributed to atmospheric nitrogen deposition. Studies in the New Forest (P. Angold, British Ecological Society Conference presentation, 1990) show nutrient addition effects up to 50-100m on heathland away from roads, but the effects are likely to be less marked on moderately nutrient rich soils such as those predominant in the study area.

14.4.2 Many road verges in Britain are markedly eutrophic (nutrient-rich), probably resulting at least in part from locally-generated nitrogen deposition from car exhausts.

14.4.3 No areas of high sensitivity to nutrient enrichment have been identified within the road corridor.

14.5 Pollution

14.5.1 High levels of heavy metals (eg lead, copper) in soils can be very toxic to plants and can dictate the types of vegetation which grows at particular sites. Heavy metal input associated with roads (eg, lead from petrol, zinc from tyres) rarely results in concentrations sufficient to affect the vegetation significantly, but they may affect other parts of the food chain (eg, snails are very sensitive to copper pollution).

14.5.2 Gaseous pollutants such as ozone, sulphur dioxide and oxides of nitrogen have all been shown to affect plant growth. The effects tend to be specific to individual plants and the impacts on communities as a whole are not well understood or easily predicted (TERG 1988).

14.6 De-icing salt

14.6.1 Salt (usually sodium chloride) is widely used in Britain for winter de-icing of roads. Salt application rates vary from 2-20 tonnes per lane km per annum, and are strongly influenced by the severity of the winter. Salt is usually transferred from the roads to verges as spray, and to ditches as run-off. It may be persistent in the soil, with maximum levels occurring in January to March, and minimum levels in September or October. Sodium is more persistent in the soil than chloride (Thompson *et al*, 1986).

14.6.2 In recent years, the influence of winter de-icing salt on roadside vegetation has been widely noted (Scott and Davison, 1982, Thompson and Rutter, 1986). Coastal species such as reflexed poa (*Puccinellia distans*) and Danish scurvy grass (*Cochlearia danica*) are now widely spread on motorways and trunk roads throughout England. Typically, these salt-tolerant plants occur in narrow (100-200 mm) strips down the verge margins where salt deposition is highest. There is usually little

sign of saline influence further away from the verges except on evergreen trees and shrubs which often show signs of salt-burn. Most plant species can tolerate some salt increase.

14.6.3 No species of particular sensitivity to salt have been found on the route corridor. Where vegetation of interest is close to the road at grade, comment is made in the following section on potential impact. Where the adjacent vegetation is protected by distance or the road being in cutting, no comment is made.

14.7 Leaching of minerals from construction materials

14.7.1 Leaching of calcium, magnesium and other cations from construction materials such as concrete or ballast can locally influence the pH and nutrient status of the soil. This is most obvious on acid soils, where areas of richer vegetation occur along roadsides. This is analogous to the agricultural practice of liming.

14.7.2 Such leaching would be unlikely to have significant effects on the areas discussed in this report.

14.8 Dust deposition

14.8.1 Dust may be generated during construction, or as a result of wear and tear on carriageway surfaces. Deposition of such dust and incorporation into soils could significantly affect the vegetation of sensitive soils by altering the soil pH and nutrient status (eg, Etherington 1978). The addition of base-rich dust to acid soils would increase the pH in the short term, although this would be reversible in the longer term on permeable soils as a result of leaching. Input of sand and acid dust onto calcareous soils can result in decreases in pH, while deposition of clay or fine dust onto permeable soils could restrict the drainage.

14.8.2 No significant dust impacts would be anticipated within the areas described in this report.

14.9 Disturbance

14.9.1 Changes in the physical environment introduced by a development may affect adjacent vegetation. For instance, considerable edge effects as a result of increased light would result if a road was put through the middle of a closed woodland, or a viaduct would introduce local shading.

14.9.2 The principal effect on the areas discussed in this report would be the liability of the newly-exposed woodland edges to windblow. This is discussed for each area affected in the following section.

14.10 Water table and drainage

14.10.1 Variations in water table height are of crucial importance for many communities on seasonally-inundated or wet soils (eg, swamps, wet grasslands). The construction of cuttings, re-direction and culverting of drainage channels and addition of road surface run-off can markedly affect the local hydrology of sites, and may have knock-on effects elsewhere in the catchments.

14.10.2 The environmental impact of drainage and runoff associated with the road is dealt with in Report 9.

15.0 SITE SPECIFIC IMPACTS AND THEIR MITIGATION

15.1 General

15.1.1 The assessment of the severity of the effects of an environmental impact is dependant on the following factors:

a) the importance of the feature affected;
b) the type of effect;
c) the confidence that can be placed in the assessment made.

A very severe effect on a site of low value for nature conservation would be of less significance than a slight effect on a site of high value.

15.1.2 Impacts can be divided into direct impacts such as loss of vegetation, and indirect impacts such as severance. The latter can be difficult to assess and the confidence of the prediction may be low. The impacts are classed as:

low	-	no significant change in nature conservation interest
medium	-	significant diminution in nature conservation interest
high	-	complete change in vegetation/habitat and loss of nature conservation interest.

15.1.3 In the following account the impacts are dealt with as they occur along the route, starting from the western end. They are described in sections according to the chainages at which they occur (figures 2-9).

15.2 Figure 2, Chainages 0-1500

15.2.1 General

Within this section there is no grassland or woodland of nature conservation significance, and the impacts would be confined to hedges and wetland.

15.2.2 **Hedges**

Impact 770 m of hedges would be removed. The community type present is mainly W21a, the ivy - nettle sub-community of hawthorn - ivy scrub. These are not of significant nature conservation interest. The impact would therefore be high on vegetation of low significance. Small sections of the hedges to the south of the road are alder - nettle community.

Mitigation The scrub to be planted as part of the landscape scheme for this section would more than compensate for their loss. Hedges planted as accommodation works could add to this benefit.

15.2.3 **Ditches**

Impact Approximately 120 m of Old East Stream would be lost in this section. This is a wide ditch fringed with S26c common reed - nettle fen with A9b broad-leaved pondweed community, Canadian pondweed sub-community. Nearby ditches of S14c branched bur-reed swamp, water mint sub-community, totalling 140 m and a further 120 m of S26c would be lost. The full impact on ditches is assessed in Report 9.

Mitigation The new sections of ditch proposed would be excavated to a profile allowing colonisation by vegetation similar to that lost.

15.2.4 **New Lodge Pond**

Impact The whole of this pond which is S12 greater reedmace swamp and S13 lesser reedmace swamp with A9b broad-leaved pondweed community, Canadian pondweed sub-community would be lost. There is therefore a high impact on a feature of local interest.

Mitigation A new pond of similar size and profile would be created on the opposite side of the road.

15.3 Figure 3, Chainages 1500-3500

15.3.1 *General* In this section, only one area of grassland of nature conservation significance would be affected. The road would however affect hedges, ditches, Birchtree Wood, Highfield Wood and Woodland 1.

15.3.2 **Hedges**

Impact 1745 m of W21a, the ivy nettle sub-community of hawthorn ivy scrub would be lost, together with 260 m of common sallow hedge 320 m of hazel-blackthorn hedge and 130 m ash - field maple. The area of greatest interest is from footpath 10d northwards where the well-developed hedge network links to improved grassland and smaller woodland blocks.

The impact on individual hedges is high on features of low significance, but from footpath 10b northwards, the impact has to be considered cumulatively with other semi-natural habitats.

15.3.3 **Ditches**

Impact 310 m of ditch comprising S26c common reed - nettle fen, hemlock water-dropwort sub-community and S5 reed sweet-grass swamp would be lost. 460 m of S14c branched bur-reed swamp, water mint sub-community and 1260 m of shaded ditches would also be destroyed. The full impact is discussed in Report 9.

Mitigation New sections of ditch would be created which would be excavated to a profile allowing colonisation by vegetation similar to that lost.

15.3.4 **Grassland**

Impact 1.8 ha of grassland of the Yorkshire fog - soft rush pasture, typical sub-community would be lost to construction of the road and the adjacent balancing pond. This is a high impact on a feature of local interest.

Mitigation New wetland habitats would be created both by over deepening the balancing pond and by the excavation of new ditches. These would not replace the wet grassland lost but would add features of nature conservation interest.

15.3.5 **Woodland (Woodland 1)**

Impact The southern-most end of the wood (0.05 ha) would be lost through excavation of the roadside ditch. Access to the wood for survey was denied, but it appears to contain wetland species like alder and willow. Construction of embankment on the downhill side may adversely affect the moisture regime of the wood. However, with appropriate detailed setting out of ditch and highway fence, exposure of the edge to windblow is unlikely. The planting within the highway boundary would act as a buffer in preventing salt spray entering the wood.

Mitigation New planting within the highway boundary would compensate for the small loss of woodland habitat.

Birchtree Wood (Woodland 2)

Impact Realignment of Whydown Road would remove 0.06 ha of W10c pedunculate oak - bracken - bramble woodland, a common vegetation type. There would, therefore, be a high but very localised direct impact on a feature of local value. Since the existing culvert would be replaced, there is unlikely to be a significant alteration to the moisture regime within the woodland and while windblow is possible, the exposed edge would lie away from the prevailing wind. The indirect impacts are therefore unlikely to be significant.

Mitigation New planting on the Whydown Road embankments would compensate for the loss of trees and shrubs.

Highfield Wood (Woodland 3)

Impact About a quarter of the central part of the wood, totalling 0.9 ha of W8d the ivy sub-community of ash - field maple - dog's mercury woodland would be lost. The road may impede the surface drainage of the uphill remaining part of the woodland creating wetter soil conditions. This is not necessarily an adverse impact and may encourage a more diverse flora. Windblow is very probable because of the prevailing wind and the long exposed edge and the remaining areas of woodland would be likely to diminish in nature conservation interest as a result of fragmentation. Overall, salt spray along the woodland edge may also have an impact. The impact is high on a site of local significance.

Mitigation The surviving woodland would be acquired for management in which trees liable to windblow would be removed. The resulting 'coppicing' is likely to increase wildlife value of the remaining areas. New planting would compensate for trees and shrubs lost. Along the north western edge of the road the planting would link to woodland to form a continuous woodland.

15.4 Figure 4, Chainages 3500-5800

15.4.1 General

Except for Woodland 8, the route passes through land in intensive agricultural use and there would not be significant impacts. However, around the northern end of Jack O'Boreham's Wood, the route would affect a mosaic of woodland, grassland and scrub of significant interest.

15.4.2 **Ditches**

Impact 950 m of ditch would be lost or culverted. These are of low vegetation interest.

Mitigation New ditches would be created.

15.4.3 **Hedges**

Impact 530 m of hedge of either W21 hawthorn-ivy scrub or W21a ivy-nettle sub-community, would be lost. This is generally a high impact feature of low importance, but the dense network of hedges around Peartree Lane links to woodland, is close to the Jack O'Boreham's complex and is of at least local significance.

Mitigation New scrub planting would compensate for the loss of hedges.

15.4.4 **Grassland**

Impact Approximately 1 ha of the meadow vetchling sub-community of crested dog's tail - common knapweed meadow (MG5a) would be lost to the construction of the road and the balancing pond. The two surviving areas would be severed and their interest would be diminished. The significance of the grassland is increased by its position within a habitat mosaic. However, the field has not been grazed or cut for some time and if the road were not built it is possible that scrub would continue to encroach and the nature conservation interest would be greatly devalued.

The impact is, therefore, high on a site of current local to county significance.

Mitigation Consideration would be given to establishing wild flower grassland on several sections of the route in accordance with the Wild flower Handbook (Department of Transport 1993). This would not compensate directly for the vegetation type lost but would provide a great area of at least equivalent nature conservation interest.

15.4.5 **Woodland**

Woodlands 5, 6 and 7 are sufficiently far from the road for them to be unaffected by it.

Woodland 8

Impact The road would remove about 80% (0.6 ha) of this woodland which is of a nationally common type. The fragment left would be likely to suffer from windblow.

Mitigation The remaining area of woodland would be managed to prevent windblow. Planting to the west of the wood would compensate for trees and shrubs lost.

Jack O'Boreham's Wood

Impact The woodland of High Wood SSSI would not be directly affected by the road. However, a shaw extending from the northern edge of the wood, a wet flush along the northern edge and scrub on the eastern edge would be affected.

About 0.15 ha would be lost from the shaw, a narrow strip of wet flush covering 0.15 ha and a small cover of scrub. The impact arises both from the loss of habitat (a high impact on areas of local intrinsic value) and disruption of a habitat mosaic (a medium impact on an area of county/local value). The north eastern tip of the wood would be severed to such a small remnant that the resulting loss would be approximately 0.2 ha.

It is possible that the road may constrain surface water drainage at the northern end of the area of wet scrub, but this is unlikely to be a significant effect.

Mitigation The present soil moisture regime and drainage pattern of the retained areas would be retained by culverting the existing stream and placing a balancing pond adjacent to the road. This is discussed further in Report 9 (Water Quality Survey and Assessment). Scrub and wetland habitats would be created around the balancing pond.

Kiln Wood

Impact Approximately 0.8 ha (20%) of the total area of sweet chestnut coppice in this area of probable ancient woodland would be lost. The exposed edge would be liable to windblow. Salt spray is unlikely to have an effect since the cutting and new planting would buffer the woodland. A change in moisture regime is unlikely since the wood is on a steep slope. Over half the patch of scrub (0.3 ha) to the west of the wood would be lost.

Mitigation New planting on the cutting slopes and the adjacent embankment for the Pear Tree Lane overbridge would compensate for the trees and shrubs lost. These would be of mixed native species, giving a greater variety than the present sweet chestnut coppice.

15.5 Figure 5, Chainages 5800-7900

15.5.1 General

In this section the principal impacts would be on two areas of grassland of local interest, hedgerows and Little Bearsden Pond.

15.5.2 Ditches

Impact One stream and two ditches, totalling 225 m and of low interest, would be culverted.

15.5.3 Hedges

Impact 1470 m of hedges would be lost. These are all of the nationally common W21a ivy - nettle sub-community hawthorn - ivy scrub, with the exception of 70 m of W21b dog's mercury woodland. The impact would be high on features of low nature conservation value.

Mitigation Scrub planting within highway land would compensate for shrubs lost. New hedges could be provided as accommodation works.

15.5.4 Grassland

Grassland south of Thorne Crescent

Impact 0.25 ha of the bracken - heath bedstraw fern community, sweet vernal grass sub-community (U20a) and 0.005 ha of crested dog's-tail - common knapweed meadow, heath grass sub-community (MG5c) would be lost. Hydrological impact and salt damage are very unlikely since the grassland which is characteristic of acid sites is on a slope above a cutting. The impact is high in an area of local significance.

Mitigation Although the communities lost cannot be directly replaced, opportunities for developing wild flower areas elsewhere in the scheme in accordance with The Wildflower Handbook would be taken.

Preston Cottage Meadow

Impact About 0.7 ha of MG5a, the meadow vetchling sub-community of crested dog's-tail - common knapweed meadow would be lost. The remaining area is likely to be abandoned as grazing and so would change in character to rough grassland/scrub.

Mitigation The same mitigation as that described above would be adopted.

15.5.5 Woodland

Woodland 11 would be destroyed (0.9 ha) but is not of nature conservation significance. There is unlikely to be any significant impact on Woodland 12. It is possible that the embankment north of Woodland 13 may locally impede surface drainage, resulting in wetter soil conditions which could affect the northernmost edge of the wood. However, this is unlikely and the area affected is of low nature conservation value.

15.5.6 Little Bearsden Pond

The impact on this and its mitigation is discussed in Report 9.

15.6 Figure 6, Chainage 7900-10,500

15.6.1 General

Within this section the principal impacts would be on two areas of grassland of local interest, Woodland 14 (Cole Wood) and the woodland and scrub adjacent to the disused railway line and hedges.

15.6.2 Ditches

Impact Several shaded low value, often dry ditches totalling 780 m would be destroyed or culverted. The main impact would be the loss of about 280 m of the Combe Haven which would be re-routed. This has a fringing community of S5 reed sweet-grass swamp with S14 branched bur-reed swamp.

Mitigation The Combe Haven would be re-routed close to the original route with a similar profile to the existing watercourse. New ditches would be created further to the west of this section.

15.6.3 **Hedges**

Impact Approximately 890 m of hedges of hawthorn - ivy scrub community would be lost. The edge of the scrub retained, adjacent to the southern side of the road may be liable to salt damage. About 240 m of rows of trees approximating to W8d ash - field maple - dog's mercury community would be lost.

Mitigation New scrub would be planted as part of the landscape proposals.

15.6.4 **Grassland**

Grassland north of Woodland 16

Impact The majority (2.5 ha) of this field which is MG5a, the crested dog's-tail - common knapweed meadow and pasture, meadow vetchling sub-community would be removed either directly for the construction of the road, or indirectly for regrading and planting, only the north eastern corner would remain. The benefits of the regrading and planting would outweigh the loss of the remaining areas of grassland, which would probably degrade to scrub or become improved as a result of changed management practices. The impact would therefore be high in an area of local significance.

Mitigation Although the grassland lost cannot be exactly re-created, opportunities would be taken to develop wildflower grassland in accordance with the Design Manual for Roads and Bridges, Volume 10, Section 4 Part 1 (The Wildflower Handbook).

Grassland south east of the disused Railway

Impact About 1.7 ha of U4a, the typical sub-community of sheep's-fescue - common bent - heath bedstraw grassland would be lost. Salt spray is unlikely to affect the remaining grassland since new planting and the cutting would buffer it. Impact on soil moisture content is also unlikely.

Mitigation The same mitigation as that described above is proposed.

15.6.5 **Scrub**

Impact The main impact would be the loss of approximately 0.1 ha of W8 (ash - field maple - dog's mercury) wood and scrub at the edge of Combe Haven SSSI on the old railway embankment.

Mitigation New scrub would be planted as part of the landscape proposals.

15.6.6 **Woodland**

Cole Wood

Impact About 0.2 ha of woodland of a nationally common vegetation type would be lost. The wood would be severed from the band of woodland to the south where 0.2 ha of a narrow strip would be lost. Salt spray is unlikely to have an effect, since the wood would be buffered by new planting. There would probably not be a significant impact on soil moisture conditions because the wood is on a steep slope. However, windblow along the exposed woodland edge is very probable. Overall there is a high localised impact on a site of local significance.

Mitigation The edge of the woodland would be managed to mitigate the effects of windblow. New planting adjacent to the wood and south of the new road would compensate for trees and shrubs lost.

Woodland 15

Impact Approximately 0.45 ha of this wet alder woodland would be lost to construction of the junction. The remaining isolated fragment would be of little value. This would be high impact on a site of local importance.

Mitigation There is no specific mitigation planned. New trees and shrubs would be planted as part of landscape proposals.

Woodlands 16 and 18

The road is not likely to have an impact on these woods.

Woodland 17

Impact The whole of this woodland comprising about 1 ha of a nationally-common vegetation type would be removed. The impact would be high on a site of low value.

Mitigation New trees and shrubs would be planted in adjacent areas as part of the landscape proposals.

Combe Wood: Woodland 19

Impact There would not be a direct impact on the large area of this wood, which would be buffered from the new road by the scrub and embankments of the disused railway. The owner of the wood has

stated that if the road is developed he may stop deer grazing in the wood. This would radically alter its vegetation character. In the short term from the nature conservation point of view, its value would increase, but would be likely to decline in the long term without further management.

Woodland 20

Impact About 1 ha of woodland scrub and grassland of nationally-common types would be lost. The soil moisture characteristics are unlikely to be affected since the wood is on a steep slope, but salt spray may affect the southern edge. The vegetation is mainly scrub and windblow is unlikely to be problem.

Mitigation New trees and shrubs would be planted in adjacent areas as part of the landscape proposals.

Woodland 21

Impact All of this woodland (0.5 ha) would be lost. The vegetation type is nationally common, so that the impact would be high on a site of low value.

Mitigation New trees and shrubs would be planted in adjacent areas as part of the landscape proposals.

15.7 Figure 7, Chainages 10,500-12,300

15.7.1 General

In this section the principal impact would be on the Combe Haven SSSI, which is discussed in Report 1 (Grasslands and Invertebrates Survey - Combe Haven SSSI) and Report 2 (Bird Studies - Combe Haven SSSI). No woodland or grassland outside the SSSI would be affected and the impact on grassland adjacent to Marline Woods is dealt with under section 15.8.

15.7.2 Ditches

Impact The construction of the viaduct would cause disturbance to a corridor 29 m wide across valuable wetland habitat. After construction, the access track would culvert several watercourses with permanent loss of 120 m of shaded ditch and 100 m of Decoy Pond Wood Stream, with good marginal vegetation.

Mitigation Decoy Pond Stream and the ditch would be re-routed with a profile allowing vegetation to recolonise the banks.

15.7.3 Hedges

Impact 480 m of hedges of the W8 ash - field maple - dog's mercury community, W21a the ivy - nettle sub-community of hawthorn - ivy scrub and W25a the bluebell sub-community of the bracken - bramble underscrub would be lost.

Mitigation New scrub planting and the option of hedges as accommodation works would compensate for the shrubs lost.

15.7.4 Scrub

Approximately 1.4 ha of gorse - bramble scrub (W23a) and bracken (U20c) would be lost east of the railway as a result of the construction of the roundabout. These areas are not of significant vegetation interest.

15.8 Figure 8, Chainages 12,300-14,100

15.8.1 General

Within this section the widening of Queensway would affect the edges of grassland and hedges of nature conservation interest, notably on the northern side adjacent to the Marline Valley Woods SSSI. No ditches would be lost in this section.

15.8.2 Hedges

Impact Approximately 500 m of hedge of the ivy - nettle sub-community of hawthorn - ivy scrub would be lost. This is a high impact on a feature of low interest.

Mitigation New planting of scrub as part of the landscape proposals would compensate for the areas lost.

15.8.3 Grassland

Impact About 3.3 ha of grassland of the meadow vetchling sub-community MG5a of crested dog's-tail - common knapweed meadow and pasture would be lost. This is intrinsically of local interest, enhanced by the continuity of some of this with grassland within the SSSI. There would therefore be a medium impact on a site of local to county interest.

Mitigation The vegetation lost cannot be directly replaced. However, there would be opportunities on similar soils within the scheme to create wildflower areas within the guidelines of Part 1 of section 4 of Volume 10 of the Design Manual for Roads and Bridges (The Wildflower Handbook).

15.8.4 **Woodland**

Marline Woods

Impact A very small area (0.05 ha) at the western end of this woodland would be lost as well as 0.01 ha of adjacent new plantation. The amount of edge to be removed is unlikely to be great enough to result in windblow.

To the east a further 0.17 ha of ash-field maple-dog's mercury woodland and about 0.7 ha of adjacent plantation would be lost, and here windblow is more likely.

The edge of both sections of road are likely to suffer from increased risk of damage from salt spray. Overall, however, there would be a slight impact on the SSSI as a whole.

Mitigation New planting east of the Castleham junction would compensate for trees and shrubs lost.

Woodland 29a

Impact 0.06 ha of this woodland would be lost from the realignment of Napier Road. This is a high impact on a site of local significance.

Mitigation Planting elsewhere on the scheme would compensate for the trees and shrubs lost.

Woodland 29b

Impact 0.2 ha of woodland of a nationally common type would be lost. The remaining fragment would be absorbed in new planting alongside the road and given appropriate management.

Mitigation New planting alongside the road would compensate for trees and shrubs lost.

15.9 Figure 9, Chainages 14,100 - 15,000

15.9.1 General

In this section the principal impact of the route would be in the woodland of Beauport Park, together with fragments of woodland and hedges. No areas of great nature conservation significance would be affected.

15.9.2 Hedges

Impact 370 m of hedge of W21a the ivy - nettle sub-community of hawthorn-ivy scrub would be removed. This is a high impact on features of low interest.

Mitigation New planting would replace the scrub species lost.

15.9.3 Scrub

Impact About 1 ha of scrub of the gorse - bramble community (W23) and bramble - Yorkshire fog underscrub community would be lost. This is not of significant nature conservation interest.

15.9.4 Woodland: Beauport Park

Impact 5.5 ha of recent secondary woodland at Baldslow Wood would be lost. This is a high impact on a site of local nature conservation value. Hydrological impact on the surrounding woodland is unlikely since the woodland is of a type that grows on dry sandy soils and the road is in cutting, so salt damage would not occur.

Mitigation New planting of adjacent areas would compensate for the trees and shrubs lost.

15.9.5 Grassland

Impact Approximately 6.5 ha of semi natural grassland, mainly of the crested dog's tail - common knapweed meadow community (MG5), would be lost. This was not of significant nature conservation interest.

Mitigation Wildflower grassland would be established along the road verges in this section.

16.0 SUMMARY

16.1 A total of 7585 m of hedgerow would be lost by construction of the road. The hedges are not of high nature conservation significance, and scrub covering a greater surface area would be planted as part of the scheme.

16.2 The value of ditches lost is discussed fully in Report 9. A total of approximately 4315 m of ditch would be lost or culverted. Not all the ditches to be lost or culverted have been mentioned here due to their lack of vegetation interest.

16.3 Eight grassland sites of local interest would be affected. These are mainly MG5, the crested dog's-tail - common knapweed meadows, but there is one small area of acid grassland (U4) sheep's fescue - common bent - heath bedstraw grassland. Grassland of county significance at Marline Woods would be slightly affected and a meadow which is of between county and local interest which is located to the south east of Cole Wood (Figure 6) would be largely lost. The meadow at Jack O'Boreham's Wood that would be affected is part of a habitat mosaic of local to county importance. The MG9, Yorkshire fog - tufted hair-grass grassland on the Barnhorn Level is of limited local interest. The establishment of wild flower grassland in one part of the scheme would partially compensate for areas lost.

16.4 A total of about 19.7 ha of woodland and scrub would be lost. The types affected are nationally common. The edge of Marline Valley Woods SSSI would be slightly affected, as would the northern tip of Jack O'Boreham's Wood. However, High Woods SSSI and the valuable grassland habitat of Combe Haven SSSI would be avoided. The remaining areas affected are of local importance only. In some areas there would be secondary effects of windblow and possible affects of salt spray damage and hydrological drawdown; the latter are unlikely to have a major impact. Windblow would be mitigated by appropriate management and new planting would partially compensate for the trees and shrubs lost.

16.5 The plantations, bracken and other communities that would be affected are generally common types of local interest or lower.

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APPENDIX 1

VEGETATION AS A BASIS FOR NATURE CONSERVATION ASSESSMENT FOR INVERTEBRATES

VEGETATION AS A BASIS FOR NATURE CONSERVATION ASSESSMENT FOR INVERTEBRATES

WOODLAND (INCLUDING PARKLAND)

Woodland has the richest invertebrate fauna of any terrestrial habitat in Britain. Ancient woodland has the highest species diversity. Broad-leaved woodland has a more diverse fauna than plantations of conifers. Most invertebrate orders are represented within a woodland community.

Rides and Clearings

Important invertebrates include *Coleoptera* (beetles), *Diptera* (flies), *Hemiptera* (bugs), *Hymenoptera* (bees, wasps and ants), *Lepidoptera* (butterflies and moths), and *Arachnida* (spiders).

Sheltered and sunny rides and clearings are of vital importance to many woodland invertebrates. Many characteristic woodland species are really inhabitants of woodland margins and glades. In addition, many grassland and heathland invertebrates are found in woodland rides.

Densely Shaded Woodland

A few specialised invertebrates inhabit dense and overgrown areas of woodland but in general, the species diversity in densely shaded areas is low.

Hedges

Ancient hedges serve as long thin strips of woodland habitat and can be very important for the same range of invertebrates listed under the heading `rides and clearings`.

The actual wildlife value depends on a number of factors such as aspect and whether pesticides are used in adjoining fields. The frequency of trimming and the width of the hedge bank can also influence the invertebrate interest.

Dead Wood

Most important for *Coleoptera* (beetles) and *Diptera* (flies).

Almost all woodlands contain some dead wood and some associated invertebrates. Dead twigs, fallen branches, wind-blown trees and standing, over-mature trees containing large cavities all have their own characteristic invertebrate communities.

Ancient trees, especially oak, affected by red heart-rot are very important for their dead-wood beetles many of which are very rare. Isolated trees are much more likely to support interesting invertebrates than those in thick densely shaded woodland.

Several other tree species are important for their dead-wood invertebrates; among those, beech, lime, elm, ash and hawthorn may be mentioned.

Parkland or Pasture Woodland

Most important for *Coleoptera* (beetles) and *Diptera*(flies).

Ancient parkland containing large pollarded trees (especially oaks) which are several hundred years old is the most important habitat for dead-wood invertebrates in Britain. The combination of the open structure and the great age of the trees has allowed a very specialised community to develop in a few favoured parkland sites but any fragment of ancient parkland is of potential interest for invertebrates.

Fungus

Most important for *Coleoptera* (beetles) and *Diptera* (flies).

Every type of fungus has its own invertebrate community but some types are very much richer than others. Ancient woodland or parkland is likely to support the richest invertebrate community associated with fungi. Large bracket fungi growing on ancient standing or fallen trees, particularly oak, beech, birch and ash, are likely to support many species.

GRASSLAND

The richest grasslands support large and very interesting assemblages of invertebrates. South-facing slopes have the most diverse communities. Grazing is often very important for maintaining site stability but invertebrate communities become progressively poorer as the level of grazing is increased. The best sites are where grazing is very light so the flowering plants are able to grow during the summer. Many grassland invertebrates are phytophagus and therefore species diversity often depends on the variety of plants present. It follows that unimproved grassland is far richer in invertebrate species than areas which are intensively farmed or otherwise improved.

Acid Grassland

Acid grassland is often on loose sandy soil and can support interesting communities of ground-dwelling and burrowing invertebrates.

Coleoptera (beetles); *Hemiptera* (bugs); and *Hymenoptera* (bees, wasps and ants) are perhaps the most important groups in this habitat.

Unimproved sites are far richer in invertebrates than intensively farmed areas but in most cases, the species diversity will never be as high as that present on unimproved calcareous grassland.

Marshy Grassland

Important for *Coleoptera* (beetles); *Diptera* (flies); *Hemiptera* (bugs); *Odonata* (dragonflies); *Orthoptera* (grasshoppers and crickets); and *Mollusca* (snails).

Providing the habitat is not improved or heavily grazed, marshy sites are often very rich in invertebrates.

Scrub

Can be important for invertebrates, especially *Coleoptera* (beetles); *Hemiptera* (bugs); and *Lepidoptera* (butterflies and moths).

Unless stabilized by regular grazing, scrub can be a transitional habitat, forming the intermediate stage between neglected grassland and young woodland. Where scrub is a long established feature the associated invertebrate communities are often interesting. Some types of scrub have characteristic species assemblages, those associated with hawthorn and juniper being particularly important.

WASTELAND

A number of man-made habitats can be described as wasteland.

Roadside Verges

The invertebrate fauna can be important for a range of invertebrates including *Coleoptera* (beetles); *Diptera* (flies); *Hemiptera* (bugs); *Hymenoptera* (bees, wasps and ants); *Lepidoptera* (butterflies and moths); and *Orthoptera* (grasshoppers and crickets).

Well managed roadside verges serve as long strips of unimproved grassland, scrub or woodland. Steep, south-facing banks with short turf, which is occasionally mown, often support the best roadside invertebrate faunas.

Disturbed ground

Frequently disturbed ground can be a very valuable habitat for ground-dwelling *Coleoptera* (beetles). If a site supports a rich annual weed flora then associated phytophagus insects including *Coleoptera* (beetles) and *Hemiptera* (bugs) may become established.

Examples of permanent areas of disturbed ground may be found in a number of situations, three of which are listed below:-

Peat production zones.
Army or defence training areas.
Allotment gardens.

Where a pattern of annual weed vegetation has been established for many years the invertebrate community often contains a number of rare species.

AQUATIC HABITATS

Most types of aquatic habitat have an associated aquatic invertebrate fauna. some types of wetland are more important for aquatic species. In some cases it is difficult to define exactly whether species are aquatic or terrestrial since there are intermediate habitats such as wet mud and it is often best to treat wetland habitats under one heading rather than to divide them into "aquatic and terrestrial". However,

there are some truly aquatic species which are ideal subjects for detailed analysis and it is these which are dealt with in this paragraph.

Aquatic invertebrates are present in the following groups:-
Coleoptera (water beetles); *Diptera* (most horse-flies, several soldier-flies, mosquitoes and meniscus midges have aquatic larvae); *Ephemeroptera* (mayflies); *Hemiptera* (water bugs); *Odonata* (dragonflies); *Trichoptera* (caddis-flies); *Mollusca* (water snails and bivalves); also a variety of small invertebrates including crustaceans, leeches, etc.

Small Field Ponds

Some field ponds contain rich invertebrate communities but much depends upon whether the habitat contains varied marginal and aquatic plant life. Ponds which are fouled with cow dung are often too polluted to be of much interest and steep-sided or sheer pond margins also detract the invertebrate interest. Heavily shaded ponds may contain their own specialised communities but generally do not have a very high species diversity.

Silt Ponds

This section covers newly constructed clay-bottomed ponds, dew ponds and water-filled sand-pits or gravel-pits. These have a very characteristic invertebrate fauna. Silt ponds tend to be unstable and as detritus forms they gradually change in character and the invertebrate fauna loses some species which colonise freshly excavated aquatic habitats. It follows therefore that silt pond invertebrate tend to be highly mobile creatures which may not permanently establish themselves in any one site.

Rivers and Streams

A varied and characteristic invertebrate community is present in flowing water. However, species diversity in the aquatic insects is much lower than that present in still water habitats such as dykes on levels marshes. Some rivers are very important for *Odonata* (dragon flies).

APPENDIX 2

CRITERIA FOR NATURE CONSERVATION EVALUATION

CRITERIA FOR NATURE CONSERVATION EVALUATION

The following points have been considered when assessing the nature conservation importance of vegetation. They are related to the principles of site evaluation and selection set out in Ratcliffe (1977) and Nature Conservancy Council (1989).

Naturalness

The more natural a site, the greater its nature conservation importance. Naturalness is related to management and history: generally, the less intensive the management, the more interesting the site, but complete neglect can also be damaging. A long history of the same management regime is often of particular value. Long periods of the same management generally give rise to stable communities. Vegetation can, however, be surprisingly resistant to short term management perturbations. Management regimes which diminish the nature conservation interest of grasslands include ploughing and re-seeding, fertiliser application, herbicide spraying and drainage.

Size

The size of the site must be big enough to be viable in terms of resistance to edge effects and maintenance of species composition. Larger areas are intrinsically of greater interest than small areas.

Rarity

The occurrence of nationally or locally uncommon vegetation type (assessed using the National Vegetation Classification (NVC), Appendix 4) is often of high interest. Local variants of the national communities may also be important. Atypical examples related to particular management episodes are of lower interest.

Diversity

Diversity relates to individual species, or to habitats. Generally, the greater the diversity, the greater the importance for nature conservation. Diversity related to disturbance, and that related to a high component of alien species, is of low value.

Species richness

In general, species-rich habitats are of higher interest for nature conservation than species-poor ones. This must be qualified in relation to the vegetation type, as some interesting vegetation types are naturally species-poor (eg heathlands). The presence of rare plants can significantly add to the value of a site, but they should not be assessed on the presence of these alone.

The composition of the vegetation type is also important. High frequencies of uncommon or rarer plants through the sward tends to indicate a long history under similar management: this is of high interest.

Habitat diversity

The presence of other habitats (eg hedges bordering meadows, or the presence of ponds, ditches, etc in woodlands or meadows), can also add to the diversity and the interest of a site.

Fragility

Habitats sensitive to natural change (eg sand dunes) are often highly valued.

Typicalness

'Typical' sites can often be of value in addition to the 'best' sites. These are more representative of the habitats as a whole.

Recorded history

Sites which have been scientifically studied in detail are highly valued. This is of importance for understanding how ecosystems work.

Position in an ecological/geographical unit.

The presence of related vegetation types in a series or in association (such as the sequence of mire - wet heath - dry heath related to water table) is regarded as being of higher importance than individual examples in isolation.

Potential value

Damaged sites which have a potential for recovery can be of value in the absence of good examples. For instance, an improved water meadow adjacent to an unimproved water meadow has potential for recovery if it is managed appropriately.

Intrinsic appeal

The intrinsic appeal of a site can add to its interest. For instance, a colourful meadow, or presence of rare orchids, appeals intrinsically more than a closely-grazed pasture or a small rare liverwort.

Nature conservation context of sites

Using the above criteria, the nature conservation interest of the vegetation types and/or sites are put into context as follows:

a) National importance: Sites of Special Scientific Interest (SSSIs) and other outstanding sites.

b) County importance: sites which are of particular interest in the county, with very few or no other examples in the county, and Sites of Nature Conservation Importance (SNCIs).

c) Local importance: semi-natural sites which occur occasionally elsewhere in the county.

d) Low interest and very low interest: these tend to be highly modified, species-poor sites, and are common and widespread.

APPENDIX 3

THE DOMIN AND DAFOR SCALES

THE DOMIN AND DAFOR SCALES

This scale provides a quantitative measure of the abundance of species. Cover is assessed by eye as a vertical projection onto the ground of all the live, above ground parts of the plant in a quadrat.

The scale is:-

COVER OF		DOMIN
91 - 100%		10
76 - 90%		9
51 - 75%		8
34 - 50%		7
26 - 33%		6
11 - 25%		5
4 - 10%		4
<4%	With many individuals	3
	With several individuals	2
	With few individuals	1

The DAFOR scale is as follows:

D	=	dominant
A	=	abundant
F	=	frequent
O	=	occasional
R	=	rare

qualified with V = very, and L = locally, where appropriate.

APPENDIX 4

NATIONAL VEGETATION CLASSIFICATION COMMUNITIES PRESENT

NATIONAL VEGETATION CLASSIFICATION
COMMUNITIES PRESENT

MESOTROPHIC GRASSLANDS

Mesotrophic grasslands are typically characterised by such grasses as rye grass (*Lolium perenne*), crested dog's-tail (*Cynosurus cristatus*), red fescue (*Festuca rubra*), Yorkshire fog (*Holcus lanatus*), cock's-foot (*Dactylis glomerata*), common bent (*Agrostis capillaris*), and creeping bent (*Agrostis stolonifera*), and by herbaceous plants and broad-leaved plants such as white and red clovers (*Trifolium repens, Trifolium pratense*), knapweeds (*Centaurea* spp), buttercups (*Ranunculus* spp), sorrel (*Rumex acetosa*) and mouse-ear (*Cerastium fontanum*). They may be grazed, mown for hay or are sometimes neglected. The soils are often nutrient-rich but neither very acid or very alkaline, and the soils may be dry or wet but not permanently waterlogged. They are common and widespread throughout Britain, and form the basic agricultural pastures in the lowlands.

MG1 false oat-grass grasslands

False oat-grass grasslands are characterised by dominant false oat-grass, cock's-foot, Yorkshire fog and hogweed (*Heracleum sphondylium*). They occur on freely draining to seasonally moist soils which are weakly acidic to weakly calcareous, and which are often moderately or strongly nutrient-rich. They are usually ungrazed, but may be mown and are widespread in lowland Britain on roadsides, banks and neglected pastures.

MG1a red fescue sub-community

This sub-community is defined as for the community as a whole, and lacks any distinctive, preferential species. It is a variable community and is common and widespread in Britain, occuring on roadsides, neglected pastures and waste ground.

MG1b nettle sub-community

This sub-community has abundant nettles (*Urtica dioica*) in addition to the community constants and typically occurs on nutrient-rich soils such as those of roadsides, neglected and disturbed pastures, and waste ground.

MG1e common knapweed sub-community

This sub-community has constant red fescue, bird's-foot trefoil, and common knapweed. It occurs on the more base-rich soils, closely related to the MG5 crested dog's-tail - common knapweed pastures and is reasonably frequent in Britain.

MG5 crested dog's-tail - common knapweed meadow and pasture

This community is characterised by red fescue, crested dog's-tail, bird's-foot trefoil (*Lotus corniculutus*), ribwort plantain (*Plantago lanceolata*), Yorkshire fog, cock's-foot, white clover, common knapweed (*Centaurea nigra*), creeping bent, sweet vernal grass (*Anthoxanthum odoratum*), and red clover. They are typically species-rich pastures and can be quite variable in composition. They occur on soils which are not high in nutrients, are neither acid nor alkaline and are freely-drained. The pastures have usually not been sprayed with herbicide, and they receive little or no fertiliser. They are usually cut for hay, and are ungrazed in summer but may be grazed in winter.

MG5a meadow vetchling sub-community

This sub-community has rye grass, daisy (*Bellis perennis*), meadow vetchling (*Lathyrus pratensis*) and ox-eye daisy (*Chrysanthemum leucanthemum*) in addition to the community constants. It is the most variable of the sub-communities which has often received some fertiliser or manure. It is common and widespread in Britain.

MG5c heath grass sub-community

This sub-community has self-heal (*Prunella vulgaris*), autumn hawkbit (*Leontodon autumnalis*), field woodrush (*Luzula campestris*), heath-grass (*Danthonia decumbens*), tormentil (*Potentilla erecta*), devil's-bit scabious (*Succisa pratensis*), in addition to the community constants. It often occurs on unimproved, more acidic soils, and occurs locally in Britain.

MG6 rye grass - crested dog's-tail pasture

This community is characterised by rye grass, crested dog's tail, white clover, Yorkshire fog, mouse-ear, and red fescue. It is often a relatively species-poor community. It is often very variable in composition, depending on the precise type of grazing and soil. It occurs on fairly nutrient-rich soils of medium pH which are well-drained. The pastures are typically heavily grazed all year, and have often recieved fertiliser or slurry. They are the commonest partly-improved grazing pastures in Britain.

MG6a typical sub-community

This sub-community is the typical rye grass - crested dog's-tail pasture characterised by the species which define the community as a whole. It is often improved through fertiliser application, and occurs on the richer soils being common in Britain.

MG6b sweet vernal grass sub-community

This sub-community in addition to the community constants has sweet vernal grass, meadow buttercup and sorrel. It often occurs on the less rich, weakly acid soils and is quite frequent in Britain.

MG7 rye grass leys

Rye grass leys are characterised by dominant rye grass associated variably with timothy (*Phleum pratense*), rough-stalked meadow grass (*Poa trivialis*), white clover, cock's-foot, meadow foxtail (*Alopecurus pratensis*), plantains (*Plantago* spp), dandelions (*Taraxacum* spp) and other broad-leaved plants of rich soils. Crested dog's-tail is usually uncommon in the sward. They are typically very species-poor communities and are characteristic of the more nutrient-rich and heavily improved soils of medium pH, which are usually well-drained. The management is either heavily grazing, hay or silage. They are the predominant, modern agricultural pasture in lowland Britain.

MG7a rye grass - white clover ley

This sub-community is characterised by rye grass, cock's-foot and white clover. It is a typical sown ley for silage or grazing, and is often very species-poor.

MG7b rye grass - rough meadow grass ley

This sub-community is characterised by rye grass, timothy, rough meadow grass, cock's-foot and white clover. It is often very species-poor, and is typical of re-seeded, improved pastures being widespread in Britain.

MG7d rye grass - meadow foxtail meadow

This sub-community is characterised by rye grass, meadow foxtail, cock's-foot and dandelion. It is a typical pasture throughout Britain on heavily improved soils and is often very species-poor.

MG7e rye grass - plantain ley

This sub-community is characterised by rye grass, ribwort and/or broad-leaved plantain (*Plantago lanceolata, Plantago major*), cock's-foot, dandelion and Yorkshire fog. It is typical of heavily trampled areas.

MG9 Yorkshire fog - tufted hair-grass grassland

This community is common throughout Britain and is characterised by tufted hair-grass (*Deschampsia cespitosa*) and Yorkshire fog, locally with rough-stalked meadow-grass or false oat-grass and cock's-foot. It usually occurs on damp, low-lying, seasonally wet, unimproved pastures, and sometimes on road verges. They are often undrained, and may be grazed or neglected. They occur throughout Britain.

MG9a rough-stalked meadow grass sub-community

This is characterised by tufted hair-grass, Yorkshire fog and rough-stalked meadow-grass. It is often lightly grazed.

MG10 Yorkshire fog - soft rush pasture

This community is typically characterised by soft rush (*Juncus effusus*), Yorkshire fog, creeping bent and creeping buttercup (*Ranunculus repens*), locally with hard rush (*Juncus inflexus*), yellow flag (*Iris pseudacorus*) or rough-stalked meadow grass. It typically occurs on damp, flushed grasslands, which are heavily poached, grazed or trampled, lying on the poorer, more marginal land which is often damp throughout the year.

MG10a Typical sub-community

This is the typical, widespread community throughout Britain, lacking hard rush, yellow flag and rough-stalked meadow grass.

MG12 tall fescue grassland

This community is characterised by tall fescue (*Festuca arundinacea*), creeping bent and red fescue. The grassland is typically coarse and tussocky. On normal mesotrophic soils it is accompanied by rye grass and Yorkshire fog, and on more saline soils, by parsley water dropwort (*Oenanthe lachenalii*), mud rush (*Juncus gerardi*), sea milkwort (*Glaux maritima*) and false fox sedge (*Carex otrubae*). It is widespread in Britain, on road verges, pastures and at the top of saltmarshes, although in the NVC it is described as coastal only. It typically occurs on clayey soils which are winter-wet but drier in summer.

MG12a rye grass - Yorkshire fog sub-community

This subcommunity is characterised by rye grass and Yorkshire fog. It occurs on non-saline soils. It is sometimes sown for pasture.

ACID GRASSLAND

Acid grasslands occur on well drained, acidic, nutrient-poor soils and heaths throughout Britain. In the lowlands they are characterised by such grasses as sheep's-fescue (*Festuca ovina*) (often as fine-leaved fescue (*Festuca filiformis*)), common bent, wavy hair-grass (*Deschampsia flexuosa*), heath grass and sweet vernal grass, and by herbs such as tormentil, sheep's sorrel (*Rumex acetosella*) and heath bedstraw (*Galium saxatile*). Heather (*Calluna vulgaris*) and other heathy plants may be present at low frequency, but at covers of 25% or more they are treated as heathlands. They are usually lightly grazed or neglected in the lowlands.

U4 sheep's fescue - common bent - heath bedstraw grassland

These grasslands are characterised by common bent, sweet vernal grass, tormentil, sheep's fescue and heath bedstraw, with many other species belonging to particular sub-communities. They occur on strongly to weakly acid, nutrient-poor soils, which are often damp but neither drought-stricken nor permanently water-logged. They are usually grazed, often heavily, and are unimproved by fertiliser or slurry.

U4a Typical sub-community

This is defined for the community as a whole, with no distinct preferential species. It is widespread in Britain.

WOODLAND HEDGES AND SCRUB

W6 - Alder - nettle woodland

Here alder (*Alnus glutinosa*) is the commonest tree species, but it may be replaced in some cases by downy birch (*Betula pubescens*) or crack willow (*Salix fragilis*). The understorey can be very varied. Osiers (*Salix viminalis*) sometimes assume prominence. Nettle is the most typical member of the field layer but varies a lot in its abundance and is absent from some stands. Broad buckler-fern (*Dryopteris dilatata*), cleavers (*Galium aparine*), honeysuckle (*Lonicera periclymenum*), rough-stalked meadow-grass and bramble (*Rubus fruticosus*) are common throughout.

W7 Alder - ash - yellow pimpernel woodland

This woodland type is characterised by a canopy of alder and ash, with meadowsweet, yellow pimpernel and moss in the field layer. It is typical of moist to very wet mineral soils, only moderately base-rich and usually of medium nutrient-status, in the wetter parts of Britain. The NVC map indicates that these are very uncommon in south east England, but recent fieldwork has shown that they are not uncommon in the Weald. These Wealden woodlands were under-sampled in the NVC and many are difficult to ascribe clearly to a sub-community.

W7b Remote sedge - marsh thistle sub-community

This sub-community is typical of mineral rich flushes associated with springs or seepage lines on permanently wet soils. In addition to the community constants it has creeping buttercup, marsh thistle, valerian, remote sedge and a conspicuous moss component. It is commonest in the north and west, with occasional outliers in south-east England.

W8 ash - field maple - dog's mercury woodland

This community is characterised by woody species such as field maple (*Acer campestre*), ash and hazel, with dog's mercury (*Mercurialis perennis*) and bramble in the field layer. This is a very diverse community, with a range of distinct types. It is characteristic of the more base-rich soils which are moist but freely draining. It is often managed for timber, most frequently as coppice but sometimes as high forest. It occurs widely in the warm, dry south-eastern lowland of England and Wales.

W8a primrose - ground ivy sub-community

This sub-community is characterised by the presence of frequent rough-stalked meadow-grass (*Poa trivialis*), ground ivy (*Glechoma hederacea*), bugle (*Ajuga reptans*) and primroses, in the absence of wood anemone (*Anemone nemorosa*), lesser celandine (*Ranunculus ficaria*), tufted hair-grass (*Deschampsia cespitosa*) or ivy. It may be coppiced or high forest, and is often fairly species-rich. It occurs mainly in south east England, and is characteristic of heavy, moist soils.

W8d ivy sub-community

This sub-community is characterised by an abundance of ivy growing as a ground carpet. The woodlands are often neglected and usually have a dense cover. It is generally less diverse than the other sub-communities and many stands are of recent origin. It occurs in southern England, usually in area with a mild, oceanic climate.

W10 pedunculate oak - bracken - bramble woodland

This community comprises oak woods, characterised by pedunculate oak, honeysuckle, bracken (*Pteridium aquilinum*) and bramble. It is somewhat variable, occurring on base-poor brown soils which are usually freely drained or seasonally-wet. The woodlands are often managed for timber, usually as high forest. It occurs widely in the warm, dry south-eastern lowlands north to the Scottish borders.

W10b wood anemone sub-community

This sub-community is characterised by frequent wood anemone in the field layer. Oak is the usual canopy dominant, but sweet chestnut (*Castanea sativa*) is often locally prominent. These woodlands are often of recent origin, but some may be older, and they are usually coppiced. It is an uncommon vegetation type occurring locally in south east England.

W10c Yorkshire fog sub-community

This sub-community is characterised by an impoverished field layer with Yorkshire fog and the shrub layer is usually sparse. It is characteristic of young plants and is widespread in the south.

W16 Oak - Birch - Wavy Hair-Grass Woodland

This woodland type essentially includes oak - birch woods in southern Britain. They are often species-poor and many are of recent origin. The canopy is typically composed of single species stands or mixtures of silver birch (*Betula pendula*), downy birch (*B. pubescens*), pedunculate oak (*Quercus robur*) and/or sessile oak (*Q. petraea*). Scots pine (*Pinus sylvestris*) may be locally frequent. The shrub layer is sparse with holly (*Ilex aquifolium*), rowan (*Sorbus aucuparia*) and saplings of other species. The ground flora is typically species-poor with wavy hair-grass (*Deschampsia flexuosa*) and bracken (*Pteridium aquilinum*). Yorkshire fog (*Holcus lanatus*), bilberry (*Vaccinium myrtillus*), bramble and heather (*Calluna vulgaris*) may be locally prominent and there are usually with common mosses and liverworts. The community occurs on acid, nutrient-poor soils which are dry in summer. It is widely distributed and common in lowland southern Britain. There are two sub-communities.

W16a Pedunculate Oak sub-community

This sub-community is typically dominated by pedunculate oak and silver birch, with much bracken in the understory and wavy hair grass in the gaps. Yorkshire fog and bilberry may be locally prominent. Heather, gorses (*Ulex* species) and purple moor-grass (*Molinia caerulea*) many be frequent where heathland has been colonised. This is widespread in southern Britain.

W21 hawthorn - ivy scrub.

This scrub type is characterised by constant hawthorn, ivy and bramble. It is a diverse community, the variation being related to soils and origin of the scrub. They occur on moderately acid to strongly alkaline soils. It may be deliberately planted, or have colonised naturally. It is the commonest scrub type in lowland Britain occurring on neglected land, and very commonly as hedges.

W21a - Ivy - nettle sub-community

Cleavers, elder (*Sambucus nigra*) and nettle are common here. False brome (*Brachypodium sylvaticum*) and dog's mercury are usually sparse or absent. The field layer often has an untidy look with occasional false oat grass, hedge bindweed (*Calystegia sepium*), couch (*Elymus repens,*) hogweed, Yorkshire fog or red campion (*Silene dioica*).

W21b - Dog's mercury sub-community

Cleavers, elder and nettle are common with only sparse amounts of false broom. The field layer usually has much lords-and-ladies (*Arum maculatum*) and dog's mercury with occasional ground ivy (*Glechoma hederacea*), bluebell (*Hyacinthoides non-scripta*) and rough-stalked meadow-grass.

W22 blackthorn - bramble scrub

Scrub dominated almost exclusively by blackthorn without hawthorn is treated as the W22 blackthorn - bramble scrub. Blackthorn is the only constant species, but bramble, ivy, red campion, common dog violet (*Viola riviniana*), cock's foot, bracken and cleavers may be locally frequent. Blackthorn spread by suckering to produce dense strands. This scrub is frequent throughout Britain in suitable places, often on rich soils.

W23 gorse-bramble scrub

Gorse - bramble scrub is a variable community. It is characterised by bramble, gorse and common bent. It occurs throughout Britain on roadsides and banks, commons, hedgebanks, rocky outcrops and marginal agricultural land. The soils are moderately to strongly acid brown soils, free-draining and not nutrient-poor.

W24 bramble-Yorkshire fog underscrub

This vegetation type essentially comprises bramble patches, which lack bracken and gorse. It is typically dominated by brambles with tall herbs and rank grasses forming a variable, untidy cover to about 1 m tall. It is very common on abandoned and neglected ground and road verges in the lowlands. It occurs on a range of soils, although rarely on nutrient-poor ones.

W25a bracken-bramble underscrub bluebell sub-community

This type of vegetation is characterised by mixtures of bracken and bramble which are the two constant species, although bluebells, nettles and wood sage (*Teucrium scorodonia*) may be locally frequent. It occurs on deep, freely-draining, fertile, moderately acid to neutral soils and is found commonly throughout lowland Britain. The W25a bluebell sub-community is widespread in Britain.

SWAMPS

Swamp vegetation occurs on seasonally, periodically or permanently inundated soils in ditches, on river banks and around the margins of ponds and lakes where there is permanent standing water. They are usually ungrazed, lack tree cover and are usually dominated by tall herbs and grasses.

S5b Reed sweet-grass swamp branched bur-reed - water plantain sub-community

Dense stands of reed sweet-grass (*Glyceria maxima*) are frequent in lowland Britain in still water in ditches and lakes, and sometimes on river banks. Often they are quite species-poor. The sub-

community is characteristic of dryer sites in the lowlands. It is less common than the S5a reed sweet-grass sub-community.

S12a great reedmace swamp, great reedmace sub-community

This community is characterised by dominant great reedmace often with a limited range of other water-margin species. It is most characteristic of seasonally inundated soils and is widespread in Britain in ditches, ponds and stream sides. One stand was seen near Ninfield on the margin of a pond. The sub-community is widespread in Britain.

S14c branched bur-reed swamp, water mint sub-community

This is a variable community with branched bur-reed as the main constant. Water plantain, water mint (*Mentha aquatica*), soft rush and reed canary grass (*Phalaris arundinacea*) may be locally prominent. The sub-community is characteristic of seasonally-inundated soils and is widespread in Britain.

S26 common reed - nettle fen

This vegetation type is characterised by dominant common reed (*Phragmites australis*) and nettles. It occurs in seasonally-inundated, nutrient rich places and is very characteristics of ditches. The S26c hemlock water dropwort (*Oenanthe crocata*) sub-community is characterised by abundant hemlock water dropwort, greater bindweed (*Calystegia sepium*), tufted vetch (*Vicia cracca*) and marsh woundwort (*Stachys palustris*). The S26d great willowherb (*Epilobium hirsutum*) sub-community is characterised by great willowherb, woody nightshade (*Solanum dulcomara*) and reed sweet-grass. These are common vegetation types in Britain.

S28 reed canary-grass swamp

This vegetation type has dominant reed canary grass with locally-prominent nettle, great hairy willowherb, Yorkshire fog and couch grass. It is common throughout Britain on periodically-inundated soils in ditches, lake shores and river banks.

APPENDIX 5

WOODLAND QUADRATS

WOODLAND QUADRATS

Woodland 2 - Birchtree Wood

	WET	DRY	OPEN
Ajuga reptans	4		
Alnus glutinosa (c)	4	4	
Betula pubescens (c)	6	7	
Cirsium palustre	4		
Corylus avellana (s)		4	
Digitalis purpurea		2	
Fraxinus excelsior (c)		2	
Juncus effusus	2	2	
Lysimachia nemorum	2		
Oenanthe crocata	6		
Populus tremula	2		
Pteridium aquilinum		6	7
Quercus robur (c)	2	2	
Ranunculus ficaria			7
Ranunculus repens	4		6
Rubus fruticosus agg.		7	7
Salix fragilis	6	4	
Silene dioica	6		4
Urtica dioica	4		5
Viburnum opulus		2	
Hedera helix (c)	4		
Populus tremula (s)		4	
Narcissus sp.			2

Woodland 3 - Highfield Wood

Ajuga reptans	+
Anthriscus sylvestris	+
Betula pubescens (c)	+
Brachypodium sylvaticum	+
Carpinus betulus	+
Hyacinthoides non-scripta	+
Fraxinus excelsior (c)	+
Lamiastrum galeobdolon	+
Galium aparine	+
Glechoma hederacea	+
Hedera helix (g)	+
Holcus mollis	+
Ilex aquifolium (s)	+
Malus sylvestris	+
Oenanthe crocata	+
Primula vulgaris	+
Prunus avium (c)	+
Prunus spinosa (s)	+
Quercus robur (c)	+
Ranunculus repens	+
Rubus fruticosus agg.	+
Salix fragilis	+
Sambucus nigra (s)	+
Silene dioica	+
Stellaria holostea	+
Urtica dioica	+
Thamnobryum alopecurum	+
Acer campestre (s)	+
Betula pubescens (s)	+
Fraxinus excelsior (s)	+
Prunus avium (s)	+
Hedera helix (c)	+
Hedera helix (s)	+
Lonicera periclymenum (s)	+
Cardamine sp.	+
Salix seedling/sp	+
Corylus avellana (c)	+

Veronica seedling/sp	+
Crataegus sp.	+

Woodland 5 - Holmes Farm Wood

	QUADRAT		
	1	2	3
Ajuga reptans	+		
Alnus glutinosa (c)	+		+
Anemone nemorosa	+		
Angelica sylvestris	+		
Arum maculatum	+		
Betula pubescens (c)	+		
Carex acutiformis			+
Carex pendula			+
Carpinus betulus	+		
Cirsium vulgare			+
Corylus avellana (s)	+		
Dryopteris filix-mas	+		
Hyacinthoides non-scripta	+		
Epilobium hirsutum			+
Euonymus europaeus		+	
Fraxinus excelsior (c)	+		
Galium aparine	+		+
Hedera helix (g)	+		+
Ilex aquifolium (s)	+		
Juncus effusus			+
Mercurialis perennis	+		
Oenanthe crocata	+		+
Populus tremula			+
Prunus spinosa (s)		+	
Pteridium aquilinum		+	
Quercus robur (c)	+		
Ranunculus repens			+
Rosa arvensis		+	
Rubus fruticosus agg.	+		
Ruscus aculeatus		+	
Salix fragilis			+
Sambucus nigra (s)	+		+
Silene dioica	+		
Stellaria holostea	+		
Urtica dioica	+		+

Acer campestre (s)	+	
Fraxinus excelsior (s)	+	
Prunus avium (s)	+	
Hedera helix (c)	+	
Lonicera periclymenum (s)	+	
Cardamine sp.	+	+
Carex seedling/sp	+	
Glyceria seedling/sp		+
Salix seedling/sp	+	+
Quercus seedling/sp	+	
Ribes rubrum (g)	+	
Crataegus sp.	+	

Woodland 6

	Domin
Betula pubescens (c)	4
Castanea sativa	9
Cirsium vulgare	2
Corylus avellana (s)	4
Digitalis purpurea	2
Hyacinthoides non-scripta	4
Fraxinus excelsior (c)	2
Galium aparine	4
Holcus mollis	6
Pteridium aquilinum	4
Quercus robur (c)	2
Rubus fruticosus agg.	7
Sambucus nigra (s)	4
Cytisus scoparius (s)	
Scrophularia nodosa	2
Silene dioica	4
Stellaria holostea	4
Teucrium scorodonia	2
Ulex europaeus (s)	
Lonicera periclymenum (s)	4
Salix seedling/sp	2
Euphorbia amygdaloides	2

Woodland 7

	Domin
Ajuga reptans	4
Anemone nemorosa	3
Arum maculatum	2
Betula pendula (c)	4
Carpinus betulus	6
Castanea sativa	4
Hyacinthoides non-scripta	3
Fraxinus excelsior (c)	4
Lamiastrum galeobdolon	2
Galium aparine	4
Geum urbanum	2
Mercurialis perennis	2
Prunus avium (c)	2
Prunus spinosa (s)	4
Pteridium aquilinum	4
Quercus robur (c)	6
Rosa arvensis	4
Rosa canina agg.	2
Rubus fruticosus agg.	7
Sambucus nigra (s)	2
Silene dioica	2
Sorbus torminalis	2
Stellaria holostea	4
Teucrium scorodonia	2
Ilex aquifolium (g)	2
Hedera helix (c)	4
Lonicera periclymenum (c)	4
Corylus avellana (c)	4
Populus tremula (s)	4
Crataegus sp.	6

Woodland 8

	QUADRAT		
	1	2	3
Acer campestre (c)	+		
Alliaria petiolata	+		
Alnus glutinosa (c)		+	
Angelica sylvestris		+	
Brachypodium sylvaticum			+
Carex remota		+	
Corylus avellana (s)	+		
Deschampsia cespitosa			+
Fagus sylvatica (c)			+
Fraxinus excelsior (c)	+		
Lamiastrum galeobdolon		+	
Geranium robertianum	+		
Geum urbanum			+
Glechoma hederacea			+
Hedera helix (g)	+		
Ilex aquifolium (s)	+		
Mercurialis perennis	+		
Oenanthe crocata		+	
Polypodium vulgare			+
Prunus spinosa (s)	+		
Quercus robur (c)	+		
Ranunculus repens	+		
Rosa arvensis	+		
Rubus fruticosus agg.	+		
Rumex sanguineus	+		
Silene dioica	+		
Stellaria holostea			+
Stellaria media	+		
Urtica dioica		+	
Fraxinus excelsior (s)	+		
Quercus robur (s)	+		
Carex seedling/sp	+		
Rumex seedling/sp		+	
Quercus seedling/sp	+		
Viola seedling/sp	+		
Crataegus sp.	+		

Woodland 9

	QUADRAT				
	1	2	3	4	5
Acer campestre (c)	+				
Ajuga reptans	+			+	
Alnus glutinosa (c)	+	+			
Angelica sylvestris		+			
Anthriscus sylvestris	+				
Arum maculatum	+				
Betula pendula (c)	+				
Calluna vulgaris				+	
Corylus avellana (s)			+		
Deschampsia cespitosa	+				
Hyacinthoides non-scripta	+				
Fagus sylvatica (c)					+
Festuca ovina				+	
Fraxinus excelsior (c)	+				
Galium aparine	+	+			
Geum urbanum	+				
Glechoma hederacea	+	+			
Hedera helix (g)	+			+	
Ilex aquifolium (s)	+		+		
Juncus effusus				+	
Mercurialis perennis	+				
Oenanthe crocata		+			
Orchis mascula	+				
Pinus sylvestris (c)				+	
Potentilla sterilis	+				
Primula vulgaris	+				
Prunus spinosa (s)			+		
Pteridium aquilinum			+	+	+
Quercus cerris	+				
Quercus petraea (c)				+	+
Quercus robur (c)	+				+
Ranunculus ficaria	+	+			
Ranunculus repens		+			
Rosa arvensis	+				
Rosa canina agg.	+				

Rubus fruticosus agg.			+	+
Ruscus aculeatus	+			
Salix fragilis	+	+		
Silene dioica	+			+
Teucrium scorodonia				+
Ulex europaeus (s)			+	+
Urtica dioica		+		
Alnus glutinosa (s)		+		
Betula pendula (s)			+	
Fraxinus excelsior (s)			+	
Quercus robur (s)	+			
Hedera helix (c)	+			
Hedera helix (s)	+			
Lonicera periclymenum (c)			+	
Lonicera periclymenum (s)	+			
Carex seedling/sp	+			
Salix seedling/sp			+	
Rumex seedling/sp	+	+		
Corylus avellana (c)	+			
Castanea sativa (g)				+
Populus tremula (s)			+	
Quercus seedling/sp	+			
Crataegus sp.	+			
Grass sp.		+		

Samples 6 to 8

	6	7	8
Ajuga reptans		+	+
Alnus glutinosa (c)			+
Angelica sylvestris			+
Athyrium filix-femina			+
Betula pubescens (c)	+		+
Betula pendula (c)	+		
Calluna vulgaris	+		
Carex pendula		+	+
Carpinus betulus	+		
Chrysosplenium oppositifolium			+
Cirsium palustre		+	+
Corylus avellana (s)			+

Dryopteris dilatata			+
Filipendula ulmaria			+
Fraxinus excelsior (c)			+
Lamiastrum galeobdolon			+
Geranium robertianum			+
Glechoma hederacea			+
Hedera helix (g)	+		+
Juncus effusus	+		
Mercurialis perennis			+
Oenanthe crocata		+	
Oxalis acetosella			+
Quercus robur (c)	+		
Ranunculus repens		+	+
Ribes nigrum			+
Rubus fruticosus agg.	+		+
Salix fragilis		+	+
Solanum dulcamara			+
Teucrium scorodonia	+		
Urtica dioica		+	
Viburnum opulus			+
Fraxinus excelsior (s)			+
Hedera helix (c)			+
Lonicera periclymenum (s)			+
Cardamine sp.			+
Carex seedling/sp	+		+
Glyceria seedling/sp			+
Salix seedling/sp	+		
Viola seedling/sp			+

Woodland 10 - Kiln Woods

Betula pubescens (c)	+
Carpinus betulus	+
Castanea sativa	+
Corylus avellana (s)	+
Digitalis purpurea	+
Hyacinthoides nonscripta	+
Fagus sylvatica (c)	+
Ilex aquifolium (s)	+
Juncus effusus	+
Pteridium aquilinum	+
Quercus robur (c)	+
Rhododendron ponticum	+
Sambucus nigra (s)	+
Silene dioica	+
Teucrium scorodonia	+
Urtica dioica	+
Hedera helix (c)	+
Lonicera periclymenum (s)	+
Ilex aquifolium (c)	+
Narcissus sp.	+

Woodland 12 - Bircham Shaw

Betula pubescens (c)	+
Betula pendula (c)	+
Carpinus betulus	+
Castanea sativa	+
Corylus avellana (s)	+
Hyacinthoides non-scripta	+
Fraxinus excelsior (c)	+
Galium aparine	+
Hedera helix (g)	+
Ilex aquifolium (s)	+
Lysimachia nemorum	+
Quercus robur (c)	+
Rubus fruticosus agg.	+
Silene dioica	+
Urtica dioica	+
Lonicera periclymenum (s)	+
Salix caprea (c)	+
Crataegus sp.	+

Woodland 13

	QUADRAT 1	2
Alnus glutinosa (c)	+	
Anemone nemorosa		+
Angelica sylvestris	+	
Anthriscus sylvestris		+
Betula pubescens (c)		+
Castanea sativa		+
Corylus avellana (s)		+
Dryopteris dilatata		+
Hyacinthoides non-scripta		+
Fraxinus excelsior (c)		+
Galium aparine	+	
Hedera helix (g)	+	+
Ilex aquifolium (s)		+
Oxalis acetosella		+
Primula vulgaris		+
Ranunculus ficaria	+	
Rosa arvensis		+
Rubus fruticosus agg.		+
Salix fragilis	+	
Sambucus nigra (s)		+
Silene dioica		+
Stellaria media	+	
Urtica dioica	+	
Viburnum opulus	+	
Fraxinus excelsior (s)		+
Hedera helix (c)		+
Hedera helix (s)		+
Lonicera periclymenum (s)		+
Crataegus sp.		+

Woodland 14 - Cole Wood

	QUADRAT			
	1	2	3	4
Ajuga reptans				+
Alnus glutinosa (c)				+
Angelica sylvestris				+
Betula pubescens (c)	+	+		+
Betula pendula (c)	+			+
Carex pendula				+
Carpinus betulus	+			
Castanea sativa		+	+	
Centaurium erythraea			+	
Epilobium angustifolium			+	
Chrysosplenium oppositifolium				+
Corylus avellana (s)				+
Dryopteris dilatata				+
Dryopteris filix-mas				+
Fraxinus excelsior (c)	+			+
Lamiastrum galeobdolon				+
Hedera helix (g)				+
Hypericum pulchrum		+		
Ilex aquifolium (s)		+		
Iris pseudacorus				+
Juncus effusus			+	
Lysimachia nemorum				+
Mentha aquatica				+
Oenanthe crocata				+
Oxalis acetosella				+
Potentilla erecta			+	
Pteridium aquilinum	+	+	+	
Quercus robur (c)	+		+	
Ranunculus ficaria				+
Ranunculus repens				+
Rubus fruticosus agg.	+		+	
Ruscus aculeatus		+		
Solidago virgaurea		+		
Teucrium scorodonia	+	+	+	
Ulex europaeus (s)		+		

Urtica dioica	+			+
Alnus glutinosa (s)				+
Betula pubescens (s)			+	
Betula pendula (s)			+	
Cardamine sp.				+
Carex seedling/sp			+	+
Galium sp				+
Salix seedling/sp				+
Rumex seedling/sp	+			+
Luzula campestris/multiflora		+		
Grass sp.		+		

Woodland 15

	QUADRAT 1	2
Alnus glutinosa (c)	+	+
Arum maculatum		+
Betula pubescens (c)	+	+
Chrysosplenium oppositifolium	+	+
Corylus avellana (s)		+
Hyacinthoides non-scripta		+
Lamiastrum galeobdolon		+
Galium aparine	+	+
Hedera helix (g)		+
Mercurialis perennis		+
Oenanthe crocata	+	+
Quercus robur (c)		+
Ranunculus ficaria	+	+
Ranunculus repens	+	+
Rubus fruticosus agg.		+
Salix fragilis	+	+
Sambucus nigra (s)		+
Silene dioica		+
Urtica dioica	+	+
Fagus sylvatica (g)		+
Hedera helix (c)		+

Woodland 16

	QUADRAT 1	2
Acer campestre (c)	+	
Carex pendula		+
Carpinus betulus	+	
Corylus avellana (s)	+	+
Fraxinus excelsior (c)	+	
Lamiastrum galeobdolon		+
Galium aparine		+
Hedera helix (g)	+	
Ilex aquifolium (s)	+	
Mercurialis perennis		+
Oenanthe crocata		+
Prunus avium (c)	+	
Quercus robur (c)	+	
Rosa arvensis	+	+
Rubus fruticosus agg.	+	+
Salix fragilis		+
Solanum dulcamara		+
Hedera helix (c)	+	
Lonicera periclymenum (s)	+	+
Salix seedling/sp		+
Crataegus sp.	+	

Woodland 17

Crataegus monogyna (s)	+
Hedera helix (g)	+
Ilex aquifolium (s)	+
Prunus spinosa (s)	+
Quercus robur (c)	+
Ranunculus ficaria	+
Rubus fruticosus agg.	+
Sambucus nigra (s)	+
Urtica dioica	+
Hedera helix (c)	+

Woodland 18

	QUADRAT	
	1	2
Alnus glutinosa (c)	+	+
Betula pubescens (c)		+
Corylus avellana (s)		+
Crataegus monogyna (s)		+
Hyacinthoides nonscripta		+
Euonymus europaeus		+
Fraxinus excelsior (c)	+	+
Lamiastrum galeobdolon	+	
Hedera helix (g)		+
Ilex aquifolium (s)		+
Oenantha crocata	+	
Pteridium aquilinum		+
Quercus robur (c)		+
Rosa canina agg.		+
Rubus fruticosus agg.		+
Salix fragilis	+	+
Silene dioica	+	
Urtica dioica	+	
Hedera helix (c)		+
Lonicera periclymenum (s)		+
Cardamine sp.	+	

Woodland 19 - Combe Wood

	QUADRAT		
	1	2	3
Acer pseudoplatanus (c)			+
Alnus glutinosa (c)		+	
Anemone nemorosa	+		
Betula pubescens (c)		+	+
Betula pendula (c)	+		+
Carpinus betulus	+		+
Castanea sativa	+		+
Crataegus monogyna (s)		+	+
Digitalis purpurea	+		
Dryopteris dilatata	+		+
Hyacinthoides non-scripta	+		+
Fraxinus excelsior (c)		+	+
Lamiastrum galeobdolon		+	+
Hedera helix (g)			+
Ilex aquifolium (s)			+
Lysimachia nemorum		+	
Mercurialis perennis	+		
Myosotis sylvatica	+		
Populus tremula			+
Pteridium aquilinum	+		
Quercus robur (c)	+		+
Ranunculus repens	+	+	
Rubus fruticosus agg.			+
Sambucus nigra (s)	+		+
Silene dioica	+		+
Stellaria holostea			+
Urtica dioica	+		
Acer pseudoplatanus (g)			+
Betula pendula (s)	+		
Fraxinus excelsior (s)	+		
Quercus robur (s)	+		
Hedera helix (c)			+
Hedera helix (s)			+
Lonicera periclymenum (s)			+
Cardamine sp.		+	

Rubus seedling	+	
Viola seedling/sp		+

Woodland 20

Acer campestre	+
Anthriscus sylvestris	+
Betula pubescens (c)	+
Betula pendula (c)	+
Carpinus betulus	+
Corylus avellana (s)	+
Crataegus monogyna (s)	+
Euonymus europaeus	+
Fraxinus excelsior (c)	+
Lamiastrum galeobdolon	+
Galium aparine	+
Glechoma hederacea	+
Hedera helix (g)	+
Ilex aquifolium (s)	+
Prunus spinosa (s)	+
Pteridium aquilinum	+
Quercus robur (c)	+
Ranunculus ficaria	+
Rosa arvensis	+
Rosa canina agg.	+
Rubus fruticosus agg.	+
Rumex sanguineus	+
Sambucus nigra (s)	+
Silene dioica	+
Stellaria holostea	+
Stellaria media	+
Urtica dioica	+
Crataegus mongyna (g)	+
Hedera helix (c)	+
Lonicera periclymenum (s)	+
Viola seedling/sp	+

Woodland 21

Acer campestre (c)	+
Anthriscus sylvestris	+
Carex pendula	+
Carex sylvatica	+
Carpinus betulus	+
Corylus avellana (s)	+
Dryopteris filix-mas	+
Fraxinus excelsior (c)	+
Lamiastrum galeobdolon	+
Galium aparine	+
Glechoma hederacea	+
Hedera helix (g)	+
Holcus mollis	+
Ilex aquifolium (s)	+
Mercurialis perennis	+
Polystichum setiferum	+
Primula vulgaris	+
Quercus robur (c)	+
Rosa arvensis	+
Rosa canina agg.	+
Rubus fruticosus agg.	+
Sambucus nigra (s)	+
Silene dioica	+
Stellaria holostea	+
Urtica dioica	+
Hedera helix (c)	+
Hedera helix (s)	+
Cardamine sp.	+
Carex seedling/sp	+
Rumex seedling/sp	+
Crataegus sp.	+

Woodland 23

Anthriscus sylvestris	+
Betula pubescens (c)	+
Betula pendula (c)	+
Carpinus betulus	+
Castanea sativa	+
Hyacinthoides non-scripta	+
Fraxinus excelsior (c)	+
Galium aparine	+
Glechoma hederacea	+
Holcus mollis	+
Ilex aquifolium (s)	+
Malus sylvestris	+
Primula vulgaris	+
Ranunculus ficaria	+
Rosa canina agg.	+
Rubus fruticosus agg.	+
Ruscus aculeatus	+
Silene dioica	+
Stellaria holostea	+
Urtica dioica	+
Crataegus sp.	+

Woodland 25 - Monkham Wood

Anthriscus sylvestris	+
Carex pendula	+
Carex remota	+
Carpinus betulus	+
Castanea sativa	+
Hyacinthoides non-scripta	+
Fraxinus excelsior (c)	+
Geum urbanum	+
Glechoma hederacea	+
Holcus mollis	+
Ilex aquifolium (s)	+
Primula vulgaris	+
Prunus avium (c)	+
Prunus spinosa (s)	+
Pteridium aquilinum	+
Quercus robur (c)	+
Ranunculus ficaria	+
Rubus fruticosus agg.	+
Sanicula europaea	+
Stellaria holostea	+
Teucrium scorodonia	+
Hedera helix (c)	+
Cardamine sp.	+
Carex seedling/sp	+
Rumex seedling/sp	+
Agrostis sp	+
Viola seedling/sp	+

Woodland 26

	QUADRAT	
	1	2
Alnus glutinosa (c)	+	+
Betula pubescens	+	
Carpinus betulus	+	
Castanea sativa	+	
Cirsium palustre		+
Digitalis purpurea	+	
Dryopteris dilatata	+	
Hyacinthoides non-scripta	+	
Fraxinus excelsior (c)	+	
Ilex aquifolium (s)	+	+
Juncus effusus		+
Lolium perenne		+
Oenanthe crocata		+
Oxalis acetosella	+	
Quercus robur (c)	+	
Ranunculus repens	+	+
Rosa canina agg.	+	
Rubus fruticosus agg.	+	
Salix fragilis		+
Silene dioica	+	
Cardamine sp.		+
Glyceria seedling/sp		+
Galium sp		+
Salix seedling/sp		+
Rumex seedling/sp	+	
Viola scedling/sp	+	
Grass sp	+	

Woodland 27 - Park Wood

	QUADRAT 1	2
Acer campestre (c)	+	
Anemone nemorosa		+
Arum maculatum	+	
Betula pubescens(c)	+	
Betula pendula (c)	+	
Brachypodium sylvaticum	+	
Carpinus betulus	+	+
Dryopteris filix-mas		+
Hyacinthoides non-scripta	+	
Fraxinus excelsior (c)	+	+
Galium aparine	+	
Geranium robertianum	+	
Geum urbanum	+	
Glechoma hederacea	+	+
Ilex aquifolium (s)	+	+
Mercurialis perennis	+	
Potentilla sterilis	+	
Primula vulgaris	+	
Quercus robur (c)	+	+
Ranunculus ficaria	+	
Rubus fruticosus agg.	+	+
Rumex sanguineus	+	
Ruscus aculeatus	+	
Sambucus nigra (s)	+	+
Silene dioica	+	
Acer campestre (s)	+	
Hedera helix (c)	+	
Lonicera periclymenum (s)	+	+
Cardamine sp.	+	
Carex seedling/sp	+	
Castanea sativa (s)	+	
Viola seedling/sp	+	
Crataegus sp	+	+

Woodland 28 - Marline Wood

	QUADRAT					
	1	2	3	4	5	6
Acer campestre (c)			+			
Ajuga reptans		+				
Alnus glutinosa (c)		+			+	+
Anemone nemorosa	+	+				
Betula pubescens (c)	+	+		+		+
Betula pendula (c)				+	+	
Blechnum spicant						+
Carex pendula	+	+	+		+	+
Carpinus betulus	+			+		
Castanea sativa	+		+	+		
Chrysosplenium oppositifolium						+
Corylus avellana (s)	+	+	+		+	
Crataegus monogyna (s)				+		
Deschampsia cespitosa						+
Dryopteris dilatata		+		+		
Hyacinthoides non-scripta		+	+	+		+
Fraxinus excelsior (c)	+	+	+		+	
Lamiastrum galeobdolon		+				
Galium aparine					+	
Geranium robertianum					+	
Geum urbanum		+				
Glechoma hederacea					+	
Hedera helix (g)	+	+	+	+	+	
Ilex aquifolium (s)	+	+	+	+	+	
Luzula sylvatica	+					
Mercurialis perennis						+
Oxalis acetosella	+	+				+
Phyllitis scolopendrium						+
Polypodium vulgare	+					
Potentilla sterilis	+					+
Prunus spinosa (s)		+				+
Quercus robur (c)	+	+	+	+		
Ranunculus ficaria	+					+
Rosa arvensis	+	+				+
Rubus fruticosus agg.	+	+	+	+	+	+

Sanicula europaea					+
Saponaria officinalis	+				
Plagiomnium undulatum	+	+			
Acer campestre (s)			+		
Fagus sylvatica (s)	+		+		
Fraxinus excelsior (s)	+				
Fraxinus excelsior (g)	+				
Quercus robur (s)				+	
Hedera helix (c)	+				
Hedera helix (s)	+	+			
Lonicera periclymenum (c)			+		
Lonicera periclymenum (s)	+	+	+	+	
Cardamine sp		+			+
Dryopteris sp	+		+		
Dryopteris carthusiana		+			
Viola seedling/sp	+	+			+
Crataegus sp	+		+	+	

Woodland 29- Area 1

Acer campestre (c)	+
Acer pseudoplatanus (c)	+
Anthriscus sylvestris	+
Arum maculatum	+
Carpinus betulus	+
Corylus avellana (s)	+
Hyacinthoides non-scripta	+
Euonymus europaeus	+
Fraxinus excelsior (c)	+
Galium aparine	+
Hedera helix (g)	+
Ilex aquifolium (s)	+
Mercurialis perennis	+
Prunus spinosa (s)	+
Quercus robur (c)	+
Rosa arvensis	+
Rosa canina agg.	+
Rubus fruticosus agg.	+
Salix fragilis	+
Sambucus nigra (s)	+
Urtica dioica	+
Acer campestre (s)	+
Fraxinus excelsior (g)	+
Hedera helix (c)	+
Rumex seedling/sp	+
Crataegus sp	+

Woodland 29- Area 2

Alnus glutinosa (c)	+
Brachypodium sylvaticum	+
Carpinus betulus	+
Corylus avellana (s)	+
Crataegus monogyna (s)	+
Deschampsia cespitosa	+
Dryopteris dilatata	+
Hyacinthoides non-scripta	+
Fagus sylvatica (c)	+
Fraxinus excelsior (c)	+
Lamiastrum galeobdolon	+
Geum urbanum	+
Glechoma hederacea	+
Hedera helix (g)	+
Ilex aquifolium (s)	+
Ligustrum vulgare	+
Mercurialis perennis	+
Polystichum aculeatum	+
Quercus robur (c)	+
Ranunculus ficaria	+
Rubus fruticosus agg.	+
Silene dioica	+
Solanum dulcamara	+
Acer campestre (s)	+
Fraxinus excelsior (s)	+
Lonicera periclymenum (s)	+
Carex seedling/sp	+
Castana sativa (s)	+

Woodland 31

Acer pseudoplatanus (c)	+
Aesculus hippocastanum	+
Ajuga reptans	+
Arum maculatum	+
Carpinus betulus	+
Castanea sativa	+
Corylus avellana (s)	+
Crataegus monogyna (s)	+
Fraxinus excelsior (s)	+
Galium aparine	+
Geranium robertianum	+
Geum urbanum	+
Mercurialis perennis	+
Pinus sylvestris (c)	+
Potentilla sterilis	+
Pteridium aquilinum	+
Quercus cerris	+
Quercus ilex	+
Quercus robur (c)	+
Rosa arvensis	+
Rubus fruticosus agg.	+
Salix caprea (s)	+
Sambucus nigra (s)	+
Silene dioica	+
Urtica dioica	+
Fagus sylvatica (s)	+
Lonicera periclymenum (s)	+
Carex seedling/sp	+

Woodland 32 - Beauport Park

	QUADRAT				
	1	2	3	4	5
Acer pseudoplatanus (c)	+			+	+
Aesculus hippocastanum			+		
Arum maculatum	+				+
Betula pubescens (c)				+	+
Betula pendula (c)	+			+	
Blechnum spicant		+	+		
Carpinus betulus	+				
Castanea sativa		+			
Circaea lutetiana	+				
Corylus avellana (s)	+	+	+		+
Dryopteris dilatata	+	+			
Dryopteris filix-mas	+				
Hyacinthoides non-scripta		+			+
Fraxinus excelsior (c)	+		+		+
Geum urbanum	+				
Glechoma hederacea	+				
Hedera helix (g)		+	+		
Ilex aquifolium (s)		+	+		
Mercurialis perennis	+	+			
Prunus avium (c)					+
Prunus laurocerasus				+	
Pteridium aquilinum	+	+		+	
Quercus cerris					+
Quercus robur (c)	+			+	+
Rhododendron ponticum	+	+	+	+	
Ribes nigrum		+			
Rosa arvensis	+				
Sambucus nigra (s)	+		+	+	+
Taxus baccata (c)				+	
Urtica dioica	+				
Acer campestre (s)	+				
Acer pseudoplatanus (s)	+				
Acer pseudoplatanus (g)		+			
Fagus sylvatica (s)		+			
Fraxinus excelsior (s)	+				

Quercus robur (s)		+		
Hedera helix (s)		+	+	
Lonicera periclymenum (s)		+	+	+
Carpinus betulus (s)	+			
Salix seedling/sp		+		

Woodland 33

Ajuga reptans	2
Anemone nemorosa	2
Betula pubescens (c)	5
Carpinus betulus	1
Corylus avellana (s)	6
Hycanthoides non-scripta	2
Fraxinus excelsior (c)	7
Mercurialis perennis	2
Potentilla sterilis	2
Quercus robur (c)	1
Rubus fruticosus agg.	2
Salix caprea (s)	1
Lonicera periclymenum (s)	2
Viola seedling/sp	3

APPENDIX 6

QUADRATS OTHER THAN WOODLAND

SITE The Lamb A259, north side **QUADRAT NO: 1**

Sample area - 30 m x 5 m

VEGETATION DESCRIPTION

This was a tall hedge belt of trees on a roadside bank. It was probably planted. It was a mixture of oak, sycamore, hawthorn, willow and blackthorn. The ground layer was dense brambles on the edge and dense ivy inside the belt.

NVC type: Plantation (No NVC equivalent)

layers (ht. cover):	8 m. 100 %		1 m. 100 %	m. %
Species	**Domin**	**Species**	**Domin**	
Tree species and shrubs		**Ground layer**	
Prunus spinosa	5	*Rubus fruticosus*	10
Acer pseudoplatanus	6	*Arrhenatherum elatius*	2
Crataegus monogyna	6	*Agrimonia eupatoria*	1
Salix caprea	6	*Galium aparine*	3
Quercus robur	6	*Brachypodium sylvaticum*	1
Fraxinus excelsior	3		
Malus domestica	1		
Hedera helix	7		

SITE New Lodge Farm, hedge, east side of road **QUADRAT NO: 2**

Sample area - 30 m x 1 m

VEGETATION DESCRIPTION

This was a hedgerow on a bank above the road. On the east side there was an arable field. The hedge was dominated by blackthorn with a few ash and oak trees. The hedge was regularly cut. The hedge on the west side of the road was very similar.

NVC type: W21a Hawthorn - ivy scrub, ivy - nettle sub-community

layers (ht. cover): 2 m. 100 % 300 mm. 80 m. %

%

Species	Domin	Species	Domin
Shrubs and climbers		**Herbs (4x4 m quadrat)**	
Prunus spinosa	8	*Arrhenatherum elatius*	5
Quercus robur	3	*Galium aparine*	3
Rosa canina s.l.	1	*Urtica dioica*	4
Crataegus monogyna	2	*Stachys sylvatica*	1
Fraxinus excelsior	5	*Glechoma hederacea*	3
Acer pseudoplatanus	1	*Arum italicum*	2
Tamus communis	1	*Hedera helix*	7
Rubus fruticosus	5		
Hedera helix	7	**Also present nearby**	
		Geum urbanum	
		Brachypodium sylvaticum	

SITE A259 verge **QUADRAT NO: 3**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a tall, species-rich bank on a road verge. The verge was dominated by common knapweed, with lots of grasses and herbs. The verge was cut occasionally.

NVC type: MG1c False oat-grass grassland, common knapweed sub-community

layers (ht. cover):	1 m.	100%	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
			Herbs			
Arrhenatherum elatius	5		*Centaurea nigra*		8	
Holcus lanatus	4		*Plantago lanceolata*		3	
Festuca rubra	3		*Heracleum sphondylium*		3	
Lolium perenne	2		*Senecio erucifolius*		2	
Elymus repens	3		*Achillea millefolium*		3	
Poa trivialis	3		*Lathyrus pratensis*		3	
Agrostis capillaris	3		*Ranunculus repens*		3	
Agrostis gigantea	3		*Rosa canina sapling*		1	
Dactylis glomerata	3		*Tragopogon pratensis*		1	
Festuca arundinacea	3		*Hypochaeris radicata*		1	
Agrostis stolonifera	3		*Leucanthemum vulgare*		1	
			Also nearby			
			Vicia cracca			
			Rumex crispus			

SITE Court Lodge footpath, ditch **QUADRAT NO: 4**

Sample area - 5 m x 3 m

VEGETATION DESCRIPTION

This was a ditch filled with shallow, still water. The sides were steep with abandant reeds, reed canary-grass and herbs. The ditch had branched bur-reed and duckweed. It was about 20cm deep. There were arable fields on both sides of the ditch.

NVC type: S26c Common reed - nettle fen, hemlock water-dropwort sub-community

layers (ht. cover):	1 m.	100 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Phragmites communis	7		*Polygonum amphibium*		2	
Calystegia sepium	3		*Alisma plantago - aquatica*		3	
Oenanthe crocata	5		*Scuttelaria galericulata*		3	
Juncus effusus	5		*Arrhenatherum elatius*		3	
Sparganium erectum	5		*Equisetum fluviatile*		2	
Phalaris arundinacea	6		*Lemna minor*		3	
Urtica dioica	3					
Carex otrubae	2					
Rumex conglomeratus	1					
Vicia tetrasperma	1					

SITE Court Cottage, Meadow **QUADRAT NO: 5**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a permanent pasture. It was either cut for hay or grazed by sheep. Some hay cutting was under way. The field was sprayed and fertilised up to about 1980, then light fertilizer only, but nothing in recent years. There were few herbs present. The soil was clayey.

NVC type: MG9a Yorkshire fog - Tufted hair-grass grassland, rough meadow grass sub-community

layers (ht. cover):	300 mm.	100%	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
grasses			**Herbs**			
Deschampsia cespitosa	5		*Ranunculus repens*		4	
Cynosurus cristatus	6		*Polygonum amphibium*		3	
Agrostis capillaris	6		*Trifolium repens*		4	
Trisetum flavescens	3					
Poa trivialis	3					
Holcus lanatus	3					
Alopecurus pratensis	3					

SITE Barnhorn Level, ditch **QUADRAT NO: 6**

Sample area - 10 m x 1 m

VEGETATION DESCRIPTION

This ditch was dominated by branched bur-reed and creeping bent. There were abundant soft rushes along the margins. There were semi-improved fields on both sides. The ditch was nearly dry.

NVC type: S14c Branched bur-reed swamp, water mint sub-community

layers (ht. cover):	1 m.	100 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Sparganium erectum	9					
Agrostis stolonifera	7					
Juncus effusus	6					
Iris pseudacorus	1					
Equisetum fluviatile	2					
Lotus uliginosus	2					
Glyceria fluitans	1					
Urtica dioica	2					
Phalaris aundinacea	1					

SITE Barnhorn Level, ditch **QUADRAT NO: 7**

Sample area - 10 m x 1 m

VEGETATION DESCRIPTION

This ditch was filled with soft rush, with other herbs scattered along. The ditch was more or less dry. There was a fence on one side of the ditch

NVC type: S14c Branched bur-reed swamp, water mint sub-community

layers (ht. cover):	1 m.	100 %	m.	%	m.	%
Species	**Domin**	**Species**	**Domin**			
Juncus effusus	10					
Glyceria maxima	2					
Urtica dioica	2					
Sparganium erectum	3					
Agrostis stolonifera	4					
Equisetum flaviatile	2					
Lycopus europaeus	1					
Alopecurus geniculatus	3					
Rumex hydrolapatham	1					
Iris pseudacorus	1					

SITE Barnhorn Level, ditch **QUADRAT NO: 8**

Sample area - 4 m x 1 m

VEGETATION DESCRIPTION

This ditch was filled with equal mixture of reed sweet-grass and reed canary-grass, and very little else. The ditch was almost dry.

NVC type: S5b Reed sweet-grass swamp, water plantion - branched bur-reed sub-community -

layers (ht. cover):	1 m. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Phalaris arundinacea	7		
Glyceria maxima	7		
Sparganium erectum	2		

SITE Broad Green Farm, bottom hedge **QUADRAT NO: 9**

Sample area - 30 m x 1 m

VEGETATION DESCRIPTION

This was a dense blackthorn hedge with a few trees at the northern end above a small ditch. There was improved pasture on both sides. There was a small step up from the lower to the upper field. It was fenced on both sides. The hedge was dominated by blackthorn with a few brambles. Ivy dominated the ground layer.

NVC type: W22 blackthorn - bramble scrub

layers (ht. cover):	3 m.	100%	300 mm.	90%	m.	%

Species	Domin	Species	Domin
Shrubs and trees and climbers		**Herbs**	
Quercus robur	1	*Arum maculatum*	3
Prunus spinosa	10	*Hedera helix*	8
Rosa tomentosa agg	2		
Crataegus monogyna	1		
Rubus fruticosus	2		
Rubus ulmifolius	4		
Tamus communis	1		

SITE Broad Green Farm, hedge **QUADRAT NO: 10**

Sample area - 30 m x 1 m

VEGETATION DESCRIPTION

This was a weak hedge on a bank between two improved fields. There was a dry shallow ditch below the hedge. There were many rabbit holes. The hedge was mainly hazel with blackthorn. The ground flora was very poor.

NVC type: No NVC equivalent, probably best treated as W21 hawthorn-ivy scrub

layers (ht. cover):	1.5 m. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Shrubs		**Herbs**	
Corylus avellana	8	*Urtica dioica*	4
Crataegus monogyna	1	*Arum maculatum*	3
Prunus spinosa	7	*Juncus effusus*	2
Sambucus nigra	1	*Pteridium aquilinum*	4
		Calystegia sepium agg	2
Rubus fruticosus	3	*Glechoma hederacea*	2
Rubus cf ulmifolius	4		
Hedera helix	4		

SITE Broad Green Farm, double hedgerow over ditch **QUADRAT NO: 11**

Sample area - 30 m x 5 m

VEGETATION DESCRIPTION

This was a double hedgerow over a ditch. The hedgerow on the south west side was cut, 1m tall and mainly hawthorn. The hedgerow on the north east side was mainly blackthorn with sallows. The two hedges had grown together with dense bramble and bracken between. The ground flora was sparse.

layers (ht. cover):	1 m.	100%	m.	%	m.	%
Species		**Domin**	**Species**			**Domin**
South west side			**North east side (No equivalent NVC type)**			
W21a Hawthorn - ivy scrub, ivy nettle sub-community			*Salix cinerea*			6
Crataegus monogyna		9	*Prunus spinosa*			8
Ilex aquifolium		1	*Tamus communis*			2
Rosa canina s.l.		2	*Crataegus monogyna*			2
Rubus fruticosus		5	*Rosa canina s.s.*			4
Corylus avellana		1	*Quercus robur*			1
Tamus communis		2	*Hedera helix*			4
Salix aurita		1	*Lonicera periclymenum*			2
Quercus robur		1	*Corylus avellana*			2
Digitalis purpurea		1				
			In between the two hedges			
			Oenanthe crocata			
The ground flora was mainly grassy and rabbit grazed			*Rubus fruticosus*			
			Pteridium aquilinum			
			Rumex sanguineus			
			Also nearby			
			Populus tremula			

SITE Longdown Farm **QUADRAT NO: 12**

Sample area - 30 m x 1 m

VEGETATION DESCRIPTION

This was an old hedgerow dominated by common sallow, with bracken and brambles. The hedge had some gaps. There was a fence in the hedge. There was no ditch.

NVC type: No NVC equivalent

layers (ht. cover):	3 m. 100 %		m. %		m. %
Species	**Domin**	**Species**		**Domin**	
Shrubs and climers		**Herbs**			
Salix cinerea	10	*Centaurea nigra*		2	
Rosa canina s.s.	3	*Arrhenatherum elatius*		4	
Pteridium aquilinum	6	*Dactylis glomerata*		3	
Tamus communis	3	*Holcus lanatus*		4	
Rubus fruticosus	4	*Ranunculus repens*		3	
Calystegia sepium agg	2	*Holcus mollis*		3	
		Lotus corniculatus		3	
		Galium aparine		3	
		Rumex crispus		1	
		Juncus effusus		2	

SITE Longdown Farm, hedge **QUADRAT NO: 13**

Sample area - 30 m x 1 m

VEGETATION DESCRIPTION

This was a cut managed elm hedgerow between two improved fields. There were several gaps in the hedge. The hedge was dominated by elm and bracken. It was on a step c. 50cm high up to the next field.

NVC type: W21a hawthorn - ivy scrub, ivy-nettle sub-community

layers (ht. cover): 2 m. 95 % 50 cm. 80 % m. %

Species	Domin	Species	Domin
Shrubs and climbers		**Herbs**	
Ulmus cf procera	10	*Arrhenatherum elatius*	4
Rosa arvensis	3	*Holcus lanatus*	5
Rubus fruticosus	2	*Galium aparine*	3
Lonicera periclymenum	2	*Pteridium aquilinum*	7
Tamus communis	2	*Agrostis copillaris*	3
Rosa canina s.s.	2	*Juncus effusus*	3
Calystegia sepium agg	3		
Rubus cf ulmifolius	3		

SITE Holmes Farm footpath 30 **QUADRAT NO: 14**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a largely unimproved grassland on a shallow west facing bank. The grass was dominated by common bent and white clover, with a mixture of other species. The soil was sandy, well drained and moderately acidic.

NVC type: MG6b Rye grass - crested dog's-tails pasture, sweet vernal-grass sub-community

layers (ht. cover):	80 mm. 100 %	m. %	m. %

Species	Domin	Species	Domin
Grass		**Herbs**	
Agrostis capillaris	8	*Trifolium repens*	4
Lolium perenne	3	*Leontodon autumnalis*	3
Cynosurus cristatus	3	*Achillea millefolium*	3
Anthoxanthum odoratum	3	*Ranunculus repens*	3
Phleum pratense s.l.	2	*Plantago lanceolata*	2
Holcus lanatus	4	*Hypochaeris radicata*	2
		Also present nearby were	
		Pimpernella saxifraga	
		Ulex europaeus	
		Prunella vulgaris	
		Lotus corniculatus	
		Ranunculus acris	
		Juncus acutiflorus	
		Leontodon taraxacoides	

SITE Longdown Farm, rushy meadow **QUADRAT NO:15**

Sample area - 4 m x 4 m

VEGETATION DESCRIPTION

This was a wet marshy grassland in a valley bottom. The grassland was dominated by soft rush and branched bur-reed. It was lightly cattle-grazed. It was probably unimproved.

NVC type: MG10a Yorkshire fog - soft rush pasture, typical sub-community

layers (ht. cover):	1 m.	100 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Juncus effusus	9		*Mentha aquatica*		3	
Sparganium erectum	4		*Ranunculus repens*		3	
Holcus lanatus	4		*Lotus uliginosus*		3	
Agrostis stolonifera	4		*Cirsium palustre*		1	
Poa trivialis	3		*Galium palustre*		2	
Glyceria fluitans	2		*Equisetum cf fluviatile*		1	
Juncus acutiflorus	2		*Ranunculus flammula*		1	
			Also present nearby			
			Myosotis laxa			
			Rumex acetosa			
			Oenanthe crocata			
			Stellaria alsine			
			Lycopus europaeus			
			Solanum dulcamara			
			Deschampsia cespitosa			

SITE Longdown Farm, hedge **QUADRAT NO: 16**

Sample area - 30 m x 3 m

VEGETATION DESCRIPTION

This was a hedge of common sallow in the valley bottom. The ground flora was grazed and open. There was a fence both sides of the ditch.

NVC type: No equivalent NVC community

layers (ht. cover):	5 m. 100 %	1 m. 80 %	m. %
Species	**Domin**	**Species**	**Domin**
Shrubs		**Herbs**	
Salix fragilis	1	*Sparganium erectum*	3
Salix cinerea	10	*Oenanthe crocata*	8
		Solanum nigram	3
		Juncus effusus	3
		Urtica dioica	3
		Agrostis stolonifera	3
		Glyceria fluitans	3
		Rumex sanguineus	2
		Hedera helix	3

SITE Whydown Road, hedge in field **QUADRAT NO: 17**

Sample area - 30 m x 3 m

VEGETATION DESCRIPTION

This was a dense, thick hedge on a step up between 2 improved fields. There was a ditch along the lower side. The lower side of the hedge was mainly hazel, the upper side mainly blackthorn. There were probably badger sets present. The grould flora was mainly bracken and bramble, with bluebells and foxgloves. The hedge was cut

NVC type: Best treated as W10 - pedunculate oak - bracken - bramble woodland

layers (ht. cover):	4 m.	100 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Shrubs and climers			**Herbs**			
Corylus avellana	7		*Pteridium aquilinum*		6	
Prunus spinosa	6		*Digitalis purpurea*		4	
Quercus robur	2		*Silene dioica*		3	
Fraxinus excelsior	1		*Holcus lanatus*		4	
Sambucus nigra	2		*Hyacinthoides non-scripta*		3	
Rosa canina s.l.	2		*Arrhenatherum elatius*		3	
Rubus fruticosus	6		*Urtica dioica*		2	
Lonicera periclymenum	3					
Tamus communis	3					
Hedera helix	5					

SITE Whydown Road, hedge on west side **QUADRAT NO: 18**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a managed hedgerow between the road and an improved field. The hedgerow was an a bank above the field (c 50cm high). The hedge was about 1m wide. There were patches of privet, blackthorn and roses. Bracken was frequent along the hedge. The ground flora was poor and shaded, with much ivy

NVC type: W22 Blackthorn - bramble scrub

layers (ht. cover):	1.5 m. 100 %		m. %		m. %
Species	**Domin**	**Species**	**Domin**		
Srubs		**Herbs**			
Prunus spinosa	8	*Pteridium aquilinum*	4		
Ligustrum vulgare	6	*Equisetum arvense*	1		
Rosa canina s.s.	1	*Elymus repens*	3		
Rosa tomentosa s.l.	4	*Sonchus oleraceus*	1		
Corylus avellana	1	*Lapsana communis*	1		
Hedera helix	6	*Urtica dioica*	3		
Salix cinerea	1	*Cirsium vulgare*	2		
Quercus robur	1	*Tamus communis*	1		
		Senecio erucifolius	1		
The west of the hedge had many more herbaceous plants of acid grassland					

SITE Whydown Road, hedge on east side **QUADRAT NO: 19**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a trimmed, dense hedgerow about 2m tall and 1m wide. It was species rich. The hedge was dominated by hawthorn and blackthorn. There was lots of ivy in the ground layer. On the west side of the hedge there was a road, on the east side a partly improved pasture. The hedge was on a slight bank about 50cm high above the field (but level with the road).

NVC type: W21a Hawthorn - ivy scrub, ivy - nettle sub-community

layers (ht. cover):	2 m.	100 %	m.	%	m.	%
Species	**Domin**		**Species**	**Domin**		
Shrubs			**Herbs**			
Prunus spinosa	7		*Lathyrus pratensis*	2		
Crataegus monogyna	7		*Elymus repens*	3		
Prunus ?domestica	2		*Dactylis glomerata*	3		
Ligustrum vulgare	4		*Heracleum sphondylium*	2		
Malus sylvestris	4		*Urtica dioica*	3		
Corylus avellana	1		*Anthriscus sylvestris*	3		
Rosa canina s.s.	1		*Vicia cracca*	2		
Quercus robur	1		*Arrhenatherum elatius*	3		
Hedera helix	7		*Holcus lanatus*	3		
Rubus fruticosus	4		*Galium aparine*	2		
Salix cinerea	1		*Calystegia sepium agg*	2		

SITE Whydown Road, pasture by old pond **QUADRAT NO: 20**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a partly improved, sheep - grazed field. The sward was dominated by bents and Yorkshire fog. The soil was sandy and probably acidic. There were few herbs present. This pasture was probably ploughed and reseeded.

NVC type: Poor MG6 Rye grass - crested dog's-tail grassland

layers (ht. cover):	100 mm.	100 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Grasses			**Herbs**			
Agrostis capillaris	6		*Trifolium repens*		4	
Holcus lanatus	5		*Trifolium dubium*		2	
Lolium perenne	4		*Ranunculus repens*		2	
Cynosurus cristatus	1					
Agrostis stolonifera	6		Moss			
Anthoxanthum odoratum	1		*Brachythecium rutabulum*		4	
Poa trivialis	2		*Rhytidiadelphus squarrosus*		2	
			Also present were			
			Alopecurus pratensis			
			Lolium multiflorum			

SITE Whydown Road, hedge near old pond **QUADRAT NO: 21**

Sample area - 30 m x 1 m

VEGETATION DESCRIPTION

This was a dense, species-rich hedge on a steep bank. There was an arable field to the east, and a semi-improved pasture to the west. The arable field to the east, and a semi-improved pasture to the west. The ground layer was mainly ivy with few other species.

NVC type: W8d Ash - Field maple - dog's mercury woodland, ivy sub-community

layers (ht. cover):	1.5 m. 100 %		m. %		m. %
Species	**Domin**	**Species**		**Domin**	
Shrubs		**Herbs**			
Prunus spinosa	5	*Galium aparine*		3	
Acer campestre	5	*Hedera helix*		8	
Fraxinus excelsior	5				
Rosa canina	1				
Rosa arvensis	1				
Crataegus monogyna	4				
Carpinus betulus	4				
Rubus fruticosus	5				

SITE Jack O'Boreham's Wood, Pasture **QUADRAT NO: 22**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a colourful meadow which was fairly uniform throughout. The sward was dominated by common bent grass, Yorshire fog, sweet vernal grass and buttercups and was abundant at the time of the surveying. The meadow was enclosed by woodland and thick hedgerows. Meadow barley grass was scattered throughout but was more prominent on the western edge of the meadow in association with meadow buttercups and patches of thistles. A pond was situated within the middle of the meadow.

NVC type: MG5a crested dog's-tail - common knapweed pasture, meadow vetchling sub-community

layers (ht. cover):	400 mm. 95 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Grasses		**Herbs**	
Agrostis capillaris	7	*Ranunculus acris*	5
Holcus lanatus	5	*Lathyrus pratensis*	5 *
Anthoxanthum odoratum	4	*Prunella vulgaris*	2
Lolium perenne	3	*Cerastium fontanum*	1
Poa trivialis	3	* this species was not generally so frequent throughout the meadows	
		Also accociated were	
		Dactylis glomerata	
		Hordeum secalinum	
		Potentilla reptans	
		Trifolium repens	
		Phleum pratense	
		Alopecurus pratensis	

SITE Pear Tree Lane **QUADRAT NO: 23**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This had highly improved rye grass ley with lots of rough meadow-grass. The sward was fairly species-poor with few herbs

NVC type: MG7b Rye grass - rough meadow-grass ley

layers (ht. cover):	300 mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Lolium perenne	9	*Ranunculus acris*	1
Holcus lanatus	3	*Cerastium glomerata*	1
Poa trivialis	5	*Rumex obtusifolius*	1
Agrostis capillaris	5	*Trifolium dubium*	2
Anthoxanthum odoratum	1		
Bromus hordeaceus	1	Also associated were	
Vulpia bromoides	1	*Trifolium pratense*	
		Trifolium repens	
		Rumex crispus	
		Matriciria recutita	

SITE Kiln Wood, pasture east of **QUADRAT NO: 24**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a reasonably herb-rich pasture which was ungrazed at the time of surveying. The dominant species were Yorkshire fog, sweet vernal-grass, rough meadow grass and bents. The pasture was adjacent to wood. There were signs of rabbits grazing. The vegetation was reasonably uniform.

NVC type: MG5a Crested dog's-tail - common knapweed pasture, meadow vetchling Sub-community

layers (ht. cover): 300 mm. % 100 m. % m. %

Species	Domin	Species	Domin
Grasses		**Herbs**	
Holcus lanatus	5	*Ranunculus repens*	5
Anthoxanthum odoratum	6	*Rumex acetosa*	3
Poa trivialis	4	*Stellaria graminea*	2
Agrostis capillaris	7	*Lotus corniculatus*	4
		Vicia cracca	2
		Achillea millefolium	2
		Trifolium repens	2
		Also present were	
		Cirsium arvense	
		Trifolium pratense	
		Prunella vulgaris	
		Cynosurus cristatus	
		Rumex acetosella	
		Lolium perenne	

SITE Kiln Wood, Bracken **QUADRAT NO: 25**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a dense stand of bracken invading a pasture. There were a few nettles and grasses. The mixture was species - poor

NVC type: U20a Bracken - heath bedstraw fern community, sweet vernal-grass sub-community

layers (ht. cover):	1 m. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Pteridium aquilinum	10		
Holcus lanatus	4		
Rumex acetosa	2		
Heracleum sphondylium	2		
Cirsium arvense	2		
Urtica dioica	4		
Ranunculus acris	1		
Arrhenatherum elatius	2		

SITE Thorne Crescent recreation ground **QUADRAT NO: 26**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a mown recreation ground of unimproved grassland. The grassland had been cut for hay. The sward was dominated by common bent and red fescue, with a few herbs. There were a few unmown patches. The sward was species - poor.

NVC type: MG5c crested dog's tail - common knapweed pasture, heathgrass sub-community

layers (ht. cover):	100 mm.	100 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Grasses						
Festuca rubra	7		*Ranunculus acris*		3	
Holcus lanatus	5		*Trifolium pratensis*		1	
Agrostis capillaris	8		*Trifolium dubium*		2	
Anthoxanthum odoratum	3		*Rumex acetosa*		2	
			Hypochaeris radicata		3	
			Taraxacum officinale		1	
			Plantago lanceolata		2	
			Trifolium repens		1	
			Lotus corniculatus		1	
			Potentilla cf anglica		1	
			Also present were			
			Carex ovalis			
			Vicia cracca			
			Juncus conglomeratus			

SITE Kiln Wood, open hedge east of **QUADRAT NO: 27**

Sample area - 30 m x 3 m

VEGETATION DESCRIPTION

This was an open hedge of blackthorn and hawthorn. There were many gaps. There were patches of bracken and bramble, and grassy patches between. The hedge was unmanaged and was probably grazed heavily in the past. There was a barbed wire fence through the hedge.

NVC type: W21a hawthorn - ivy scrub, ivy - nettle sub-community

layers (ht. cover): 3-5 m. 90 % 1-2 m. 50 % 300 mm. 80 %

Species	Domin	Species	Domin
Shrubs		**Herbs**	
Crataegus monogyna	7	*Pteridium aquilinum*	7
Prunus spinosa	7	*Urtica dioica*	5
Euonymus europaeus	1	*Galium aparine*	3
Rubus ulmifolius	6	*Dactylis glomerata*	4
		Holcus lanatus	5
		Poa trivialis	4
		Stellaria media	2
		Heracleum sphondylium	2
		Also associated was	
		Corylus avellana	

SITE Kiln Wood, pastures **QUADRAT NO: 28**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a colourful herb-rich pasture fairly uniform throughout dominated by Yorkshire fog and long grass which was mowed at the time of survey. There were some large patches of annual grasses.

NVC type: MG6b Rye grass - crested dog's-tail pasture, sweet vernal-grass sub-community

layers (ht. cover):	250 mm. 95 %		m. %		m. %
Species	**Domin**	**Species**		**Domin**	
Grasses		**Herbs**			
Holcus lanatus	5	*Hypochaeris radicata*		3	
Lolium perenne	4	*Crepis capillaris*		4	
Cynosurus cristatus	3	*Rhinanthus minor*		3	
Bromus hordeaceus	5	*Rumex crispus*		1	
Vulpia bromoides	3	*Rumex acetosa*		2	
Agrostis capillaris	7	*Trifolium repens*		2	
Anthoxanthum odoratum	5	*Trifolium pratense*		1	
Poa trivialis	1	*Taraxacum officinale agg*		2	
Festuca rubra	1	*Ranunculus acris*		3	
		Stellaria graminea		1	
		Achillea millefolium		1	
		Also present were			
		Heracleum sphondylium			
		Centaurea nigra			
		Dactylis glomerata			

SITE St Mary's Lane, hedge **QUADRAT NO: 29**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a dense hedgerow on the east side of St Mary's Lane. The hedge was trimmed. There was a ditch on the west side by the road. The east side was a neglected market garden. There were many shrubs and tree species present. The ground flora was of ivy and dog's mercury but was poor and heavily shaded. It was difficult to see inside the hedge.

NVC type: W21b Hawthorn - ivy scrub, dog's mercury sub-community

layers (ht. cover):	4 m.	100 %	m.	%	m.	%
Species	**Domin**		**Species**	**Domin**		
Shrubs and climbers			**Herbs**			
Viburnum opulus	1		*Scrophularia nodosa*	1		
Corylus avellana	7		*Brachypodium sylvaticum*	2		
Ilex aquifolium	4		*Pteridium aquilinum*	3		
Prunus spinosa	6		*Geum urbanun*	2		
Rosa canina s.s.	3		*Dactylis glomerata*	3		
Fraxinus excelsior	4		*Mercurialis perennis*	4		
Quercus robur	5		*Galium aparine*	3		
Crataegus monogyna	6		*Urtica dioica*	3		
Hedera helix	7		*Glechoma hederacea*	2		
Rubus fruticosus	3		*Epilobium obscurum*	1		
Calystegia sepium agg	1		*Heracleum spondylium*	1		
Tamus communis	1		*Elymus repens*	2		
			Geranium robertianum	1		

SITE Little Bearsden, meadow **QUADRAT NO: 30**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a heavily grazed pony field. The field was ploughed about 25 years ago and reseeded. It has received no fertilizer or spray. The sward was dominated by rye-grass and bent. The sward contained lots of herbs.

NVC type: Atypical MG6 Rye grass - crested dog's-tail pasture

layers (ht. cover):	30 mm	100%	m.	%	m.	%
Species		**Domin**	**Species**			**Domin**
Grasses						
Lolium perenne		7	*Trifolium repens*			3
Agrostis capillaris		8	*Prunella vulgaris*			4
Poa annua		1	*Ranunculus repens*			3
			Achillea millefolium			3
Also present were			*Bellis perennis*			2
Centaurium erythraea			*Anagallis arvensis*			2
Epipactis helleborine			*Trifolium dubium*			2
Leontodon taraxacoides			*Lotus corniculatus*			1
Sonchus officinale			*Senecio jacobaea*			1
Cerastium fontanum			*Plantago major*			3
Geranium dissectum			*Ranunculus acris*			2
Matricaria recutita			*Veronica serpylifolia*			2
Plantago lanceolata						
Trifolium micranthum						
Rumex crispus						
Trifolium pratense						

SITE Little Bearsden, pond **QUADRAT NO: 31**

Sample area - 15 m x 10 m

VEGETATION DESCRIPTION

This was a pond in a grazed pony field. The pond was not original,and was moved from about 30m away. It was stocked with water-lillies and fish. There were large mats of Canadian pondweed. The margins were trampled with club-rush, yellow iris and hemlock water-dropwort. The pond was fairly species-poor. The soil was clayey.

NVC type: A15 Canadian pondweed community

layers (ht. cover):	0 m.	95 %	m.	%	m.	%
Species		**Domin**	**Species**		**Domin**	
Water			**Margins**			
Elodea canadensis		10	*Carex hirta*		3	
Nymphaea alba		4	*Eleocharis palustris*		3	
			Glyceria fluitans		3	
			Oenanthe crocata		2	
			Ranunculus repens		4	
			Iris pseudacorus		2	
			Salix cinerea		5	

SITE Little Bearsden, neglected pasture **QUADRAT NO: 32**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a neglected pasture. The grass was long and dense. There was lots of leaf litter. The sward was dominated by red fescue, Yorkshire fog and bents. There were a few herbs, but they were swamped by the long grass.

NVC type: Poor MG5a Crested dog's-tail - common knapweed pasture, meadow vetchling sub-community

layers (ht. cover):	200 mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Grasses			
Festuca rubra	7	*Rumex acetosa*	3
Holcus lanatus	6	*Stellaria graminea*	3
Agrostis capillaris/gigantea	7	*Trifolium repens*	3
Trisetum flavescens	2	*Cerastium fontanum*	3
Dactylis glomerata	1	*Luzula campestris*	3
Lolium perenne	1	*Ranunculus bulbosus*	1
		Trifolium pratense	2
		Achillea millefolium	3
		Also present nearby	
		Lotus corniculatus	
		Lathyrus pratensis	
		Cirsium arvense (some large patches)	
		Senecio jacobaea	
		Centaurea nigra	
		Ranunculus acris	

SITE A269, hedge **QUADRAT NO: 33**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a hedgerow with trees bordering the A269, (It was not surveyed in detail due to heavy traffic). There were several oak trees and some young birches, The hedge was fairly species-rich with hazel and hawthorn most common. The ground layer had ivy and tall roadside herbs. The west side of the hedge was a scrubby field, set at about 2m above the road.

NVC type: W10c Pedunculate oak - bracken - bramble woodland, ivy sub-community

layers (ht. cover): 10 m. 40 % 3 m. 100 % 500 mm. 80 %

Species	Domin	Species	Domin
Trees		**Herbs**	
Quercus robur	6	*Sonchus arvensis*	3
Betula pendula	2	*Heracleum sphondylium*	3
		Pteridium aquilinum	3
Shrubs and Climbers		*Arrhenatherum elatius*	3
Corylus avellana	7	*Urtica dioica*	3
Euonymus europaeus	1	*Rumes crispus*	2
Ilex aquifolium	2		
Prunus spinsosa	3		
Rosa canina s.l.	2		
Hedera helix	7		
Lonicera periclymenum	4		
Rubus fruticosus	4		
Salix cinerea	3		

SITE A269 Verge **QUADRAT NO: 33a**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a species-rich, colourful grassland on a broad road verge. It was cut regularly. The sward was mainly common bent with lots of legumes. There were some open patches with lots of annuals. Some areas were rutted by vehicles.

NVC type: MG5a Crested dog's tail - common knapweed pasture, meadow vetchling sub-community

layers (ht. cover):	50 mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Grasses		**Herbs**	
Holcus lanatus	4	*Rumex acetosa*	2
Lolium perenne	2	*Lotus corniculatus*	4
Agrostis capillaris	8	*Crepis capillaris*	2
Aira praecox	3	*Hypochaeris radicata*	2
Vulpia bromoides	3	*Trifolium pratense*	2
Anthoxanthum odoratum	4	*Trifolium repens*	2
Poa annua	2	*Trifolium dubium*	3
Cynosurus cristatus	3	*Hieracium pilosella*	3
		Leontodon taraxacoides	3
		Senecio jacobaea	2
		Achillea millefolium	2
		Plantago lanceolata	2

SITE Ninfield Road, gorse bank **QUADRAT NO: 34**

Sample area - 10 m x 2 m

VEGETATION DESCRIPTION

This was a road bank with broom and gorse invading a grassy mixture. The broom and gorse did not mix and may have been originally planted. The herb layer was grassy. The soil was sandy.

NVC type: W23a Gorse - bramble scrub, sweet vernal-grass sub-community

layers (ht. cover): 1-1.5 m. 90 % 50 mm. 100 % m. %

Species	Domin	Species	Domin
		Herbs (4x1 m quadrat)	
Cytisus scoparius	7	*Holcus lanatus*	6
Ulex europaeus	8	*Agrostis capillaris*	7
Betula pendula	1	*Achillea millefolium*	4
Rubus fruticosus	4	*Hieracium pilosella*	4
Quercus robur sapling	1	*Plantago lanceolata*	3
		Aira praecox	3
		Hypochaeris radicata	3
		Centaurea nigra	1
		Ranunculus repens	2
		Rumex acetosella	2
		Centaurium erythraea	1
		Agrostis gigantea	2
		Leucanthemum vulgare	1

SITE Kiteye Farm, horse bank **QUADRAT NO: 35**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a small, low, grassy north facing bank in a heavily grassed pony field. The sward was mainly grassy with herbs such as bluebell and trailing St Johns-wort indicating unimproved conditions. The ground was poached. The soil was sandy and acidic.

NVC type: MG6b Rye grass - crested dog's-tail pasture, sweet vernal-grass sub-community

layers (ht. cover):	20 mm.	95 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Grasses			**Herbs**			
Agrostis capillaris	8		*Hypericum humifusum*		2	
Lolium perenne	3		*Trifolium repens*		3	
Anthoxanthum odoratum	4		*Hyacinthoides non-scripta*		3	
Holcus lanatus	4		*Ranunculus repens*		3	
			Bellis perennis		1	
			Luzula campestris		2	
Also present nearby			*Sagina procumbens*		3	
Carex ? caryophyllea			*Cerastium fontanum*		2	
Potentilla erecta			*Juncus bufonius*		1	
Ulex europaeus			*Conopodium majus*		2	
Hypochaeris radicata			*Veronica serpyllifolia*		2	
Crepis capillaris			*Ranunculus acris*		2	
Veronica officinalis			*Gnaphalium uliginorum*		1	
Cardamine flexuosa						
Prunella vulgaris			moss			
Cotoneaster sp			*Polytrichum cf formosum*		3	
Hypericum pulchrum						

SITE Kiteye Farm, woodland strip **QUADRAT NO: 36**

Sample area - 30 m x 5 m

VEGETATION DESCRIPTION

This was a narrow, wooded bank running down to a ditch and buildings. On the north side there was a semi-improved field. The canopy was dominated by hornbean and oak with hazel in the shrub layer. The ground flora was bramble on the margins, with ivy inside the woodland.

NVC type: W10c Pedunculate oak - bracken - bramble woodland, ivy sub-community

layers (ht. cover):	10-12 m.	100 %	4 m.	30 %	m.	%
Species		**Domin**	**Species**			**Domin**
Trees			**Ground Layer**			
Carpinus betulus		8	*Hedera helix*			7
Quercus robur		6	*Rubus fruticosus*			3
Fagus sylvatica		4	*Hyacinthoides non-scripta*			3
			Lonicera periclymenum			2
Shrubs						
Corylus avellana		5	Also nearby were			
Crataegus monogyna		3	*Digitalis purpurea*			
Hedera helix		4	*Fraxinus excelsior*			
Rubus fruticosus		4	*Dryopteris filix-mas*			
Ilex aquifolium		1	*Betula pubescens*			
Ruscus aculeatus		1	*Silene dioica*			
			Stachys sylvatica			

SITE Bircham Shaw Wood, pasture **QUADRAT NO: 37**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a heavily poached horse grazed pasture. The pasture was narrow with a track and footpath running through it. The vegetation was very short and sparse in places with much bare ground. The pasture was dominated by grasses including perennial rye grass, bents and annual meadow grass with numerous plantains and occasional docks especially around the pasture margins.

NVC type: MG7e rye grass - plantain ley

layers (ht. cover):	10 mm.	95%	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Grasses			**Herbs**			
Agrostis stolonifera	5		*Plantago major*		4	
Lolium perenne	4		*Polygonum aviculare*		3	
Poa annua	3		*Rumex sanguineus*		1	
Alopecurus geniculatus	1		*Ranunculus repens*		2	
			Gnaphalium uliginosum		2	
Also present were:			*Trifolium repens*		2	
Rumex obtusifolius			*Juncus bufonius*		3	
Urtica dioica			*Bellis perennis*		1	
			Prunella vulgaris		1	
			Matricaria recutita		1	

SITE Bircham Shaw, wooded stream **QUADRAT NO: 38**

Sample area - 30 m x 5 m

VEGETATION DESCRIPTION

This was a wooded bank over a small stream. The canopy had oak and birch standards. The shrub layer was mainly hazel. The ground layer had bramble and nettle along the margins, and ivy inside. The hedge back was unmanaged. There were partly improved pastures each side.

NVC type: W10c Pedunculate oak - bracken - bramble woodland, ivy sub-community

layers (ht. cover): 12 m. 40 % 6 m. 100 % 300 mm. 100 %

Species	Domin	Species	Domin
Trees		**Main herbs**	
Quercus robur	6	*Hedera helix*	7
Betula pendula	5	*Carex remota*	1
		Silene dioica	3
Shrubs		*Oenounthe crocata*	1
Corylus avellana	9	*Urtica dioica*	5
Prunus spinosa	3		
Sambucus nigra	1		
Rosa arvensis	1		
Rubus fruticous	5		
Crataegus monogyna	2		
Calystegia sepium agg	1		

SITE Preston Hall, pasture - (Western pasture) **QUADRAT NO: 39**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This pasture was situated on shoulder which slopes to the west and the south. The sward was fairly uniform, with occasional patches of MG7 but mostly MG6. A grass dominated sward with occasional to frequent herbs. The pasture was uncut at the time of surveying. The sward was dominated by Yorkshire fog and crested dog's-tail. The pasture had been improved in the past and was slowly reverting.

NVC type: MG6b Rye grass - crested dog's-tail pasture, sweet vernal-grass sub-community

layers (ht. cover):	40o mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Grasses		**Herbs**	
Cynosurus cristatus	7	*Cirsium arvense*	3
Holcus lanatus	6	*Lotus corniculatus*	2
Anthoxanthum odoratum	5	*Trifolium pratense*	3
Lolium perenne	4	*Prunella vulgaris*	2
Agrostis capillaris	6	*Hypochaeris radicata*	1
		Rumex acetosa	1
Also present with one of pasture		*Lathyris pratensis*	2
Bromus hordeaceus		*Trifolium dubium*	2
Leucanthemum vulgare		*Geranium dissectum*	1
Vulpia bromoides		*Vicia sativa agg.*	1
Crepis capillaris			
Vicia cracca			
Luzula campestris			
Convolvulus arvensis			

SITE Preston Hall Farm, hedge in pasture west of road **QUADRAT NO: 40**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a managed hazel hedge with a few hawthorn trees and blackthorn bushes. The edge may have been double-planted - there was more hazel on the eastern side, and more blackthorn on the west side. The hedge was kept trimmed. The herb layer was grassy with ivy and bracken. The soil was clayey. There were semi-improved pastures on both sides.

NVC type: W21a Hawthorn - ivy scrub, ivy - nettle sub-community

layers (ht. cover):	2 m. 95 %		1 m. 30 %		m. %
Species	**Domin**		**Species**	**Domin**	
Shrubs					
Crataegus monogyna	4		*Pteridium aquilinum*	5	
Corylus avellana	10		*Holcus lanatus*	4	
Prunus spinosa	3		*Galium aparine*	3	
Lonicera periclymenum	2		*Poa trivialis*	3	
Tamus communis	3		*Centaurea nigra*	1	
Rosa canina	1		*Arrhenatherum elatius*	3	
Rubus fruticosis	3				
Hedera helix	5				

SITE Preston Hall Farm (west pastures) northern hedge **QUADRAT NO: 41**

Sample area - 30 m x 4 m

VEGETATION DESCRIPTION

This was an over-grown, gappy and neglected hedgerow with massive oak standards. There were uncut semi-improved pastures to the north and south. The easten end of the hedgerow was less gappy but very similar in nature. The shrubs consisted predominatly of cut-leaved hawthorn with occasional hazel. The large gaps supported bramble, bracken and nettles. The hedge was situated along a possible old ditch line.

NVC type: W10 Pedunculate oak - bracken - bramble woodland, indeterminable sub-community

layers (ht. cover): Trees 20 m. 20% Shrubs 6 m. 40 % Ground 1 m. 90 %

Species	Domin	Species	Domin
Trees			
Querus robur	5	*Pteridium aquilinum*	7
Crataegus monogyna	6	*Rumex sanguineus*	2
Corylus avellena	1	*Galium aparine*	2
Rubus fruticosus	5	*Urtica dioica*	5
Tamus communis	1	*Arum maculutum*	1
Acer campestre	1		
		Associated with the hedge were	
		Arrhenatherum elatius	
		Dactylis glomerata	
		Also present along the rest of the hedge were	
		Sambucus nigra	
		Rosa arvensis	

SITE Preston Hall Farm, pasture west of Watermill Lane **QUADRAT NO: 42**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a permanent pasture dominated by grasses with very few herbs. The sward was species-poor. The field was uniform. This meadow had been improved. The sward had not been cut, and was ungrazed.

NVC type: MG7B Rye grass - rough meadow-grass ley

layers (ht. cover):	450 mm. 100%	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Grasses		**Herbs**	
Lolium perenne	2	*Ranunculus acris*	1
Holcus lanatus	7		
Poa trivialis	4	Also present were	
Anthoxantham odoratum	1	*Lotus corniculatus*	
Agrostis capillaris	7	*Trifolium pratense*	
		Cirsium arvense	
		Luzula campestris	

SITE Watermill Lane, hedge on west side **QUADRAT NO: 43**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a cut, managed hedgerow beside the road. On the west side there was a ditch, and a partly unimproved field. The ditch had hemlock, water-dropwort, hairy willow-herb and nettles. The hedge was hawthorn, crack willow, common sallow and privet. The ground flora was mainly nettles and brambles, indicating nutrient-rich conditions. The ditch was over-grown. The hedgerow had been planted.

NVC type: No NVC equivalent community

layers (ht. cover):	1.5 m. 100 %		500 mm. 80 %		m. %
Species	**Domin**		**Species**	**Domin**	
Shrubs			**Herb(4x1 quadrat)**		
Crataegus monogyna	7		*Urtica dioica*	7	
Salix viminalis	6		*Rubus fruticosus*	7	
Salix cinerea	5		*Rumex conglomeratus*	2	
Ligustum vulgare	2		*Anthriscus sylvestris*	2	
Rubus fruticosus	7		*Galium aparine*	3	
Hedera helix	6		*Taraxacum officinale*	1	
Calystegia sepium	3		*Heracleum sphondylium*	4	
			Elymus repens	2	
			Poa trivialis	3	
			Also present nearby were		
			Dryopteris filix-mas		
			Geum urbanum		
			Cirsium arvense		
			Oenanthe crocata		
			Arrhenatherum elatius		

SITE Watermill Lane (East hedge) **QUADRAT NO:44**

Sample area - 30 m x 3 m

VEGETATION DESCRIPTION

This was a mature hedge bank with frequent mature standard oaks with an understorey of holly and hazel. The road verge hedge bank was dominated by false oat-grass, nettles and bracken. Inside the hedge, the dense canopy cast a deep shade and few herbs were present within the hedge. However the road verge supported a reasonable range of plants.

NVC type: W10c Pedunculate oak -bracken - bramble woodland, ivy sub-community

layers (ht. cover): 14-20 m. 60% 10 m. 100 % 300 mm. 25%

Species	Domin	Species	Domin
Trees		**Herbs edge of hedge (5x1 Qu)**	
Quercus robur	7	*Arum maculastum*	1
Carpinus betulus	4	*Scrophularia nodosa*	2
Fraxinus excelsior	4	*Rumex sangineus*	2
		Stellaria holostea	1
Shrubs		*Galium aparine*	2
Euonymus europaeus	1	*Pteridium aquilium*	4
Ilex aquifolium	6	*Brachypodium sylvaticum*	4
Rosa canina	2		
Rubus fruticosus	5	Associated on bank	
Ligustrum vulgare	3	*Achillea millefolium*	
Prunus spinosa	3	*Arrhenatherum elatius*	
Corylus avellena	4	*Crepis capillaris*	
Hedera helix	5	*Plantago lanceolata*	
Tamas communis	3	*Stachys sylvatica*	
		Guem urbanum	
		Alliaria petiolata	
		Glechoma hederacea	

SITE Preston Paddock, by gate **QUADRAT NO:45**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a species-poor, trampled, resown grassland, once used as winter horse paddock. The sward was dominated by rye grass and white clover. This was grazed all year.

NVC type: MG7e Rye grass - plantain ley

layers (ht. cover):	50 mm.	100 %	m.	%	m.	%
Species		**Domin**	**Species**		**Domin**	
Lolium perenne		9	*Trifolium repens*		6	
Poa trivialis		4	*Bellis perennis*		3	
Cynosurus cristatus		2	*Plantago major*		3	
Phleum bertelonii		1	*Prunella vulgaris*		2	
Agrostis capillaris		2	*Taraxacum officinale*		1	
			Convolulus arvensis		1	
			Hypochaeris radicata		2	
			Crepis capillaris		1	

SITE Preston Paddock, lower field **QUADRAT NO: 46**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

A horse grazed pasture on south facing slope. This was a very colourful herb-rich grass sward with legumes. There were possible remains of ridge and furrow. No fertilisers have been applied for 20 years. The field was grazed throughout the year and had signs of some poaching in places. Ragwort was pulled by hand.

NVC type: MG5a Crested dog's-tail - common knapweed pasture, meadow vetchling sub-community

layers (ht. cover):	100 mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Grasses		**Herbs**	
Lolium perenne	5	*Trifolium repens*	4
Poa trivialis	4	*Trifolium pratense*	4
Holcus lanatus	4	*Lotus corniculatus*	8
Cynosurus cristatus	5	*Ranunculus acris*	2
Anthoxanthum odoratum	4	*Prunella vulgaris*	2
Agrostis capillaris	6	*Cerastium fontanum*	2
		Senecio jacobaea	1
Also present		*Convolvulus arvensis*	2
Festuca pratensis		*Hypochearis radicata*	2
Centaurea nigra		*Ranunculus bulbosus*	2
Leucathemum vulgare		*Daucus carota*	1
Lathyrus pratensis			
Also reported			
Centaurium erythraea			

SITE Preston Paddock, upper meadow **QUADRAT NO: 47**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a grazed pony field. It was fairly grassy with few herbs (mainly legumes). There were possible ridge and furrows. This field had probably been improved in the past, but was now reverting slowly. There had been no fertiliser added for 20 years. There was some poaching locally. Manure from the horses was collected. Ragwort was pulled by hand.

NVC type: MG6a Rye grass - crested dog's-tail pasture, typical sub-community

layers (ht. cover):	50 mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Grasses			
Lolium perenne	5	*Lotus corniculatus*	3
Cynosurus cristatus	5	*Daucus carota*	2
Holcus lanatus	7	*Trifolium repens*	5
Anthoxantham odoratum	4	*Trifolium dubium*	3
Poa trivialis	4	*Vicia sativa subsp segetalis*	2
Agrostis capillaris	6	*Prunella vulgaris*	2
		Ranunculus repens	3
		Also present in field were	
		Trifolium pratense	
		Senecio jacobaea	
		Hypochaeris radicata	
		Convolvulus arvensis	
		Lathyrus pratensis	
		Leucanthemum vulgare	

SITE Preston Hall Farm **QUADRAT NO: 48**

Sample area - 30 m x 1 m

VEGETATION DESCRIPTION

This was a cut, managed hawthorn hedge. The hawthorn trees were closely plated (not laid). The field layer was mainly grass. On the east side of the hedge there was an improved field. On the west side there was a footpath and another hedge. There was one 6m pollarded oak tree in the middle of the hedge. The hedge was very species poor. The hawthorn was the cut-leaved form widely planted.

NVC type: W21a hawthorn - ivy scrub, ivy - nettle sub-community

layers (ht. cover):	1.5 m. 98 %		300 mm. 90 %		m. %
Species	**Domin**		**Species**	**Domin**	
Shrubs			**Field layer (4x1 Quadrat)**		
Crataegus monogyna	10		*Arrhenatherum elatius*	6	
Sambucus nigra	2		*Lolium perenne*	6	
Quercus robur	1		*Galium aparine*	3	
Rosa canina	1		*Arum maculatum*	1	
Prunus spinosa	1		*Poa trivialis*	3	
Hedera helix	5		*Elymus repens*	6	
Tamus communis	2		*Holcus lanatus*	5	
Rubus fruticosus	4				
Lonicera periclymenum	1		Also present nearby		
Solanum dulcamara	1		*Pteridium aquilinum*		
			Urtica dioica		
			Cirsium arvense		

SITE Preston Hall Farm, hedge **QUADRAT NO: 49**

Sample area - 30 m x 1 m

VEGETATION DESCRIPTION

This was predominantly a cut-leaved hawthorn hedge, without trees, and cut to 1.5 m height. The hedge was situated on a bank with old tree stumps present. Pylons were running east/west across the hedgerow. This hedge was probably double planted with blackthorn on one side, hawthorn on the other.

NVC type: W21a Hawthorn - ivy scrub - nettle sub-community

layers (ht. cover):	1.5 m. 100 %		300 mm. 50 %		m. %
Species	**Domin**		**Species**	**Domin**	
Shrubs			**Ground flora (same quadrat size)**		
Crataegus monogyna	9		*Pteridium aquilinum*	6	
Rosa arvensis	2		*Holcus lanatus*	5	
Rosa tomentosa agg	1		*Arrhenatherum elatius*	6	
Prunus spinosa	4		*Stellariagraminea*	3	
Quercus robur	1		*Teucrium scorodonia*	3	
Tamus communis	3		*Cirsium arvense*	2	
Solanum nigrum	1		*Heracleum sphondylium*	1	
Corylus avellana	4		*Agrostis gigantia*	2	
Ilex aquifolium	2		*Vicia cracca*	1	
Sambucus nigra	2		*Galium aparine*	3	
Rubus fruticosus	5		*Achillea millefolium*	2	

SITE Preston Hall Farm, hedge at east end **QUADRAT NO: 50**

Sample area - 30 m x 1 m

VEGETATION DESCRIPTION

This was a tall mature hedgerow with standards of oak and ash situated along a break of slope, with improved pasture to the north, semi-improved pasture to south, with patches of blackthorn scrub.

NVC type: W10 - Pedunculate oak - bracken - bramble woodland, indeterminate sub-community

layers (ht. cover): 10-20 m. 40 % 6-8 m. 60 % 300 mm. 40 %

Species	Domin	Species	Domin
Trees		**Ground**	
Quercus robus	6	*Mercuralis perennis*	4
Fraxinus excelsior	5	*Galium aparine*	3
		Pteridium aquilinum	3
Shrubs		*Holcus lanatus*	4
Corylus avellana	6	*Anthriscus sylvestris*	2
Prunus spinosa	3	*Rumex sangineus*	1
Crataegus monogyna	4	*Primula vulgaris*	3
Rosa canina	1		
Rosa arvensis	1	Also associated with the hedge	
Rubus fruticosus agg	2	*Cirsium arvense*	
Hedera helix	3	*Dactylis glomerata*	
Euonymus europaeus	1	*Urtica dioica*	
Tamus communis	2		

SITE Preston Hall Farm, blackthorn scrub **QUADRAT NO: 51**

Sample area - 10 m x 5 m

VEGETATION DESCRIPTION

This was a tall, dense patch of blackthorn scrub. It was invading a water meadow. There was a hedge with trees behind. The scrub was grazed by cattle and the ground flora was poor and trampled.

NVC type: W22a Blackthorn - bramble scrub ivy - red campion subcommuntiy

layers (ht. cover):	5 m.	100 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Shrubs			**Herbs**			
Prunus spinosa	10		*Holcus lanatus*		3	
Rubus fruticosus	4		*Cirsium vulgare*		1	
Hedera helix	6		*Cirsium arvense*		1	
Tamus communis	1		*Heracleum sphondylium*		1	
			Urtica dioica		3	

SITE Buckholt Lane, pasture **QUADRAT NO: 52**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a uniform, species-poor grazed pasture. The soil was clay, and it was dry and cracking. There were virtually no herbs present. It was not sprayed or ferlilized by the current owner, but probably had been in the past.

NVC type: Atypical mesotrophic grassland (see 'other vegetation')

layers (ht. cover): 50 mm. 100 m. % m. % %

Species	Domin	Species	Domin
Alopecurus pratensis	8		
Poa trivialis	5		
Carex hirta	5		
Holcus lanatus	7		
Juncus acutiflorus	1		
Alopecurus geniculatus	3		
Agrostis stolonifera	2		
Rumex acetosa	1		

SITE Buckholt Lane, hedge on west side **QUADRAT NO: 53**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a mixed oak - hazel - hawthorn hedge. It was about 5m high and 2 m wide. On the east side there was Buckholt Lane, on the west side an improved meadow. The ground flora was mixed bracken and nettles. There was a telephone line above the hedge.

NVC type: W10 pedunculute oak - bracken - bramble woodland, inderminate sub-community

layers (ht. cover):	5 m. 100 %	1 m. 100 %	m. %
Species	**Domin**	**Species**	**Domin**
Canopy		**Ground flora**	
Crataegus monogyna	5	*Pteridium aquilinum*	8
Corylus avellana	7	*Urtica dioica*	6
Prunus spinosa	5	*Elymus repens*	3
Quercus robur	7	*Anthriscus sylvestris*	3
Ilex aquifolium	3	*Bromus sterilis*	2
Hedera helix	3	*Heracleum sphondylium*	2
Tamus communis	2	*Galium aparine*	1

SITE Oak Farm, Buckholt Lane hedge **QUADRAT NO: 54**

Sample area - 30 m x 3 m

VEGETATION DESCRIPTION

This was a broad (c. 3m) hedge over a ditch. Buckholt Lane was on one side, an improved pony field was on the other. The canopy was a mixture of pedunculate oak, common sallow and hazel. The herb layer was dense brambles and nettles, and there was some ivy on the ground.

NVC type: W10 Pedunculate Oak - bracken - bramble woodland, indeterminate sub-community

layers (ht. cover):	7 m.	100 %	500 mm.	80 %	m.	%
Species		**Domin**	**Species**		**Domin**	
Canopy and Shrubs			**Herbs (4x4m)**			
Salix cinerea		8	*Rubus fruticosus*		8	
Corylus avellana		7	*Urtica dioica*		5	
Quercus robur		7	*Cirsium arvense*		3	
Lonicera periclymenum		2	*Hedera helix*		4	
Ilex aquifolium		1				
Tamus communis		3				
Rosa arvensis		4				

SITE Oakfield Farm, field **QUADRAT NO: 55**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a very finely grazed pony field. The soil was clayey and poached. The sward was dominated by crested dog's-tail and rye grass. The herbs were mainly clover and buttercup. There were patches of longer grass with thistles and horse dung. There was one damper patch.

NVC type: MG6a Rye grass - crested dog's-tail pasture, typical sub-community

layers (ht. cover):	20 mm. 90 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Lolium perenne	7	*Trifolium repens*	5
Cynosurus cristatus	8	*Taraxacum officinale*	1
Agrostis stolonifera	3	*Ranunculus acris*	3
Holcus lanatus	3	*Prunella vulgaris*	2
Phleum pratense	1	*Veronica serpyllifolia*	1
		Plantago major	2
Also present		*Hypochaeris radicata*	1
Poa trivialis		*Bellis perennis*	1
Cirsium arvense			
Cirsium vulgare		Moss	
Plantago lanceolata		*Brachythecium rutabulum*	3
Senecio jacobaea			
Trifolium pratense			

SITE Oakfield Farm, hayfield **QUADRAT NO: 56**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a very species-rich old grassland used for hay (currently uncut). The vegetation was dominated by meadow foxtail. It was fairly uniform. The soil was clayey (? Wadhurst clay). There were several horse jumps.

NVC type: MG5a Crested dog's-tail - common knapweed pasture, meadow vetchling sub-community

layers (ht. cover):	500 mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Hordeum secalinum	7	*Vicia cracca*	4
Anthoxanthum odoratum	4	*Trifolium dubium*	3
Alopecurus pratensis	8	*Rumex acetosa*	2
Holcus lanatus	3	*Ranunculus acris*	3
Cynosurus cristatus	3	*Cerastium fontanum*	1
Bromus hordeaceus	2	*Rhinanthus minor*	1
Lolium perenne	1	*Trifolium repens*	1
Poa trivialis	3	*Trifolium pratense*	1
Trisetum flavescens	2		
Also present		*Lotus corniculatus*	
Ranunculus repens		*Heracleum sphondylium*	
Lathyrus pratensis		*Taraxacum officinale*	
Centaurea nigra		*Prunella vulgaris*	
Rumex crispus		*Phleum pratense*	
Rumex conglomeratus		*Cirsium arvense*	
Leucanthemum vulgare		*Cirsium vulgare*	
Oenanthe crocata		*Matricaria recutita*	
Convolvulus arvensis		*Plantago major*	
Tragopogon p[illegible]tensis		*Cerastium glomeratum*	
Hypochaeris radicata		*Agrostis stolonifera*	

SITE Glovers Farm/Oak Farm, hedge **QUADRAT NO: 57**

Sample area - 30 m x 4 m

VEGETATION DESCRIPTION

This was a hedgerow with trees. The hedge was broad and tall. Oak trees dominated the canopy, field maple and blackthorn dominated the shrub layer, and climbers and bramble the sparse field layer. The hedge was over a dry ditch. On the east side there was an improved field. On the west side there was an unimproved field. On the field margins there was soft rush and hemlock water-dropwort.

NVC type: W8d ash - field maple - dog's mercury woodland, ivy sub-community

layers (ht. cover):	12 m. 100 %		4 m. 100 %		1 m. 50 %
Species	**Domin**		**Species**		**Domin**
Trees			**Herbs**		
Quercus robur	10		*Galium aparine*		3
Acer campestre	1		*Rubus fruticosus*		7
Shrubs					
Prunus spinosa	8				
Acer campestre	7				
Lonicera periclymenum	3				
Rosa canina	1				
Hedera helix	5				
Corylus avellana	1				
Crataegus monogyna	1				

SITE Glovers Farm, hedge **QUADRAT NO: 58**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a cut hedgerow betwcen two improved fields. It had a steep stcp down from one field to the other on the north. The hedge was mainly blackthorn, bramble and hazel. There were improved fields on both sides. The hedge immediately to the west was much richer with field maple and spindle.

NVC type: No equivalent NVC type

layers (ht. cover):	2 m. 95 %		200 cm. 80%	m. %
Species	**Domin**	**Species**	**Domin**
Shrubs		**Herbs (2x2 m quadrat)**	
Corylus avellana	8	*Hedera helix*	8
Prunus spinosa	8	*Urtica dioica*	4
		Galium aparine	3
Climbers and sub-shrubs			
Hedera helix	4		
Rubus fruticosus	5		
Pteridium aquilinum	4		
Tamus communis	1		
Calystegia sepium	3		
Rosa sp.	1		

SITE Glovers Farm, ditch **QUADRAT NO: 59**

Sample area - 4 m x 1 m

VEGETATION DESCRIPTION

This was a stand of hairy willow-herb along a ditch. The swamp was tall. The ditch was damp, but not wet. Nettles lined the banks.

NVC type: S28b Reed canary-grass swamp, hairy willow-herb - nettle sub-community

layers (ht. cover):	1 m. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Epilobium hirsutum	9		
Apium nodiflorum	4		
Urtica dioica	4		
Elymus repens	2		
Poa trivialis	2		
Calystegia sepium s.l.	2		

SITE Glovers Farm, ditch **QUADRAT NO: 60**

Sample area - 4 m x 1 m

VEGETATION DESCRIPTION

This was a ditch filled with common reed and nettles and other tall herbs. The ditch was damp but had no water. It was fenced on both sides, and there was MG1 false oat-grass grassland lining it.

NVC type: S26d Common reed - nettle fen, hairy willow-herb sub-community

layers (ht. cover):	1 m.	100 %	m.	%	m.	%
Species		**Domin**	**Species**			**Domin**
Phragmites communis		10				
Phalaris arundinacea		4				
Epilobium hirsutum		3				
Urtica dioica		3				
Poa trivialis		3				
Calystegia sepium		3				
Solanum dulcamara		2				
Arrhenatherum elatius		2				
Rubus fruticosus		2				

SITE Combe Wood, footpath 31a hedgerow **QUADRAT NO: 61**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a tall hedge with trees. Away from the railway it changed into a typical hawthorn hedge. The trees were oak, alder and field maple. The shrubs were hawthorn and hazel. The ground flora was mainly ivy and Yorkshire fog. On the west side of the hedge there was an improved field. On the east side there was a stream and damp alluvium with scrub and nettles. The hedge was grazed by rabbits (browse line at 20cm).

NVC type: W8d Ash - field maple - dog's mercury woodland, ivy sub-community

layers (ht. cover): 12 m. 90 % 3 m. 90 % 100 mm. 50 %

Species	Domin	Species	Domin
Trees		**Ground flora**	
Alnus glutinosa	6	*Hedera helix*	7
Quercus robur	7	*Holcus lanatus*	5
Acer campestre	7	*Dactylis glomerata*	2
Shrubs and climbers			
Crataegus monogyna	8		
Corylus avellana	5		
Hedera helix	4		
Rosa canina	2		
Ilex aquifolium	2		
Lonicera periclymenum	2		

SITE Wet ditch and alluvium east of footpath 31a **QUADRAT NO: 62**

Sample area - 4 m x 4 m

VEGETATION DESCRIPTION

This was a damp area of alluvium and ditch between two tall hedges. The area was very dense and full of nettles, with elder scrub patches.

NVC type: Nettle - beds (no NVC community)

layers (ht. cover):	1 m.	100 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Urtica dioica	10					
Hedera helix	2					
Rumex sanguineus	1					
Carex remota	1					
Sambucus nigra	2					

SITE Combe Wood, bracken on north side **QUADRAT NO: 63**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was an area of dense bracken, with a ground flora of creeping soft grass and bluebells. The soil was sandy with lots of humus. There were oak, hawthorn and blackthorn shrubs invading. There were also foxgloves and some brambles.

NVC type: U20a Bracken - heath bedstraw fern community, sweet vernal-grass sub-community

layers (ht. cover): 1.5 m. 100 % 200 mm. 50 % m. %

Species	Domin	Species	Domin
Pteridium aquilinum	10		
Holcus mollis	6		
Hyacinthoides non-scripta	4		
Viola riviniana	3		
Silene dioica	3		
Conopodium majus	1		

SITE Combe Wood, hedge on meadow, north side **QUADRAT NO: 64**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a tall, unmanaged hedge. The north end had some large trees. The south end was mainly hawthorn. The west side was a rye grass ley, the east side was an arable field. This 30m section was with trees nearest to the railway line. The trees were oak and field maple. The shrub layer was incomplete and mixed hawthorn and hazel. There were lots of climbers. The soil was clayey (?Wadhurst clay) and the east side of the hedge was over a ditch (dry). The herb layer was dominated by nettles.

NVC type: W8d Ash - field maple - dog's mercury woodland, ivy sub-community

layers (ht. cover): 13 m. 90 % 4 m. 65 % 1 m. 100 %

Species	Domin	Species	Domin
Trees		**Herbs (4x1m quadrat)**	
Acer campestre	7	*Urtica dioica*	9
Quercus robur	7	*Calystegia sepium agg*	3
Acer pseudoplatanus	1	*Oenanthe crocata*	4
		Arrhenatherum elatius	3
Shrubs and climbers		*Rumex obtusifolius*	2
Corylus avellana	6	*Stachys sylvatica*	2
Prunus spinosa	4		
Crataegus monogyna	6		
Hedera helix	6		
Tamus communis	3		
Rubus fruticosus	4		
Lonicera periclymenum	2		

SITE Little Worsham Farm, hedge by railway line **QUADRAT NO: 65**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a managed hedgerow, about 3m tall, continuous, and 2m wide. There was a range of woody species present, which were usually locally dominant. The inside of the hedge had a layer of ivy. The eastern margin had tall herbs indicative of nutrient-rich, ungrazed conditions (cow parsley, nettles, false oat-grass). There was a track on the east side and an arable field on the west. The hedges to the south along the track were similar and species-rich.

NVC type: W21a Hawthorn - ivy scrub, ivy - nettle sub-community

layers (ht. cover):	3 m.	100 %	100 mm.	80 %	m.	%
Species		**Domin**	**Species**			**Domin**
Shrubs						
Cornus sanguinea		5	*Galium aparine*			3
Prunus spinosa		5	*Urtica dioica*			5
Acer campestre		5	*Anthriscus sylvestris*			5
Crataegus monogyna		5	*Calystegia sepium s.l.*			2
Corylus avellana		1	*Arrhenatherum elatius*			5
Rosa canina s.l.		1				
Quercus robur		1				
Underscrub						
Hedera helix		9				
Tamus communis		3				
Rubus fruticasus		4				

SITE Little Worsham Farm, pony field **QUADRAT NO: 66**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was probably unimproved meadow but was heavily grazed by ponies. The turf was very short. The ground was poached. The soil was sandy (Ashdown sands) and well-drained. The sward was mixed rye grass, crested dog's tail, buttercups and clover. There were patches of grass with thistles in places. The ground was uneven, and there were longer patches of grass with thistles in places. The ground was uneven and there were ridge and furrows running across the slope. The ridges were about 2 m apart.

NVC type: MG6b Rye grass - crested dog's-tail pasture, sweet vernal-grass sub-community

layers (ht. cover):	30 mm.	95 %	m.	%	m.	%
Species		**Domin**	**Species**			**Domin**
Grasses			**Herbs**			
Lolium perenne		5	*Trifolium repens*			4
Cynosurus cristatus		5	*Trifolium pratense*			1
Anthoxanthum odoratum		4	*Ranunculus acris*			3
Holcus lanatus		4	*Taraxacum officinale*			2
Agrostis capillaris		6	*Lotus corniculatus*			1
Festuca rubra		2	*Brachythecium rutabulum*			3
			Also present in the field were			
			Rumex acetosa			
			Ranunculus repens			
			Ranunculus bulbosus			
			Cirsium vulgare			
			Cirsium arvense			
			Rumex crispus			
			Cerastium fontanum			
			Trisetum flavescens			
			Digitalis purpurea			
			Bellis perennis			
			Alopecurus pratensis			
			Cirsium palustre			

SITE Little Worsham Farm Pond **QUADRAT NO: 67**

Sample area - 4 m x 4 m

VEGETATION DESCRIPTION

This was a sloping flush (possibly an old pond) fed by a small spring in a pony field. The vegetation was variable, heavily grazed and trampled by ponies. There were puddles and a trickle of water flow. This quadrat was placed on the wettest, most uniform area. There was a wettish ditch draining to the north.

NVC type: Probably best treated as an MG10 Yorkshire fog - soft rush pasture

layers (ht. cover):	100 mm. 70 %		m. %		m. %
Species	**Domin**	**Species**	**Domin**		
Rumex obtusifolius	2	*Cynosurus cristatus*	3		
Ranunculus repens	4	*Poa trivialis*	3		
Ranunculus hederaceus	3	*Rumex acetosa*	3		
Juncus bufonius s.s.	3	*Holcus lanatus*	3		
Juncus effusus	5	*Lotus uliginosus*	3		
Juncus acutiflorus	5	*Myosotis laxa*	1		
Stellaria alsine	3	*Ranunculus flammula*	2		
Agrostis stolonifera	4	*Cardamine flexuosa*	2		
Cirsium palustre	2	*Polygonum hydropiper*	3		
Epilobium obscurum	2	*Alopecurus genicalatus*	3		
Glyceria fluitans	4				
Glyceria declinata	2				
Anthoxantham odoratum	2				

SITE Little Worsham Farm, pony field **QUADRAT NO:68**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was an unimproved acid grassland bank. The field was heavily pony-grazed. The grassland was species-rich with many good indicator species. The soil was sandy (Ashdown sands).

NVC type: U4a sheep's fescue - common bent - heath bedstraw grassland, typical sub-community

layers (ht. cover):	80 mm. 100 %		m. %		m. %
Species	**Domin**	**Species**	**Domin**		
Grasses		**Herbs**			
Festuca rubra	6	*Hieracium pilosella*	3		
Holcus lanatus	6	*Galium saxatile*	3		
Agrostis capillaris	6	*Rumex acetosa*	3		
Danthonia decumbens	4	*Hypochaeris radicata*	2		
		Hyacinthoides non-scripta	1		
		Luzula campestris	5		
		Carex ovalis	1		
		Potentilla erecta	3		
		Centaurea nigra	1		
		Crataegus monogyna sapling	1		
		Mosses			
		Rhytidelphus squarrosus	3		
		Also present were			
		Conopodium majus			
		Achillea millefolium			
		Stellaria graminea			
		Leontodon taraxacoides			

SITE Little Worsham Farm, hedge along old railway line **QUADRAT NO: 69**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a tall hawthorn hedge planted along the old railway. The hedge was species poor. The ground flora was sparse under the dense shade and indicated disturbed, nutrient-rich conditions. On one side of the hedge there was an unimproved field, on the other, the railway line.

NVC type: W21a Hawthorn - ivy scrub, ivy - nettle sub-community

layers (ht. cover):	6 m.	100 %	500 mm.	30 %	m.	%
Species		**Domin**	**Species**			**Domin**
Shrubs			**Herbs**			
Crataegus monogyna		10	*Urtica dioica*			5
Rosa canina s.s.		1	*Galium aparine*			3
Sambucus nigra		3	*Arrhenatherum elatius*			1
Salix cinerea		2	*Heracleum sphondylium*			2
Quercus robur		1				
			Other woody species also noted			
Climbers and undershrubs			in the hedge nearby were			
Solanum dulcamara		2	*Prunus spinosa*			
Lonicera periclymenum		3	*Fraxinus excelsior*			
Tamus communis		1				
Rubus fruticosus		3				

SITE Little Worsham Farm, old railway line **QUADRAT NO: 70**

Sample area - 4 m x 1 m

VEGETATION DESCRIPTION

This old railway had four different communities. There were hawthorn hedges planted along the edges. Then a strip of bramble underscrub had developed. Then there was tall grassland and then the short open grassland in the middle of the line. The ballast had been stripped and the line was now churned by tractors in places. There were lots of butterflies along the railway.

Species	Domin	Species	Domin
Bramble scrub (1m tall, 100% cover)		**Short grassland (80 mm tall, 80% cover)**	
Rubus fruticosus	10	*Vulpia bromoides*	3
Lonicera perclymenum	2	*Trisetum flavescens*	5
Rosa canina	2	*Holcus lantatus*	3
Urtica dioica	2	*Lolium perenne*	4
Galium aparine	3	*Cynosurus cristatus*	6
Arrhenatherum elatius	2	*Poa annua*	2
This was a W24b bramble-Yorkshire fog scrub		*Poa pratensis*	4
		Trifolium pratense	5
Tall grassland (700 mm tall, 100% cover)		*Bellis perennis*	3
Arrhenatherum elatius	9	*Medicago lupulina*	2
Holcus lanatus	3	*Centaurium erythaea*	1
Cynosurus cristatus	3	*Plantago lanceolata*	3
Rubus fruticosus	3	*Lotus corniculatus*	2
Leucanthemum vulgare	2	*Leontodon taraxacoides*	4
Centaurea nigra	3	*Centaurea nigra*	1
Poa trivialis	3	*Linum catharticum*	3
Plantago lanceolata	2	*Prunella vulgaris*	3
Dactylis glomerata	2	*Vicia sativa agg*	2
Trisetum flavescens	3	*Veronica serpyllifolin*	2
Trifolium pratense (cont)*	3		
Lotus corniculatus	2	This was an MG5a crested dog's-tail - common knapweed pasture, meadow vetchling sub-community	
Festuca rubra	4		

Heracleum sphondylium This was a MG1e false oat-Grass grassland common knapweed sub-community	1	The more disturbed areas had an open weedy flora (ht 100 mm, cover 50%)	
		Gnaphalium uliginosum	4
		Matricaria matricariodes	5
		Juncus bufonius s.s.	4
		Agrostis stolonifera	5
		Polygonum aviculare	2
		Plantago major	4
		Alopecurus geniculatus	2
		Matricaria recutita	3
		Lolium perenne	3
		Poa annua	3
		Trifolium repens	2
		This stand had no NVC equivalent. It was treated as a pineappleweed community	
		Also present along the railway line were	
		Senecio erucfolius	
		Cytisus scoparius	
		Sagina apetala	
		Ulex europaeus	
		Vicia segetalis	
		Linum usistatissimum	
		Pulicaria dysenterica	
		Carex flacca	

SITE Little Worsham Farm, crested dog's-tail pasture **QUADRAT NO: 71**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a heavily cattle-grazed pasture on a slope. The grassland was dominated by crested dog's tail. It was fairly uniform and had probably been lightly ferlilized. The soil was dry and sandy (Ashdown sands) and was well drained. There were herbs and grasses present which indicated little improvement such as birds foot trefoil, cat's ear and sweet vernal-grass

NVC type: MG6b Rye grass-crested dog's tail pasture sweet vernal-grass sub-community

layers (ht. cover):	50 mm. 100 %		m. %		m. %
Species	**Domin**	**Species**	**Domin**	**Species**	**Domin**
Grasses					
Cynosurus cristatus	8	*Cerastium fontanum*	3		
Lolium perenne	5	*Trifolium repens*	4		
Holcus lanatus	4	*Rumex acetosa*	3		
Agrostis capillaris	4	*Hypochaeris radicata*	2		
Festuca rubra	3	*Ranunculus repens*	3		
Anthoxanthum odoratum	2	*Ranunculus acris*	2		
		Taraxacum officinale	1		
		Cirsium arvense	1		
		Lotus corniculatus	1		
		Also present were			
		Bellis perennis			
		Cirsium vulgare			

SITE Little Worsham Farm, rush pasture **QUADRAT NO: 72**

Sample area - 4 m x 4 m

VEGETATION DESCRIPTION

This was damp marshy field in the valley bottom dominated by soft rush. It was grazed by cattle. The other species were scattered between the clumps of soft rush. The sward was species-poor. The soil was probably alluvium, it was currently firm and not wet.

NVC type: MG10a Yorkshire fog - soft rush pasture, typical sub-community

layers (ht. cover):	0.5 m.	100%	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
			Other species present			
Juncus effusus	10		*Ranunculus flammula*			
Alopecurus pratensis	4		*Myosotis laxa*			
Potentilla anserina	4		*Ranunculus repens*			
Poa trivialis	3		*Polygonum hydropiper*			
Equisetum palustre	2		*Rumex conglomeratus*			
Alopecurus geniculatus	3					
Galium palustre	2					
Agrostis stolonifera	3					
Glyceria fluitans	3					

SITE Upper Wilting Farm, 4th hedge **QUADRAT NO: 73**

Sample area - 30 m x 3 m

VEGETATION DESCRIPTION

This was a mixed-species hedge. Nearer to Decoy Pond Wood there were small trees. Away from Decoy Pond Wood hawthorn dominates. The hedge was above a small stream in a ditch. On the north side there was a flax field, on the south side a semi-improved meadow. The ditch had tall herbs such as hairy willow-herb on the hedge side.

NVC type: W21a Hawthorn - ivy scrub, ivy - nettle sub-community

layers (ht. cover):	4 m. 100 %	1 m. 100 %	m. %
Species	**Domin**	**Species**	**Domin**
Herbs			
Ilex aquifolium	1	*Pterdium aquilinum*	4
Corylus avellana	3	*Arrhenatherum elatius*	3
Crataegus monogyna	8	*Galium aparine*	3
Alnus glutinosa	1		
Acer pseudoplatanus	1		
Fraxinus excelsior	2		
Quercus robur	1		
Prunus spinosa	2		
Salix caprea	1		
Herbs and climbers			
Rubus fruticosus	5		
Humulus lupulus	2		
Lonicera periclymenum	2		
Calystegia sepium agg	2		
Hedera helix	1		

SITE Upper Wilting Farm, 3rd hedge **QUADRAT NO: 74**

Sample area - 30 m x 3 m

VEGETATION DESCRIPTION

This was on open hedge with trees. The trees were mainly oaks. The shrubs were mainly blackthorn and rose. The herbs were bramble and bracken. Grassy gaps had false oat-grass and cocksfoot. The hedge also had a fence. Ther were flax fields on either side of the hedge.

NVC type: W10 Pedunculate oak - bracken - bramble woodland, indeterminate sub-community

layers (ht. cover): 8 m. 70 % 4 m. 90 % 50 cm. 50 %

Species	Domin	Species	Domin
Trees		**Herbs (4x4 quadrat)**	
Quercus robur	8	*Pteridium aquilinum*	7
Prunus domestica	1	*Rubus fruticosus*	7
Acer campestre	1	*Arrhenatherum elatius*	3
Carpinus betulus	1	*Dactylis glomerata*	3
		Urtica dioica	3
Shrubs		*Agrostis capillaris*	2
Rosa canina	3		
Prunus spinosa	9		
Crataegus monogyna	2		
Tamus comminis	3		

SITE Upper Wilting Farm, sunken lane **QUADRAT NO: 75**

Sample area - 30 m x 10 m

VEGETATION DESCRIPTION

This was an old sunken lane with trees planted on both sides. The trees had often been coppiced or laid and had stems growing sideways. There was a mixture of trees, with field maple, hornbean and oak. The sunken lane was about 1m deep and 5m wide, and one area had been used as a sandstone quary. The ground flora was mainly grassy and was lightly cattle grazed. The cattle may shelter here and trample during winter.

NVC type: W8 Ash - field maple - dog's mercury woodland, indeterminate sub-community

layers (ht. cover): 10 m. 90 % 3 m. 20 % 300 mm. 100 %

Species	Domin	Species	Domin
Trees		**Ground flora (4x4 quadrat)**	
Quercus robur	7	*Poa trivialis*	9
Acer pseudoplatanus	7	*Urtica dioica*	4
Carpinus betulus	5	*Rubus fruticosus*	4
Populus tremula	6	*Prunella vulgaris*	2
Malus sylvestris	1	*Galium aparine*	2
Ilex aquifolium	1	*Stachys sylvatica*	1
		Rumex sanguineus	1
Shrubs			
Crataegus monogyna	3	Also present were	
Corylus avellana	3	*Primula vulgaris*	
Euonymus europaeus	2	*Brachypodium sylvaticum*	
Rosa canina	1	*Potentilla sterilis*	
Prunus spinosa	2	*Circaea lutetiana*	
Ilex aquifolium	4	*Digitalis purpurea*	
Tamus communis	2	*Silene dioica*	
Hedera helix	3	*Melica uniflora*	
Rubus fruticosus	3		
Ruscus aculeatus	1		

SITE Upper Wilting Farm, semi-improved meadow **QUADRAT NO: 76**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a semi-improved meadow with rye grass dominant. There were patches of nettles and thistles. The field was uneven and patchy. There were three oak trees on the east side close to the wood. The bank on the south west side has meadow barley, knapweed, meadow vetchling, hairy sedge, yellow oat-grass and red clover and has probably escaped improvement.

NVC type: MG7d Rye grass - meadow foxtail ley

layers (ht. cover):	100 mm.	100 %	m.	%	m.	%
Species		**Domin**	**Species**			**Domin**
Lolium perenne		9	*Trifolium repens*			3
Alopecurus pratensis		4	*Cirsium arvense*			3
Poa pratensis		2				
Poa trivialis		2				
Holcus lanatus		2				

SITE Upper Wilting Farm, pony field **QUADRAT NO: 77**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a field grazed by ponies. The grassland was partly-improved with rye grass and white clover on the flatter areas, but the banks and edges can be quite rich and were Centaureo-cynosuretem rather than Lolio-cynosuretum.. The grasslands were species-rich, poached in places, and had some weedy patches. There were a few ant hills.

NVC type: MG6b Rye grass - crested dog's-tail pasture sweet vernal-grass sub-community

layers (ht. cover):	30 mm. 100 %		m. %		m. %
Species	**Domin**	**Species**	**Domin**	**Species**	**Domin**
Grasses					
Lolium perenne	7	*Trifolium repens*	4		
Cynosurus cristatus	7	*Trifolium pratense*	1		
Poa pratensis agg	3	*Lotus corniculatus*	3		
Agrostis capillaris	4	*Achillea millefolium*	3		
Phleum pratense agg	3	*Cerastium fontanum*	3		
Poa annua	1	*Crepis capillaris*	2		
Holcus lanatus	3	*Trifolium dubium*	3		
		Leontodon autumnalis	3		
		Taraxacum officinale	1		
		Ranunculus repens	1		
		Prunella vulgaris	1		
		Plantago lanceolata	2		
		Senecio jacobaea	1		
		Also present			
		Hypochaeris radicata			
		Trisetum flavescens (on ant hills)			
		Centaurea nigra			

SITE Upper Wilting Farm, hedge 1 **QUADRAT NO: 78**

Sample area - 30 m x 5 m

VEGETATION DESCRIPTION

This was a broad hedge between an improved and a semi-improved field. The hedge may be double-planted with hawthorn on the south side and blackthorn on the north side. The hedge was not very species-rich. Blackthorn was invading the field on the south side.

The hedge on the west side of the gate was largely blackthorn with hornbeam, sycamore and elm trees. There was no obvious sign of it having been double-planted.

NVC type: W21a Hawthorn - ivy scrub, ivy-nettle sub-community

layers (ht. cover):	4 m. 90 %		m. %		m. %
Species	**Domin**	**Species**	**Domin**	**Species**	**Domin**
Shrubs		**Herbs**			
Crataegus monogyna	7	*Centaurea nigra*	2		
Prunus spinosa	8	*Malva moschata*	1		
Sambucus nigra	1	*Stellaria graminea*	2		
Rosa canina	2	*Urtica dioica*	3		
Acer pseudoplatanus	1	*Rumex sanguineus*	1		
Tamus communis	3	*Dactylis glomerata*	3		
Rubus fruticosus	5	*Cirsium arvense*	2		
Pteridium aquilinum	4	*Agrostis capillaris*	1		
		Glechoma hederacea	1		

SITE Hollyhocks, hedge **QUADRAT NO: 79**

Sample area - 20 m x 2 m

VEGETATION DESCRIPTION

This was a narrow, species-poor, recent hedge dominated by hawthorn, with ivy, bramble and nettles. The hedge was uniform and about 2 m wide. The ground flora was typical of disturbed nutrient-rich road verges.

NVC type: W21a Hawthorn - ivy scrub, ivy - nettle sub-community

layers (ht. cover):	4 m.	100 %		m.	%		m.	%
Species		**Domin**	**Species**				**Domin**	
Crataegus monogyna		10	*Pteridium aquilinum*				1	
Sambucus nigra		3	*Mercurialis perennis*				2	
Rosa canina s.s.		1	*Urtica dioica*				6	
Ligustrum vulgare		1	*Galium aparine*				3	
Hedera helix		6	*Alliaria petiolata*				3	
Rubus fruticosus		5	*Rumex crispus*				1	
			Rumex obtusifolius				3	
			Lapsana communis				3	
			Arrhenatherum elatius				3	
			Holcus lanatus				3	

SITE Hollyhocks, verge opposite **QUADRAT NO: 80**

Sample area - 10 m x 2 m

VEGETATION DESCRIPTION

This was a road verge with bracken and bramble scrub growing over a chain-link fence. The vegetation was tall and unmown.

NVC type: W25a Bracken - bramble underscrub bluebell sub-community

layers (ht. cover):	1 m. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Pteridium aquilinum	8		
Rubus fruticosus	8		
Arrhenatherum elatius	4		
Urtica dioica	3		
Heracleum sphondylium	2		
Galium aparine	3		
Potentilla anserina	2		
Bromus sterilis	1		
Cirsium arvense	1		
Elymus repens	1		

SITE The Sanctuaire, verge **QUADRAT NO: 81**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a tall, rank, grassland on a roadbank. It was dominated by nettles, creeping thistle, Yorkshire fog and red fescue. The grassland was weedy and probably nitrogen-rich.

NVC type: MG1b False Oat-grass grassland, nettle sub-community

layers (ht. cover): 300 mm. 100 % m. % m. %

Species	Domin	Species	Domin
Holcus lanatus	7	*Urtica dioica*	5
Festuca rubra	8	*Cirsium arvense*	5
Bromus hordeaceus	3	*Rumex crispus*	1
Agrostis stolonifera	4	*Heracleum sphondylium*	1

SITE The Sanctuaire, pony field **QUADRAT NO: 82**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a finely grazed pony field. The field was dominated by grasses with a few herbs. It was probably largely unimproved. It had received no fertiliser for at least 13 years. There were some ant hills on the steep slopes. The soil was probably Wadhurst clay with sand.

NVC type: MG6b Rye grass - crested dog's - tail pasture, sweet vernal-grass sub-community

layers (ht. cover):	300 mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Grasses		**Herbaceous plants**	
Holcus lanatus	7	*Trifolium repens*	3
Agrostis capillaris	7	*Cirsium arvense*	3
Festuca rubra	7	*Luzula campestris*	3
Anthoxanthum odoratum	3	*Rumex acetosa*	2
		Stellaria graminea	1
Also present:		*Cerastium fontanum*	1
Prunella vulgaris		*Ranunculus acris*	1
Potentilla reptans		*Lotus corniculatus*	1
Sagina procumbens		*Achillea millefolium*	1
Agrostis vinealis			
Trifolium pratense		Also reported by farmer	
Ranunculus repens		*Primula veris*	
Glechoma hederacea			
Veronica serpyllifolia			
Centaurium erythraea			

SITE The Sanctuaire, bracken stand in pony field **QUADRAT NO: 83**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a dense stand of bracken with a sparse, grassy understory. There were patches of brambles in the bracken locally.

NVC type: U20a Bracken heath - bedstraw fern community sweet vernal-grass sub-community

layers (ht. cover):	1 m. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Pteridium aquilinum	10		
Rumex acetosa	2		
Poa trivialis	4		
Holcus lanatus	4		
Agrostis capillaris	4		
Ranunculus acris	1		

SITE The Sanctuaire, hedge **QUADRAT NO: 84**

Sample area - 30 m x 2 m

VEGETATION DESCRIPTION

This was a mixed species hedgerow with a few trees. The hedge was about 4m tall and 5m wide. It was variable in height and composition. Some field maple trees have been planted on the eastern side. The ground flora was very sparse due to the dense shade and rabbit grazing (there was a browse line at about 20 cm).

NVC type: W21a Hawthorn - ivy scrub, ivy nettle sub-community

layers (ht. cover):	4 m.	100 %	100 mm.	5 %	m.	%
Species		**Domin**	**Species**			**Domin**
Shrubs						
Fraxinus excelsior		2	*Rubus fruticosus*			3
Quercus robur		1	*Lonicera periclymenum*			3
Acer campestre		3	*Pteridium aquilinum*			4
Prunus spinosa		8	*Hedera helix*			3
Crataegus monogyna		5				
Sambucus nigra		1	**Ground layer**			
Corylus avellana		2	*Galium aparine*			3
			Holcus lanatus			3

SITE Queensway, SW end, bank **QUADRAT NO: 85**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a tall rank grassland dominated by red fescue and Yorkshire fog. There were patches of creeping thistles. False oat-grass occurs abundantly along the foot of the slope. It was unmanaged. The grassland was fairly species-poor. It was probably sown.

NVC type: MG1a False oat-grass grassland red rescue sub-community

layers (ht. cover): 300 m m. 100 % m. % m. %

Species	Domin	Species	Domin
Grasses		**Herbs**	
Holcus lanatus	8	*Stellaria graminea*	3
Festuca rubra	7	*Cirsium arvense*	1
Agrostis stolonifera	5	*Ranunculus repens*	2
Poa trivialis	3		

SITE Marline Valley Wood SSSI, south field **QUADRAT NO: 86**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a species-rich, unimproved meadow with lots of herbs. It was probably a hay meadow and ungrazed. The soil was clay (currently dry). The sward was mixed, patchy and variable. There was bad creeping thistle invasion in places.

NVC type: MG5a Crested dog's tail - common knapweed pasture, meadow vetchling sub-community

layers (ht. cover):	300 mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Grasses		**Herbs**	
Holcus lanatus	6	*Centaurea nigra*	5
Poa trivialis	6	*Pulicaria dysenterica*	5
Anthoxanthum odoratum	4	*Ranunculus acris*	3
Alopecurus pratensis	4	*Rumex acetosa*	3
Agrostis capillaris	4	*Lathyrus pratensis*	3
		Lotus uliginosus	2
		Ranunculus repens	4
		Rumex crispus	1
		Stellaria graminea	2
		Potentilla anserina	1
		Cardamine pratensis	1
		Equisetum arvense	1
		Ranunculus bulbosus	1
		Also present in field	
		Dactylorhiza fuchsii	
		Genista tinctoria	
		Carex flacca	
		Carex ovalis	

SITE Marline Valley Wood SSSI flush **QUADRAT NO: 87**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a rushy flush on a slope on a sping. The spring was currently dry. The vegetation was dominated by rushes and herbs, with few grasses.

NVC type: MG10a Yorkshire fog - soft rush pasture, typical sub-community

layers (ht. cover):	500 mm.	100%	m.	%	m.	%
Species		**Domin**	**Species**		**Domin**	
Rushes			**herbs**			
Juncus conglomeratus		7	*Pulicaria dysenterica*		7	
Juncus acutiflorus		7	*Epilobium hirsutum*		4	
Juncus inflexus		2	*Rumex acetosa*		3	
			Equistum arvense		3	
Grasses			*Rumex crispus*		1	
Holcus lanatus		3	*Centaurea nigra*		1	
Poa trivialis		3	*Stellaria graminea*		1	
Alopecurus pratensis		3	*Lathyrus pratensis*		1	
Anthoxanthum odoratum		3				
Festuca rubra		3				

SITE Marline Valley Wood SSSI, hedgerow **QUADRAT NO: 88**

Sample area - 30 m x 5 m

VEGETATION DESCRIPTION

This was an open hedgerow at the top of the slope. The shrubs covered about half of the hedge, with bracken and bramble dominating the remainder. The bracken and bramble were invading the adjacent fields. The adjacent fields were mesotrophic grassland dominated by Yorkshire fog. The hedge was about 6m wide.

NVC type: W21 Hawthorn - ivy scrub, ivy nettle sub-community/ W25 Bracken - bramble undersrcub Bluebell sub-community

layers (ht. cover):	3 m. 50 %	1.5 m. 100 %	m. %
Species	**Domin**	**Species**	**Domin**
Shrubs			
Corylus avellana	5	*Pteridium aquilinum*	8
Ilex aquifolium	2	*Dactylis glomerata*	3
Sambucus nigra	2	*Rubus fruticosus*	8
Prunus spinosa	5	*Holcus lanatus*	5
Crataegus monogyna	5	*Galium aparine*	3
		Chamerion angustifolium	4
		Vicia cracca	2
		Tamus communis	2
		Festuca rubra	3
		Arrhenatherum elatius	3
		Ranunculus acris	3
		Rumex acetosa	2
		Lower down the slope, the hedge was taller, dense and continuous.	

SITE Napier Road, verge opposite **QUADRAT NO: 89**

Sample area - 4 m x 4 m

VEGETATION DESCRIPTION

This was tall gorse-bramble scrub developing on a road verge between the road and the shelter belt planted behind. It was dominated by gorse, and had bramble climbing through it. The herb layer was sparse and shaded by the gorse.

NVC type: W23a Gorse - bramble scrub, sweet vernal - grass sub-community

layers (ht. cover):	3 m. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Shrubs		**Herbs**	
Ulex europaeus	10	*Glechoma hederacea*	3
Rubus fruticosus	4	*Holcus lanatus*	3
Quercus robur sapling	1	*Festuca rubra*	2
Fraxinus excelsior sapling	1	*Poa trivialis*	2
		Cirsium arvense	2
		Galium aparine	3
		Solanum dulcamara	1
		Urtica dioica	1

QUADRAT NO: 90

SITE Marline Valley Wood SSSI, meadow opposite Napier Road

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

A tall, ungrazed meadow of medium species-richness. The grass was dominated by Yorkshire fog, but there were many grasses present. The herb flora was more limited. There were patches of creeping thistle invading on the top south side of the meadow. This meadow had probably been improved in the past but was now reverting to unimproved grassland. It was cropped for hay.

NVC type: MG5a Crested dog's tail - common knapweed pasture, meadow vetchling sub-community

layers (ht. cover):	350 mm.	100 %	m.	%	m.	%
Species	**Domin**		**Species**		**Domin**	
Grasses						
Holcus lanatus	8		*Rumex acetosa*		3	
Anthoxanthum odoratum	4		*Ranunculus bulbosus*		2	
Alopecurus pratensis	4		*Ranunculus acris*		2	
Agrostis capillaris	5		*Lathyrus pratensis*		2	
Lolium perenne	3		*Plantago lanceolata*		2	
Phleum pratense	3		*Stellaria graminea*		2	
Poa pratensis	2					
			Also present nearby			
			Dactylis glomerata			
			Cynosurus cristatus			
			Trifolium pratense			
			This site was part of a Sussex Wildlife Trust reserve			

QUADRAT NO: 91

SITE Marline Valley Wood SSSI, planted shelter belt by B2092

Sample area - 30 m x 5 m

VEGETATION DESCRIPTION

This was a shelter belt planted to screen the SSSI from the road. It was about 4m tall, with many dense, closely packed young trees. Along the edges of the plantation the ground layer was grassy with thistles. Under the dense canopy, it was very sparse.

NVC type: Plantation

layers (ht. cover):	4 m.	100 %	100 mm.	30 %	m.	%

Species	Domin	Species	Domin
		Ground layer (2x2m)	
Quercus robur	8	*Galium aparine*	5
Acer campestre	8	*Holcus lanatus*	5
Crataegus monogyna	3	*Alopecurus pratensis*	3

SITE Queensway, common sallow scrub on embankment **QUADRAT NO: 92**

Sample area - 30 m x 5 m

VEGETATION DESCRIPTION

This was dense common sallow scrub on a road embankment. The shrubs were closely packed and spindly. The ground layer was grassy and very sparse. The trees had been planted. Some patches had dense blackthorn.

The blackthorn was a large-leaved, hairy form. It produced abundant suckers.

NVC type: Plantation

layers (ht. cover):	4 m. 100 %	100 cm. 50 %	m. %
Species	**Domin**	**Species**	**Domin**
Salix cinerea	8	*Poa trivialis*	7
Prunus spinosa	7	*Hedera helix*	1
Quercus robur	1	*Poa annua*	2
Rosa canina agg	1	*Holcus lanatus*	2

SITE Queensway, blackthorn hedge **QUADRAT NO: 93**

Sample area - 10 m x 5 m

VEGETATION DESCRIPTION

This was a broad spreading hedge of blackthorn and bramble. The hedge was tall, dense and continuous. There was bramble along the edges. Both blackthorn and bramble were invading the grassland. The ground flora was impossible to record due to the dense scrub. There were mesotrophic grasslands on either side of the hedge which were neglected and unmanaged. Further away from the road the hedge was taller (to 8m) with oak, field maple, holly and ash.

NVC type: W22 Blackthorn - bramble scrub

layers (ht. cover):	5 m.	100%	m.	%	m.	%
Species	**Domin**	**Species**	**Domin**			
Prunus cf spinosa	10					
Rubus fruticosus	5					
Corylus avellana	2					
Fraxinus excelsoir sapling	1					

SITE Queensway, rough rush pasture **QUADRAT NO: 94**

Sample area - 4 m x 4 m

VEGETATION DESCRIPTION

This was a rough pasture with a mixture of rushes, grasses and herbs. The ground was dry underfoot. The meadow was unmanaged. The ground was uneven and had probably been disturbed. The soil was clay (currently dry and cracking in places due to drought).

NVC type: MG10a Yorkshire fog - soft rush pasture, typical sub-community

layers (ht. cover):	100 mm. 100 %		m. %		m. %
Species	**Domin**	**Species**		**Domin**	
Rushes		**Herbs**			
Juncus conglomeratus	5	*Centaurea nigra*		5	
Juncus inflexus	2	*Cirsium arvense*		4	
Juncus acutiflorus	2	*Ranunculus acris*		3	
		Vicia cracca		3	
Grasses		*Glechoma hederacea*		3	
Anthoxanthum odoratum	4	*Prunella vulgaris*		3	
Dactylis glomerata	2	*Rumex acetosa*		4	
Holcus lanatus	7	*Leucanthemum vulgare*		3	
Agrostis capillaris	3	*Stellaria graminea*		2	
Poa trivialis	2	*Achillea millefolium*		2	
		Vicia sativa agg		3	
		Ranunculus repens		4	
		Dactylorhiza fuchsii		1	
		Rumex crispus		1	
		Geranium dissectum		2	
		Cerastium fontanum		2	

SITE Queensway, bramble scrub **QUADRAT NO: 95**

Sample area - 4 m x 4 m

VEGETATION DESCRIPTION

This was a dense patch of bramble scrub invading grassland. The vegetation was dominated by bramble, with very few, sparse herbs and grasses.

NVC type: W24b Bramble - Yorkshire fog underscrub, false oat-grass - hogweed sub-community

layers (ht. cover):	1 m.	100 %	m.	%	m.	%
Species		**Domin**	**Species**		**Domin**	
Rubus fruticosus		10	*Dactylis glomerata*		3	
			Juncus comglomeratus		1	
			Elymus repens		3	
			Holcus lanatus		3	
			Cirsium arvense		3	
			Urtica dioica		2	
			Rumex acetosa		1	

SITE Queensway, grassy verge **QUADRAT NO: 96**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a tall dense grassland on a landscaped road verge. The grassland was dominated by a mixture of grasses and herbs there was some scrub invasion in places. This was fairly typical of roadside banks.

NVC type: MG1a False oat - grass grassland, red fescue sub-community

layers (ht. cover):	300 mm. 100 %	m. %	m. %
Species	**Domin**	**Species**	**Domin**
Festuca rubra	7	*Achillea millefolium*	3
Phleum pratense	4	*Rumex acetosa*	3
Anthoxanthum odoratum	4	*Geranium dissectum*	2
Elymus repens	5	*Rumex crispus*	1
Arrhenatherum elatius	3	*Centaurea nigra*	1
Poa trivialis	3	*Vicia sativa subsp. segetalis*	2
Holcus lanatus	6		
Dactylis glomerata	3		
Agrostis capillaris	3		

SITE The West Ridge, oak - birch woodland **QUADRAT NO: 97**

Sample area - 30 m x 10 m

VEGETATION DESCRIPTION

This was a birch - oak - ash woodland on a steep road bank. It has probably been planted. It was fairly even aged. It was impossible to record the ground flora due to the dense bramble and gorse on the edge of the wood.

NVC type: Plantation

layers (ht. cover):	10 m. 100 %		m. %		m. %
Species	**Domin**	**Species**		**Domin**	
		Herb layer			
Betula pendula	7	*(not recorded)*			
Quercus robur	7				
Acer campestre	2				
Acer pseudoplatanus	3				
Fraxinus excelsior	3				
Shrubs					
Ulex europaeus	3				
Rubus fruticosus	2				

SITE West ridge, pony field **QUADRAT NO: 98**

Sample area - 2 m x 2 m

VEGETATION DESCRIPTION

This was a grazed pony field with abundant clover and herbs and relatively few grasses. The ground was clayey and poached. There were some large patches of docks, nettles and thistles around the margins. Ox-eye daisy was abundant along the top edge of the field.

NVC type: MG5a Crested dog's-tail - common knapweed pasture, meadow vetchling sub-community

layers (ht. cover): 30 mm. 98 % m. % m. %

Species	Domin	Species	Domin
Holcus lanatus	5	*Trifolium repens*	6
Festuca rubra	5	*Trifolium pratense*	5
Anthoxanthum odoratum	4	*Trifolium dubium*	4
Poa annua	2	*Prunella vulgaris*	4
Cynosurus cristutus	4	*Plantago lanceolata*	3
		Hypchaeris radicata	2
Herbs		*Ranunculus repens*	3
Sagina procumbens	2	*Lotus corniculatus*	1
Bellis perennis	2	*Crepis vesicaria*	1
Senecio jacobaea	1	*Stellaria graminea*	1
Leucanthemum vulgare	2	*Cerastium fontanum*	1
Centaurium erythraea	1	*Plantago major*	1
		Moss	
		Brachythecium rutabulum	3

SITE Industrial Estate, ditch in abandoned field **QUADRAT NO: 99**

Sample area - 4 m x 2 m

VEGETATION DESCRIPTION

This was a tall, dense stand of hemlock water-dropwort over a ditch in an abandoned field. There were a few other swamp species. The ditch was currently dry.

NVC type: No clear NVC equivalent. Treated as a hemlock water-dropwort stand

layers (ht. cover):	1.5 m.	100%	m.	%	m.	%
Species		**Domin**	**Species**			**Domin**
Oenanthe crocata		10				
Glyceria declinata		3				
Juncus acutiflorus		3				
Poa trivialis		3				
Ranunculus repens		3				
Juncus effusus		2				
Holcus lanatus		2				
Agrostis stolonifera		2				
Epilobium cf obscurum						

APPENDIX 7

ANCIENT WOODLAND

ANCIENT WOODLAND

Britain's woodlands may be classed as being either recent or ancient according to their history.

Recent Woodland

These are the woods which have not been continuously wooded since the year 1600 AD but have acquired a tree cover on sites thought to have been either former heathland, open fields or grazing land. Such woodland may arise by planting or through natural development of woodland on abandoned or ungrazed land. These sites may show similarities to ancient woodland depending on their age, their proximity to ancient sites and the presence of natural features (streams, ponds, etc) and are regarded as recent semi-natural woodland. Generally speaking their biological diversity is not as great as that of ancient woodland.

Ancient Woodland

Ancient woods are those which have had a continuous woodland cover since at least 1600 AD and have only been cleared for underwood or timber production. The importance of ancient woodland is four fold:

i) the great majority are believed to be PRIMARY, that is they are surviving fragments of primeval forests, the climax vegetation type of this country;

ii) the characteristics of ancient but not primary woods (ANCIENT SECONDARY woods) are likely to resemble those of primary woods;

iii) ancient woodlands have had a long time to acquire species and to form stable floral and faunal communities;

iv) their soils have remained largely undisturbed.

Ancient woods may be described as either primary or ancient secondary. **Primary woodland** constitutes the relicts of the natural tree cover which developed after the retreat of the glaciation 10,000 years ago. Such woodland may have been managed by man but it has never been completely cleared of trees and converted to another land use. **Ancient secondary woods** are those which have developed on land which may have been open ground or farmland at some stage before the year 1600 AD.

Ancient Semi-Natural Woodland

This term covers all stands of ancient woodland which do not obviously originate from planting. They can be classified into stand types which are ecologically distinct association of trees, shrubs and herbs determined by edaphic, climatic and biotic influences (Peterken, 1982).

The following variations have also been classified as semi-natural for the purposes of the inventory, largely due to a lack of detailed site information or due to their location within an otherwise undisturbed ancient wood.

1. Birch woodland which occurs on disturbed ground inside ancient woods.

2. Small, secondary , semi-natural stands within ancient sites which may have developed on former settlements, gravel pits, etc.

3. Woods where semi-natural stands have been slightly modified by planting (e.g. mixed woods containing a scattering of ornamental conifers or sweet chestnut (*Castanea sativa*) in a mixed coppice.

4. Woods containing self-sown sycamore (*Acer pseudoplatanus*).

Ancient Replanted Woodland

This includes obviously planted woodland of any age of a broadleaved, mixed or coniferous type, identifiable from field survey. Automatically included in this category are plantations of any coniferous species, sweet chestnut, sycamore, poplar, red oak, southern beech and native species planted so densely that the semi-natural underwood is suppressed. However, special cases exists for beech and sweet chestnut. Sweet chestnut is not native to this country, however, in some counties, particularly in the south-east it is a very long established introduction.

APPENDIX 8

SSSI SCHEDULES

File Ref: TQ/60-1

COUNTY: EAST SUSSEX

SITE NAME: PEVENSEY LEVELS

DISTRICT: WEALDEN, ROTHER

Status: Site of Special Scientific Interest notified under Section 28 of the Wildlife and Countryside Act 1981. Part of this site has been designated a National Nature Reserve under Section 16 of the National Parks and Access to the Countryside Act 1949.

Local Planning Authority: WEALDEN DISTRICT COUNCIL, ROTHER DISTRICT COUNCIL

National Grid Ref: TQ 650 070

Area: 3501.0 ha (8650.9 acres)

Ordnance Survey Sheets 1:50,000: 199

1:10,000: TQ 60 SW, TQ 60 SE, TQ 60 NW, TQ 60 NE, TQ 61 SW, TQ 61 SE, TQ 70 NW

Date notified (under 1949 Act): 1977

Date notified (under 1981 Act): 1990

Other Information: This site is listed in "A Nature Conservation Review" and part is a National Nature Reserve.

Reasons for Notification

Pevensey Levels ia a large area of low-lying grazing meadows intersected by a complex system of ditches which show a wide variety of form and species composition and support important communities of wetland flora and fauna. The site supports one nationally rare and several nationally scarce aquatic plants and many nationally rare invertebrates. Ornithologically, the site is of national importance as the number of wintering lapwings has regularly exceeded 1% of the total British population in recent years.

Geologically, the Levels are located where impervious Weald Clay reaching the coast has been overlain by superficial alluvial deposits. In places, however, the Weald Clay itself forms outcrops, as at Horse Eye, and Tunbridge Wells Sands reach the surface occasionally, as on part of Hooe Level. Once an area of intertidal mud flats, the Levels have developed in turn to salt marsh and fresh water marsh. This process has been aided by the deposition of shingle beach deposits, by the process of longshore drift, along the present coastline. This shingle ridge now protects the Levels from sea water inundation, since most of the site lies below the level of highest tide. Past intersection of the marshes by a series of ditches has created the present-day area of rich grazing meadows.

The ditch system facilitates removal of surface water to enable successful stock grazing, at the same time acting as a network of "wet fences" and as a source of stock drinking water. Maintenance of the ditches is necessary to continue efficient execution of these functions and also creates a wide variety of ditch types from intensively or recently dredged ditches to neglected ones. In this way a wide variety of floral conditions prevail and the specific requirements of certain invertebrates are always catered for. Following the dredging of a clogged ditch a distinct successional pattern occurs. First, floating and submerged aquatic plants such as duckweeds Lemna sp, pondweeds Potamogeton sp or water fern Azolla sp colonize. These are followed by larger, floating or emergent plants such as frog-bit Hydrocharis morsus-ranae, bur-reed Sparganium erectum and arrow-head Sagittaria sagittifolia. Finally, common reed Phragmites australis becomes dominant at the expense of most other species. If left undredged the ditches may dry up and become scrubbed over with drastic effects on plant and animal diversity.

The most species-rich ditches show a varied structure and a good mixture of both open water and emergent species. The broad-leaved pondweed Potamogeton natans and frog-bit are abundant, whilst the nationally rare* sharp-leaved pondweed Potamogeton acutifolius (RDB:** Vulnerable)

is of particular importance. Other open water species include ivy-duckweed Lemna trisulca and the nationally scarce+ water-soldier Stratiotes aloides and flat-stalked pondweed Potamogeton friesii. Numerous other pondweeds are found here including shining pondweed Potamogeton lucens, curled pondweed P. crispus and blunt-leaved pondweed P. obtusifolius. Emergents of interest include the nationally scarce greater water-parsnip Sium latifolium and river water-dropwort Oenanthe fluviatilis. These very species-rich ditches are largely confined to gravity-drained areas within the site.

The main arterial channels, which carry drainage water from the Levels to the sea, are generally poor in vegetation, both in number of species and cover. Submerged and floating species such as common duckweed Lemna minor and greater duckweed Lemna polyrhiza predominate with the nationally scarce spineless hornwort Ceratophyllum submersum and the nationally scarce pondweed Potamogeton trichoides also present. Ditches surrounding and within arable areas support relatively few open-water species and tend to be characterised by the presence of water plantain Alisma plantago-aquatica and bur-reed. They are often fringed with hard rush Juncus inflexus and jointed rush J. articulatus.

Rich bankside floras support the nationally scarce marshmallow Althaea officinalis, ragged robin Lychnis flos-cuculi, water mint Mentha aquatica and cuckoo flower Cardamine pratensis. Most of the fields are improved rye grass Lolium perenne leys with occasional creeping bent Agrostis stolonifera.

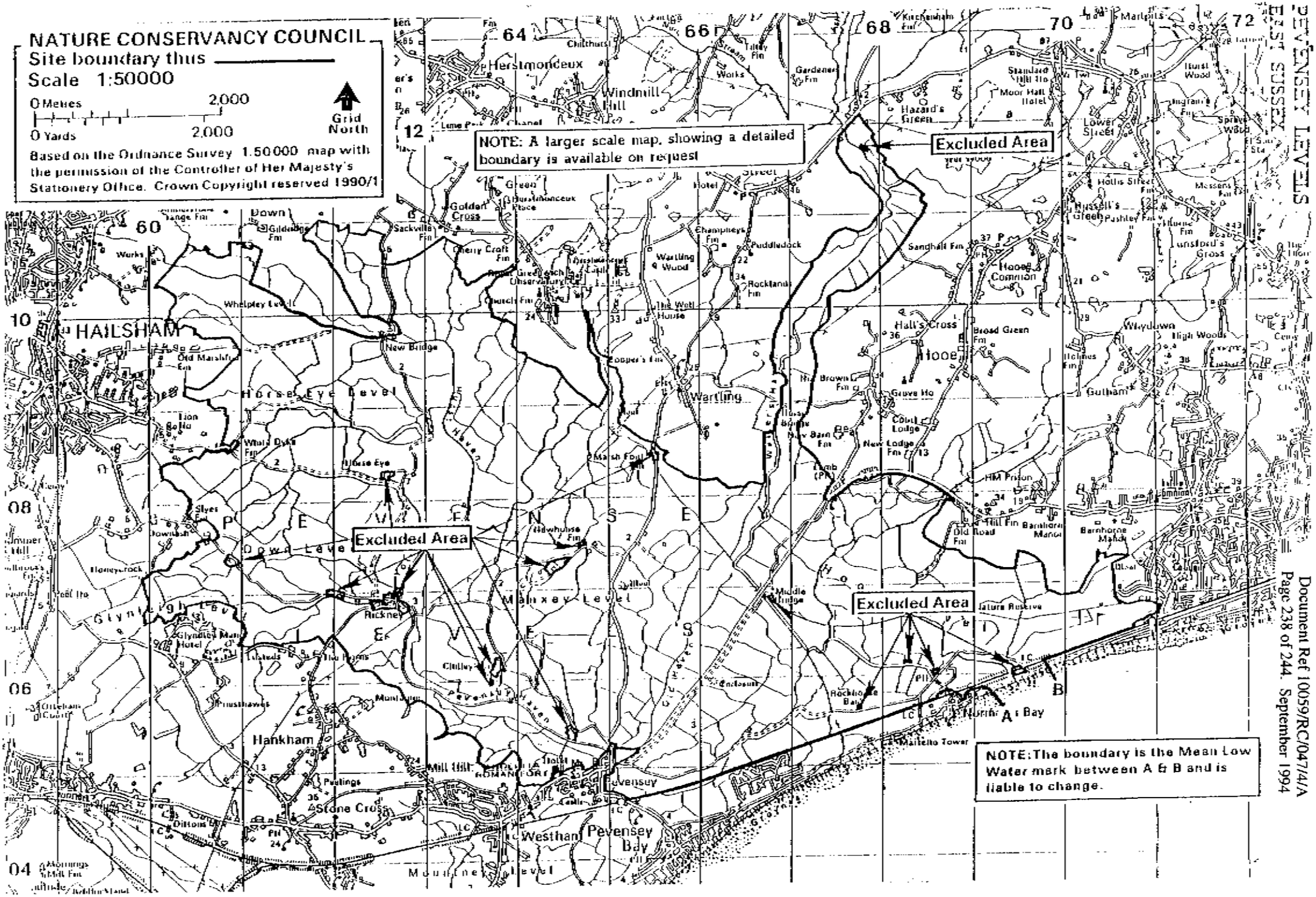
Woodland dividing the modern main Pevensey to Middle Bridge Road from the old road parallel to it is dominated by mature crack willow Salix fragilis with hawthorn Crataegus monogyna and elder Sambucus nigra scrub. Closed canopies have a sparse ground cover of ground ivy Glechoma hederacea and nettle Urtica dioica. This area is of importance for moths.

An area of shingle and intertidal muds and sands is included within the site. Although the shingle is largely bereft of vegetation, yellow horned-poppy Glaucium flavum, sea campion Silene maritima and the nationally scarce sea-kale Crambe maritima do occur; there is also a record for pyramidal orchid Anacamptis pyramidalis.

The site supports outstanding invertebrate populations and is a top national site for Mollusc and aquatic Coleoptera. Indeed, the site is perhaps the best in Britain for freshwater Mollusc fauna. A ramshorn snail Segmentina nitida (RDB: Endangered), is found in well-oxygenated drains with lush vegetation. Particularly widespread and abundant on this site is an aquatic snail Valvata macrostoma (RDB: Vulnerable). Of the many species of water beetle recorded at the site, the most interesting are confined to the ditches in areas of permanent pasture. Of particular interest is Britain's largest water beetle, the great silver water beetle Hydrophilus piceus (RDB: Rare) which is found only on grazed levels in the southern part of Britain. Also of importance is Bagous puncticollis (RDB: Endangered), found on Horse Eye Level and several nationally rare water beetles such as the small reddish-brown Hydrovatus clypealis (RDB: Rare) confined to the coast of southern England.

Over fifteen species of dragonfly (Odonata) have been recorded including the nationally scarce species, hairy dragonfly Brachytron pratense and variable damselfly Coenagrion pulchellum. Survey has also revealed Britain's only known location of Placobdella costata (provisional RDB), a large leech which feeds on the blood of vertebrates. One of Britain's largest spiders Dolomedes plantarius (RDB:Endangered) has also been recorded.

The site is of national importance for its wintering lapwing Vanellus vanellus which exceed 1% of the total British population. The numbers of snipe Gallinago gallinago may also be of national importance but exact data relating to the country's wintering population is as yet unavailable. Wintering golden plover Pluvialis apricaria are of local significance and in some years are of national importance. Sedge warblers Acrocephalus schoenobaenus and reed warblers Acrocephalus scirpaceus which nest in scrub close to water and reeds in the ditches respectively, breed in numbers of local significance. The site also supports about one fifth of the breeding yellow wagtails Motacilla flava in Sussex.



File Reference: TQ/70-4

COUNTY: EAST SUSSEX

SITE NAME: HIGH WOODS

DISTRICT: ROTHER; WEALDEN

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

Local Planning Authority: Rother District Council; Wealden District Council

National Grid Reference: TQ 715095 Area: 33.5 (ha) 82.7 (ac.)

Ordnance Survey Sheet 1:50,000: 199 1:10,000: TQ 70 NW

Date Notified (Under 1949 Act): - Date of last Revision: -

Date Notified (Under 1981 Act): 1985 Date of last Revision: -

Other Information: This is a new site.

Reasons for Notification:

This site is of primary importance for its sessile oak Quercus petraea coppice, a type of woodland not known to occur anywhere else in East Sussex. The woods have developed over Weald Clay and Lower Tunbridge Wells Sandstone and the variation in soils, drainage and management have resulted in a mosaic of woodland types, three of which are becoming rather rare in the national context. Several other semi-natural habitats: ponds, streams and an area of wet heath with acidic grassland are also present, thus increasing the diversity and interest of the site.

Two compartments of actively coppiced sessile oak woodland occur in the east and centre west of the site, over a sparse field layer of ground-ivy Glechoma hederacea and bramble Rubus fruticosus. Elsewhere the majority of the wood is dominated by pedunculate oak Quercus robur and birch Betula pendula. However, past management has resulted in a great deal of variation within this woodland type and other species locally dominate including sweet chestnut Castanea sativa, alder Alnus glutinosa, beech Fagus sylvatica, sycamore Acer pseudoplatanus Scots pine Pinus sylvestris and holly Ilex aquifolium.

The shrub layer consists of hawthorn Crataegus monogyna, elder Sambucus nigra and very occasionally alder buckthorn Frangula alnus. The field layer is dominated by bramble, bracken Pteridium aquilinum and honeysuckle Lonicera periclymenum. Where base rich soils occur this becomes more diverse and includes dog's mercury Mercurialis perennis, bugle Ajuga reptans, yellow archangel Lamiastrum galeobdolon and marsh pennywort Hydrocotyle vulgaris, together with several notable species such as common cow-wheat Melampyrum pratense, southern wood-rush Luzula forsteri and the mosses Sphagnum squarrosum and Hookeria lucens.

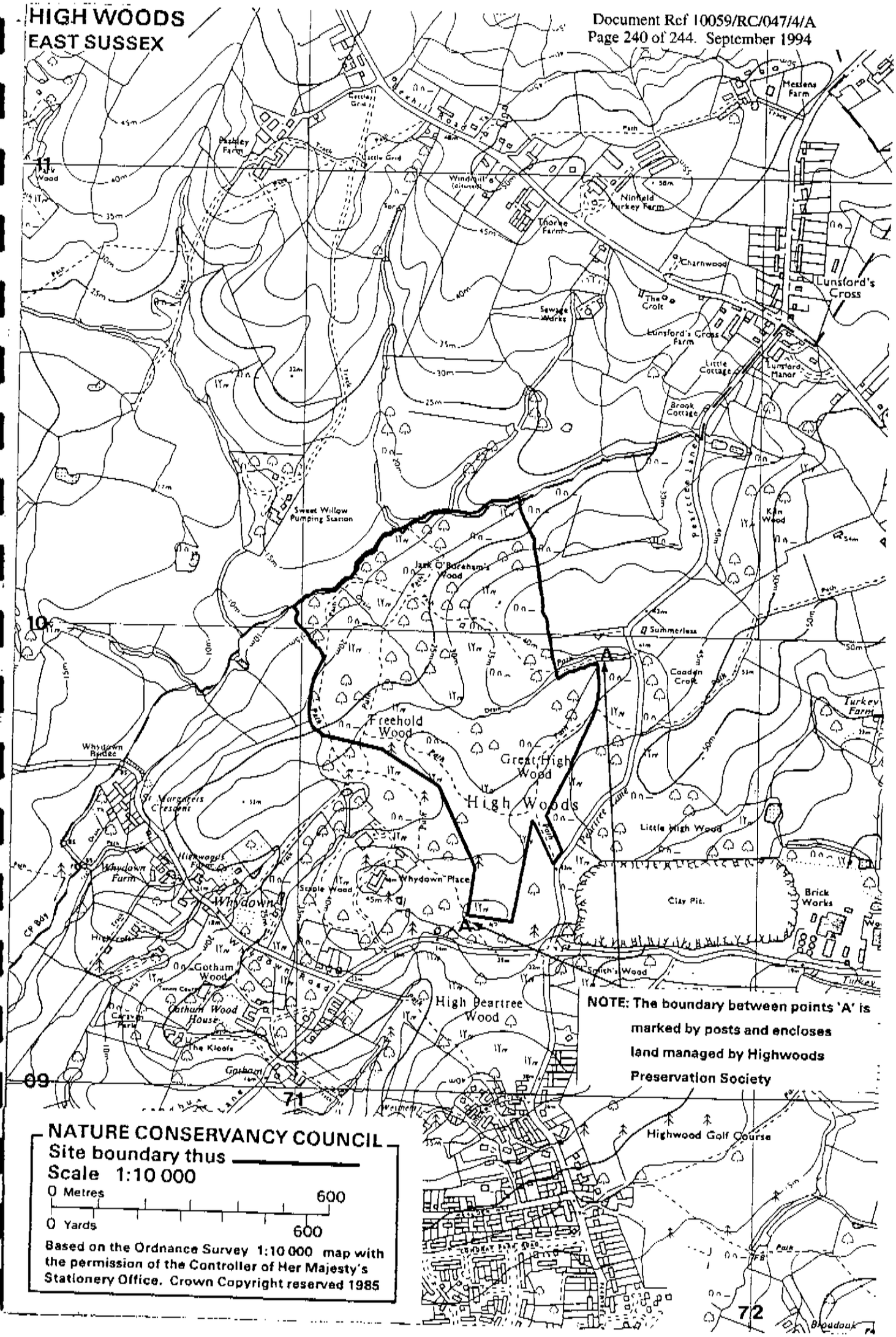
The other distinct woodland types present are mature alder-carr woodland and hornbeam - Carpinus betulus coppice, which occupies much of the north west of the site but rarely forms such discrete blocks as does the oak coppice.

The small area of wet heath and acidic grassland in the north east of the site is dominated by purple moor-grass Molinia caerulea, tufted hair-grass Deschampsia cespitosa and creeping bent Agrostis stolonifera with patches of heather Calluna vulgaris, cross-leaved heath Erica tetralix and the sphagnum mosses Sphagnum compactum and S. palustre. Bracken invasion is a problem here and birch-grey willow Salix cinerea scrub occurs throughout.

Two small ponds support water starworts Callitriche species, common marsh-bedstraw Galium palustre, hemlock water-dropwort Oenanthe crocata and a range of bryophytes (mosses and liverworts).

The invertebrate populations at Highwoods have yet to be studied in detail but it is likely that this site, particularly the oak woodland, supports a rich insect fauna. A number of mammals have been recorded from this site including a population of the very local yellow-necked mouse Apodemus flavicollis. Breeding birds include sparrowhawk, willow tit, green woodpecker and greater-spotted woodpecker.

HIGH WOODS
EAST SUSSEX



NOTE: The boundary between points 'A' is marked by posts and encloses land managed by Highwoods Preservation Society

NATURE CONSERVANCY COUNCIL
Site boundary thus
Scale 1:10 000
0 Metres 600
0 Yards 600

COUNTY: **EAST SUSSEX** SITE NAME: **COMBE HAVEN**

BOROUGH/DISTRICT: **HASTINGS; ROTHER**

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

Local Planning Authority: **HASTINGS BOROUGH COUNCIL; ROTHER DISTRICT COUNCIL**

National Grid Ref: TQ 770102 Area: 156.1 (ha) : 385.7 (acres)

Ordnance Survey Sheets 1:50,000: 199 1:10,000: TQ 71SE TQ 70NE

Date notified (under 1949 Act): - Date of last revision: -

Date notified (under 1981 Act): 1985 Date of last revision: -

Other Information: Filsham Reed Bed is a Local Nature Reserve declared by Hastings Borough Council and managed by the Sussex Trust for Nature Conservation. This is a new site.

Reasons for Notification:

This extensive site contains a rich diversity of habitat types. Alluvial meadows dominate much of the site and a nationally uncommon grassland type is present. Filsham reed bed is the largest reed bed in East Sussex and carries a rich community of breeding birds. Blocks of ancient woodland add to the site's interest. The range of habitat types is responsible for the wide diversity of plant, invertebrate and bird life at the site.

The alluvial meadows and the drainage ditches which dissect them are the remnants of a once much more extensive marshland which developed on river alluvium over Ashdown sandstones. Filsham reed bed has colonised poorly drained, ungrazed marsh and a small lagoon is present within the bed. Two areas of mixed tall fen communities are also present within the site. Woodlands have developed on higher ground over Wadhurst Clay and support several unusual plants. The whole site, but particularly the reed bed, is valuable for breeding, wintering and passage birds. The invertebrate fauna includes two notable dragonflies and important butterfly populations.

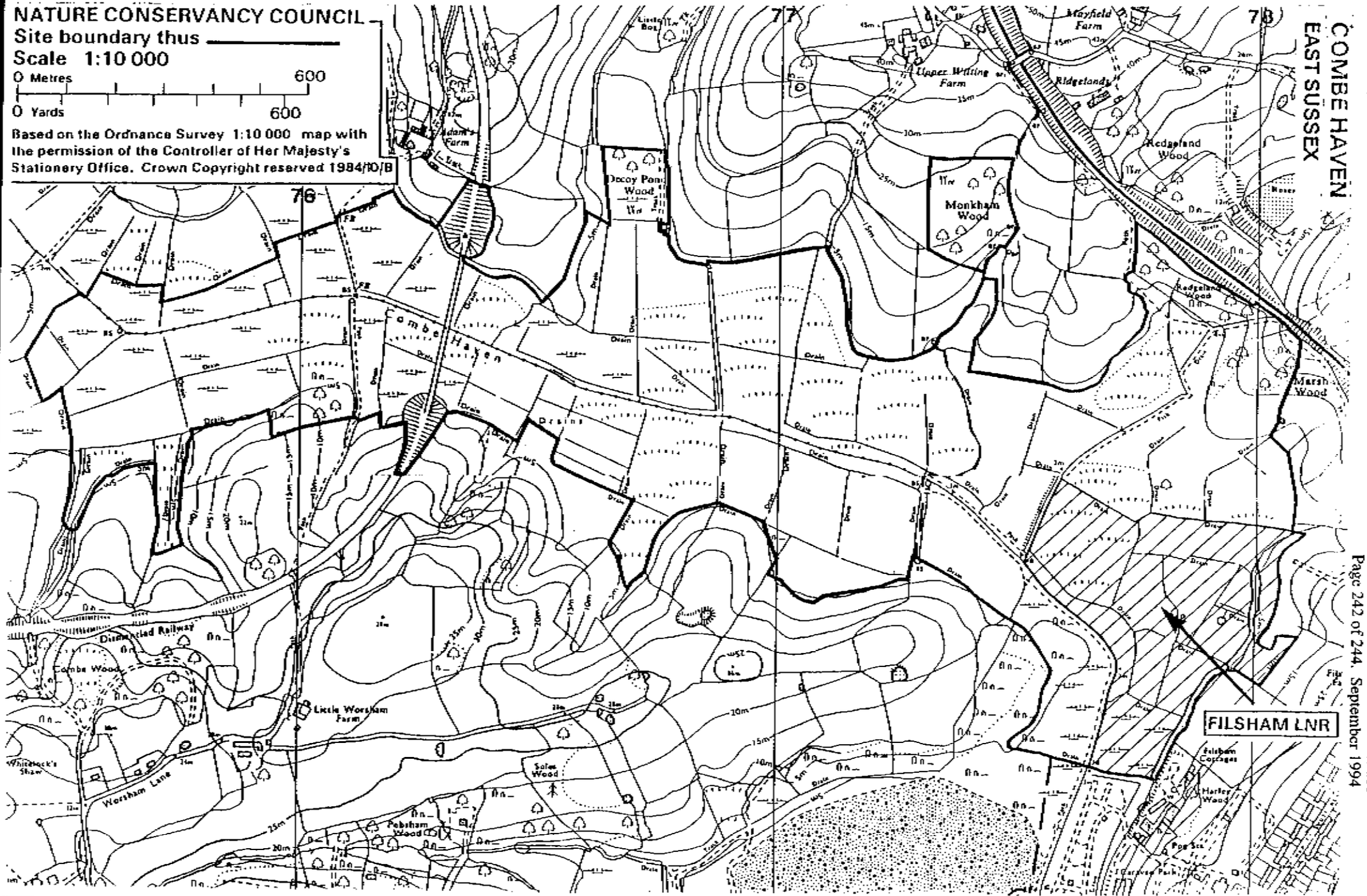
ALLUVIAL MEADOWS The meadows vary in composition and most are poorly drained. Reed sweet grass Glyceria maxima dominates large areas and its association with reed canary grass Phalaris arundinacea and marsh bedstraw Galium palustre is a nationally uncommon grassland type. Tussock grass Deschampsia cespitosa, rushes Juncus species and creeping bent grass Agrostis stolonifera occur commonly in the sward but corky fruited water-dropwort Oenanthe pimpinelloides and common meadow rue Thalictrum flavum are two unusual species. The ditches dissecting the meadows have a rich flora which includes several uncommon plants such as marsh violet Hottonia palustris, arrowhead Sagittaria sagittifolia, frogbit Hydrocharis morsus-ranae and flowering rush Butomus umbellatus.

FEN COMMUNITIES Common reed Phragmites australis dominates Filsham reed bed although open water and ditches within the bed are richer in plant life. Two areas of mixed tall fen (at TQ 777095 and TQ 778103) contain common reed, reed sweet grass, gipsywort Lycopus europaeus, yellow flag Iris pseudacorus and purple loosestrife Lythrum salicaria. Alder Alnus glutinosa and sallow Salix cinerea fringe parts of the reed bed and the tall fen community.

WOODLAND Variation in past management and in local drainage conditions have resulted in a range of woodland types. Redgeland Wood consists of hazel Corylus avellana coppice below standards of ash Fraxinus excelsior and pedunculate oak Quercus robur; notable plants of the shrub and ground layers include butcher's broom Ruscus aculeatus, Midland hawthorn Crataegus laevigata and bird's-nest orchid Neottia nidus-avis. Marsh Wood is another oak-hazel-ash wood but with field maple Acer campestre present above a ground flora which includes wood speedwell Veronica montana and goldilocks Ranunculus auricomus. Monkham Wood is coppice-with-standards woodland with oak and ash standards above coppiced hazel, hornbeam Carpinus betulus and sweet chestnut Castanea sativa. Decoy Pond Wood has developed on wet ground around a pond which is drying up; white willow Salix alba, crack willow Salix fragilis, alder Alnus glutinosa and sallow Salix cinerea occur above a ground flora of cyperus sedge Carex pseudocyperus, wood bittercress Cardamine flexuosa, yellow flag Iris pseudacorus and purple loosestrife Lythrum salicaria. Ash, oak and English elm Ulmus procera occur on the drier margins of this wood and early purple orchid Orchis mascula and twayblade Listera ovata occur in the ground flora.

RAILWAY EMBANKMENT A dense scrub of hawthorn Crataegus monogyna, wild privet Ligustrum vulgare, gorse Ulex europaeus, broom Cytisus scoparius, oak and sallow dominates much of this area. Open patches include fenland species such as the purple small-reed Calamagrostis canescens, and species associated with the chalk substrate used in the construction of the embankment; the latter group includes mullein Verbascum thapsus, bladder campion Silene vulgaris and wild mignonette Reseda lutea.

FAUNA Breeding birds associated with the reed and fen include reed warbler, moorhen, coot, sedge warbler and water rail. Other breeding birds from the whole site include grasshopper warbler, yellow wagtail and cuckoo. Wintering birds such as lapwing, teal and snipe are found on the alluvial meadows and the site is important for passage birds including large flocks of thrushes, finches, warblers and buntings. There is also a rich dragonfly fauna which includes the uncommon species Coenagrion pulchellum and Brachytron pratense. A good variety of butterflies are present including orange tip, holly blue, red admiral and purple hairstreak.


NATURE CONSERVANCY COUNCIL
Site boundary thus
Scale 1:10 000
0 Metres 600
0 Yards 600
Based on the Ordnance Survey 1:10 000 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1984/10/B
COMBE HAVEN
EAST SUSSEX
FILSHAM LNR
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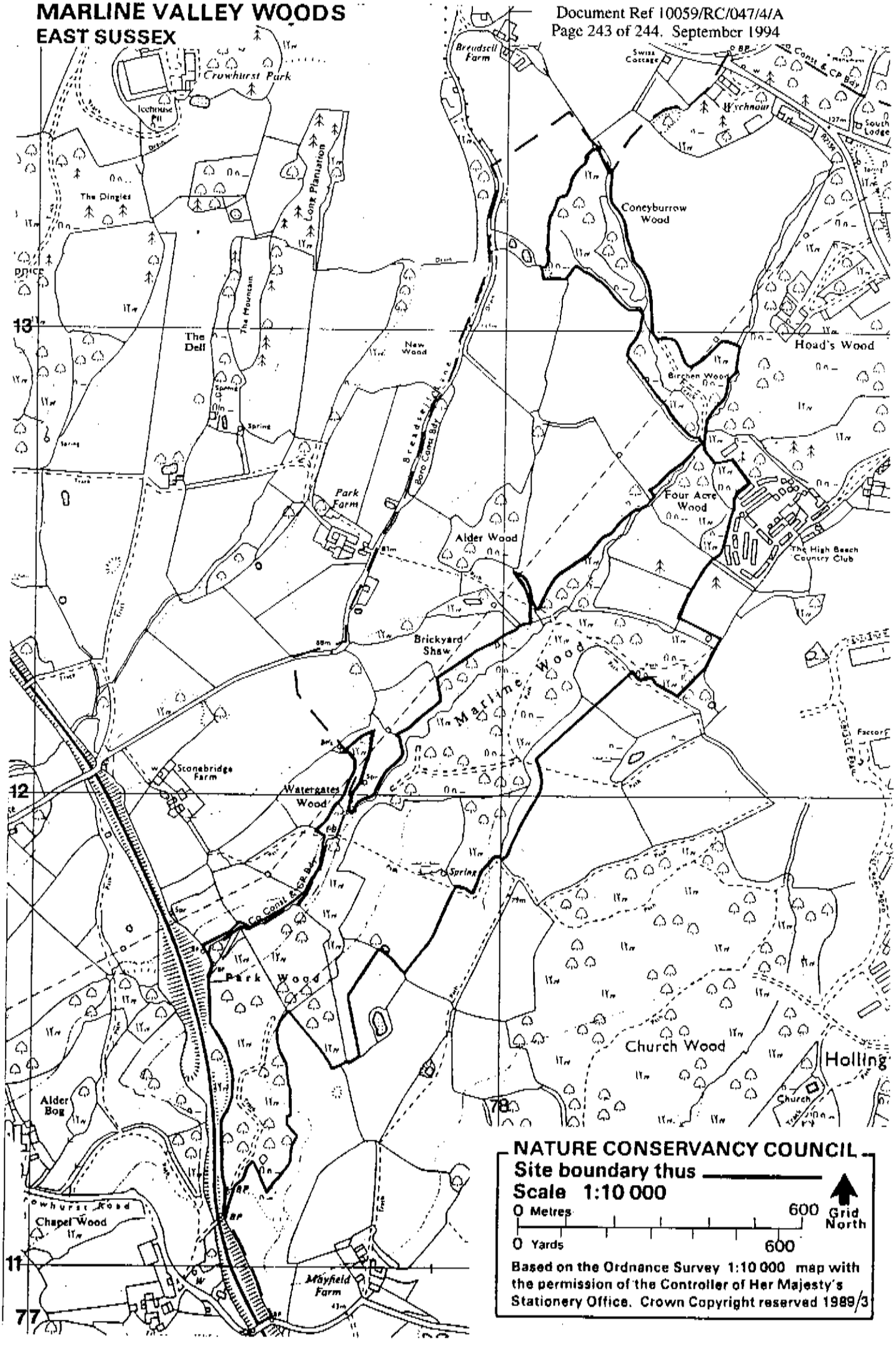
Combe Haven
Monkham Wood
Decoy Pond Wood
Redgeland Wood
Marsh Wood
Combe Wood
Little Worsham Farm
Worsham Lane
Pebsham Wood
Solow Wood
Mayfield Farm
Upper Wilting Farm
Ridgelands
Adam's Farm
Filsham Cottages
Harlee Wood
Disused Railway

MARLINE VALLEY WOODS
EAST SUSSEX



NATURE CONSERVANCY COUNCIL

Site boundary thus ——

Scale 1:10 000

0 Metres 600

0 Yards 600

Grid North

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COUNTY: **EAST SUSSEX** SITE NAME: **MARLINE VALLEY WOODS**

BOROUGH/DISTRICT: **HASTINGS, ROTHER**

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

Local Planning Authority: **HASTINGS BOROUGH COUNCIL, ROTHER DISTRICT COUNCIL**

National Grid Reference: TQ 780122 Area: 55.0 ha : 135.82 acres

Ordnance Survey Sheets 1:50,000: 199 1:10,000: TQ 71 SE

Date Notified (under 1949 Act): 1965

Date Notified (under 1981 Act): 1986 Date of Last Revision: 1989

Other Information: Part of this site is a reserve of the Sussex Wildlife Trust. This site was formerly known as Marline Wood.

Reasons for Notification:

These ancient woodlands on Wadhurst Clay and Lower Tunbridge Wells sandstone are dominated by a nationally uncommon woodland type. A valuable feature of the site is the steep sided stream valley (ghyll) which contains plants that have an 'Atlantic' distribution. The site also includes an area of species-rich unimproved grassland, a nationally declining habitat.

The nationally uncommon pedunculate oak-hornbeam (birch-hazel variant) woodland type dominates the woods. There is some variation in composition due to local differences in drainage, soil type, slope and management. There is a history of management under the coppicewith-standards system. The ghyll has been created by vigorous downcutting of the stream through the soft sandstones which underlie the Wadhurst clay. It has a moist and warm microclimate which favours 'Atlantic' plants, now restricted in Britain to the Weald and the west of the country.

Standards of pedunculate oak Quercus robur are widespread throughout above coppice of hornbeam Carpinus betulus and, less commonly, hazel Corylus avellana or sweet chestnut Castanea sativa. There are scattered stands of birch Betula pendula, ash Fraxinus excelsior, field maple Acer campestre and beech Fagus sylvatica. Alder Alnus glutinosa occurs discontinuously along the stream valley and in small flushes which drain into the stream. Occasional stands of alder coppice are present. Active coppicing has generally reduced the shrub layer but holly Ilex aquifolium is locally common and two shrubs associated with ancient woodland are present: butcher's-broom Ruscus aculeatus and midland hawthorn Crataegus laevigata. The ground flora varies with the current state of management, but honeysuckle Lonicera periclymenum, enchanter's-nightshade Circaea lutetiana, dogs mercury Mercurialis perennis, bluebells Hyacinthoides non-scripta and wood avens Geum urbanum are often abundant. The stream valley and lateral flushes support a flora of pendulous sedge Carex pendula, yellow archangel Lamiastrum galeobdolon and opposite-leaved golden saxifrage Chrysosplenium oppositifolium. Two wide rides have been cut through Marline Wood and are dominated by tufted hair grass Deschampsia cespitosa with bramble Rubus fruticosus.

The stream valley supports 61 species of bryophytes (mosses and liverworts) including 3 uncommon 'Atlantic' species: Fissidens rivularis, Tetrodontium brownianum and Metzgeria furcata. Other plants of the ghyll area include soft shield fern Polystichum setiferum and broad buckler fern Dryopteris dilatata.

The agriculturally unimproved pasture supports a species-rich neutral grassland flora, dominated by lesser knapweed Centaurea nigra, red fescue Festuca rubra and common bent Agrostis capillaris. Other species adding to the interest of the pasture include adder's-tongue fern Ophioglossum vulgatum, dyer's greenweed Genista tinctoria, quaking grass Briza media and common spotted-orchid Dactylorhiza fuchsii.

Report 1

Grasslands and Invertebrates - Combe Haven SSSI

Report 2

Birds - Combe Haven SSSI

Report 3

Shadow Modelling - Combe Haven Viaduct

Report 4

Vegetation

Report 5

Aquatic Invertebrates

Report 5

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REPORT 5

SURVEY OF AQUATIC INVERTEBRATES

September 1994

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FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 This report gives an assessment of the aquatic invertebrate interest of watercourses on the line of the proposed A259 Bexhill and Hastings Western Bypass.

1.2 In Report 1 (Volume 2) the significance of Combe Haven for invertebrates is reviewed. In Report 9 the invertebrates of watercourses that could be affected by drainage of the road are discussed. In both of these reports water beetles and bugs (*Coleoptera* and *Hemiptera*) have been taken as indicators of the overall significance of the watercourses for invertebrates. This principle is continued in the present report and the data collected for those reports have been reused where appropriate.

1.3 Fieldwork was carried out in July 1993 over two days, using the sampling methods described in Appendix 1. The survey data are given in Tables 1 - 4, and are summarised in Table 5. Assessment of the significance of sites was based on the calculation of a Water Quality Total (WQT) and Species Quality Score (SQS) for each site according to the formula:

$$\text{Species Quality Score} = \frac{\text{Water Quality Total}}{\text{Number of Species}}$$

These terms are explained in Appendix 2.

1.4 During the fieldwork to assess water quality, the fen raft spider (*Dolomedes plantarius*) was found at a ditch on the edge of the Pevensey Levels (Figure 1). A study of this species was carried out in summer 1993 and this is included in this report as section 3.0.

2.0 SAMPLE SITES AND AQUATIC INVERTEBRATE SAMPLES

2.1 Location of Samples

The location of sampling points are shown on Figures 2-10.

2.2 Sites with Insignificant Invertebrate Interest

The following sites were examined but not sampled:

SITE 1C	Ditch TQ 676081
SITE 2	Ditch TQ 680082
SITE 3d	Dyke TQ 687084
SITE 5d	Ditch TQ 690087
SITE 6	Ditch TQ 693091
SITE 7	Ditch TQ 695093
SITE 9	Ditch TQ 699099
SITE 10	Ditch TQ 701101
SITE 11	Ditch TQ 704103
SITE 14	Stream TQ 714103
SITE 16	Pond TQ 718103
SITE 19	Ditch TQ 735100
SITE 21a	Ditch TQ 746098
SITE 23	Ditch TQ 771106

2.3 Sites Surveyed for Report 9

The following sites were sampled either in 1991 or 1992 as part of the work undertaken for the water quality assessment (Report 9):

SITE 1a/1b	Dyke TQ 675080. Station 1, upper and lower samples taken on 17.8.1992
SITE 3c	Dyke TQ 686083. Station 2, lower sample taken on 18.8.1992 (Station 2, upper sample is in the same dyke).
SITE 5a	Dyke TQ 689086. Station 3, lower sample taken on 17.8.1992.
SITE 5b	Ditch TQ 689087. Station 3, upper sample taken on 17.8.1992.

SITE 8a/8b	Hooe Sewer TQ 696096. Station 4, upper and lower samples taken on 17.8.1992.
SITE 12	Ditch TQ 707104. Station 5, upper and lower samples taken on 17.8.1992.
SITE 13	Ditch TQ 711104. Station 6, upper and lower samples taken on 17.8.1992.
SITE 15	Ditch TQ 716103. Station 7, upper and lower samples taken on 17.8.1992.
SITE 18c	Stream TQ 734101. Station 8, upper and lower samples taken on 17.8.1992.
SITE 20	Stream TQ 744099. Station 9, lower sample taken on 17.8.1992.
SITE 21b	Stream TQ 750097. Station 10, lower sample taken on 17.8.1992.
SITE 21c	Stream TQ 753097. Station 11, lower sample taken on 17.8.1992

2.4 Sites Surveyed for Report 1

SITE 22	Combe Haven SSSI TQ 7610.
SITE 22a	Ditch TQ 746100. Report 9 Station 12, sample taken on 18.8.1992.
SITE 22b	Dyke TQ 764101. The site sampled on 18.6.1991 (sample 17) was on the west side of the field entrance, just outside the line of the viaduct. The sample taken on 28.7.1993 was on the east side of the field entrance.
SITE 22c	Main Drain TQ 764102. Sample 16 taken on 12.6.1991.
SITE 22d	Combe Haven River TQ 765102. A stretch of deep, slowly flowing water, just downstream from a concrete weir, bordered by tall emergent vegetation. Aquatic plants include *Sparganium emersum* and *Sagittaria sagittifolia*.
SITE 22e	Dyke TQ 765102. Sample 3 taken on 12.6.1991.
SITE 22f	Dyke TQ 766103. The same site as the sample taken on 18.6.1991. (sample 7).
SITE 22g	Dyke TQ 767103. Sample 5 taken on 18.6.1991.

SITE 22h — Ditch TQ 768104. Report 9 Station 13, lower sample taken on 18.8.1992.

2.5 Sites sampled on 24 and 28 July 1993 outside Combe Have SSSI

SITE 3a — Dyke TQ 686083. A narrow, steep-sided dyke with some invading grasses but little other aquatic vegetation.

SITE 3b — Pond TQ 686083. Man-made pond containing dense stands of emergent vegetation.

SITE 4 — Dyke TQ 688085. Steep-sided dyke containing some emergent plants such as water plantain.

SITE 5c — Ditch TQ 690087. Wide water-filled ditch completely choked with reed sweet-grass.

SITE 17 — Pond TQ 724100. Ornamental duck-pond containing stands of reed sweet-grass.

SITE 18a — Pond TQ 726100. A field pond, probably of fairly recent construction, densely choked with Canadian pond-weed (*Elodea canadensis*) and with some white water-lily (*Nymphaea alba*) (see Report 4). It was largely unshaded apart from some small isolated bushes.

SITE 18b — Pond TQ 727009. A pond with great reedmace (*Typha latifolia*) in an ungraded pasture.

3.0 FEN RAFT SPIDER (*DOLOMEDES PLANTARIUS*) SURVEY

3.1 The fen raft spider (*Dolomedes plantarius*) is classified as endangered (RDB1 Section 5). It is common over suitable areas of habitat on Pevensey Levels but is known only from one other site in Britain (Fens in Norfolk). The spider needs clean permanent water supporting an abundant aquatic fauna, combined with low, sunny tussocks of bankside vegetation. This essentially swamp-like habitat is only found in ditches on the low-lying levels. The streams draining areas of raised ground in the survey area are very different in ecology from true fen-swamp and have no chance of supporting the species.

3.2 The area surveyed included a small section of a drainage channel called the Old East Stream (Figure 1). The water within this channel is clean enough to support a reasonable freshwater fauna and the bank profile, aspect and vegetation structure are suitable for the spider. This length of ditch supports a small population and five adult females were located. Juveniles were also present indicating that the colony is viable.

3.3 The other ditches in the area appear to be devoid of the spider. Several factors have rendered them unsuitable as habitats; including pollution probably from slurry drainage and under-drainage which will have caused a lowering of the water table. Even the Old East Stream adjacent to the length where the fen raft spider occurs seems unsuitable due to tall overhanging bankside vegetation and slight pollution due to a cess-pit outfall.

3.4 The overall impression is that the spider has almost been eradicated from the survey area due to farming practices that reduce the number of suitable habitats. The population inhabiting the Old East Stream exists by virtue of a section of stream that is less polluted and a bank that happens to be currently more open and sunny. Otherwise the habitat is relatively poor in quality compared to the best on the Levels.

3.5 The population may be a remnant of a once more widespread colony, or may represent the temporarily successful colonisation of the location from the immediate south-west (i.e. Pevensey Levels) where the species still survives in comparative abundance. In the context of the overall population on the Pevensey Levels, the spiders here are insignificant in number. The adult spiders are probably numbered in a few tens at the most.

4.0 NATURE CONSERVATION VALUE OF SELECTED WETLANDS SURVEYED

4.1 Outside Combe Haven

SITE 3a — This site is of low nature conservation value : WQT 6.

SITE 3b — This is a significant site for aquatic insects although it is unlikely to support species not present elsewhere on Pevensey Levels: WQT 32.

SITE 4 — This site is of low conservation value for aquatic insects : WQT 1.

SITE 5c — This ditch contained a considerable number of water beetles, including two listed as Nationally Notable (Section 5.0). These are both widespread on Pevensey Levels. The site is of at least local interest for aquatic insects: WQT 21.

SITE 17 — This ornamental duck-pond contained a variety of aquatic insects but its overall conservation value is rather low: WQT 18.

SITE 18a — A complete survey of water beetles occurring in this pond was undertaken. It is estimated that over 90% of the species of aquatic *Coleoptera* present have now been recorded. In addition the relative population size of each species has been estimated using a three point scale.

A total of 37 species of water beetles were recorded during the visits on 24 and 28 July 1993. Dragonfly nymphs were exceptionally abundant. The resulting SQS and WQT were 2.1 and 78 respectively which places this pond high on the list of sites of this community type within the Wealden area (Kent, Surrey and Sussex).

Limnebius crinifer a Red Data Book (indeterminate) species was recorded on the strength of a single dissected male. Two hours of sampling on 28 July 1993 failed to reveal further specimens. It is possible that adults are only exceptionally present in mid-summer.

The aquatic beetle diversity of this pond is quite remarkable. The conservation value for aquatic invertebrates is considered to be very high and possibly of national significance.

SITE 18b — This pond would not be affected by the preferred route and was surveyed for comparison with Site 18a only. The conservation value is comparatively low and a different community type is present.

4.2 Combe Haven

SITE 22b — Both samples taken show a very poor water beetle community. This may partly be due to the very steep dyke banks and absence of shallow weedy margins. The dyke is, however, an unpolluted site with potentially valuable aquatic insect habitats. The conservation value for aquatic insects is therefore estimated as fairly high, even though few species were recorded.

SITE 22d — The stretch of the Combe Haven river below the weir was rich in aquatic insects which included three Nationally Notable species. The conservation value for aquatic insects is high but the fauna may vary depending on winter floods and bank management.

SITE 22f — The number of species recorded and the associated quality scores for this site were remarkably similar to those obtained in 1991 although the actual species present were somewhat different. The conservation value is moderately high.

5.0 RED DATA BOOK AND NATIONALLY NOTABLE SPECIES

5.1 Red Data books are now produced by the Joint Nature Conservancy Council (JNCC). They include information on the status, biology and conservation needs of rare and threatened species, thus drawing attention to their situation. Bratton (1991) and Shirt (1987) are the Red Data Books consulted for this report. Notable status has been used by English Nature as an additional aid to assessment. Six Red Data Book and sixteen Nationally Notable Species were recorded during survey work.

RDB1 Dolomedes plantarius

5.1.1 The fen raft spider is classed as endangered (RDB1) by Bratton (1991). It is known from only two sites in Britain: fens in Norfolk and from Pevensey Levels. An assessment of the population affected by the Published Scheme in Old East Stream is included in Section 3.

RDB3 Hydrochus elongatus

5.1.2 This species has a very scattered distribution and is confined to southern Britain. It is well established on Pevensey Levels and occurs south of Lewes (also East Sussex). Elsewhere it occurs on the Somerset Levels and also at Wicken Fen, Cambridgeshire. Specimens were found in ditches near The Lamb Inn (site 1a) and Old East Stream (site 3c).

RDB3 Hydrophilus piceus

5.1.3 The great silver water beetle is similarly restricted in its distribution, being common in Somerset and Gwent, with populations on Levels in Kent and East Sussex northwards to fens in East Anglia. Studies on the Somerset Levels show fluctuations in adult numbers from site to site and year to year (Shirt, 1987). A dead specimen was found in the Old East Stream.

RDB2 Anasimyia interpuncta

5.1.4 This hoverfly was classified as vulnerable (RDB2) in Shirt (1987) but has recently unofficially been downgraded in Falk (1991) to RDB3. It occurs on coastal and inland marshes scattered from Hampshire to Norfolk. The larvae are aquatic; found in the sheaths of emergent vegetation. A specimen was found in one ditch in the Combe Haven Valley (near site 22h). Many of the ditches there would be suitable for the larvae but the adults tend to disperse so they are unlikely to be picked up by sampling.

5.1.5 This water beetle was first discovered in Britain on 30 January 1983 in a pond in Longrope Wood near Ham Street in Kent. A breeding population is thought to be present in this site. Its presence in an East Sussex pond is not altogether unexpected although it must be highly localised to have escaped detection up to the present time. The record for sample site 18a is based upon a single dissected male but there is no doubt about the determination. Originally designated RDB3 status, this has now been altered to RDBI(Indeterminate) until the habits of the beetle are properly understood. Continental evidence suggests that *Limnebius crinifer* is confined to acidic pools, as is the case in Longrope Wood (see paragraph 5.1.2 above).

RDB3 Hydrochus ignicollis

5.1.6 Another species of restricted distribution south-east of a line from the Severn Estuary to the Ouse Wash. Populations occur in scattered relict sites in fenland and on Pevensey Levels. This species was found in a ditch on Combe Haven, to the north of the dismantled railway viaduct (not directly affected by the Proposed Route).

5.1.7 Nationally Notable categories are as follows:

'Na' - species known from, or estimated to occur in less than 30 ten km square or 7 or less counties.

'Nb' - species known from, or estimated to occur in 30-100 ten km squares or 8-20 counties.

Nb *Peltodytes caesus*

5.1.8 This may be a declining fenland species. Recent (post-1960) records are for the Gwent Levels, Somerset Levels, East Sussex Levels, Kent Levels and isolated sites in Cambridgeshire, Oxfordshire and Middlesex.

Nb *Ilybius fenestratus*

5.1.9 This species has a patchy distribution in Britain from the Scottish borders southwards, but evidently absent from Wales and south-west Britain. In East Sussex it is locally distributed.

Nb *Rhantus suturalis*

5.1.10 This is widely distributed throughout England but is most frequent in the south. It is a strong flyer and quickly colonises freshly cleaned-out ponds and dykes. In Sussex it is most common near the coast.
Nb *Cercyon convexiusculus*

5.1.11 A widely distributed but local wetland species which is most frequently found in areas of ancient wetland.

Nb *Cercyon ustulatus*

5.1.12 Another widely distributed wetland species. Possibly somewhat under-recorded.

Nb *Helochares lividus*

5.1.13 Widely distributed in England and Wales, this species is most frequent in the south. It occurs in ponds as well as in dykes on the Levels.

Nb *Hydroglyphus geminus* (= *Guignotus pusillus*)

5.1.14 This is a local but widespread species, confined to England, found in silt ponds, gravel-pits and freshly cleaned-out dykes. This beetle may be under-recorded.

Nb *Hygrotus decoratus*

5.1.15 This is a fen or bog species which is largely confined to England south-east of a line from the Bristol Channel to the Wash. About half the recent (post-1960) records are for East Sussex

Nb *Hydaticus seminiger*

5.1.16 Rarely occurring outside East Anglia and south-east England, this species is found in ponds and dykes containing thick aquatic vegetation.

Nb *Gyrinus urinator*

5.1.17 Most records for this species are for flowing water habitats in southern England south of London although there are scattered sites northwards to the Scottish borders.

Nb *Hydrochus angustatus*

5.1.18 A species of ponds and dykes, this species is found locally in southern England with a few isolated records further south. The majority of known sites are to the south of London.

Nb *Helphorus nanus*

5.1.19 This is mainly a species of ancient wetland where it occurs locally as far north as the Humber.

Nb *Anacaena bipustulata*

5.1.20 Widely distributed south-east of a line from the Bristol Channel to the Humber, this species often occurs in gravel-pits. It dislikes stagnant water.

Nb *Laccobius atrocephalus*

5.1.21 This species has a very patchy distribution but occurs right up to northern Scotland. In Sussex it is very local. There is an established colony in cliff pools and seepages on the undercliff between Hastings and Pett.

Nb *Enochrus melanocephalus*

5.1.22 This is a local species, most frequent in southern England. It often quickly colonises gravel-pits and freshly cleaned-out dykes.

Nb *Hydraena testacea*

5.1.23 This is a local species of ponds and dykes which is widely distributed in Britain as far north as the Scottish Borders, although it is much more frequent in southern England.

6.0 CONCLUSIONS

6.1 The data are summarised in Table 5 for each sampling site. Assessment has been based on the SQS and the context of the site.

6.2 The sites with high value are those on the Pevensey Levels SSSI (sites 1a, 1b), the Barnhorn Level (site 3c), the pond at Little Bearsden (site 18a) and Combe Haven (sites 22a-h).

6.3 Sites of medium value include other sites on the Barnhorn Level (sites 5b, 5c).

6.4 The other sites are of low value.

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TABLE 1 **AQUATIC COLEOPTERA RECORDED ON 24 JULY 1993**

		SAMPLE SITE NUMBER					
SPECIES	Status	SQS	3a	3b	4	5c	17
AQUATIC COLEOPTERA							
HALIPLIDAE							
Peltodytes caesus	Nb	4		+			
Haliplus confinis		2					
Haliplus lineatocollis		1		+			
Haliplus ruficollis		1		+			
HYGROBODIIDAE							
Hygrobia hermanni		2		+			+
NOTERIDAE							
Noterus clavicornis		2					
DYTISCIDAE							
Laccophilus minutus		1					+
Hyphydrus ovatus		1		+			+
Hygrotus inaequalis		1		+			+
Hydroporus angustatus		1				+	
Hydroporus palustris		1	+	+		+	
Hydroporus planus		1					
Hydroporus striola		2					
Graptodytes pictus		2		+			
Agabus bipustulatus		1				+	+
Agabus sturmi		1	+	+	+	+	
Ilybius fenestratus	Nb	4					
Ilybius fuliginosus		1					+
Ilybius quadriguttatus		4				+	
Rhantus suturalis	Nb	2					+
HYDROPHILIDAE							
Hydrochus elongatus	RDB3	8		+			
Helophorus brevipalpis		1	+	+		+	+
Helophorus minutus		1	+	+		+	+
Helophorus obscurus		1					
Cercyon convexiusculus	Nb	4				+	+

TABLE 1 contd

		SAMPLE SITE NUMBER					
SPECIES	Status	SQS	3a	3b	4	5c	17
Cercyon ustulatus	Nb	2				+	
Hydrobius fuscipes		1	+	+			
Anacaena limbata		1		+		+	
Anacaena lutescens		2		+		+	+
Laccobius bipunctatus		1		+			
Helochares lividus	Nb	2					
Enochrus coarctatus		2		+			
HYDRAENIDAE							
Ochthebius minimus		1	+			+	+
Hydraena riparia		1		+		+	
Limmebius crinifer	RDBI	16					
NUMBER OF SPECIES (NOS)			6	18	1	13	12
WQT FOR SITE (WQT)			6	32	1	21	18
SQS FOR SITE (SQS)			1.0	1.8	1.0	1.6	1.5
NO. NAT. NOTABLE + RDB			0	2	0	2	2

TABLE 2 AQUATIC HEMIPTERA RECORDED ON 24 JULY 1993

		SAMPLE SITE NUMBER					
SPECIES	Status	SQS	3a	3b	4	5c	17
AQUATIC HEMIPTERA							
VELIIDAE (Water - crickets)							
Microvelia reticulata				+			
GERRIDAE (Pond - skaters)							
Gerris lacustris				+			
NEPIDAE (Water - scorpions)							
Nepa cinerea				+			
NAUCORIDAE (Saucer - bugs)							
Ilyocoris cimicoides				+			
PLEIDAE (Lesser Water-boatmen)							
Plea minutissima							
CORIXIDAE (Corixid - bugs)							
Corixa punctata			+	+			
Hesperocorixa sahlbergi			+	+			+
NOTONECTIDAE (Water - boatmen)							
Notonecta glauca			+	+			+
NUMBER OF SPECIES			3	7	0	0	2

TABLE 3 AQUATIC COLEOPTERA RECORDED ON SPECIFIED DATES

			SAMPLE SITE NUMBER						
			18a	18b	22b	22b	22d	22f	22f
SPECIES	Status	SQS	24/28.7.93	28.7.93	18.6.91	28.7.93	28.7.93	18.6.91	28.7.93
AQUATIC COLEOPTERA									
HALIPLIDAE									
Haliplus confinis		2	*F						
Haliplus fluviatilis		1					+		
Haliplus fulvus		2	+R						
Haliplus ruficollis		1	*F	+	*			*	
HYGROBIIDAE									
Hygrobia hermanni		2	+A						
NOTERIDAE									
Noterus clavicornis		2	*A	+	*			*	
DYTISCIDAE									
Laccophilus hyalinus		2	+R		*		+		
Laccophilus minutus		1	*F						
Hyphydrus ovatus		1	*F	+	*		+	*	
Hydroglyrphus geminus	Nb	2	+F						
Hygrotus decoratus	Nb	4							*
Hygrotus inaequalis		1	+F	+				*	
Hygrotus versicolor		2					+		
Coelambus impressopunctatus		2							+
Hydroporus angustatus		1						*	+
Hydroporus incognitus		2	+R						
Hydroporus palustris		1		+				*	+
Hydroporus planus		1	*F					*	+
Hydroporus pubescens		1						*	+
Hydroporus striola		2	*R						
Hydroporus tessellatus		1						*	
Porhydrus lineatus		2		+					
Stictotarsus duodecimpustulatus		2					+		
Copelatus haemorrhoidalis		2	+R						
Agabus bipustulatus		1	*F					*	+
Agabus didymus		4					+		

TABLE 3 contd

Agabus melanocornis		2						*	
Ilybius ater		2	+R			+	+	*	
Ilybius fenestratus	**Nb**	4	*R						
Ilybius fuliginosus		1	*F			+	+		
Ilybius quadriguttatus		4						*	+
Rhantus suturalis	**Nb**	2	+R						+
Colymbetes fuscus		1	+F	+				*	+
Hydaticus seminiger	**Nb**	4						*	+
GYRINIDAE									
Gyrinus caspius		2					+		
Gyrinus marinus		1					+		
Gyrinus substriatus		1	+R						
Gyrinus urinator	**Nb**	8					+		
HYDROPHILIDAE									
Hydrochus angustatus	**Nb**	4					+		+
Helophorus brevipalpis		1	*A		*			*	+
Helophorus grandis		1	+R	+					
Helophorus minutus		1	*A			+	+		+
Helophorus nanus	**Nb**	4							+
Helophorus obscurus		1	*F	+					
Cercyon convexiusculus	**Nb**	4							+
Hydrobius fuscipes		1	*A					*	+
Anacaena bipustulata	**Nb**	4	+R						
Anacaena limbata		1	*A					*	+
Anacaena lutescens		2	*A						
Laccobius atrocephalus	**Nb**	4	+R						
Anacaena bipunctatus		1		+					
Helochares lividus	**Nb**	2	*A						
Enochrus coarctatus		2		+				*	
Enochrus melanocephalus	**Nb**	4	+R						
Enochrus testaceus		2		+					
Cymbiodyta marginella		2	+R				+		

TABLE 3 contd

HYDRAENIDAE									
Ochthebius minimus		1	+A					*	+
Hydraena riparia		1	*F						
Hydraena testacea	**Nb**	2					+	*	
Limnebius crinifer	**RDBI**	16	*R						
DRYOPIDAE									
Dryops luridus		1	+F						
ELMIDAE									
Elmis aenea		1					+		
Oulimnius tuberculatus		1					+		
TOTAL SPECIES (NOS)			37	12	5	3	17	22	18
POINTS AGGREGATE (WQT)			78	16	7	4	37	36	35
SQS FOR SITE (SQS)			2.1	1.3	1.4	1.3	2.2	1.6	1.9
NO.NAT.NOTABLE + RDB			8	0	0	0	3	3	5

Species occurring in Site 18a have been given an estimate of the relative abundance on a three point scale as follows:

A = Abundant
F = Frequent
R = Rare

Aquatic Hemiptera are recorded for presence only.

* = species recorded in previous reports

+ = species added in this report

Figures relating to Species Quality Scores are given for each site at the bottom of the Aquatic Coleoptera lists.

TABLE 4 AQUATIC COLEOPTERA RECORDED ON SPECIFIED DATES

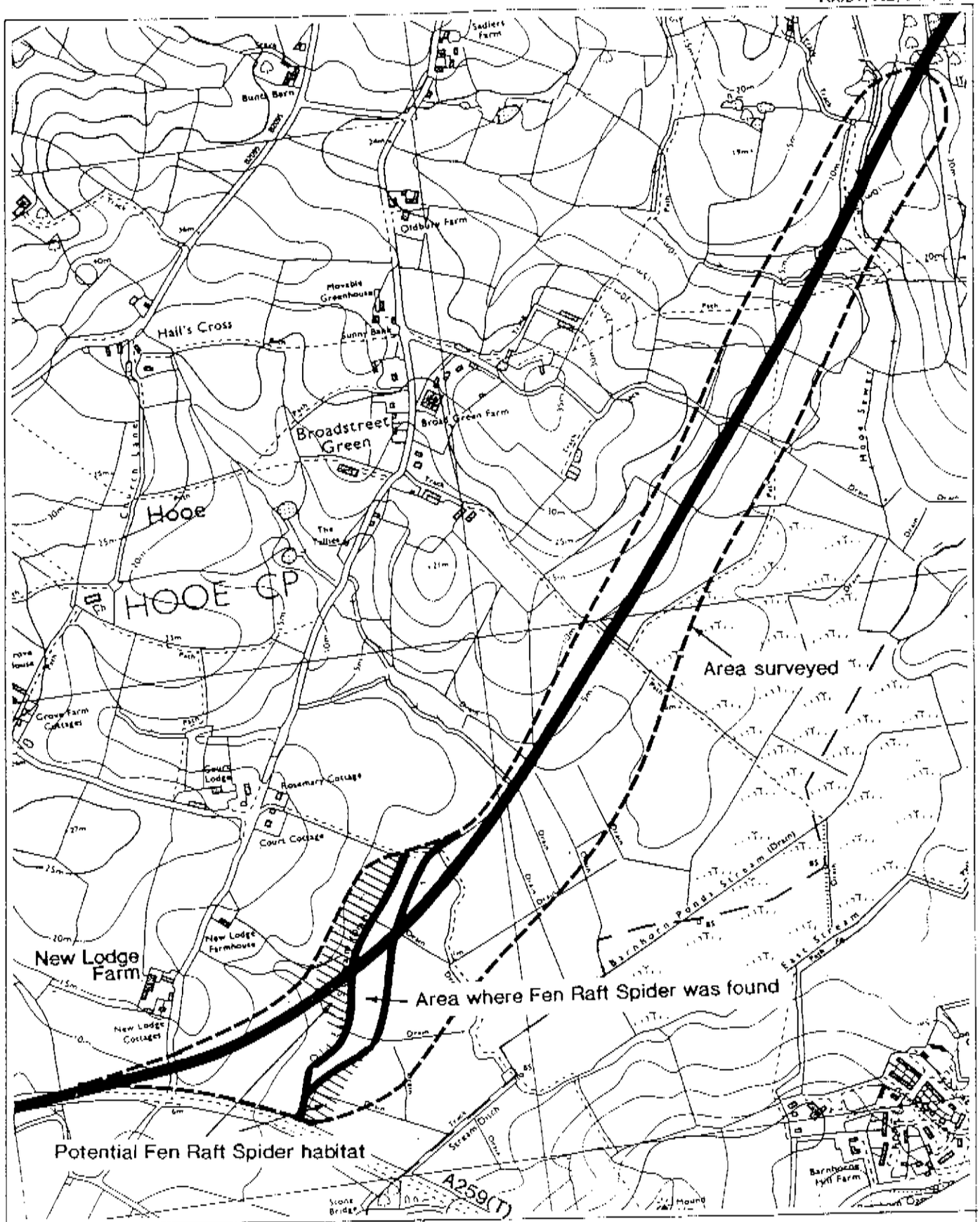
			SAMPLE SITE NUMBER						
			18a	18b	22b	22b	22d	22f	22f
SPECIES	**Status**	**SQS**	**24/28.7.93**	**28.7.93**	**18.691**	**28.7.93**	**28.7.93**	**18.6.91**	**28.7.93**
AQUATIC HEMIPTERA									
VELIIDAE (Water-crickets)									
Microvelia reticulata				+					
NEPIDAE (Water-scorpions)									
Nepa cinerea			+					*	
NAUCORIDAE (Saucer-bugs)									
Ilyocoris cimicoides			*		*				*
NOTONECTIDAE (Water-boatmen)									
Notonecta glauca					*	+			
PLEIDAE (Lesser Water-boatmen)									
Plea minutissima			*	+					
TOTAL SPECIES			3	2	2	1	0	2	0

TABLE 5 SUMMARY OF VALUE OF SITES FOR NATURE CONSERVATION

Sampling Site	SQS	Value of Site
1a	2.1	High
1b	1.6	High
1c	-	Low
2	-	Low
3a	1.0	Low
3b	1.8	High
3c	2.1	High
3d	-	Low
4	1.0	Low
5a	1.25	Low
5b	1.8	Medium
5c	1.6	Medium
5d	-	Low
6	-	Low
7	-	Low
8a	1.0	Low
8b	1.25	Low
9	-	Low
10	-	Low
11	-	Low
12	0	Low
13	0	Low
14	-	Low
15	0	Low
16	-	Low
17	1.5	Low
18a	2.1	High
18b	1.3	Medium
18c	0	Low
19	-	Low
20	1.5	Low
21a	-	Low
21b	0	Low
21c	1.0	Low
22a	1.4	Fairly high
22b	1.35	Fairly high
22c	-	Low

TABLE 5 Contd

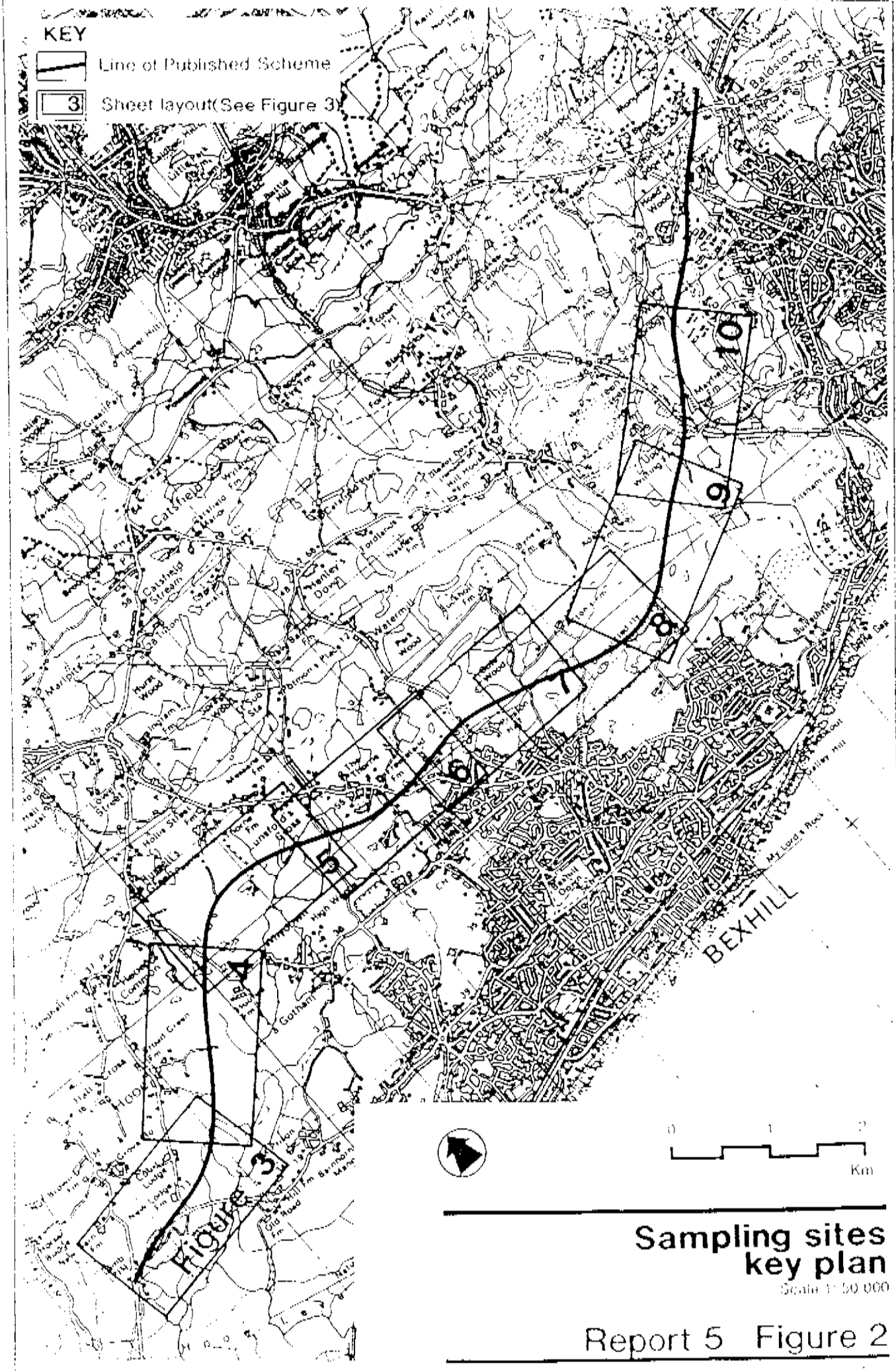
Sampling Site	SQS	Value of Site
22d	2.2	High
22e	-	Low
22f	1.75	High
22g	-	Low
22h	1.9	High
23	-	Low



Location of Fen Raft Spider

Scale 1:10 000

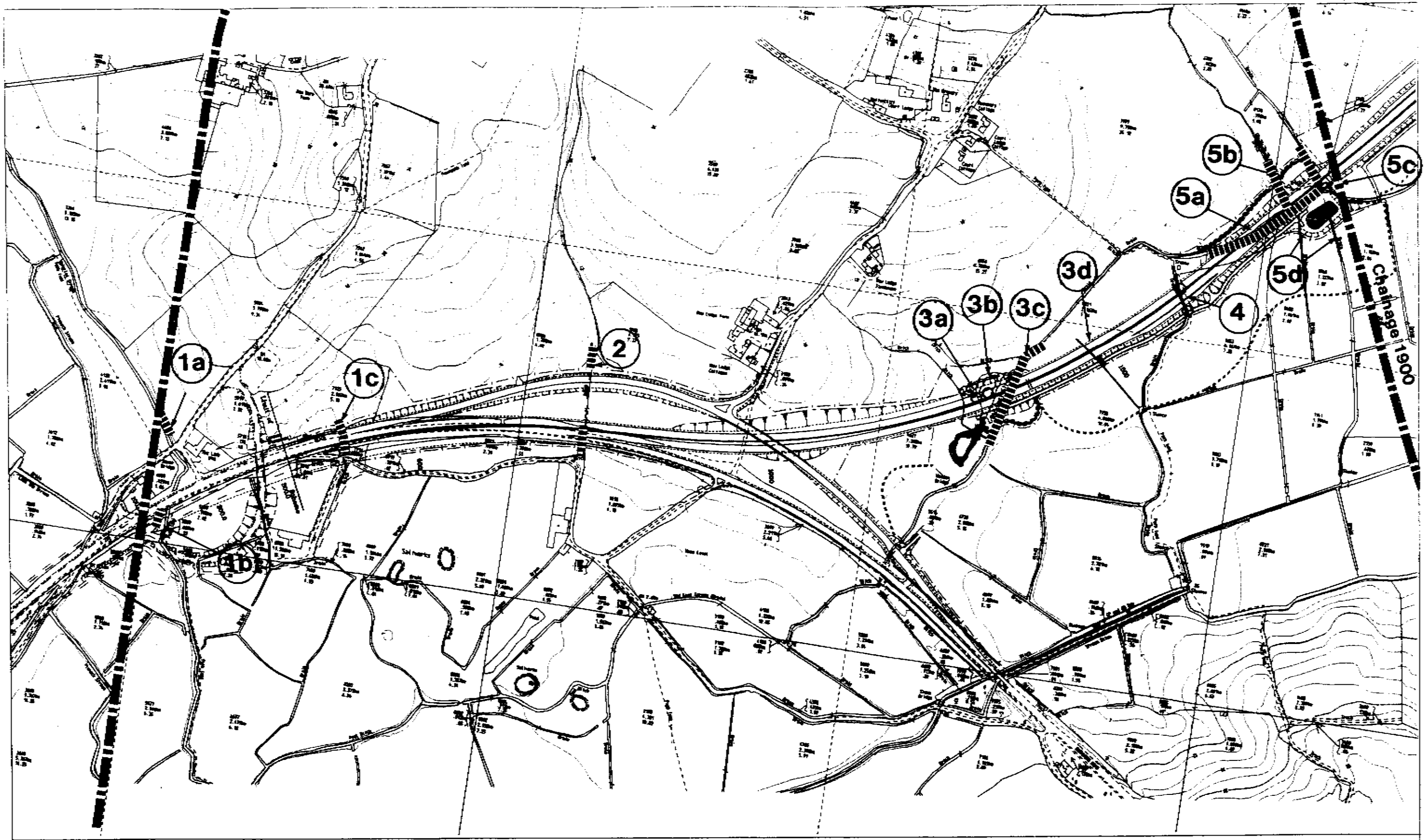
Report 5 Figure 1



Sampling sites key plan

Scale 1:50 000

Report 5 Figure 2



KEY

Sampling site

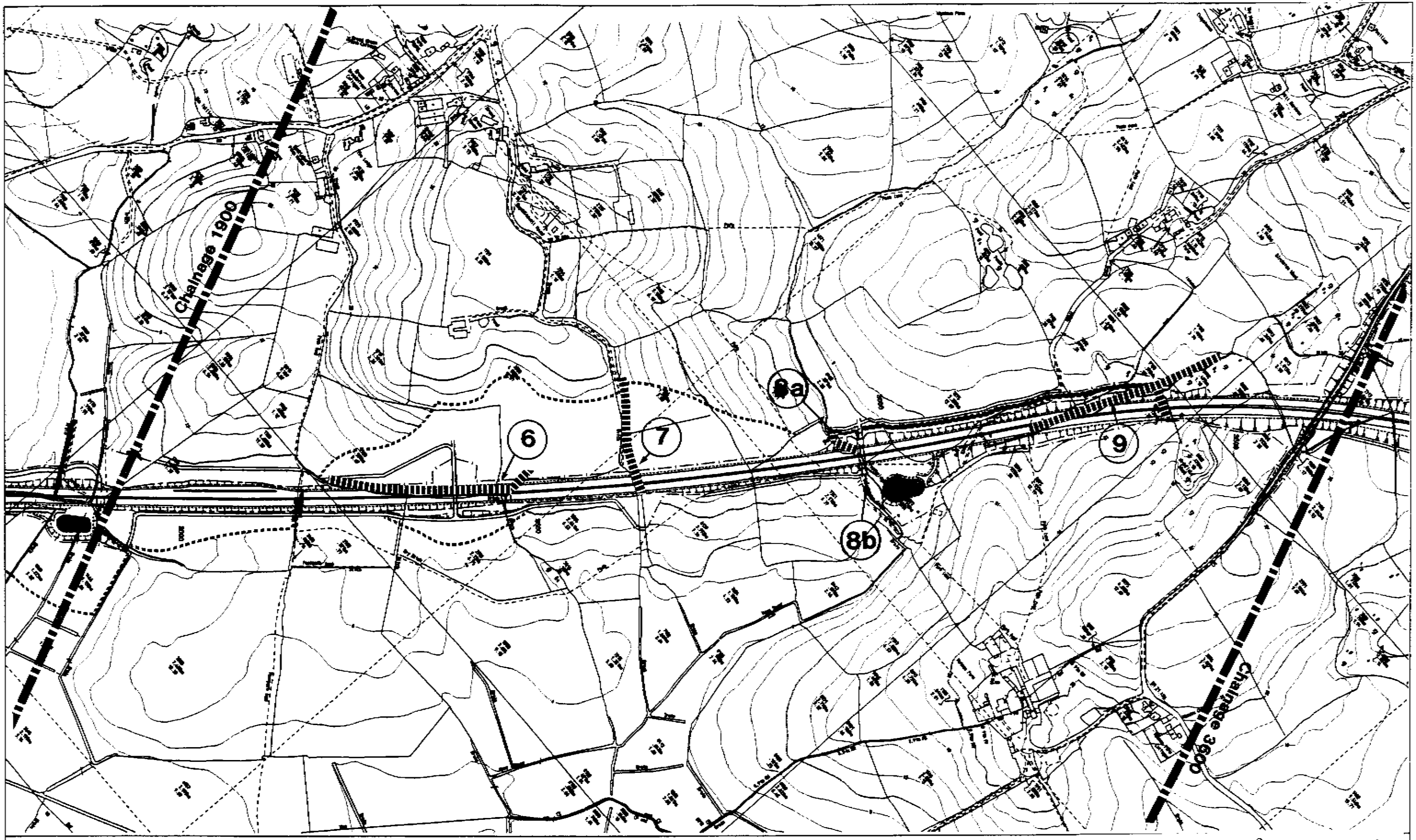
2a Reference number (refer text)

0 200 metres

Aquatic invertebrates sampling sites

Scale 1:5000

Report 5 Figure 3



KEY

Sampling site

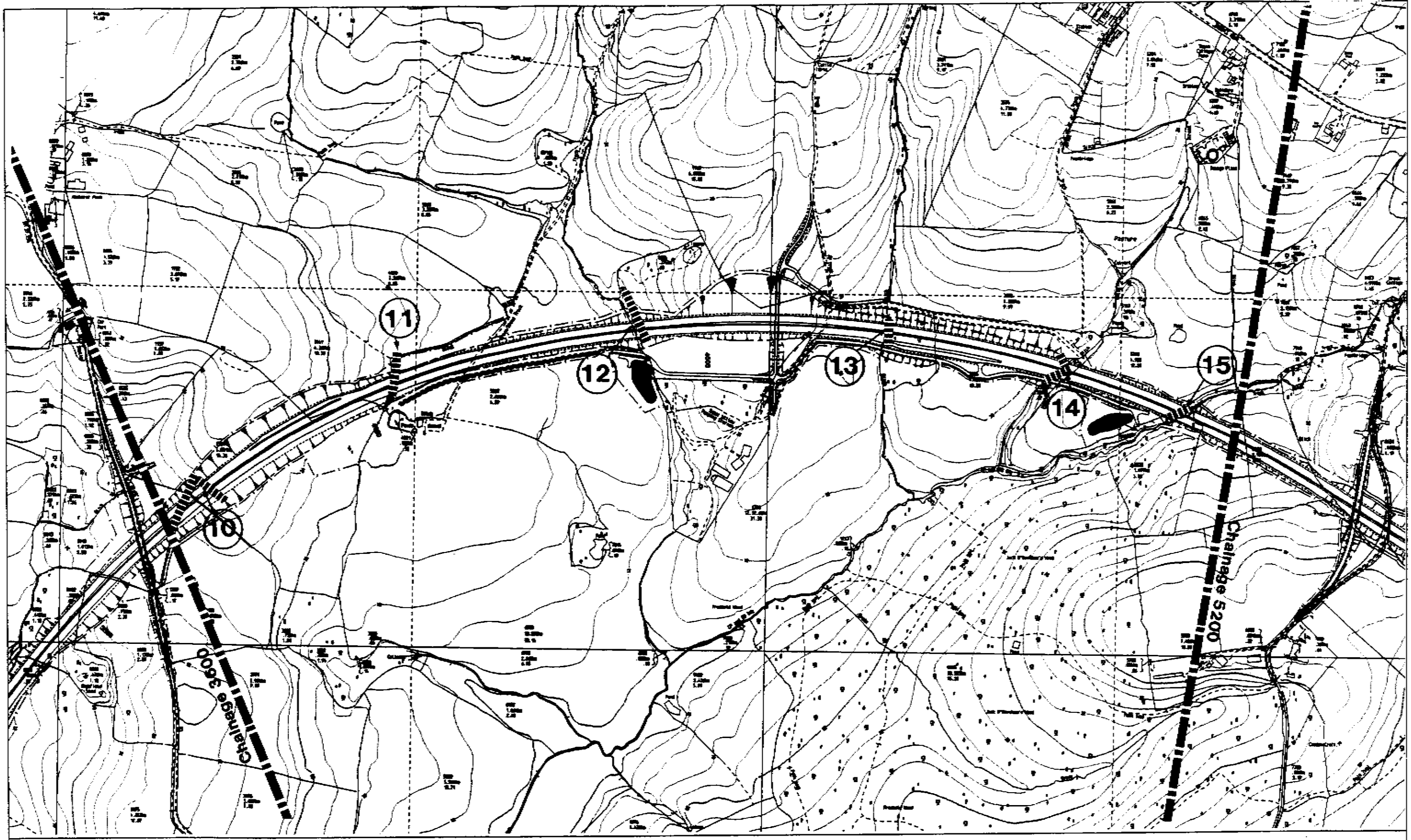
2a Reference number (refer text)

0 200 metres

Aquatic invertebrates sampling sites

Scale 1:5000

Report 5 Figure 4



KEY

Sampling site

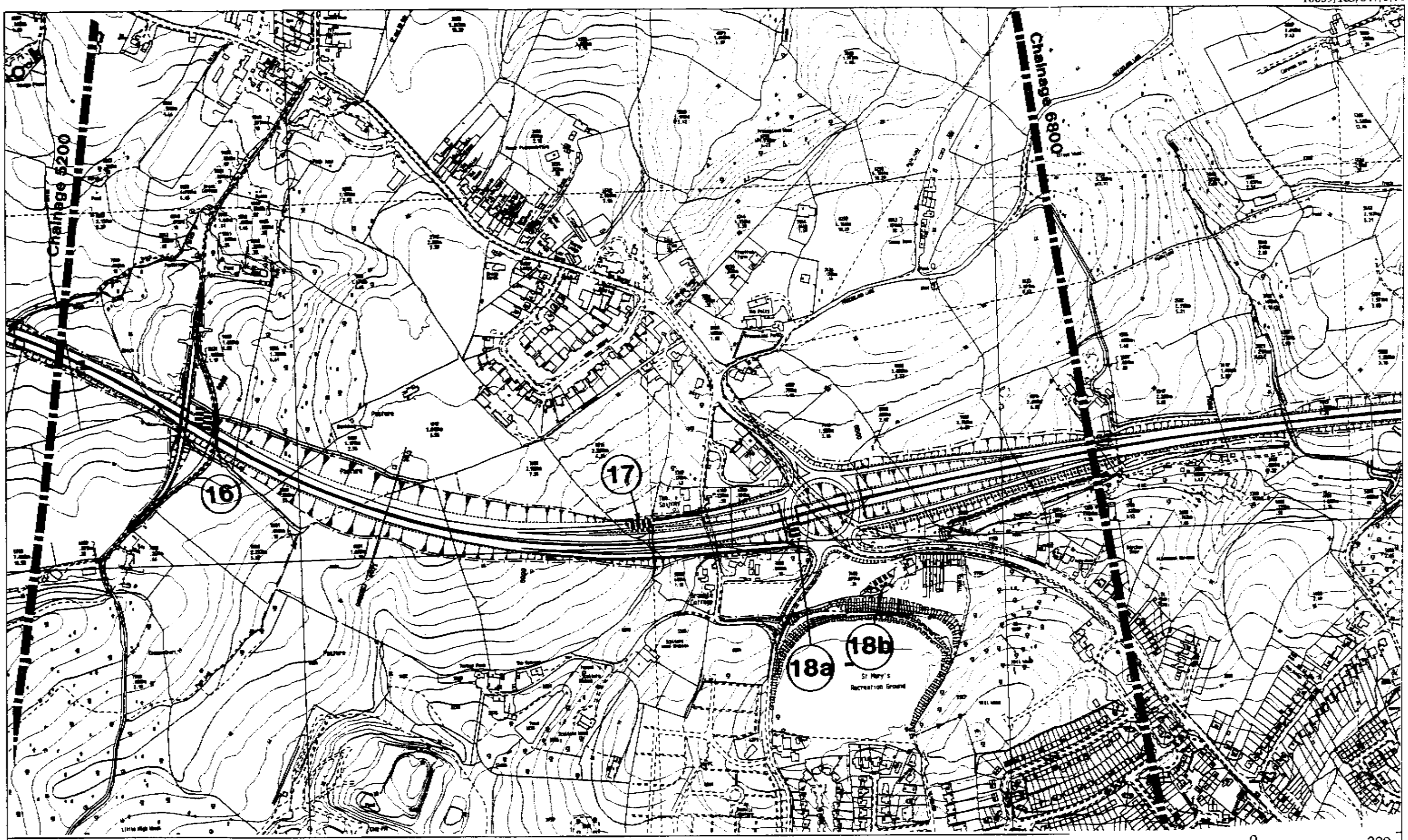
(2a) Reference number (refer text)

0 200 metres

Aquatic invertebrates sampling sites

Scale 1:5000

Report 5 Figure 5



KEY

Sampling site

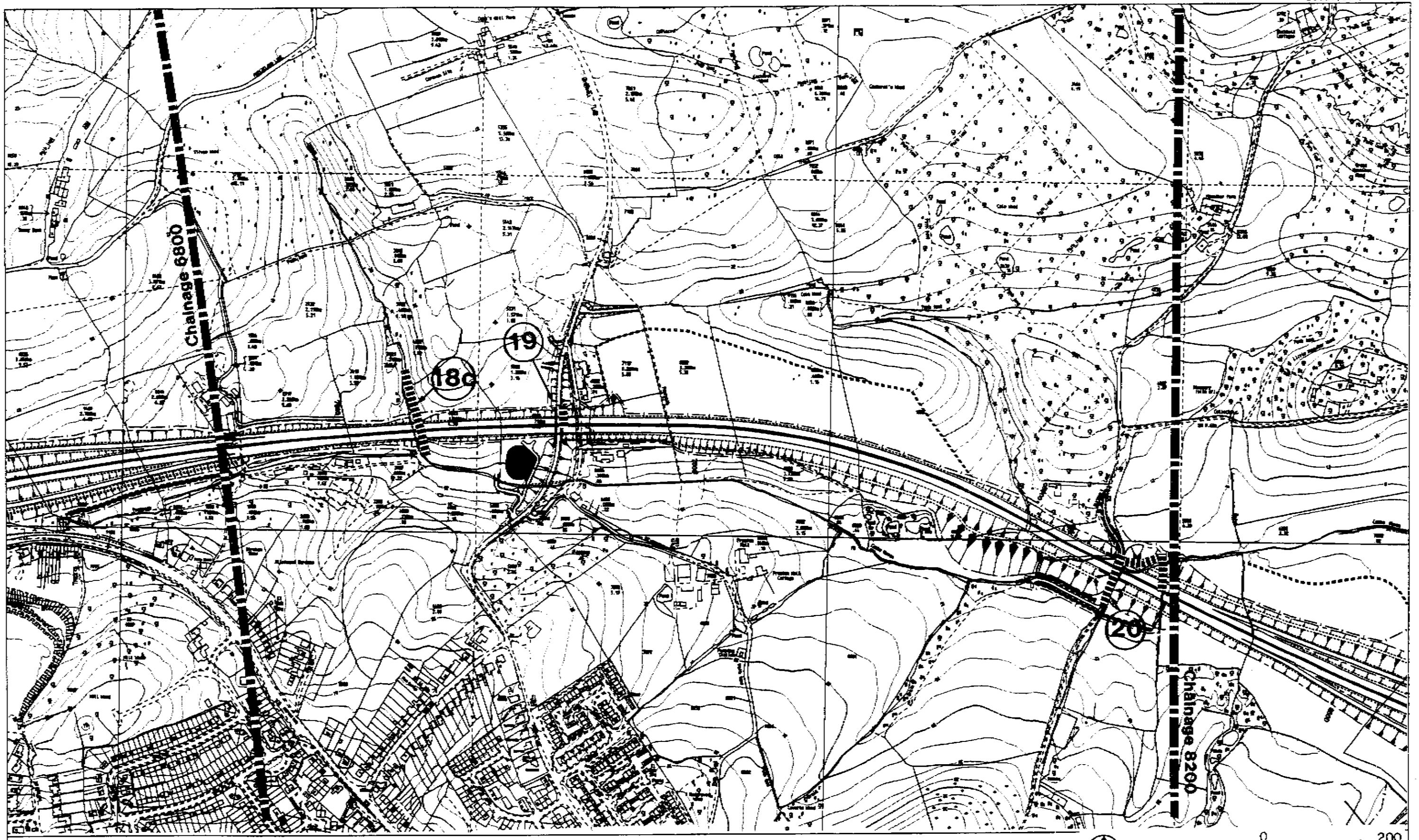
2a Reference number (refer text)

0 200 metres

Aquatic invertebrates sampling sites

Scale 1:5000

Report 5 Figure 6



KEY

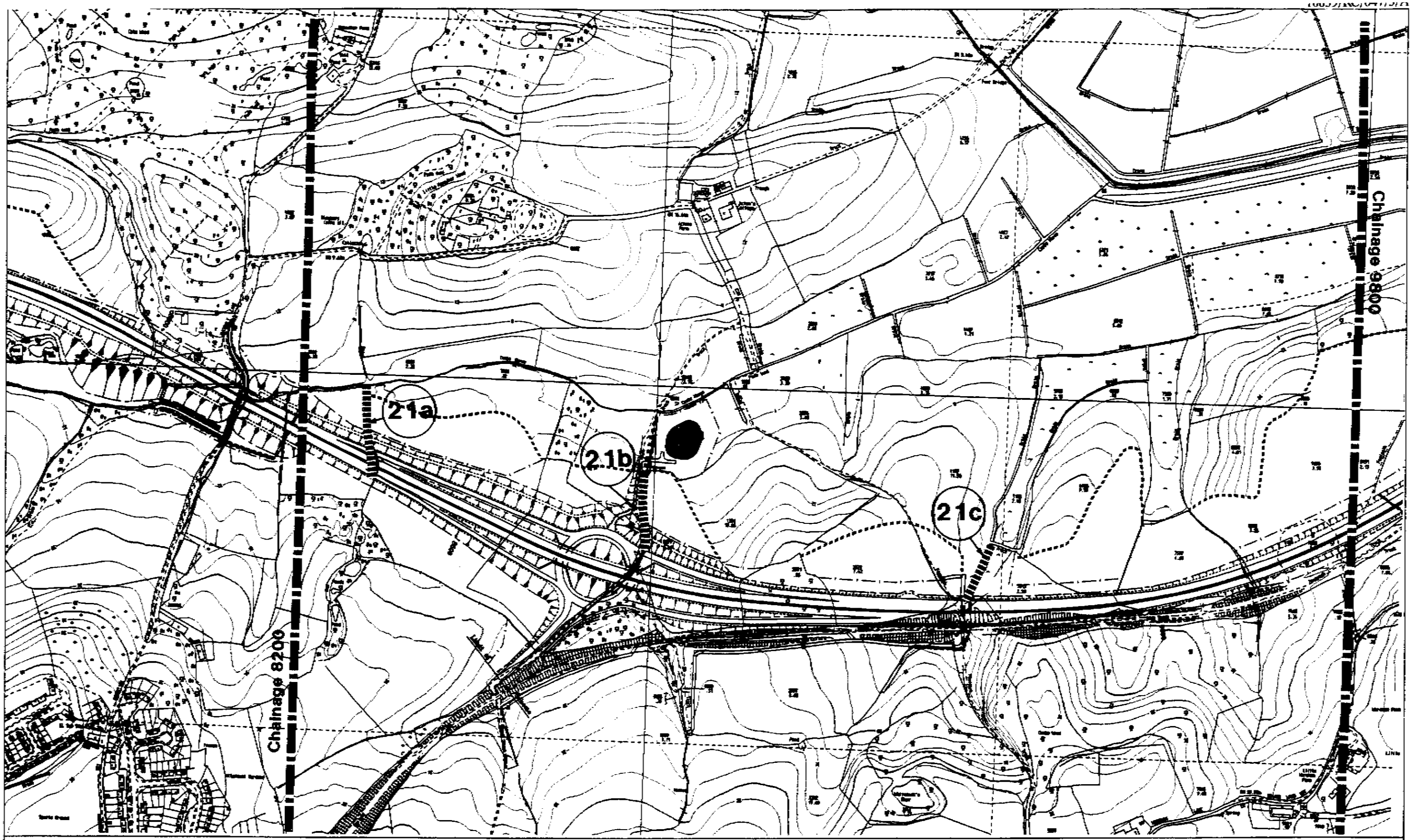
Sampling site

(2a) Reference number (refer text)

Aquatic invertebrates sampling sites

Scale 1:5000

Report 5 Figure 7



KEY

Sampling site

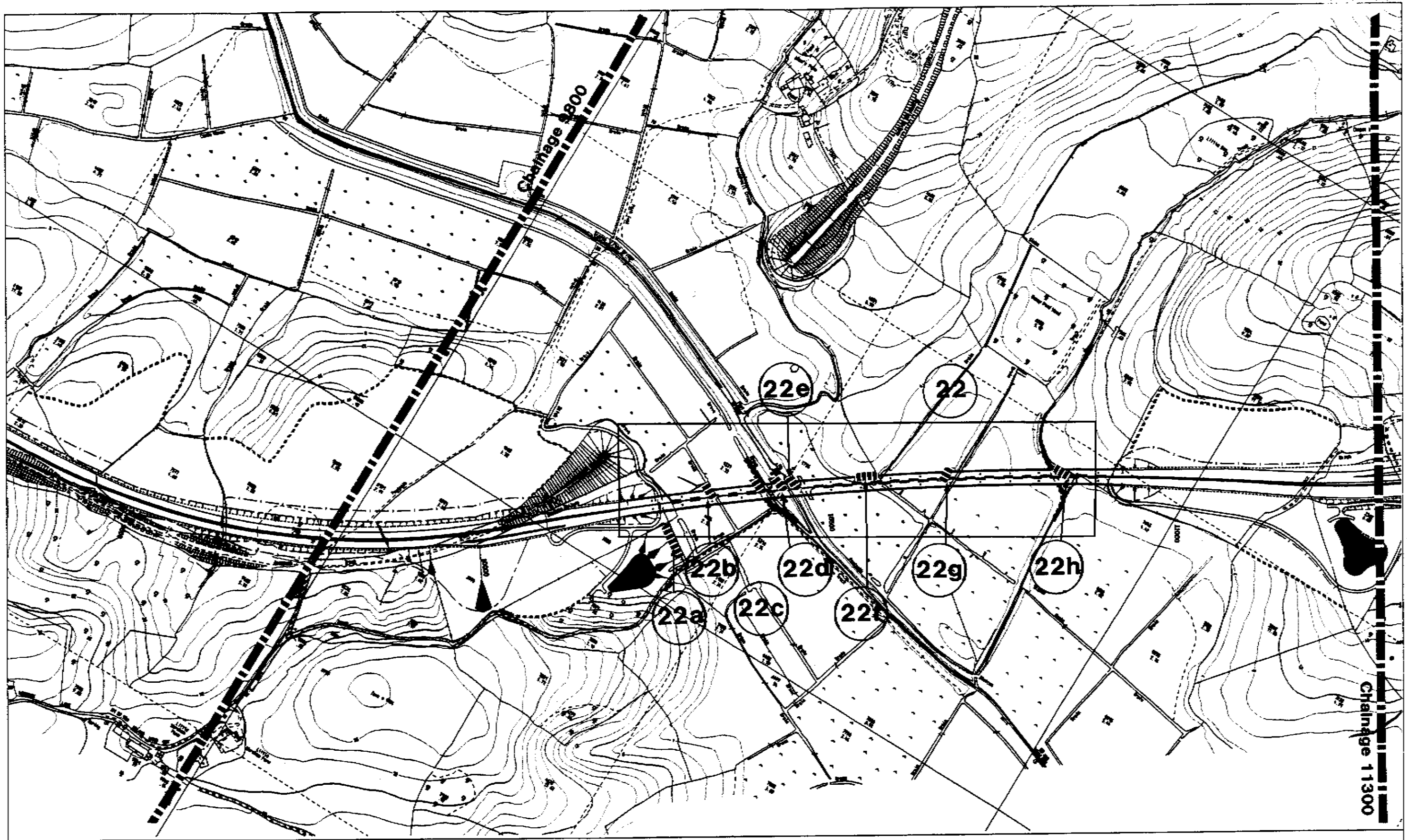
2a Reference number (refer text)

0 200 metres

Aquatic invertebrates sampling sites

Scale 1:5000

Report 5 Figure 8



KEY

Sampling site

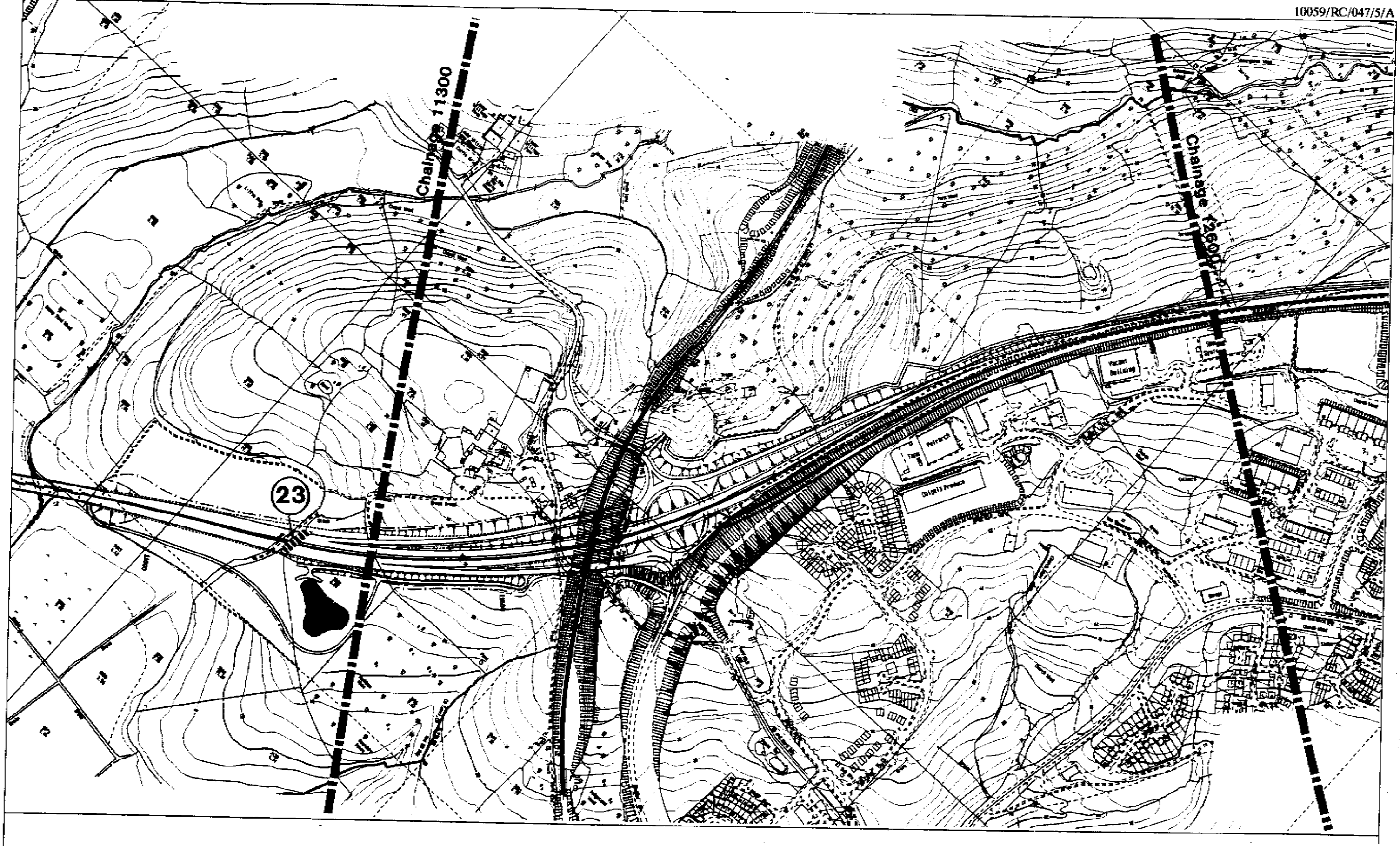
(2a) Reference number (refer text)

0 200 metres

Aquatic invertebrates sampling sites

Scale 1:5000

Report 5 Figure 9



KEY

Sampling site

2a Reference number (refer text)

0 200 metres

Aquatic invertebrates sampling sites

Scale 1:5000

Report 5 Figure 10

APPENDIX 1

METHOD OF SAMPLING

METHOD OF SAMPLING

For aquatic insects, a triangular pond net 340mm wide was used for sampling. In sites containing thick vegetation, the site was first thoroughly disturbed, if possible by standing on the vegetation in the water. This ensures that as many water beetles as possible were flushed into open water. This process was quickly followed by vigorous sweeps with the water-net, at several different depths if possible. At sites containing little or no vegetation, any stones, logs or roots were dislodged and the net worked in such a way as to catch any sheltering aquatic insects. The contents of the net were tipped onto a large polythene sheet after as much water as possible had been squeezed out of the sample. After noting identifiable species, other specimens were collected by selecting examples by hand. These were placed in a labelled glass tube and identified in the laboratory.

The time taken for these processes varied slightly depending upon the richness of the site. On average, netting took about 5 minutes and sorting on the bank up to 20 minutes.

In very rich sites it was desirable to repeat the netting process to obtain a reasonably high proportion of the species present.

Water bugs are generally found in more open water and can be caught by simply working the pond net through the water without first disturbing the roots or vegetation. There is no currently developed technique for assessing water quality from water bugs. The information was collected so that it can be used should a method become available in the future, but is not interpreted in this report.

APPENDIX 2

METHOD OF RANKING SITES

METHOD OF RANKING SITES

Foster and Eyre (1992) outline the methods currently used for the classification and ranking of water beetle communities to indicate environmental quality. Species lists are classified into assemblage types and then used to rank sites by applying a point scoring system.

The factors used for ranking sites are:

(a) The number of Red Data Book (RDB) species Bratton, 1991 and Shirt, 1987.

(b) Scores for each species have been awarded according to their rarity, ranging from 1 for the commonest species through a geometric progression to 32 for the rarest species (Foster, Foster, Eyre & Bilton, 1990).

The sum of these scores for a site, the Water Quality Total (WQT) can be divided by the number of species present (NOS) in order to give a mean Species Quality Score (SQS).

$$\text{i.e. SQS} = \frac{\text{WQT}}{\text{NOS}}$$

(c) The number of Nationally Notable species present (Na + Nb species: Section 5).

(d) The number of species present

A site with more Red Data Book or nationally notable species or with high species diversity is in general more valuable. These factors may modify the classification but the average SQS of the species is a good indication of habitat quality. An average SQS of 2 or more usually indicates a good site; between 1.5 and 2 is of moderate quality; and scores below 1.5 are sites of low quality.

The scoring system has to be used cautiously when very few species are recorded since one species with a high SQS can increase the site SQS score to an unrealistic level. Nevertheless, in the present survey all sites where water beetles were present have been given a Species Quality Score.

HIGHWAYS AGENCY

TOLLGATE HOUSE

ENVIRONMENT & LANDSCAPE
Environmental Statement

A259 BEXHILL & HASTINGS WESTERN BYPASS – ENVIRONMENTAL STATEMENT VOL 2 (REPORTS) PART 1/3 09/94

10059/RC/047/1/A

Adam's Farm

Track

Decoy Pond Wood

Drain

FB

BS

Combe Haven

Drains

Study area boundary

Dismantled Railway

Combe

15m

10m

20m

Path

KEY

High value ditches

Grassland and wetland of nature conservation value

Woodland of nature conservation value

0 200 metres

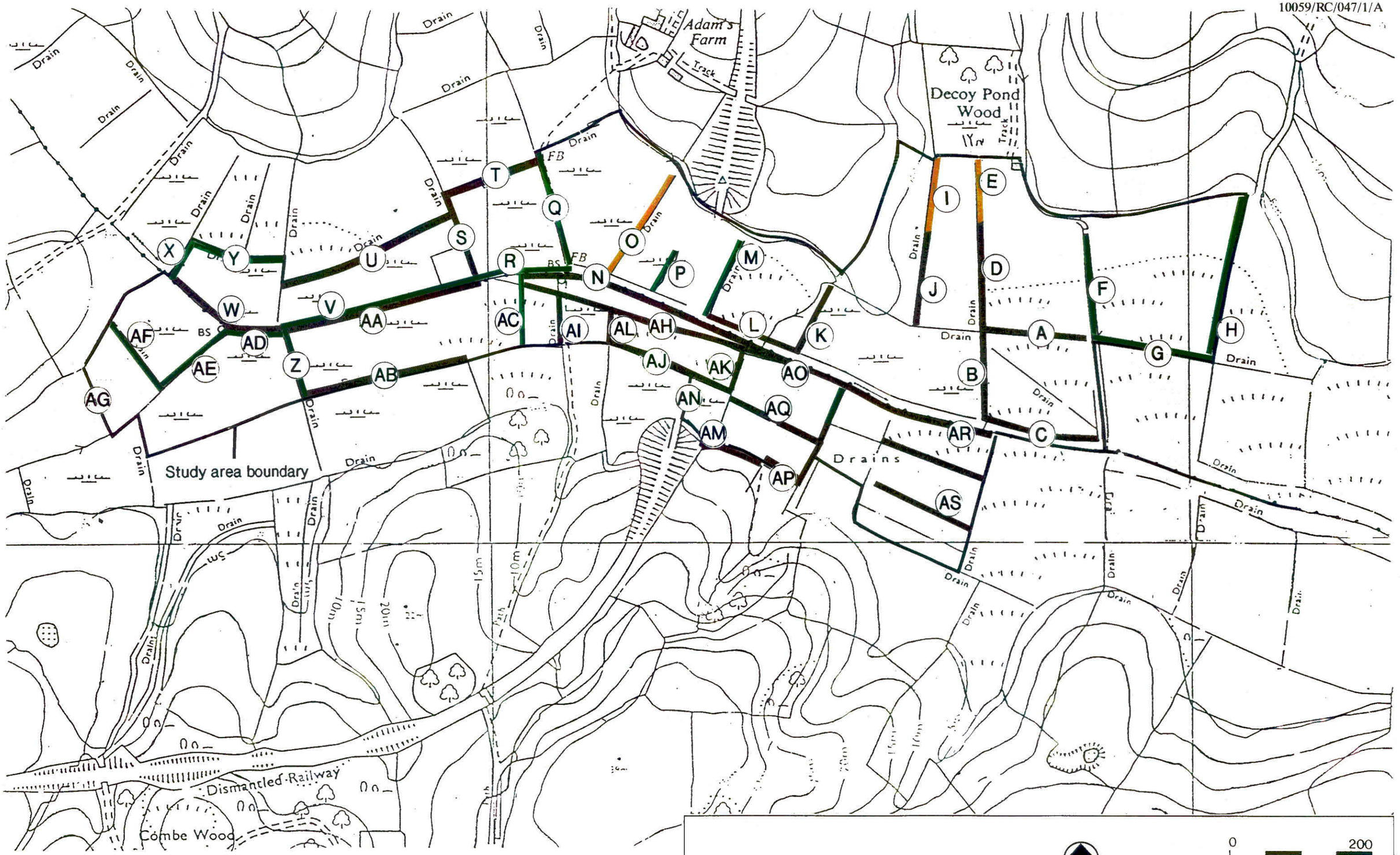
Location of the study area

1988 Survey

Scale 1: 5000

Report 1. Appendix 2. Figure A2/1.

10059/RC/047/1/A



KEY

- Species diverse: open water
- Reed grass dominated
- Overgrown

0 200 metres

Vegetation of the Ditches

1988 Survey Scale 1: 5000

Report 1. Appendix 2. Figure A2/2.

10059/RC/047/1/A

Adam's Farm

Track

Decoy Pond Wood

Track

FB

FB

BS

Path

Path

Path

Drain

Drains

Dismantled Railway

Combe Wood

5m

10m

15m

20m

KEY

1. Potamogeton berchtoldii
2. Scirpus sylvaticus
3. Giant lacewing
4. Hottonia palustris
5. Scutellaria galericulata
6. Ranunculus sardous

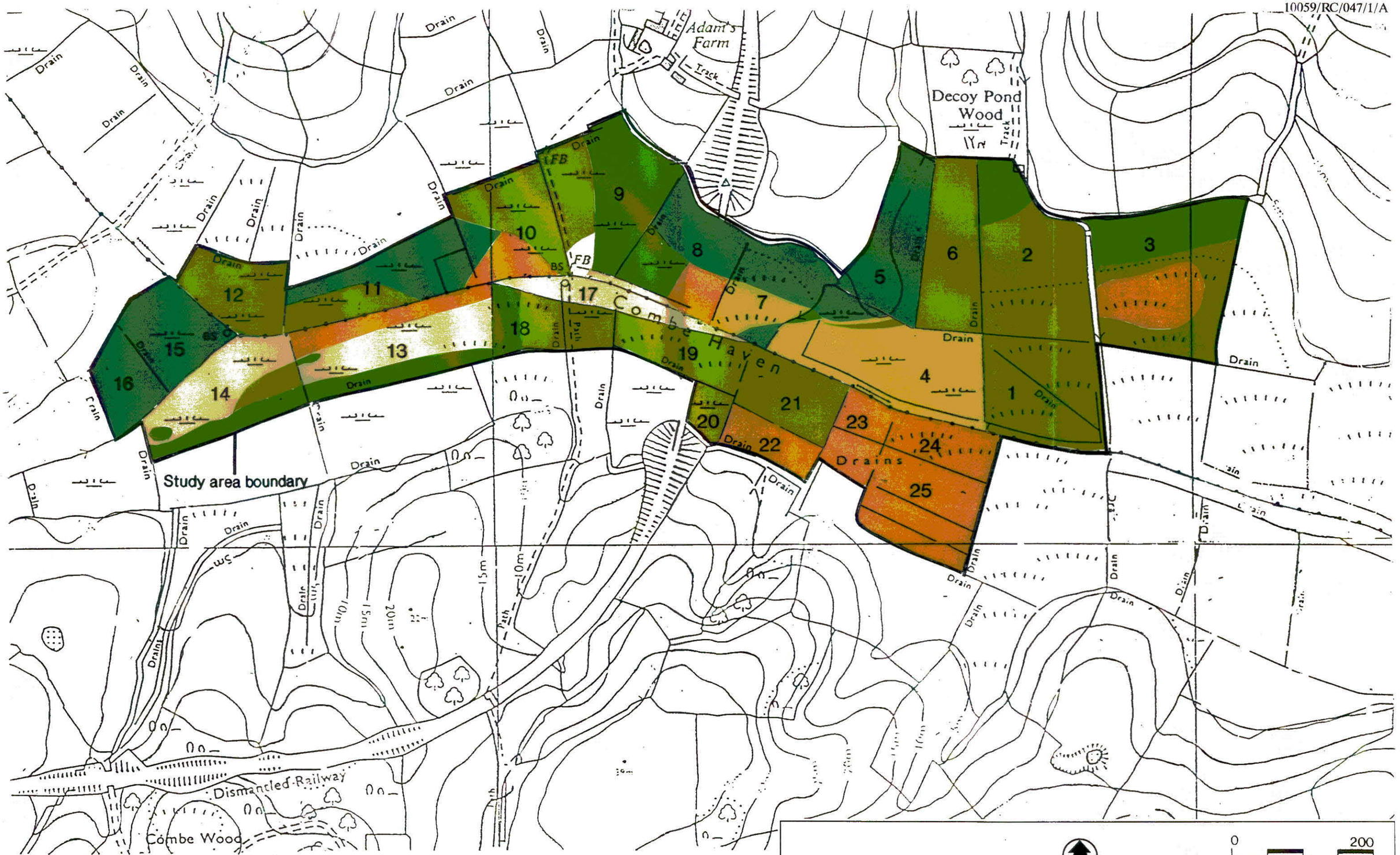
0 200 metres

Location of Unusual Species

1988 Survey Scale 1: 5000

Report 1. Appendix 2. Figure A2/3.

10059/RC/047/1/A



KEY

- Dry grassland
- Meadow foxtail and meadow grass
- Wet grassland with flote grass
- Rush dominated grassland
- Marsh foxtail grassland
- Reed grass wetland
- Unvegetated area

0 200 metres

Vegetation of the Fields

1988 Survey Scale 1: 5000

Report 1. Appendix 2. Figure A2/4.

Based upon the Ordnance Survey Map with the permission of the Controller of H.M. Stationery Office. © Crown Copyright Licence number: 194703

KEY

- W23a — National Vegetation Classification community type
- I.SI MG7 — Highly Improved Grassland
- 2 — Location of quadrat sample
- Woodland (refer text for NVC Communities)
- Scattered trees / row of trees
- Hedgerow
- Scrub or Bracken
- Semi natural mesotrophic grassland
- Wet marshy grassland
- Stream
- Water
- Grassland of local nature conservation interest

10059/RC/047/5

Vegetation and Quadrat Locations
Chainage of .0-1500
Scale 1: 2,500
Report 4. Figure 2.

0 100 metres

Continued on Figure 3

Lamb Inn

New Lodge Farm

Hooe Level

Saltworks

Improved pasture

re-seeded for turf

plantation

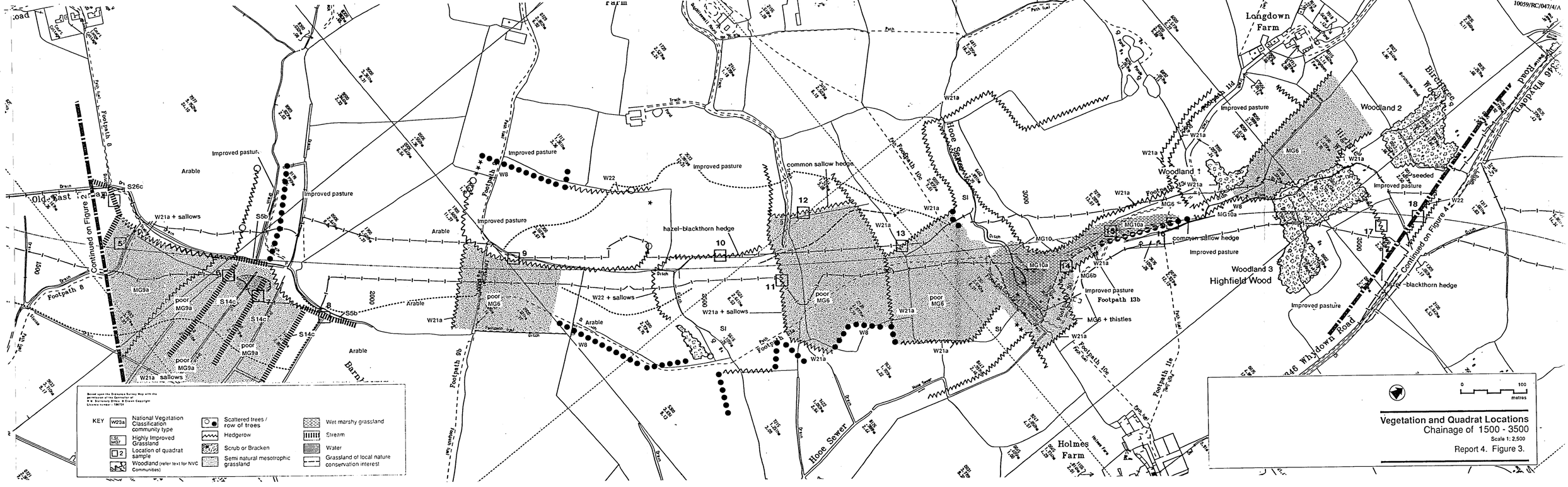
blackthorn & sallow hedge

W10d no trees

oaks

Arable

S14c + willows


10059/RC/047/4/A
Old East Barn
Improved pasture
Arable
S26c
S5b
W21a + sallows
Footpath 8
Continued on Figure 2
MG9a
poor MG9a
S14c
W21a sallows
Barn
Improved pasture
W8
W22
Arable
hazel-blackthorn hedge
W22 + sallows
W21a
W21a + sallows
poor MG6
Footpath 9b
Footpath 10c
common sallow hedge
Hooe Sewer
Footpath 10b
Footpath 11e
Holmes Farm
Longdown Farm
Woodland 1
Woodland 2
Woodland 3
Highfield Wood
Birchmere Wood
Improved pasture
MG6
MG10
MG10a
MG6b
MG6 + thistles
Footpath 13b
Footpath 14
Footpath 15
Footpath 16
Footpath 17
Footpath 18
Re-seeded
Improved pasture
Continued on Figure 4
A246 Whyldown Road
Whyldown Wood
Footpath 10a
Footpath 11a
Footpath 11b
Footpath 11c
Footpath 11d
Footpath 12
Footpath 13a
Footpath 13c
Footpath 13d
Footpath 13e
Footpath 13f
Footpath 13g
Footpath 13h
Footpath 13i
Footpath 13j
Footpath 13k
Footpath 13l
Footpath 13m
Footpath 13n
Footpath 13o
Footpath 13p
Footpath 13q
Footpath 13r
Footpath 13s
Footpath 13t
Footpath 13u
Footpath 13v
Footpath 13w
Footpath 13x
Footpath 13y
Footpath 13z
Footpath 14a
Footpath 14b
Footpath 14c
Footpath 14d
Footpath 14e
Footpath 14f
Footpath 14g
Footpath 14h
Footpath 14i
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Footpath 14k
Footpath 14l
Footpath 14m
Footpath 14n
Footpath 14o
Footpath 14p
Footpath 14q
Footpath 14r
Footpath 14s
Footpath 14t
Footpath 14u
Footpath 14v
Footpath 14w
Footpath 14x
Footpath 14y
Footpath 14z
Footpath 15a
Footpath 15b
Footpath 15c
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Footpath 15h
Footpath 15i
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Footpath 15k
Footpath 15l
Footpath 15m
Footpath 15n
Footpath 15o
Footpath 15p
Footpath 15q
Footpath 15r
Footpath 15s
Footpath 15t
Footpath 15u
Footpath 15v
Footpath 15w
Footpath 15x
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Footpath 16r
Footpath 16s
Footpath 16t
Footpath 16u
Footpath 16v
Footpath 16w
Footpath 16x
Footpath 16y
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Footpath 18t
Footpath 18u
Footpath 18v
Footpath 18w
Footpath 18x
Footpath 18y
Footpath 18z
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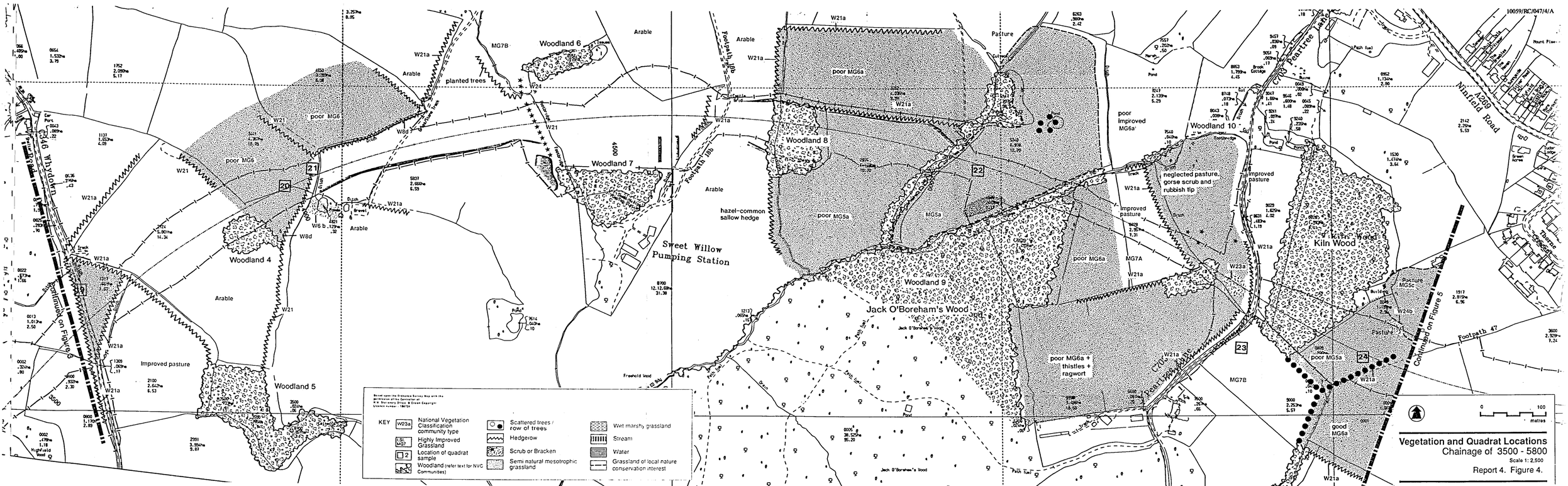
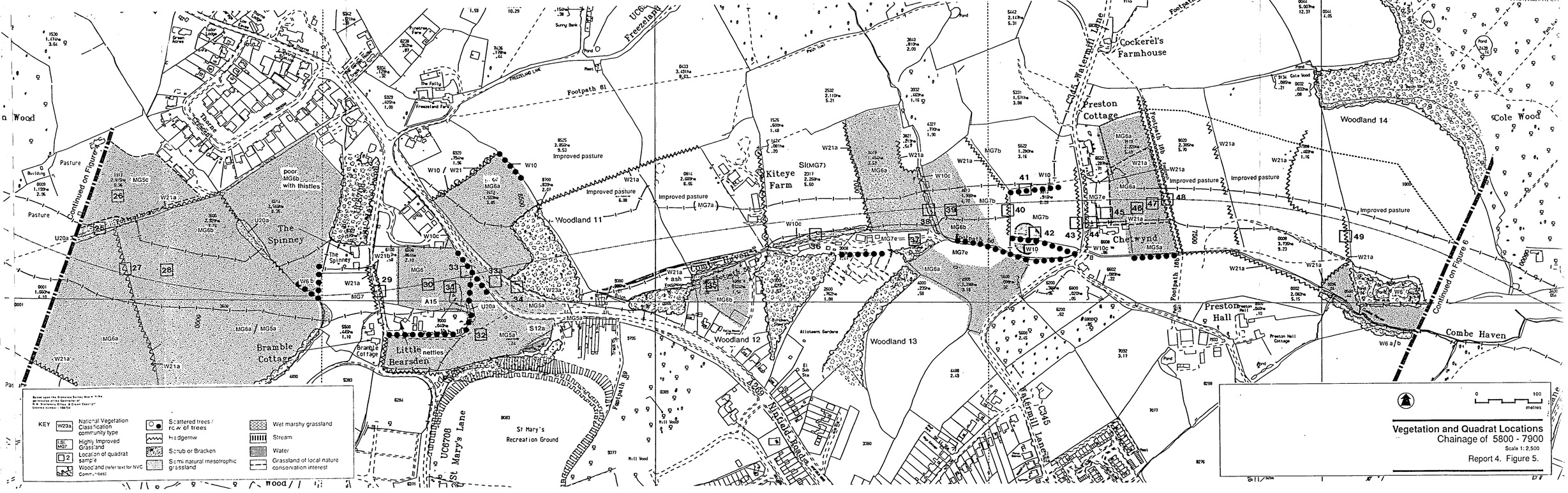


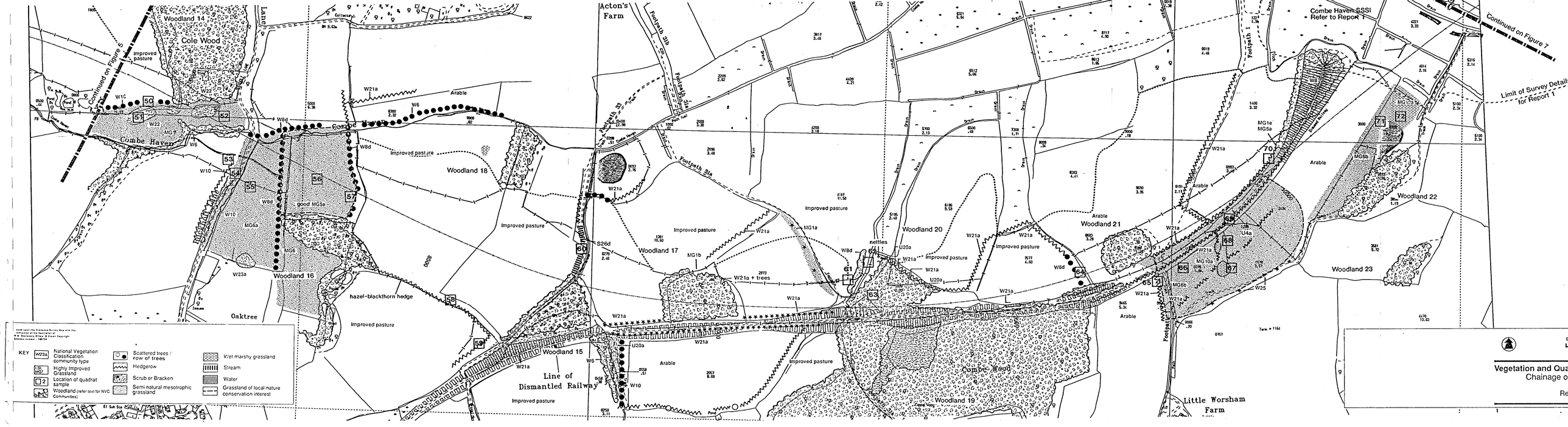
Vegetation and Quadrat Locations

Chainage of 3500 - 5800

Scale 1: 2,500

Report 4. Figure 4.


KEY
National Vegetation Classification community type
Highly Improved Grassland
Location of quadrat sample
Woodland (refer text for NVC Communities)
Scattered trees / row of trees
Hedgerow
Scrub or Bracken
Semi natural mesotrophic grassland
Wet marshy grassland
Stream
Water
Grassland of local nature conservation interest
0
100
metres
Vegetation and Quadrat Locations
Chainage of 5800 - 7900
Scale 1: 2,500
Report 4. Figure 5.
Continued on Figure 5
Continued on Figure 6
Kiteye Farm
Cockerel's Farmhouse
Preston Cottage
Preston Hall
Chetwynd
The Spinney
Bramble Cottage
Little Bearsden
Woodland 11
Woodland 12
Woodland 13
Woodland 14
Cole Wood
Combe Haven
St Mary's Recreation Ground
Footpath 81
Footpath 18b
Freezeland Lane
Cole Waterman Line
Valemill Lane
Ringfield Road
St Mary's Lane
Improved pasture
poor MG6b with thistles
Pasture
Allotment Gardens


Continued on Figure 5
Woodland 14
Cole Wood
Improved pasture
Arable
W21a
W6
W8d
Combe
Combe Haven
MG7
W22
W1C
W10
W8d
Improved pasture
Woodland 18
Improved pasture
good MG5a
MG6a
MG6
W10
W8d
W23a
Woodland 16
hazel-blackthorn hedge
Improved pasture
Oaktree
Acton's Farm
Footpath 31b
Footpath 33
Footpath 31a
Combe Haven
W21a
Improved pasture
Improved pasture
Woodland 17
MG1b
S26d
W21a + trees
MG1a
W8d
nettles
U20a
W21a
Improved pasture
Woodland 20
W21a
W21a
Improved pasture
W8d
W21a
U20a
W21a
W21a
Woodland 15
Line of Dismantled Railway
W6
W10
Arable
Improved pasture
U20a
W21a
Improved pasture
Combe Wood
Woodland 19
Little Worsham Farm
Combe Haven SSSI
Refer to Report 1
Footpath 1
Drain
Arable
Woodland 21
Arable
W21a
MG1e
MG5a
W21a
Arable
MG10a
MG6b
MG6b
W21a
W25
Arable
Woodland 22
Woodland 23
Limit of Survey Detail for Report 1
Continued on Figure 7
KEY
W23a National Vegetation Classification community type
Highly Improved Grassland
Location of quadrat sample
Woodland (refer text for NVC Communities)
Scattered trees / row of trees
Hedgerow
Scrub or Bracken
Semi natural mesotrophic grassland
Wet marshy grassland
Stream
Water
Grassland of local nature conservation interest
Vegetation and Qua
Chainage o
Re

10059/RC/047/4/A

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KEY

- W23a — National Vegetation Classification community type
- SI MG7 — Highly Improved Grassland
- 2 — Location of quadrat sample
- Woodland (refer text for NVC Communities)
- Scattered trees / row of trees
- Hedgerow
- Scrub or Bracken
- Semi natural mesotrophic grassland
- Wet marshy grassland
- Stream
- Water
- Grassland of local nature conservation interest

Vegetation and Quadrat Locations
Chainage of 10,500 - 12,300
Scale 1: 2,500
Report 4. Figure 7.

0 100 metres

Combe Haven SSSI

Limit of Survey Details for Report 1

Continued on Figure 6

Continued on Figure 8

Decoy Pond Wood

Woodland 24

Woodland 25

Woodland 26

Woodland 27

Park Wood

Monkham Wood

Upper Wilting Farm

Dalgety Produce

Plantation

Petrarch

Tank

Gorse and scrub

Improved pasture

Arable

Footpath 31

Footpath 22

London - Hastings Railway Line

C93 Crowhurst Road

Mayfield

Sanctuary

Combe Haven Drain

Decoy Pond Sluice

Decoy Pond Road

Track

Ditch

Drain

Stream

Sluice

Pond

Quadrat 1

Quadrat 2

Quadrat 3

Quadrat 4

Quadrat 5

Quadrat 6

Quadrat 7

Quadrat 8

Quadrat 9

Quadrat 10

Quadrat 11

Quadrat 12

Quadrat 13

Quadrat 14

Quadrat 15

Quadrat 16

Quadrat 17

Quadrat 18

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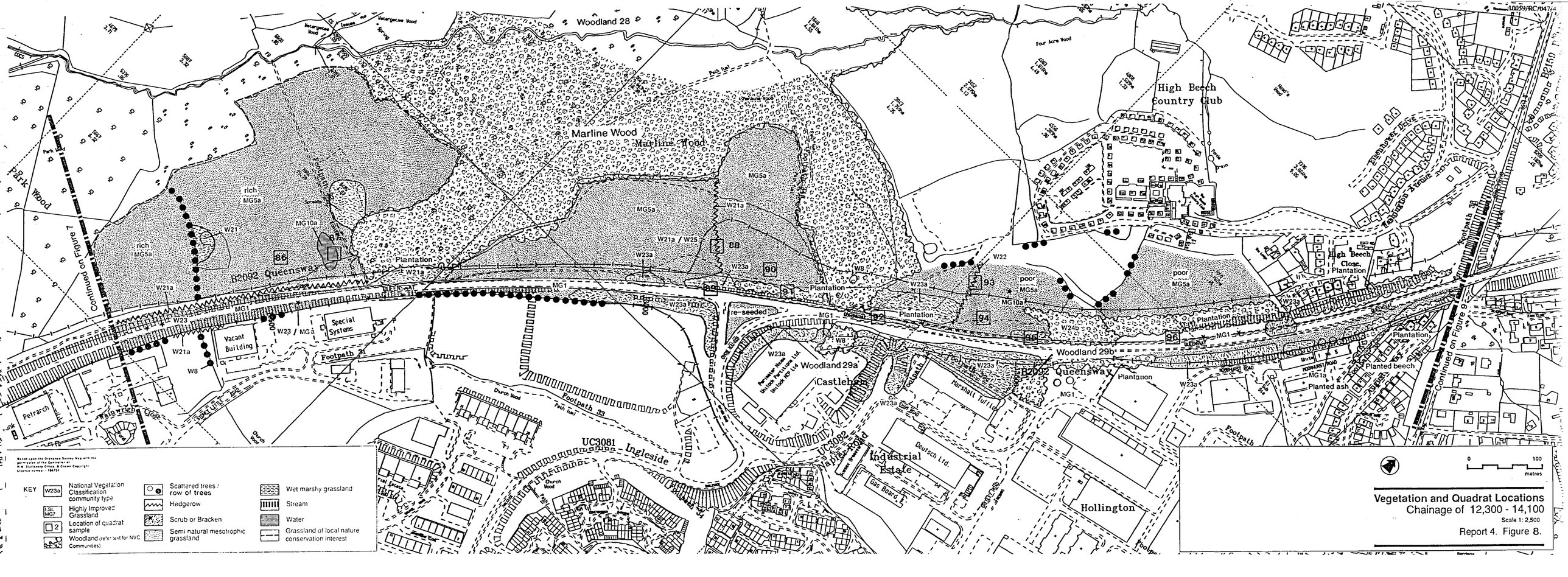

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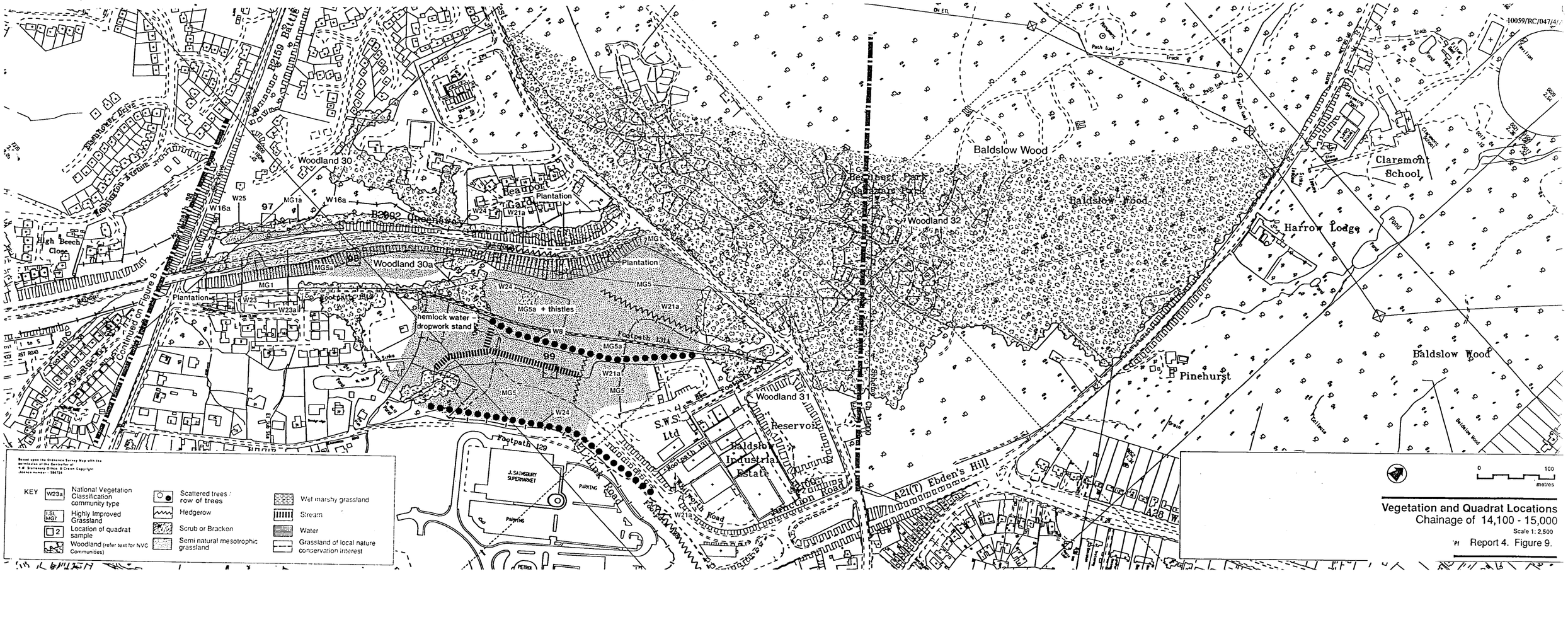
KEY

- W23a — National Vegetation Classification community type
- I.SI MG7 — Highly Improved Grassland
- 2 — Location of quadrat sample
- Woodland (reference for NVC Communities)
- Scattered trees / row of trees
- Hedgerow
- Scrub or Bracken
- Semi natural mesotrophic grassland
- Wet marshy grassland
- Stream
- Water
- Grassland of local nature conservation interest

Vegetation and Quadrat Locations
Chainage of 12,300 - 14,100
Scale 1: 2,500
Report 4. Figure 8.


10059/RC/047/4
Woodland 30
Woodland 30a
Woodland 31
Woodland 32
Baldslow Wood
Claremont School
Harrow Lodge
Pinehurst
Beaufort Park
Beaufort Plantation
Garden
Plantation
Reservoir
Baldslow Industrial Estate
S.W.S. Ltd
Junction Road
A21(T) Ebden's Hill
A2100
B2092 Queensway
B2159 Battle
Footpath 129
Footpath 131A
Footpath 130
Hooth Path
Hooth Path 131
Hooth Path 132
Footpath 133
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