3rd Draft

FIELD HANDBOOK

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SECTION 1 - INTRODUCTION

1.1 Land use studies may be classed in terms of: data collection and monitoring; land management interactions; land optimisation; and prediction. The first of these is essential in order to update land use databases and to ensure that the outputs from the other activities are both current and relevant.

1.2 ITE has carried out three major surveys of GB to sample data from the natural environment; all were based on the application of the ITE Land Classification System. The first was in 1977/8 with an emphasis on recording ecological data, especially vegetation and soils. The second was in 1984 and concentrated on the mapping of land cover and landscape features. The third, Countryside Survey 1990 (CS1990), recorded all the features of both previous surveys.

1.3 In all surveys, a sample unit of 1 x 1 km square has been used. In 1978, eight squares were drawn from each of the 32 ITE Land Classes giving a total of 256 sites; this was increased by 50% in 1984 so that 12 squares were visited in each class (384 sites in total and including those squares surveyed in 1978). In CS1990, a total of 506 squares was surveyed being a repeat of the earlier samples and the additional squares were allocated in proportion to land class size.

1.4 Data collected from these surveys have been used to characterise the land classes, leading to a better understanding of the classification and to its wider use as a stratification for ecological sampling. A comparison of the land cover and landscape data from the two surveys has allowed quantitative assessments of recent changes in the countryside.

1.5 Analysis of land cover and landscape data from 1978, 1984 and 1990 suggests that changes are continuing to take place in the countryside. It is important to provide current datasets for scientific evaluation of ecological systems in the countryside, and to monitor the changes that are taking place to identify current trends and processes. ITE is committed to monitoring changes in the rural environment and 1998 is seen as an appropriate date for re-survey.

1.6 CS1990 was reported in 1993 and provided much needed information to Government Departments and their agencies, Non Government Organisations and others involved in the formulation of countryside policy. For example, the Hedgerow Incentive Scheme (which pays farmers to manage hedgerows) was introduced following publication of the survey results. Subsequently, Departments have started to use Countryside Survey data to help fulfil obligations in relation to:

- UN Rio Declaration and Agenda 21 (UK Sustainable Development Strategy 1994; Indicators of Sustainable Development 1996)
- UN Convention on Biological Diversity (UK Biodiversity Action Plan 1994; Steering Group Report 1995; Species/Habitat Actions Plans)
- EU Habitats and Species Directive (SACs, SSSIs/ASSIs)
- EU Reform of Common Agriculture Policy (Agri-environment schemes, ESAs, Countryside Stewardship)
- UK Environment White Paper 1990
- UK Rural White Paper 1995

1.7 In particular, the Rural White paper (England) 1995 includes the following important statement:

"**The Government will carry out a repeat of Countryside Survey in the year 2000."**

1.8 ITE will conduct a further sample survey in 1998 (as part of CS2000) to collect land cover, landscape and vegetation data from sites visited in previous years. This project will adopt the approach used in previous ITE surveys, but will be enhanced by the inclusion of additional research activities, information capture at a greater level of detail, and increased research collaboration and liaison. The sample number will be increased by 60 additional sites to 568. In particular, the project will contribute to the capture of land use data using satellite imagery and a land cover map of Britain will be constructed. This will be especially valuable in linking the 'top-down' remote sensing approach with the 'bottom-up' field survey, through the ITE Land Classification System. This two-tier approach will provide additional ground-truth data, allow wider projection of the field survey results, and will enhance the detection of pattern in the landscape.

1.9 An important lesson that has been learned from previous ITE surveys is that variation in field recording is a major contributory factor when assessing the statistical accuracy of change data. It is therefore important that every attempt is made to standardise recording between observers and, during CS2000, quality control will be undertaken in several ways to maintain consistency of approach. A thorough knowledge of a clear and informative Field Handbook is a vital prerequisite.

1.10 The purpose of this Handbook is to define the set of guidelines to be used during survey. Inevitably circumstances will arise which are not fully covered here; it is important that field recording should be as consistent as possible. An accompanying set of definitions is provided but, again, not every interpretation of a data item can be covered. Where atypical or doubtful categories arise, surveyors are instructed to qualify or comment on their choice of recording.

The sampling framework

1.11 During the planning stages of Countryside Survey 2000 (CS2000), there has been consideration of sample numbers in connection with several of the component modules. This has involved re-assessment of the existing (CS1990) sample as well as the need for additional 1 km squares.

1.12 To help with an appropriate deployment of samples, and the efficient use of existing and proposed budgets, the plans and options for the deployment of sample numbers is reviewed in this paper.

Development of the existing ('core') sample

1.13 In CS1990, 508 1 km squares were sampled in England, Scotland, Wales and the Isle of Man. The sample of squares was drawn at random from a grid of squares in the 32 ITE Land Classes. These classes were created using underlying environmental attributes and crossed country (E, S & W) boundaries. Country estimates were derived from the mean characteristics of all squares in each class, irrespective of their country location.

1.14 In the development of CS2000 Module 1 (Survey of broad habitats and landscape features), funded jointly by DETR and ITE, two main issues have been addressed:

Issue 1 - there is a need to re-sample previously surveyed squares to maintain the time-series data set, and to obtain details (flows) of change between dates.

1.15 It is intended to re-survey all 508 squares that were visited in 1990, except two on the Isle of Man (see below)

Issue 2 - there is a need to report on 'country units' (a. Scotland and b. England with Wales) separately, using only squares which lie in the country for which estimates are to be made (c.f. 2.1)

1.16 Additional samples are to be deployed to assist with this requirement and the following changes have been made to the sampling framework:

- *class sub-division* - the ITE Land Classes have been sub-divided into Scottish and (English and Welsh) versions of the original classes,
- *class aggregation* - where this has resulted in there being very few squares of any particular class remaining in a country, then this 'rump' has been aggregated with a similar class in that country (the net effect of the class sub-divisions and aggregations is to create 37 strata, instead of the earlier 32),
- *additional squares* - to ensure that there is adequate representation of all new classes in each country unit, 19 additional squares have been allocated and this gives a minimum of 6 squares in each new class. To ensure relatively consistent sampling rates between England and Wales, a further 11 squares (5 in England and 6 in Wales) have been allocated,
- *replacement squares* - CS2000 does not cover the Isle of Man and so the two squares which were surveyed in 1990 have been replaced by squares in the same ITE Land Classes, elsewhere,
- *Land Class 17* - Wales is dominated by Land Class 17 and to help refine the results reported for Wales, a sub-division of Land Class 17 has been carried out in Wales. In the allocation of any new squares in Wales (either detailed above or in any further options), representation of the new sub-classes will be respected.

Survey of uplands in England and Wales

1.17 A proposal for surveying additional squares in the uplands of England and Wales funded by DETR, MAFF, and WO/CCW has already been approved.

1.18 The proposal included an additional 30 squares to be placed in ITE Land Classes which occur in the uplands and marginal uplands of England and Wales

Summary

1.19 The number of squares to be visited is shown in Table 4.

Table 5 Summary of the numbers of squares that will be surveyed as part of CS2000

New LC	No. squares in GB	Sample in 1990	Extra as part of Modules 1 & 4	No. squares in 2000	Sampling rate (1:x)
England and Wales (IOM excluded and replaced)					
2	14463	24	0	24	603
3	15452	30	0	30	515
4	9012	10	4	14	901
E9	11728	21	1	22	533
11	8895	22	0	22	404
E12	3542	10	0	10	354
E25	3205	6	2	8	401
1	14159	28	2	30	472
E5	3858	6	0	6	643
E6	10011	23	0	23	435
E7	2838	13	3	16	177
E8	4052	11	0	11	338
E10	13776	22	0	22	626
E13	5455	10	0	10	546
E15	3852	9	2	11	350
E16	4273	11	4	15	285
E17	12935	27	16	43	287
E18	3009	8	4	12	215
E19	5677	9	10	19	258
E22	3308	6	5	11	301
E23	1082	5	1	6	155
E & W	154582	311	54	365	418
Scotland					
S25	8594	19	0	19	452
S26	5683	14	0	14	406
S7	843	7	2	9	94
S13	2267	7	1	8	283
S27	5697	15	0	15	380
S18	3634	6	2	8	454
S19	3214	3	3	6	536
S28	6502	13	0	13	500
31	3016	11	0	11	274
S21	9708	19	0	19	511
S22	9250	19	0	19	487
S23	6066	12	0	12	506
S24	7010	15	0	15	467
29	5465	11	0	11	497
30	4254	14	0	14	304
32	3779	10	0	10	378
Scotland	84982	195	8	203	419
Total GB	239564	506	62	568	418

1.20 Further information on the background to the Countryside Surveys (CS1990 and CS2000) is available from ITE, Merlewood Research Station, Grange over Sands, Cumbria. LA11 6JU.

SECTION 2 – PLANNING SITE VISITS

2.1 The sample squares have been split up into six groups and will be surveyed by teams from the six ITE Research Stations. Thus, each team has about 95 squares to survey but this number varies from station to station.

2.2 Each square is reckoned to take four days to survey, on average, with the more inaccessible sites often being the easiest to record once reached. The day-to-day working arrangements are in the hands of the Station Co-ordinators and will be guided by the following principles:

a. The survey teams are expected to be reasonably flexible in their working arrangements and, similarly, Station Co-ordinators will be sympathetic to requests for leave of absence for special occasions, when possible.

b. Travelling time is expensive both in terms of overall project time and finance - every attempt should be made to avoid returning to a site more often than is necessary, even if this involves some evening work. There will be no overtime payments, in the first instance, but any large accumulations of overtime will be compensated by 'time off in lieu'.

c. The costings of the project are based on a reasonable proportion of the squares being surveyed on a daily travel basis (with no overnight subsistence). Surveyors are expected to use day travel whenever it is reasonable to do so.

d. There are at least three ways of planning survey arrangements e.g. (i) daily travel from Stations for local squares (ii) one week away for two or three squares (iii) two or three weeks away for a group of squares (with work being undertaken at weekends, by arrangement).

2.3 To minimise variation between surveys due to seasonal differences, previously visited squares will be surveyed in the same order as was done in 1990. New squares will be surveyed at the same time as their nearest neighbours (as resources allow).

SECTION 3 - EQUIPMENT

3.1 Equipment will be provided as follows:

Item	Central supply	Station	Surveyor
Safety & identification			
Bivvy bags	✔		
Dayglo waistcoats	✔		
First aid kit	✔		
Handouts (explaining project)	✔		
Identity card	✔		
Life jackets (restricted)	✔		
Mobile phones	✔		
Phone cards	✔		
Torches (in vehicles)	✔		
Whistle	✔		
Personal waterproof clothing	**(✔)**		✔
Navigation & location			
Aerial photographs of the site	✔		
Compass	✔		
GPS	✔		
Maps of the site (1:10,000)	✔		
Road atlas	✔		
Maps to locate sites (1:50,000)		✔	
Recording & measuring			
Survey poles	✔		
Field assessment booklets (FAB's)	✔		
Metal marker plates and Hammer	✔		
Soil sampling equipment	✔		
Weatherproof clipboards	✔		
Coloured pencils	✔		
Measuring tape (50 metre)	✔		
Camera and film (initial supply)	✔		
Plot marker boards	✔		
Wooden stakes	✔		
Poly bags	✔		
Metal detectors	✔		
Rucksack (if available)	✔		✔
Pencils and rubber	✔		
Reference books (if needed)		✔	✔
Hand lens		✔	✔
Binoculars (if available)			✔

3.2 Surveyors are expected to look after the equipment, not least because much of it has to be used for other work or returned to the customer. If accidental damage does occur, then the broken item must be shown to the Co-ordinator before a replacement is purchased.

SECTION 4 – GENERAL FIELD SURVEY PROCEDURES

4.1 There are essentially two types of 1 km square to be surveyed in CS2000:

1. 'old' squares (that have been visited as part of earlier surveys), and
2. 'new' squares (that have not been visited before).

4.2 When mapping in new squares, the emphasis is on recording the stock of everything present within the square, whereas in old squares the emphasis is on recording any changes since 1990. When recording plots, species are recorded 'blind' (ie with no reference to earlier data) in both types of square.

4.3 How a square is surveyed will depend on a number of factors including the type of land, and the degree of access. However the recommended procedure includes the following points:

- In 'old' squares, surveyors should study the information that was recorded in 1990 before going into the field to obtain an impression of the square.
- On arrival at the square, surveyors should have a quick look round (where access permits), assess likely problems and generally acquaint themselves with the area.
- Having assessed the nature of the square, the surveyors should attempt to confirm permission for access to the whole square, before commencing any part of the survey (see below).
- A suitable route should be chosen which will allow a full and detailed examination of the whole square.

4.4 Having completed recording, surveyors should allow time to read through the records they have made, checking for omissions and ensuring full coverage and clear presentation.

SECTION 5 – PERMISSION FOR ACCESS

5.1 ITE requires that all survey should be carried out with the knowledge and consent of the landowner, farmer, or the agent of one or both (collectively referred to as the landowner hereafter). There are several reasons why permissions to survey should be sought. The most obvious is to gain legal access to all parts of the square. It is also important to ensure the goodwill of the landowner, not only to avoid an embarrassing confrontation, but to gain useful background information (see Farmer/landowner Information Sheet) and to assist data recording.

5.2 By way of an introduction, letters have been sent to all known landowners saying that the survey is taking place and asking them to expect a visit from ITE surveyors. (Separate letters have also been sent to 'the occupier' of farms which are likely to own land in the new sample sites.) Letters have also been sent to the Headquarters of all organisations which are likely to have interests in land or landowners interests (eg NFU, CLA, NT, FC, etc).

5.3 Letters notwithstanding, landowners will also expect the teams to call on the day to establish that they are in the area and confirm that the arrangements for survey are satisfactory. About 90% of the sites have been visited before and so the landowners should be aware of ITE's work (except, obviously, where there have been changes in ownership/tenancy).

5.4 It is very important that all necessary permissions are confirmed before commencing survey since if a permission is refused when half the square has already been surveyed, then that work will be wasted. (On a comforting note, only one significant refusal was experienced in the 1977/78 survey, three in 1984 and another three in 1990).

5.5 Experience has shown that some form of permission can nearly always be gained on the day of survey, but Co-ordinators may prefer to make some sort of prior contact (however this latter approach may lead to delays, letters, phone calls etc.). Copies of a handout, containing a brief explanation of this survey, will be available to all survey teams for distribution as appropriate. Surveyors should always carry their ITE identity card.

5.6 A list of known names and addresses from previous surveys, updated using a commercial address package, is available and surveyors should further update and supplement this list on the ownership data sheet. Details of problems, or special requirements, concerning access to land are held by the Co-ordinators.

5.7 There are therefore two types of farmers/landowners: those whose land we have visited before; and those who are new to us in 1998. If permission to access land is refused, the following procedures should be adopted:

a) if access is denied to all parts of a square, then all attempts at field recording should be abandoned and reports made to the Station Co-ordinator as soon as possible (a replacement square will be drawn at random).

b) if access is denied to any part of the square, then:

i. if an 'old' square, then the rest of the square should be surveyed,

ii. if a 'new' square, then survey should be abandoned as in a) above, unless the area concerned is easily surveyed from neighbouring land.

c) if permission is refused for a vegetation plot then a note should be made and the plot repositioned using guidelines shown in Section 6.2

d) every attempt should be made to contact farmers rather than their staff; where appropriate, advice should be taken on who else might be informed of the survey as a matter of courtesy, eg anglers, shooting syndicates, grazing clerks.

SECTION 6 – GENERAL DATA RECORDING

6.1 The Countryside Survey 1990 has three basic elements:
- mapping – see Sections 7 and 8
- recording plant species in plots – see Section 9
- sampling – see Section 10.

Background to mapping

6.2 The most geographically comprehensive element of the survey is basically a mapping exercise. Surveyors are asked to annotate a series of enlarged 6" (1:10,000) maps with a variety of information. Wherever possible, this information should be formatted according to the list of options available, but rarely it may be necessary to add other categories to the list.

6.3 The objectives of CS2000 will require three basic refinements to earlier methodology:

(i) mapping change only
(ii) reporting land cover change by 'broad habitats', as well as by Countryside Survey reporting categories.
(iii) focusing on plot-level information to detail change in those habitats which are characteristic of more upland, unenclosed landscapes

Mapping change only

6.4 For the first time in the series of Countryside Surveys, surveyors are to be provided with data from earlier surveys and instructed to map only change in land cover and landscape features. In previous surveys, independent estimates of what was present were compared to generate change statistics but there has been some difficulty in distinguishing genuine changes and differences between observers.

6.5 This means that there are two types of mapping to be done:
(i) mapping *de novo* in new squares (as was done in CS1990), and
(ii) mapping change only in old squares.

6.6 Descriptions of the methods to be used for both types of mapping are given below (see Sections 7 and 8)

Reporting by 'widespread habitats'

6.7 To meet some of the monitoring and reporting requirements of the UK Biodiversity Action Plans, the results from CS2000 must be presented according to an agreed framework based on 'Broad Habitats'. Some of these are too rare or scattered to be detected by a sample survey of this type but reasonably robust (<25% CV) statistical estimates can be made for most. These are the widespread habitats.

6.8 Work done with CS1990 results suggest that the reporting framework used to date can be translated to give widespread 'Broad Habitats'. The only exception is the 'montane' category. Accordingly, there needs to be very little change to the recording codes used in previous surveys.

Using more plots in Broad Habitats characteristic of upland, unenclosed landscapes

6.9 After examination of the CS1990 and subsequent follow-up pilot studies, ITE has reached the conclusion that there are spatial limitations in the mapping of those habitats which are characteristically found in more upland, unenclosed landscapes – they tend not to have regular, easily mapped boundaries, often form gradients between two or more relatively homogeneous land cover types and often consist of mosaics. ITE believes that while the mapping done to date gives reasonable estimates of extent of these habitats, the spatial inaccuracies in their recording mean that change cannot reliably be detected by overlaying independently recorded maps.

6.10 Instead, CS2000 will use the existing plot information to say something about changes in these habitats, and will lay down a baseline of additional plots to allow more comprehensive monitoring of change in future surveys. To this end, up to ten extra plots will be placed in the broad habitats.

SECTION 7 – MAPPING IN NEW SQUARES (CS1990 METHODOLOGY)

7.1 Surveyors are provided with a list of standard codes which should be used in combination to describe each feature (area, line or point) in the square.

7.2 In order to give as much information as possible about each area of land or landscape feature, combinations of data codes should be used to annotate each category on the map. To enable this form of coding, boxes are provided on each data recording form, which enable a series of numeric codes to be combined and represented by a single alpha character. For instance a particular length of boundary might be coded with a letter "A". In the boxes at the foot of the recording form "A" might be recorded as being a combination of codes **321**, 342, 346, 351, 353, 357, 361, 374, 385 where:

321 = Hawthorn hedge; 342 = 1-2 m high; 346 = Trimmed both sides, 351 = stockproof; 353 = gaps filled along <10% length; 357 = hedge trimmed; 361 = laying, 374 = Box-shaped, 385 = Type C2 (Middle-aged trimmed), 34

7.3 In order to give as much information as possible about each area of land or landscape feature, an alpha code is used on the map to represent a series of numeric codes. This is designed to save space in marking up the map but allow a comprehensive description to be given.

7.4 Capital letters should always be used for alpha codes. "X" and "O" should not be used these are easily confused with other symbols. Use "I" not "l". Once all the letters of the alphabet have been used through to "Z", then use double codes: AA, AB, AC - AZ, BA, BB, BC - BZ etc.

7.5 There are two types of code: primary and secondary. All features must be annotated with at least one primary code (which are shown in **bold** on code lists). In general, the use of more than one primary code should be avoided. However, where more than one primary code has to be used (eg land cover mosaics or multiple land use) then the code reflecting the dominant use must come first.

7.6 In some cases, there may be no code which adequately describes a feature. In these cases, surveyors should use a new code number which lies between 601 and 699 and write the new code and a description of the feature on the 'Surveyor-created codes recording sheet'. This 'unique' code will only apply to a feature in one particular square so that the number 602 might be used to describe a wind turbine, for example, in one square and might be used to describe a type of quarry in another square. **In general, the use of unique codes is discouraged and surveyors are asked to use standard codes wherever possible.**

7.7 It is very important that the codes are used in an order which links the information logically eg a cover code always follows a species code etc.

7.8 Boundaries on the maps should be clearly marked, whether actual boundaries such as fences, or interpreted ones, between two moorland vegetation types for instance. Boundaries shown on the OS map which no longer exist on the ground should be marked with the universal code 999 (no longer present). When annotating different boundary types then each length should be clearly defined at each end with a short line drawn perpendicular to the line of the boundary (except where a boundary junction serves to demarcate the end of a unit).

7.9 The minimum mappable area is 1/25th ha (400m2), provided that the feature measures at least 5m in all directions (otherwise it is a length and marked with a line). No vegetation (except Bracken) should be mapped as a separate unit unless it comprises this area.

7.10 The minimum mappable length is 20 m (1/50th km). These units are shown on the data sheets.

7.11 Some features which are not on the agricultural/natural vegetation page of the FAB (and bracken) may be marked using a cross (X). Such features might include isolated trees, a well, or a caravan.

7.12 The surveyor in the field is the best person to make decisions about data recording. It is not useful if a decision is deferred in the field and a decision is forced on the data-processor "in the lab". Decisions must be made on the spot and, in exceptional circumstances, may be accompanied by a qualifying note or comment.

7.13 Finally, it is important that the whole square is surveyed and that even the smallest field corner, at the edge of a square, is coded.

Aerial photographs

7.14 For nearly all sites, aerial photographs (APs) are available for use in the field by surveyors. In 1990, a restricted aerial photograph interpretation (API) exercise was undertaken by staff at ITE's Environmental Information Centre (at Monks Wood). There was no attempt to interpret the land cover types or to categorise any feature. The work was carried out with the following objectives in mind:

a) to assist in the identification of features which are not generally included on OS maps (such as isolated trees)

b) to indicate 'boundaries' between different semi-natural vegetation types

c) to update OS maps, eg for new buildings, roads etc

7.15 The API was found to be helpful in only some circumstances and has not been repeated in CS2000. However, the conventions and symbolic representations that were adopted during this work need to be learned by surveyors in advance of survey because the 1990 field sheets will show them:

a) on copies of maps to be used for annotation by surveyors, all contour lines, place names and other non-essential information were removed from the 1:10,000 maps.

b) any boundary that has been identified through API is marked onto the map using dashed lines - these are for guidance only and are subordinate to the surveyors judgement on the ground.

c) any isolated/individual feature is marked as a cross (these are usually trees)

d) any boundary that was apparently identified as 'no longer present' is marked with a diamond on the line and arrows mark the extent of the feature.

7.16 It is important that this information is used wherever possible, but if it clearly conflicts with evidence on the ground, then it should be ignored and marked accordingly. At the end of the day, the API is for guidance only.

Filling in the FAB

7.17 For each square, the data recording forms, together with their enlarged 1:10,000 maps, have been combined into a booklet which, for historical reasons, is known as a Field Assessment Booklet (FAB). The order of the pages in the booklet is not significant.

7.18 It is extremely important that the FABs are completed as **neatly** as possible. If information is not clearly interpretable by those undertaking analysis of data in due course, then effort has been wasted.

7.19 There are several general points about filling in the FAB's.

1. The square series number should be recorded on every page.

2. Where possible, a pencil should be used - mistakes can then be erased and waterproofing is enhanced.

3. In recording semi-natural vegetation and certain other complex situations, the surveyor is asked to map recognisably different, yet mappable units. As a rule, an area should be mapped separately from another if **any** descriptive code applies in one case but not in the other. The units are therefore decided by the definitions of the codes which characterise them.

4. This may mean that a mosaic is recorded in a comparatively large unit, the proportions of the components being reflected in the primary 'cover codes'. In these situations, the surveyor should use the primary code which most closely fits the majority of the ground cover.

5. Where it is impossible to choose a single primary code, then the dominant one should be recorded first in a list of codes. For example an area of *Molinia*/Heather moorland might be recorded as **103**/175/163/176/**106**/175/161/180/189 where:

   103 = Moorland - grass 175 = 25-50% (ie 25-50% of the mapped area is moorland grass) 163 = *Molinia caerulea*; 176 = 50-75% (ie 50-75% of the moorland grass is *Molinia*)

   104 = Moorland - shrub heath 175 = 25-50% (ie 25-50% of the mapped area is moorland shrub heath) 161 = *Calluna vulgaris*; 175 = 25-50% (ie 25-50% of the shrub heath is *Calluna*) 180 = <30cm (ie the *Calluna* was <30cm high on average)

   189 = Sheep (ie the whole area was grazed by sheep)

6. Point information (such as the presence of a hedgerow tree) should be marked with an X, distinguishing them from lines (such as a row of trees) and areas, delimited by a boundary.

7. If an area becomes too complex to record using code numbers (especially in built-up areas) then use coloured pens, showing which codes are represented by each colour in the boxes. (See further notes on colour convention under the Buildings, etc. sheet). Remember that colours cannot easily be deleted after error.

8. If recent change is obvious then please make use of codes where possible to show this, or else make a note on the sheet concerned.

9. Dotted lines after a category are intended to invite further information e.g. what type of quarry/mine or what sort of race track, etc.

10. To avoid cluttering the map, arrows showing a link between a code and the feature should be avoided as far as possible. Instead, the code should be written, neatly and unambiguously, immediately adjacent to the feature.

11. Note the guidelines for recording information in woodlands (7.38) and immediately adjacent to non-agricultural curtilages (7.39).

7.20 There follows a page-by-page guide on how to complete the data sheets, including some definitions or notes on those data categories which are not self-explanatory.

i. Front cover of the FAB

7.21 All sections of the cover must be completed.

- Series number - this must be filled in on every page on the FAB.
- Grid reference –
- Location - this should refer to the nearest village/town/geographical feature and the County or Region (in Scotland).
- 1:50,000 Sheet Number –
- Date surveyed (start) –
- Date surveyed (finish) –
- Number of days to survey –
- Surveyors – the family name of all surveyors involved.

ii. Ownership

7.22 As explained previously, permission must be obtained to access all parts of the square. During this exercise, the ownership of all parts of the square should be established in detail and marked on the map. All the land units (e.g. fields) belonging to owner number 1 should be marked with a "1", those belonging to number 2 with a "2" etc.

7.23 The **exact** address and telephone number of each owner or tenant should be recorded and in recording ownership information, please use a "T" against the name of tenant farmers, and a "C" against the name of owners of farms which have changed ownership since 1990.

7.24 The code numbers to the right of "address" are to be circled according to how interested/co-operative/helpful the owner appears to be, as follows

0 = Not available or unable to judge

1 = Less than interested/co-operative/helpful

2 = Generally interested/co-operative/helpful

3 = Very interested/co-operative/helpful.

This will provide useful introductions on further possible surveys but will not be used in any way as part of an analysis etc.

7.25 If the owner asks for information on his land to be sent, this should be noted on the ownership page of the FAB.

iii. Farmer/Landowner Information

7.26 This is not intended as an official questionnaire and details recorded here will only be used as background information, hence a uniform cover of all farmers is not required. However, many farmers do like to chat about their land and in this event the surveyor is requested to steer the conversation towards the questions posed on this sheet.

7.27 The clipboard should not be much in evidence - many farmers feel inhibited by surveyors scribbling down every word they say, but notes should be made or a summary of the conversation made on leaving the premises.

7.28 In each square, surveyors should attempt to engage at least one farmer in such conversation, preferably the one who holds most land within the square. The code from the ownership sheet should be noted and if a second 'Interview' takes place, a line drawn across the page to separate the information.

iv. Physiography/Inland Water/Coastal

[N.B. after each primary code name, the permitted recording unit ie Area, Line or Point is indicate by the letters, A, L and P]

7.29 These features are a mix of 'natural' features of the land surface and some human artefacts.

Inland physiographic features

1 **Cliff >30m high (A, L)**: a vertical or near-vertical face of rock
2 **Cliff 5-30m high (A, L)**:
3 **Rock outcrop & cliff <5m (A, L, P)**: areas of bare rock should be included here together with a % cover category (12-14)
4 **Scree (A)**: more or less unstable loose or shattered rock on slopes
5 **Surface boulders (A, P)**: boulders are defined as >50 cms in any direction and should be mapped as an area with a % cover code (12-14)
6 **Limestone pavement (A)**:
7 **Peat hags (A)**: includes any bare or eroding peat which is not vegetated and should be qualified by a % cover code (15-17)
8 **Current peat workings (A)**: where peat has obviously been extracted in the current or previous season - should be qualified by a % cover code (15-17)
9 **Old peat workings (A)**: and may be qualified by a % cover code (15-17)
10 **Soil erosion (A, L, P)**: includes both human and natural erosion in any situation
11 **Ground levelling (A)**: includes any formerly raised area that has been reduced to the level of the surrounding terrain (eg for development)

Codes 12 to 17 should be used in conjunction with primary codes above and should relate to the percent of the area as seen from above (this excludes many cliffs, for example).

12 **95 - 100% rock**:
13 **>50% rock**:
14 **10-50% rock**:
15 **95 - 100% peat**:
16 **>50% peat**:
17 **10-50% peat**:

Coastal features

Coastal features should only be mapped above Mean High Water Mark.

31 **Cliff > 30m high (A, L)**:
32 **Cliff 5-30m high (A, L)**:
33 **Rock outcrop & cliff <5m (A, L, P)**: to be used when the rock is outcropping base-rock, as opposed to ...
34 **Rocky/Boulder shore (A, L)**: used when the shore is of shattered rocks or boulders >10cm diam (ie grapefruit-size)
35 **Pebble/Gravel shore (A, L)**:
36 **Sandy shore (or un-vegetated dune) (A)**:
37 **Bare mud (A)**:

38 **Sea (A)**: this may seem obvious but is helpful in estuarine and coastal marsh situations - always record.

Inland water features

7.30 These features should be recorded and mapped whether they are dry at the time of survey or not.

50 **Pond (A, P)**: **–**a body of standing water 25m^2 - 2 ha in area which usually holds water for at least 4 months of the year (this definition was used in the Lowland Pond Survey 1996 and may be difficult to apply in a one-off visit – particular attention should be paid to the type of vegetation associated with the feature)
51 **Lake - natural (A, P)**: any inland water body bigger than a pond, should be mapped using this code.
52 **Lake - artificial (A, P)**: usually distinguished by the presence of a dam or embankment.
53 **River (A, L)**: defined as being more than 2.5m wide; a stream is less than 2.5m. (2.5 m would be a very brave leap).
54 **Canalised river (A, L)**: rivers which have been modified (eg sections straightened, banks smoothed), but which still follow the same basic direction as the natural watercourse.
55 **Canal (A, L)**: constructed where no watercourse existed previously.
56 **Stream (L)**: defined as being less than 2.5m wide (see River)
57 **Roadside ditch (L)**: linear excavations with the purpose of drainage; should be recorded even if dry at the time of survey.
58 **Other ditch (A, L)**: (see Roadside ditch)
59 **Spring (P)** usually marked on the map but implies evidence of a continual supply of water at ground surface.
60 **Well (A, L, P)**
61 **Signs of drainage (A)**: includes evidence of tile-drains or mole-drains ie lines of disturbance across a field.

63 **Gorge (P)**:
64 **Levee (A, L)**: artificial raised banks at the sides of rivers, characteristic of canalised rivers.

Banks - two codes should be used for each length of watercourse, one for each side. Record the Right-hand bank first, as seen looking downstream.

65 **Bank <1m**: to describe the bank intimately associated with, or effected by, a watercourse ie river, stream, ditch, canal etc.; the bank would run from the 'normal' water's edge to a boundary, or change in land cover type. The height is a vertical height, not the distance across the ground.
66 **Bank <5m**: (vertical height)
67 **Bank >5m**: (vertical height)

v. Agriculture/Natural vegetation etc

7.31 This sheet includes most of the ground cover types in GB except urban and woodland. The first section, cover types, includes categories which may be qualified by the other codes, such as species, use or measurements.

7.32 It is important to note that these cover types should **not** be used in a **built-up** area. Once a **curtilage** has been recognised, as defined in Section viii, then all land within the curtilage is to be recorded according to the Section viii categories. Hence an orchard in a residential garden is not to be recorded on this sheet.

Cover types

7.33 Cover types - many of these categories need defining in the context of this survey and the definitions given may not be those with which the surveyors are familiar.

7.34 Types of grassland are notoriously difficult to distinguish, especially since their current species composition and general appearance is decided by management practices, rather than origin, history or use. Hence the primary codes are limited but there are several general descriptive codes, as well as species codes, by which such areas can be described.

7.35 **Bracken** is to be treated differently to other categories. Even where bracken occurs in smaller areas than a minimum mappable unit, details should be recorded using a cross (X) to mark its location.

7.36 Some of the semi-natural land cover types, characteristic of open, unenclosed landscapes, are difficult to record consistently. The following key helps in this process:

KEY TO VEGETATION & LAND COVER CODES

This key is not absolutely definitive - it has been drawn up with the key to *Euphrasia* species in CTW as a template ie. in some cases there is no simple way to determine with 100% certainty which dichotomy should be followed. The full descriptions given in the field handbook should always be consulted in any borderline cases.

Only those BAP codes recorded in generally unenclosed situations are included in this key:

1a	Vegetation consisting of over 75% herbaceous species	2
1b	Vegetation with over 25% cover of dwarf shrubs, less than 1m	8
1c	Non-coastal vegetation cover less than 50% with residual cover being rock.	19

1d	Vegetation with over 25% cover of woody species	Refer to woodland key on page xx
2a	Vegetation consisting entirely of Bracken. There is no primary code for Bracken – a relevant primary code (e.g. acid grassland) should be used in conjunction with a bracken secondary code.	Relevant primary code with *Pter. aqu.* (156) and 95-100% (178) (BAP 9)
2b	Vegetation with Bracken cover between 25 and 95% cover	Relevant primary code with *Pter. aqu.* (156) and (175, 176 or 177)
2b	Vegetation with Bracken present but less than 25% cover	Relevant primary code with Scattered Bracken (157)
2d	Vegetation not as above	3
3a	Vegetation containing halophytic species	4
3b	Vegetation not as above	5
4a	Vegetation consisting virtually entirely of halophytes, usually on mud often much bare ground.	116 Saltmarsh (BAP 19)
4b	Vegetation with some halophytes present usually on sea cliffs	106 Maritime (BAP 18)
4c	Vegetation growing on sand dunes including yellow dunes, grey dunes and slacks[1].	172 Sand dune (BAP 19)
4d	Generally linear vegetation, just above the high-tide mark, consisting of a few specialised species such as *Cakile maritima, Agropyron junciforme* and *Elymus arenarius*	173 Strandline (BAP 19)
5a	Tall vegetation with no evidence of recent management and usually more than 25cm in height.	6
5b	Vegetation cut, grazed or with evidence of management usually less than 25cm in height.	10
6a	Terrestrial vegetation growing on lowland peat soils often with or without scattered Alder or Willow. Species include *Carex paniculata, C. acutiformis, Iris pseudacorus, Phragmites australis, Eupatorium cannabinum, Lythrum salicaria, Scutelaria galericulata*.	113 Fen (BAP 11)
6b	Aquatic vegetation where macrophytes persist as emergents	Aquatic macrophytes

[1] Machair should be coded according to the floristic composition of consituent parcels - this allows variation from place to place within a Machair landscape to be reflected in the land cover map and acknowledges that Machair has cultural and geographical, as well as floristic, connotations.

	within standing water . Species include *Typha* spp., *Ranunculus fluitans, Phragmites australis.*	108
6c	Vegetation fringing open water often developed as a narrow part of a hydrosere between standing water and upslope vegetation. Species include *Valeriana officinalis, Epilobium hirsutum, Filipendula ulmaria, Oenanthe crocata*.	Aquatic marginal vegetation 109
6d	Not as above	7
7a	Mature vegetation consisting entirely of long-lived perennials with little or no open ground	8
7b	Seral vegetation containing arable weeds with some long-lived perennial species usually with some open ground present	9
8a	Vegetation with over 50% grass cover usually *Arrhenatherum, Dactylis* and *Elymus repens*.	Unmanaged Grass 133
8b	Vegetation with less than 50% grass cover with species such as *Epilobium hirsutum, Urtica dioica* and *Filipendula ulmaria*.	Tall herb 134 (BAP 11)
9a	Vegetation consisting mainly of annual weeds. Open ground usually conspicuously present. Actual species composition dependent upon starting point.	Neglected 141
9b	Vegetation containing some annual weeds but consisting mainly of long lived perennials including some grasses. Some shrubby species maybe present as infrequent juveniles.	Abandoned 142
10a	Vegetation well dominated by palatable grasses with a rich or poor suite of accompanying herbs on fertile, neutral soils. Calcareous grassland species absent. Indicators include *Trifolium repens, Stellaria media, Cerastium fontanum, Rumex acetosa, Ranunculus repens.*	11
10b	Calcareous indicators present	12
10c	Calcifugous indicators present	13
11a	Palatable grasses predominate mainly *Lolium, Phleum, Dactylis, Cynosurus* and the larger *Festuca* spp. *Agrostis capillaris* and *Anthoxanthum odoratum* maybe present at the less fertile end of the gradient. Varies from pure grass to moderately species rich grassland but herb-rich grassland indicators are always infrequent or absent.	Fertile grassland (101)

11b	Cover of grass species usually less than 50% with a high proportion of high quality grassland indicators such as *Lathyrus pratensis, Alchemilla glabra, Trifolium pratense, Geranium sylvaticum, Leucanthemum vulgare, Galium verum, Primula veris, Conopodium majus* and *Centaurea nigra.*	Herb-rich grassland (169)
12a	Vegetation with scattered sedges, many calcicoles present in often species rich turf on calcareous soils usually rendzinas on chalk or limestone. Examples include *Lotus corniculatus, Linum catharticum, Sanguisorba minor, Carlina vulgaris, Sesleria albicans, Cirsium acaule.*	Calcareous grassland 105
12b	Localised, narrow areas of vegetation, usually with several sedge species and species of wet soils. Includes *Briza media, Parnassia palustris, Carex hostiana, Carex dioica.*	Flush 115 (BAP 11)
13a	Vegetation with many wetland species on nutrient rich, mainly inorganic soils. Some species maybe over 25cm in height however the sward will be dominated by a shorter turf of grazing tolerant species[2].	Marsh 114 (BAP 11)
13b	Not as above	14
14a	Localised narrow wet areas of vegetation or obvious flushing. Vegetation usually dominated by acidophilous species e.g.. *Sphagnum, Juncus effusus/articulatus/acutiflorus, Carex echinata, Ranunculus flammula, Stellaria alsine.*	Flush 115 (BAP 11)
14b	Vegetation with many acid indicators but not in linear features	Go to 15
15a	Cover of peat land species over 25% eg. *Tricophorum, Molinia, Sphagnum* and *Myrica* usually on deep-peats or wet peaty rankers	Go to 16
15b	Peat land species under 25% on variable soil types	Go to 17
16a	Vegetation dominated by *Eriophorum vaginatum* often including *Rubus chamaemorus*	Blanket bog (111) (BAP 12)
16b	Vegetation dominated by other peatland species eg. *Tricophorum, Molinia, Sphagnum* and *Myrica*	Bog (112) BAP 12
17a	Fine grasses predominate in generally in dry situations eg. *Agrostis, Festuca, Anthoxanthum* usually brown podzolic soils. Acid indicators present eg. *Galium saxatile, Potentilla erecta, Pleurozium schreberi* and *Rumex acetosella*	Acid grassland (102) BAP 8

[2] *Molinia caerulea* maybe present sometimes at high cover but speces poor, acidophilous vegetation well dominated by *Molinia* should be included under 103 Moorland grass.

17b	Coarse grasses predominate generally in wet situations eg. *Nardus, Molinia, Deschampsia flexuosa* usually on peaty-gley soils	Moorland grass (**103**) BAP 8
18a	Peat land species predominate eg. *Tricophorum, Molinia, Sphagnum* and *Myrica* usually on deep-peat soils or wet peaty rankers	Bog (**112**) BAP 12
18b	Wetland indicators present eg. *Pedicularis/Narthecium* Peat land species not dominant eg. *Calluna, Vaccinium, Empetrum* and *Erica* predominate.	Go to 18
19a	Sub-arctic indicators present eg. *J. trifidus, C. bigelowii, Racomitrium* usually on rankers or distinctive arctic-type soils	Sub-arctic (Montane) (**174**) (BAP 15)
19b	Sub-arctic indicators not present dominated by dwarf shrubs usually on podzolic soils but also on brown podzolics, shallow peats, rankers and gleys	Dwarf shrub heath (**104**) (BAP 10)
19c	Saxicolous (on rock) and chasmophytic (in crevices), non-coastal vegetation cover less than 50% with residual cover being rock. Includes species such as *Cryptogamma crispa, Cystopteris fragilis* and *Asplenium trichomanes.*	Rock vegetation (**135**) (BAP 26)

Codes

101 **Fertile agricultural grass (A)**: includes any grass crop or pasture in a generally lowland, or enclosed, situation. Palatable grasses predominate mainly *Lolium, Phleum, Dactylis, Holcus lanatus, Agrostis stolonifera,* and *Cynosurus. Agrostis capillaris* and *Anthoxanthum odoratum* maybe present at the less fertile end of the gradient. Varies from pure grass to moderately species rich grassland but herb-rich grassland indicators are always infrequent or absent. Other species such as *Trifolium repens, Taraxicum officianale, Ranunculus repens* and *Stellaria media* may also be present. Uncommon planted species may also occur eg. *Festuca arundinacea*. *Lolium multiflorum* may be present which has colonised from plants which have been introduced during re-seeding. Also note that there are many cultivars of *Lolium perenne* which have large leaves comparable to *Lolium multiflorum*. Some broadleaved species indicative of lower fertility such as *Plantago lanceolata, Ranunculus acris* and *Rumex acetosa* may also be present but quality indicators included under 171 (below) are absent.

171 **Herb-rich grassland (A):** Cover of grass species usually less than 50% with species such as *Festuca pratensis*, *Trisetum flavescens* and *Alopecurus pratensis*. There is a high proportion of quality grassland indicators such as *Lathyrus pratensis, Alchemilla glabra, Trifolium pratense, Geranium sylvaticum, Leucanthemum vulgare, Galium verum, Sanguisorba officinalis, Conopodium majus* and *Centaurea nigra.* This category is usually found on brown earth soils.

102 **Acid grassland (A)**: grassland usually in an upland situation but also on appropriate soils in the lowlands. There is a high proportion of palatable grasses and including, individually or in combination, *Festuca ovina, Agrostis*

tenuis, and *Anthoxanthum odoratum*. Usually on unenclosed land but some enclosed land on the margin between fertile grassland and open hillsides may have this vegetation. Other species which are present include *Galium saxatile, Potentilla erecta* and *Polygala serpyllifolia* and *Pleurozium schreberi*. Scattered *Pteridium aquilinum* may also be present but dense *Pteridium* should be included under code 156. This vegetation is usually on brown podzolic or mineral soils.

103 **Moorland - grass (A)**: Coarse grass, usually occurring in a moorland setting but is also present within lowland heath landscapes in southern Britain and in the Scottish lowlands. Usually dominated by *Nardus* or *Molinia* but often with significant amounts of *Deschampsia flexuosa* and *Juncus squarrosus. Sphagnum* species may be present but if so, associated with *Anthoxanthum odoratum* and/or *Juncus* species. Dwarf shrubs and peatland species may be frequent but are usually less than 25% cover and are never dominant. Usually on peaty gley soils but also on some peats.

104 **Dwarf shrub heath (A)**: cover of dwarf shrub/ericaceous species over 25% and usually much higher. *Calluna, Vaccinium myrtilus, Erica cinerea, Arctostaphylos uva-ursi* and *Empetrum nigrum* are species which have significant cover, individually or in combination. Peat land species of bogs, codes 111 and 112, are usually scarce or absent. *Deschampsia flexuosa, Festuca ovina* and *Nardus stricta* may be present but rarely form significant cover. Herb-rich variants of this category include species such as *Thymus praecox, Viola riviniana* and *Hypericum pulchrum.* This vegetation is usually found on podzolic soils but may also be on peats, peaty gleys or rankers.

174 **Sub-arctic (montane) (A)**: Mainly confined to exposed mountain summits in Scotland. The vegetation has at least 25% cover of *Calluna* and/or *Racomitrium lanuginosum*, together with much bare rock, often sorted into polygons or with exposed mineral/peat soil. Often the vegetation is in stripes with evidence of wind pruning and will usually contain one ore more of the following species: *Salix herbacea, Juncus trifidus, Carex bigelowii, Loiseleuria procumbens, Cladonia* spp. and *Cetraria* spp. Small patches of snow bed vegetation are likely to be less than an MMU. Usually on sub-arctic or skeletal soils.

135 **Rock vegetation (A)**: Saxicolous (on rock) and chasmophytic (in crevices), non-coastal vegetation cover less than 50% with residual cover being rock. Includes species such as *Cryptogamma crispa, Cystopteris fragilis* and *Asplenium trichomanes.* Not including vegetation with sub-arctic species (see 174, above). This code may need to be used in a mosaic (ie with another primary code).

105 **Calcareous grassland (A)**: found on calcareous soils with a high proportion of calcicole species usually on limestone or chalk but occasionally on shell sand or other calcareous substrate. Characteristic grasses forming significant cover, individually or in combination, include *Festuca ovina, Briza media, Koeleria cristata, Avenula pratensis, Bromus erectus* and *Sesleria caerulia*. Typical calcicole species include *Circium acaule, Sanguisorba minor, Helianthemum nummularium* and *Carlina vulgaris*. Usually growing on rendzinas.

106 **Maritime vegetation (A)**: found on sea cliffs or other coastal situations and usually herb-rich due to salt spray. Some halophytes always present eg *Plantago maritima, Plantago coronopus, Armeria maritima* and *Tripleurospermum maritium.*

~~107~~ **~~Lowland heath~~**: code no longer used – refer to 104

108 **Aquatic macrophytes (A)**: aquatic vegetation where macrophytes persist as emergents within standing water . Species include *Typha* spp., *Ranunculus fluitans, Phragmites australis.*

109 **Aquatic marginal veg (A)**: vegetation fringing open water often developed as a narrow part of a hydrosere between standing water and upslope vegetation. Species include *Valeriana officinalis, Epilobium hirsutum, Filipendula ulmaria, Oenanthe crocata*.

~~110 Raised bog~~: code no longer used – see 112

111 **Blanket bog (A)**: Ombrogenous bog, common in the Pennines, Wales and northern and western Scotland. May occur on moderate slopes, as well as flatter ground. *Eriophorum vaginatum*, or *Sphagnum* (usually hummocks) occur individually at over 25% cover. Often with some *Calluna*, and with or without *Erica tetralix*. *Molinia* is frequent but rarely over 25% (see 103 - Moorland grass). Sphagnum rarely forms carpets as in 112.

112 **Other bog (A)**: This broad category includes all vegetation (other than blanket bog) that is dominated by peatland species and should be identified by the plants present and not by topographic position since across the whole of Britain there is no consistency in the position of bogs within the landscape. The category therefore includes wet heaths, raised bogs and valley bogs but note that the soligenous mires dominated purely by *Molinia* and *Juncus* species would be included under 103 as no other peatland species are present. *Calluna* may be up to 50% cover but usually less. *Molinia* and *Sphagnum* species are usually present, often over 25%. *Tricophorum* is also often present as a significant cover species. Other species which may be locally dominant include *Myrica gale, Eriophorum angustifolium, Nardus stricta* and *Eriophorum vaginatum*. The latter species will always have less than 25% cover, otherwise it would fall in category 111. Indicative species include *Narthecium ossifragum, Drosera* spp., and *Pedicularis ssp*.

113 **Fen (A)**: Lowland peat-forming sites, usually dominated by sedges or rushes often with alder or willow. Common species include *Carex rostrata, Filipendula ulmaria, Equisetum fluviatile, Carex paniculata* and *Iris pseudocorus*. On wet, peaty soils.

114 **Marsh (A)**: Nutrient-rich wetland on predominantly inorganic soil dominated by rushes or sedges. Commonly found indicative species are *Juncus artic./acutiflorus* and *J. effusus. Carex panicea, C. demissa, C. nigra, C. flacca* and *C. hostiana; Iris pseudacorus* frequently present, particularly in west. Found on wet, mineral soils. Does not include 101, fertile grassland, with *Juncus effusus* and no wetland indicators (= 101 + 158).

115 **Flush (A)**: Localised, usually narrow areas (which may coalesce where adjacent) with evidence of the influence of water which tend to have species which are different from surrounding vegetation. Calcareous flushes are dominated by species such as *Linum catharticum, Carex hostiana and C. dioica, Campyllium stellatum* and *Parnassia palustris*. Non-calcareous flushes are usually dominated by *Juncus effusus, J articulatus/acutiflorus* and *Carex echinata,* often with *Sphagnum*. Usually found on peaty gley soils.

116 **Saltmarsh (A)**: Should only be recorded where the area is vegetated, otherwise bare mud (Physiography section) is appropriate. In complex situations which cannot be mapped, the proportions of 'bare mud' and vegetated ground in a polygon should be indicated by as % cover code following the primary code on their respective pages. Typical species include *Salicornia, Puccinellia, Triglochin maritima* and *Aster tripolium*.

172 **Sand dune (vegetated) (A)**: Should only be recorded where the area is vegetated at 25% or greater, otherwise sandy shore (36). Typical species include *Ammophila arenaria, Viola tricolor,* and *Euphorbia portlandica*. Dune slacks should also be included with typical species such as *Salix repens.*

173 **Strandline vegetation (A)**: generally linear, just above the high-tide mark, consisting of a few specialised species such as *Cakile maritima, Agropyron junciforme* and *Elymus arenarius*

117-132 These categories are straightforward - young crops may be difficult to recognise (the notes following each code may help):

117 **Wheat (A)**: - wheat plants have broad, glaucous blades with auricles.
118 **Barley (A)**: - barley has dull green leaves and auricles.
119 **Oats (A)**: - oat plants have broad soft glaucous leaves with no auricles.
120 **Sugar beet (A)**:
121 **Turnips/Swedes/Roots (A)**:
122 **Kale (A)**:
123 **Potatoes (A)**:
124 **Field Beans (A)**:
125 **Peas (A)**:
126 **Maize (A)**:
127 **Rye (A)**:
128 **Oilseed rape (A)**:
129 **Other crop (A)** .... (please use English/Common name)
130 **Flowers (A)**:
131 **Commercial horticulture (A)**: to include strawberries, salad crops, cabbages and onions etc.
170 **Perennial crops (A)**: to include raspberries, currents and vineyards
132 **Orchard (A)**: commercial enterprises only – not to include, for example a few fruit trees in a back garden (see curtilage – 402, 434).
133 **Unmanaged grass (A)**: this is grassland that has no obvious use (agricultural, amenity etc) but which cannot be called an abandoned land use. (Wide roadside verges, only cut once/twice per year, may be coded as unmanaged grass - or tall herb vegetation, as appropriate).
134 **Tall herb vegetation (A)**: semi-natural vegetation, often in wet or disturbed positions; dominated by tall herbs but with grasses present.
135 **Rock vegetation (A)**: (see before 105)

136 **Ley**: a short-term grassland, re-seeded less than five years previously. Characterised by evidence of ploughing, bare soil between grass plants, scarcity of broadleaf species and is often dominated by a single grass species eg *Lolium*. This code should only be used if there is absolutely no doubt about these factors (eg from landowner information or recent sowing). Any field with more than 10% Lolium multiflorum (a short-lived ley species) would be included here.
~~*137* **Unimproved grass**~~: code no longer in use
~~*138* **Forbs >10%**~~: code no longer used.
~~*139* **Forbs >25%**~~: code no longer used.
~~*140* **Forbs >50%**~~: code no longer used.
141 **Neglected land (A)**: agricultural land for which there is no obvious intended change of use, but where the former use has been temporarily neglected (for up to 3 years). **Fallow** land (which has been unused as part of an agricultural rotation) should be recorded here and most Set aside land should be recorded here with 198 (if identified without doubt). Vegetation consisting mainly of annual weeds. Open ground usually conspicuously present. Actual species composition dependent upon previous management.
142 **Abandoned land (A)**: agricultural land which has been neglected for more than 3 years and in which long-lived perennials and shrubby species are

becoming established. Vegetation containing some annual weeds but consisting mainly of long lived perennials including some grasses. Some shrubby species maybe present as infrequent juveniles.

143 **Ploughed**: the crop harvested before ploughing should be identified (from fragments that remain) and this code used as an extra description after the crop primary code.

144 **Burnt (moorland)**: land which has been burned deliberately as a management practice e.g. for grouse (muirburn) within the last 12 months..

145 **Mown:** to be used for any grassland type that has been mown such that the 'normal' vegetative structure of grasses is not present and therefore hinders species identification.

Species (if >25% cover)

7.37 The following major agricultural grasses and semi-natural ground cover species (which are listed according to a gradient from rich to poor land) are recorded if they cover 25% or more of a mapped unit, irrespective of the number of canopies present (ie total cover can reach more than 100%). For any species which is not listed here and which reaches 25% cover, one of the blank code numbers should be used:

146 ***Lolium multiflorum***
147 ***Lolium perenne***
148 ***Trifolium repens***
149 ***Dactylis glomerata***
150 ***Anthoxanthum odoratum***
151 ***Phleum pratense***
152 ***Cynosurus cristatus***
153 ***Holcus lanatus***
154 ***Agrostis tenuis***
155 ***Festuca ovina***
156 ***Pteridium aquilinum –*** should follow a primary code (e.g. 102) and should also be used with a cover code
157 ***Pteridium aquilinum –*** **scattered –** to be used as a secondary code on its own to indicate presence of bracken at less than 25% cover
158 ***Juncus effusus***
159 ***Deschampsia flexuosa***
160 ***Nardus stricta***
161 ***Calluna vulgaris***
162 ***Vaccinium myrtillus***
163 ***Molinia caerulea***
164 ***Eriophorum angustifolium***
165 ***Eriophorum vaginatum***
166 ***Tricophorum cespitosum***
167 ***Sphagnum*** spp
168 ***Juncus squarrosus***

See above for these new land cover codes in CS2000

170 **Perennial crops** (after 131)
171 **Herb-rich grassland** (after 101)
172 **Sand dune** (after 116)
173 **Strandline vegetation** (after 116)
174 **Sub-arctic (Montane)** (after 104)

Cover

175-178 These cover % codes should be used with the species codes 146-168 and, where a mosaic of vegetation categories exists, with land cover types. Usually, no more than three cover codes may be used to describe any area.

175 **25-50%**:
176 **50-75%**:
177 **75-95%**:
178 **95-100%**:

Heights (*Calluna* only)

179-182 These height class codes should only be used with Heather (but not with Bracken as was done in 1990) and should reflect the average height of the stand being mapped

179 **<10cms**:
180 **<30cms**:
181 **<50cms**:
182 **>50cms**:
~~*183* **<1.5m:**~~ no longer used
~~*184* **>1.5m:**~~ no longer used

Uses etc

185-198 These codes should be used to qualify the cover types where known. Stock type can be told from recent dung as well as actual presence of animals.

185 **Beef**: cattle which tend to be of stocky build and do not have udders - should also include 'sucklers' (0-6 mths) and 'rearers' (6 mths onwards)
186 **Dairy**: cattle which have udders – especially Fresians –
(N.B. mixed herds of beef cattle and dairy cattle should be coded 185/186)
187 **Cattle (unspecified)**: only to be used if it is not possible to determine whether the cattle are dairy, beef or dual purpose (**note**: this code was used for 'breeder' cattle in 1990).
188 **Dual purpose**: applies to the few remaining cattle breeds which are bred for beef and milk production e.g. Simmentals, South Devons, some Shorthorns and some Friesians.
189 **Sheep**:
190 **Goats (with no.)**: the numbers of goats and horses in fields should be recorded where possible, including those animals in a field, only part of which is in the square. Numbers should follow the code (in parentheses).
191 **Horses (with no.)**: (as with goats)
192 **Pigs**:
193 **Silage**: Silage fields can be distinguished from hay fields only after cutting (silage-cut stems are fresh, bright green: hayfields usually produce dried grass remnants), or by asking the farmer.
194 **Hay**: should only be used if there is firm evidence eg wisps of dry grass after harvesting. If there it is impossible to tell whether a field has been left for hay or silage, then both codes should be used, rather than not using a code.
195 **Deer:** only to be used if there is firm evidence including presence of animals or dung, artificial feeds, estate information
196 **Grouse:** as for deer

197 **No apparent use (A):** should be used if the primary use of the land cannot be identified.

198 **Setaside:** To be used with a primary code such as 141 and 142. Set-aside is arable land which has been temporarily removed from production to allow the farmer to qualify for Arable Area Payments. While there are various technical kinds of set-aside, the main points to note that:

- it can be whole or part of afield; if the latter, it must be at least 20 m wide;
- most set-aside is first-year, which comprises a mixture of crop volunteers and arable weeds (this is characteristic); much will already have been sprayed with non-selective herbicides to give a dead, yellow cover, which can hide populations of seedlings;
- older set-aside is more grassy, and more difficult to identify with confidence; if the cover is patchy, with cereals and arable plants among grasses, it is likely to be set-aside;
- there are a range of covers in set-aside (grass, crop mixtures, industrial crops) which cannot be identified as set-aside from the field evidence alone - only the farmer will know.

vi. Forestry/Woodland/Trees

7.38 The codes from the woodland sheet should be used to describe each 'woodland unit' (ranging from a single sapling to a forestry plantation) and every combination of codes must contain at least one primary code. Features from other pages of the FAB should not be recorded within woodland, unless they are above a minimum mappable unit in size (ie exceeding 1/25th ha), and excepting bracken.

7.39 Trees/scrub should be recorded in any situation except inside the curtilages of buildings or communication routes (e.g. roads, railways) or as individuals or lines immediately adjacent to non-agricultural curtilages.

7.40 Trees should be recorded from all recreation land such as golf courses and playing fields (except in urban situations). It is important that the double use of land is recorded eg individual trees growing in farmland, or sheep in an abandoned orchard.

7.41 Tree species (with apical dominance leading to the formation of recognised trunks) of all sizes should be recorded, as should shrubby species (comprising scrub).

Cover types - all occurrences of trees should be allocated to one of the primary codes and qualified by secondary codes - if any one area of trees includes distinct variation in age or species composition, then the unit should be sub-divided into blocks and coded separately.

7.42 The following key should allow any feature to be placed in one of the primary code definitions:

KEY TO WOODLAND TYPES

1. Dominant canopy is a mix of trees and vegetation in shrubby form?	YES .. Step 2	NO .. Step 3
2. Consider the two components separately in this key and use 2 primary codes as a mosaic.		
3. Canopy composed of trees (not shrubby form)?	YES .. Step 4	NO .. Step 10
Trees		
4. Less than 6 individual trees?	YES .. Code 201	NO .. Step 5
5. Less than 0.25 ha with canopy >25% area?	YES .. Code 205	NO .. Step 6
6. Linear feature (area ratio <1:5 and <4 trees wide)?	YES .. Step 7	NO .. Step 8
7. Single tree width?	YES .. Code 203	NO .. Code 204
8. Canopy cover less than 25%?	YES .. Step 9	NO .. Code 206
9. Trees less than 50 m apart (on average)	YES .. Code 202	NO .. Code 201*
Shrubby form		

10. Less than 6 individuals?	YES .. Code 207	NO .. Step 11
11. At least 20m line of single specimen width?	YES .. Code 209	NO .. Step 12
12. Canopy covers more than 25% of area?	YES .. Code 210	NO .. Step 13
13. Individuals less than 50 m apart (on average)?	YES .. Code 208	NO .. Code 207*

* because the individuals are (on average) more than 50 m apart, then they should be coded separately and not as part of an area feature

201 **Individual trees (P)**: should be marked with a cross. Groups of less than 6 trees should be recorded as individuals as should lines of trees of less than 20 m in length. A coppice stool is recorded as a single tree. Where loose groups of trees are each more than 50 m apart, they should all be marked as individuals.

202 **Scattered trees (A, P)**: 6 or more trees which do not make a wood or clump (see definitions) because their crowns are not contributing 25% cover of the mapped unit and the trees are not more than 50 m from other trees (in which case they are mapped as individuals).

203 **Line of trees (L)**: must be single tree width and be at least 20 m long with or without crown contact (215, 216). They should be marked with a line.

204 **Belt of trees (A, L)**: 2 or more trees wide with a width to length ratio of at least 1:5, parallel-sided and with a maximum width of 50m.

205 **Clump of trees (A, P)**: a small woodland or group of trees (6 or more) and of less than 0.25 ha.

206 **Woodland/Forest (A)**: an area of trees of more than 0.25 ha (but see Belt) and a crown cover of more than 25% (see 285 for areas fenced and ploughed ready for afforestation).

207 **Individual scrub (P)**: an individual of a shrubby species or a tree in shrubby form.

208 **Scattered scrub (A, P)**: scattered as for trees.

209 **Line of scrub (L)**: line as for trees.

210 **Patch of scrub (A, P)**: an area of continuous scrub (canopy >25%) of any size consisting exclusively of shrubby species or trees in shrubby form, often with tree regeneration. Individual trees of more than twice the average height of the scrub should be separately marked as individuals or scattered.

215 **Closed canopy**: canopies touching or overlapping

216 **Canopies not touching**: to be used for linear features, if the gap between two canopies does not exceed the average canopy width of the two individuals on either side.

217 **Hedgerow tree(s)**: trees in a hedgerow which are twice the average height of the hedge, or where the hedge has been trimmed to favour the growth of a young tree. They should be marked with an X or as a line.

218 **Parkland**: a series of isolated mature trees over usually grazed grassland, often associated with large country houses or recreational areas.

Species (if >25%) - should be recorded with one of the cover types if they constitute more than 25% of the canopy. It is not necessary to qualify "unspecified conifer" or "unspecified broadleaf" with a species name. The mixed category codes should be used in the same way ie when >25%.

221 **Fir - Douglas**

222 **Larch**
223 **Pine - Corsican**
224 **Pine - Lodgepole**
225 **Pine - Scots**
226 **Spruce - Norway**
227 **Spruce - Sitka**
228 **Unspecified conifer** (do NOT give species).

231 **Alder**
232 **Ash**
233 **Beech**
234 **Birch**
235 **Bramble**
236 **Elder**
237 **Elm**
238 **Field maple**
239 **Gorse**
240 **Hawthorn**
241 **Hornbeam**
242 **Lime**
243 **Oak**
244 **Poplar**
245 **Rowan**
246 **Sweet Chestnut**
247 **Sycamore**
248 **Willow**

250 **Mixed broadleaved**: ie to be used as if it were a separate species code and can be used on its own or in combination with other species codes where a proportion of the canopy is composed of a mixture of species, none of which comprises 25% (do NOT give species).
251 **Mixed conifers:** as above (do NOT give species).
252 **Unspecified broadleaf** (do NOT give species).

Proportions - these are for use with the tree species codes and should refer to the percentage cover of the dominant canopy layer, as if viewed from above. No more than three codes should be used to describe any one feature.

256 **25-50%**
257 **50-75%**
258 **75-95%**
259 **95-100%**

Age - should be used in conjunction with any of the primary codes (individuals, lines or areas of shrubs or trees) and, in the case of areas and lines, refers to the average age of the species making up the top canopy.

To help with age category recognition the following table may be of use. These figures are a guideline and individuals will vary according to species, vigour, climate and other environmental factors, particularly fast-growing species of exotic origin. Further information is available in "Trees of Britain and Europe" by Mitchell.

Age (yrs.)	Diam. at breast height

5	3-4 cm
20	18-20 cm
50	45-50 cm
100	70-75 cm

261 **1-4 yrs**
262 **5-20 yrs**
263 **20-50 yrs**
264 **> 100 yrs**
265 **50-100 yrs** (note code number order!)
264 **> 100 yrs**

Use - To be used for an area of trees (ie not individuals or lines). It can be extremely difficult to decide the use and many woodlands, especially broadleaved, appear to have no particular use. These should be left uncoded in terms of use.

266 **Timber production**: most coniferous forest and highly managed broadleaved woodland is likely to be included here.
267 **Landscape**: usually covering trees planted to improve the amenity of a site (usually visual amenity), or to fringe and 'hide' commercial plantations.
268 **Sporting/Game**: to be used if there is clear evidence that the wood is used to rear pheasants or other game birds.
269 **Public recreation**: where there is active encouragement for the public to use the area for recreation eg car parks, forest walks, arboreta etc.
270 **Nature conservation**: only to be used if there is clear evidence that the feature is being managed for nature conservation purposes.
271 **Shelter**: includes signs of wintering livestock as well as windbreaks etc.

Condition (NO LONGER USED)

~~*275* **Managed:**~~
~~*276* **Unmanaged - thriving:**~~
~~*277* **Unmanaged - improvable:**~~
~~*278* **Declining:**~~

Descriptions/Features

281 **Felling/Stumps**:
282 **Natural regeneration**: to be used only where tree species <1.3m high, which have grown naturally from seed (or suckers) are outside the canopy of a dominant woodland feature.
283 **Underplanting**: where semi-natural woodland has been under-planted with standard exotic or native species.
284 **Planted**: Planted may be used with any of the cover types where it is obvious that planting has taken place, rather than self-seeding.
285 **Ploughed land (A)**: to be used where land has been ploughed (or scarified) and fenced in advance of forestry planting. Should not be used once planting has taken place.
286 **Staked trees**: to be used for isolated trees only and not where 288 applies.
287 **Tree protectors**: light-weight plastic tubes (about 1 m high) which provide protection as well as a favourable micro-climate for planted trees.
288 **Fenced (single trees)**:
289 **Windblow**: can be used to qualify an area of forest or a single individual which has clearly been blown over, or had the top blown out, by wind.

290 **Dead standing tree(s) (A, L, P)**: recorded either singly or as a description for an area of woodland.

291 **Regrowth - cut stump**: applies to isolated regenerating trees

292 **Grazing (stock)**: to be used if there is any evidence of agricultural stock using the feature for grazing, intentionally or otherwise.

293 **Ride/Firebreak (A, L)**:

294 **Bracken dense**: closed canopy or canopy likely to close during growing season - any bracken in a woodland area must be recorded as for codes 156 and 157.

295 **Bracken scattered**:

vii. Boundaries

7.43 All boundaries should be recorded **unless** they form part of a curtilage or they are within the canopy of a woodland (except that boundaries of woodlands must be recorded). It is important that the boundary between urban and rural is marked, but it need not be coded if a curtilage is involved.

7.44 It is the total boundary feature which is to be coded, using a codes to describe each element of the boundary (e.g. fence with hedge). In these cases, the most complete (stockproof) element of the boundary should be coded first.

7.45 New boundaries should be drawn on the map as accurately as possible, using existing features for reference, as well as making full use of measuring tapes and compasses. Bearings should be taken from the centre of the plot and, as in previous surveys, bearings should be given for magnetic north and not corrected for magnetic deviation. If recent change is obvious then please make use of codes where possible to show this, or else make a note on the sheet concerned. Part of the purpose of this project is to record reasons for hedgerow change. Use codes 999 for boundaries that have been removed and add code 888 to new boundaries. If possible annotate the map or add comments on the page to give reasons for removal or addition of hedges.

7.46 Where the boundary includes a hedge, the total boundary feature must be recorded in detail, using CS1990 codes. A combination of primary codes may be used if appropriate. In these cases, the most complete (stockproof) element should be recorded first.

eg: C. 313 (fence), 351 (stockproof), 343 (< 1 metre), 321 (hedge), 352 (not stockproof), 341 (> 2 metres), 359 (overgrown), 332 (bank), 343 (< 1 metre).

or

D. 323 (hedge), 351 (stockproof), 342 (< 2metres), 357 (trimmed), 362 (flailing), 313 (fence), 352 (not stockproof), 343 (< 1 metre).

7.47 If there are two or more stockproof elements, the order of elements is not important but each element must be coded separately.

eg: E. 301 (wall), 351 (stockproof), 342 (< 2 metres), 321 (hedge), 352 (stockproof), 342 (< 1 metres), 357 (trimmed) etc..

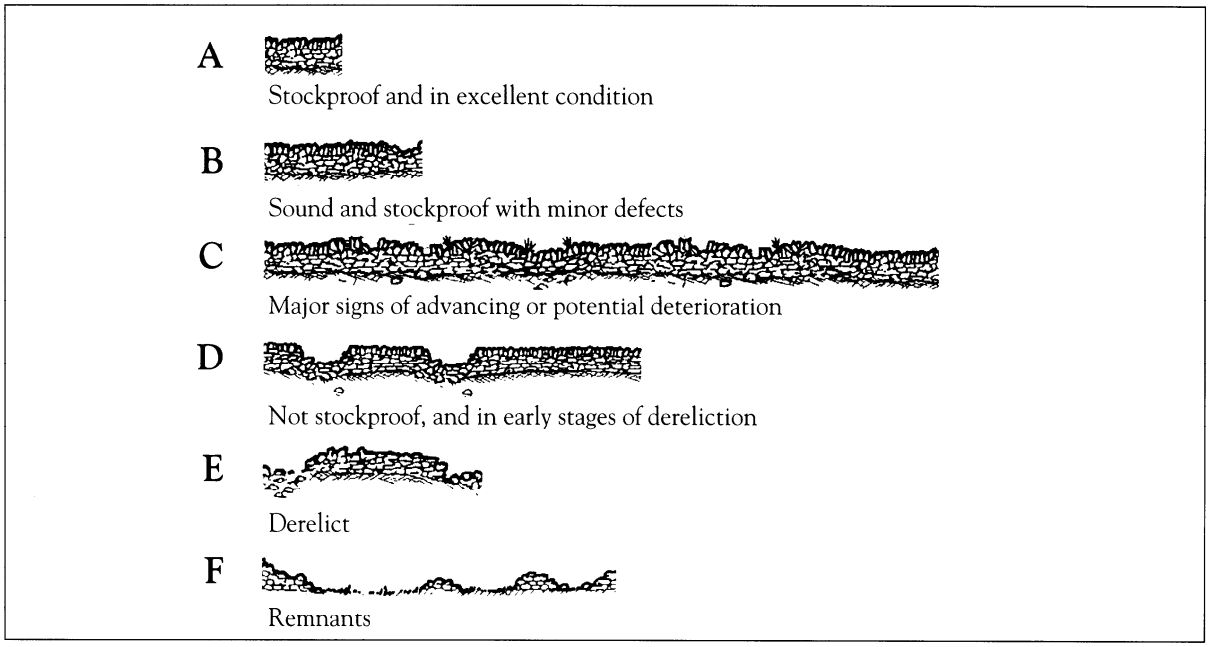
7.48 If none of the individual elements of a boundary is stockproof, but collectively they make a stockproof boundary, then code 351 should be placed at the end of the string in brackets (351).

Walls

301 Dry-stone (L):
302 Mortared (L): includes dry-stone walls which have been capped with mortared stone.
303 Other (L): ... (include a description)

Wall condition codes (after ADAS report to Countryside Commission) – see Fig 7.1

Figure 7.1 - Condition of dry stone walls (from Countryside Commission leaflet CCP 482)



305 A - Stockproof and in excellent condition
306 B - Sound and stockproof with minor defects
307 C - Major signs of advancing or potential deterioration
308 D - Not stockproof and in early stages of dereliction
309 E - Derelict
310 F - Remnants

Fences

311 Wood only (L):
312 Iron only (L):
313 Wire on posts (L):
314 Other (L): ... (include a description)

Hedges

7.48 A hedge is defined as a more or less continuous line of woody vegetation that has been subject to a regime of cutting in order to maintain a linear shape. When hedge management is abandoned and the overall natural shape of the component tree species is regained, or when the bottom 2m (or less) of the feature is not more or less continuous, then the feature can no longer be described as a hedge (and might be considered as, for example, a scattered line of shrubs or trees)

321 >50% Hawthorn (L): only to be used if Hawthorn constitutes more than half of the length of hedge under consideration.
322 >50% Other (L): . (add extra code e.g. 601 and specify species type)

323 **Mixed hedge (L)**: should be used for any length of hedge where no single species has >50% cover.

Other

331 **Stone bank (L)**:
332 **Earth bank (L)**:
333 **Grass strip (L)**: to be used where a grass strip separates two fields with no vertical boundary.
334 **Stone and earth bank (L)**:

Descriptions

340 **>3m high**: if different heights apply on either side of the boundary, then the height should apply to the side on which stock are kept; otherwise, the lowest height category should be used.
341 **2-3 m high**
342 **1-2m high**:
343 **<1m high**:

351 **Stockproof**: where possible, this should apply to the stock that would normally use the surrounding fields; if in doubt, assume sheep. The code should be applied to each separate element of the length of boundary under consideration, not necessarily to the whole side of a field. However, if none of the individual elements of a boundary is stockproof, but collectively they make a stockproof boundary, then this code should be placed at the end of the string in brackets.
352 **Not stockproof**: This code should be used when gaps of more than 1 metre but less than 20 metres are present but, together, constitute less than 50% of the total length. If unfilled gaps constitute more than 50% of the boundary length, but the gaps are less than 20 metres in length, then the boundary should be coded as a line of scattered shrubs or trees, for example. If gaps are greater than 20 metres, then the gap should be coded as boundary no longer present on map (999).
353 **Filled gaps <10%**: should be used to show that the boundary has had gaps which have been filled in an attempt to make it stockproof. The %s refer to the gaps as a % of the boundary unit being coded.
354 **Filled gaps >10%**:
355 **Signs of replacement**: (of one boundary type by another)
356 **Signs of removal**:

When is a linear feature described as a hedge?

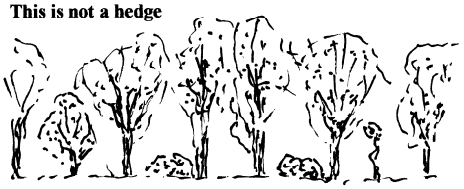
It can be difficult to distinguish between 'mature' hedges and lines of trees or lines of scattered shrubs. Some illustrations follow:

A. Management

The definition of a hedge (above) includes " … woody vegetation that has been subject to a regime of cutting in order to maintain a linear shape. When hedge management is abandoned and the overall natural shape of the component tree species is regained … then the feature can no longer be described as a hedge"

This is a hedge:

This is not a hedge

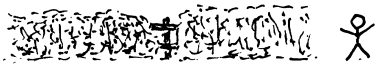


Because lack of hedge management means that the woody components have regained their natural shape. This should be coded as a line of trees.

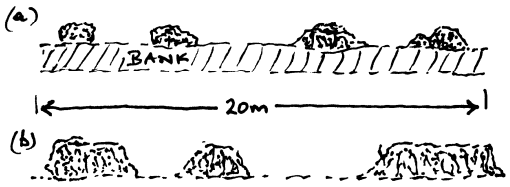
B. Continuity of length

The definition of a hedge includes " ... as a more or less continuous line of woody vegetation … "

This is a hedge:



These are not hedges



Because they cannot be described as 'more or less continuous' in the context of a 'minimum mappable length' (20m). They may be coded as shrubs (line or individuals)

C. Vertical continuity

The definition of a hedge (above) includes "…or when the bottom 2m (or less) of the feature is not more or less continuous, then the feature can no longer be described as a hedge"

This is a hedge:

This is not a hedge

Because the bottom 2m is no longer a vegetated part of the feature – this is a row of trees.

Hedge codes 345, 346 and 357 - 360 represent points on a transition from a well managed, trimmed hedge, to a relict line of shrubs.

357 **Recently planted**: to be used if it is estimated that a the hedge has been planted in the previous 5 years. (N.B. code was used for 'Trimmed' in 1990).
358 **Uncut**: has had recent management but has been 'let go' over one or more seasons. Also includes hedges where only one side has been trimmed (ie not the top or the other side.).
359 **Derelict**: still obviously a hedge but all attempts at management having been abolished.
360 **Line of relict hedge**: usually a line of shrubs showing where a hedge has once been (see definition of hedge; should be used in addition to codes on the forestry page)
361 **Laying (recent)**: to be used if it appears likely that the hedge has been laid in the last five years.
362 **Flailing**: to be used if flailed in the last year; recognisable by smashed and shattered ends to cut branches.
363 **Re-growth from stumps**: this applies to hedges that have been cut to ground level but have sprouted again, often at intervals along the old boundary.
364 **Bracken present**: to be used if <u>any</u> bracken is present in the boundary.

371 **Unfilled gaps <10%**: to be used where gaps (of less than 20m each) constitute less than 10% of the unit being described.
372 **Unfilled gaps >10%**: to be used where gaps (of less than 20m each) constitute more than 10% of the unit being described.

<u>Hedge shapes (cross section view)</u>

These codes should be used where trimming (usually in the past two years) has resulted in a particular shape of hedge. If only one side has been trimmed (ie not the top or the other side) then use code 358 (uncut) but if one side and the top has been trimmed, then use one of the following codes.

374 **Box-shaped hedge**: (see examples below):
375 **Pointed box-shaped hedge**:
376 **Chamfered hedge**:
377 **A-shaped hedge**:
378 **Topped A-shaped hedge**:
379 **Round topped hedge**: (rare as requires hand-cutting)
380 **Untopped hedge**: trimmed sides only

viii. Buildings/Structures/Communications

7.49 This sheet covers features associated with built structures and routes of communication. Note that features which are immediately adjacent to a non-agricultural curtilage (except roads) need not be recorded on other FAB pages. Similarly no information from other FAB pages need to be recorded within a curtilage (except trees - see 402 below)

7.50 Colour Coding - we would rather that colouring was not used but, where colours do have to be used because numbering is too complex, then please use the following choice of colours wherever possible:

Grey = Residential Building Yellow = Agricultural curtilage (+ green dots with trees >10% cover) Green-solid = other curtilage without trees Green-dots = other curtilage with trees Orange = Commercial Buildings Dark Blue = Public Service Buildings Purple = Religious Buildings Pink = Road (tarmac) Red = New development

7.51 Other buildings and grounds should be number-coded, most being large enough to accommodate a written code.

Cover types

7.52 Built-cover types - these categories should cover the majority of "urban" land and built features in the countryside but special codes may be needed on rare occasions. Where possible they should be qualified by use and description codes.

7.53 A curtilage is an area of ground that is associated with a building and which has a use linked with that building eg gardens, 'grounds', forecourts etc. Apart from the presence of trees (cf. code 402), it is not necessary to record any features within curtilages. If in doubt about whether a feature is a curtilage, then only treat it as such in an urban situation (eg land around a rural reservoir is not curtilage).

401 **Building (A, P)**: usually present on the map - the exceptions will be new buildings which must be coded or coloured with code 441.

Gardens/Grounds apply to curtilages associated with residential or other buildings. Gardens/Grounds may be mapped and coded in groups if they are all alike.

402 **Garden/grounds with trees (A)**: Gardens/Grounds with trees includes those curtilages or mapped group of curtilages, which have a cover of 10% or more.

403 **Garden/grounds without trees (A)**:

434 **Agricultural curtilage (A)**: generally enclosed areas around agricultural buildings eg farm yards, pens etc. – does not include residential farmhouse gardens (=402 or 403).

404 **Public open space (A)**: includes Parks, Ornamental Gardens and Accessible Common Land, especially near large conurbations.

405 **Amenity grass >1ha (A)**: non-agricultural grass which is clearly being used for amenity purposes (not recreation); to be recorded in units of 1ha or more eg parks, large lawns etc (but see 404). Use code 503 for all land on golf courses.

406 **Allotments (A)**:

407 **Car park (A)**:

408 **Glasshouse (A)**: refers to commercial, large-scale enterprises, not greenhouses at the bottom of gardens.
409 **Garden Centre/Nursery (A)**:
410 **Embankment (A)**: to be used for any constructed embankment in any situation eg motorway, reservoir etc.
411 **Other land (A, L, P)**:....: for use in exceptional circumstances; try and use other primary codes first. Always qualify.

Use - these categories should be used to describe the cover type.

421 **Residential**: covers all domestic living area (except farm houses – see 428).
422 **Commercial**: includes all buildings devoted to selling things, including shops, garages, hotels, pubs, commercial offices etc.
423 **Industrial**: those used for the manufacture of goods and include workshops, warehouses and associated buildings such as stores.
424 **Public Service & facilities**: Public Services and facilities are those buildings which are associated with services available to the public, such as Police Stations, Hospitals, Libraries and facilities associated with electricity, gas and telephone.
425 **Institutional**: includes all buildings belonging to forms of public or private institutions, such as old peoples homes, local government and central government buildings, MOD buildings, Crown land, Remand homes, Prisons and even Research Stations.
426 **Educational/Cultural**: includes schools, establishments of further education, museums, theatres and cinemas.
427 **Religious**: confined to places of worship including Churches, Mosques and Synagogues, and their curtilages eg graveyards, cemeteries etc.
428 **Agricultural**: covers all buildings used for agricultural purposes including the farmhouse if occupied by a framer or farm-worker.
429 **Sporting/Recreational**:
430 **Waste - domestic (A, P)**:
431 **Waste - industrial (A, P)**: and to include agricultural
432 **Quarry/Mine (A, P)**...:
433 **Gravel pit (A, P)**:
(434 **Agricultural curtilage) – see above**

Description

441 **New**: those developments which are not shown on the OS Map. Boundaries of associated Gardens or Grounds should also be drawn.
442 **Vacant**: building land which is temporarily out of use; often has sign posted and is adjacent to building land.
443 **Derelict**: buildings or land that have been abandoned or neglected such that they are beyond ordinary repair.

Communications

451 **Railway track/land (A, L)**: to include tracks, yards, sidings and their associated curtilages (e.g. banks and ‘verges’).
452 **Road (tarmac) (A, L)**: includes any road, whether private or not, which is totally tarmac across its width.

453-455 Verges should be coded separately for each side of the road so that two numeric codes should be used to describe the verges for the length of road concerned

(even if they are the same). Record the 'north-most' verge first. If road runs north-south, then record 'east-most' first. If there is no verge (eg tarmac up to a wall, or in a moorland) then do not use a code at all. Verges should be mapped adjacent to constructed tracks, as well as tarmac roads.

453 **Verge <1m**: this refers to the width of the verge across the ground surface.
454 **Verge <5m**:
455 **Verge >5m**:

456 **Constructed track (L)**: includes any track which has been manufactured using stone or hard material.
457 **Unconstructed track (L)**: those tracks which are not defined as above ie no construction has been involved along their length.
458 **Footpath (exclusive) (L)**: a path which uses land area for the purposes of a footpath only - often walled or fenced.
459 **Footpath (other) (L)**: those which are shared with some other land use, such as a path across a grazed field.

Surface: (these codes should be used as qualifiers for public footpaths, bridleways, and 'roads used as public paths')

460 **satisfactory throughout**:
461 **parts in poor condition**:
462 **impassable/difficult**:

Barriers: (to be used as descriptions of Rights of Way as above)

463 **difficult stile/gate**:
464 **difficult bridge**:
465 **difficult fence/wall**:
466 **ploughed/crops**:
467 **natural vegetation**:
468 **muddy/flooded**:
469 **fallen trees/rock**:
470 **bull(s)**:
471 **other** ....:

ix. Recreation

Designated

7.54 These are generally areas deliberately set aside for recreational purposes; examples other than those given, may be entered using new codes.

501 School playing fields (A):
502 Other playing fields (A):
503 Golf course (A):
504 Race track .... (A):
505 Tennis courts (A, P):
506 Boating area (A, P):
507 Static caravan(s) (A, P):
508 Touring caravan park (A):
509 Camp site (A):
510 Launch site .... (A, P):
511 Other designated area ... (A, L, P):

Non-designated

7.55 Information or signs - where land normally given to some other use, has been used for recreation, often on a very ad hoc basis.

521 Horsiculture (A, P): any signs of horses used for recreational purposes eg jumps, schooling rings etc
522 Angling (A, P): any signs of angling eg notices, platforms etc.
523 Boat - inland water (A, P): any evidence that a boat is used on a piece of water, eg boathouse, moorings etc.
524 Other .... (A, L, P):

x. Universal codes

(*555* Curtilage boundary – this code was applied by some surveyors to boundaries which were part of a curtilage and therefore not recorded in detail – the code does not need to be used in 1998 but surveyors should be aware of its previous use.)

(*777* This code was used in the digitising of 1990 data to indicate a missing code – it should not be used by surveyors in 1998 but surveyors should be aware of its previous use.)

888 **New to map**:

999 **No longer on map**:

Change reliability (to be used when coding change in old squares only)

701 Perceived as genuine change.

702 Probable mis-recording in 1990.

SECTION 8 – MAPPING CHANGE IN 'OLD' SQUARES (1998 METHODS)

8.1 As stated in 6.4 above, for the first time in the Countryside Survey series, CS2000 will focus on recording change, rather than making independent records which are compared post-survey with data from earlier surveys. Obviously, this approach is only possible in squares that have been recorded previously.

8.2 In order to carry out this change detection, surveyors must be familiar with the methods and codes used in CS1990 *de novo* mapping (Section 7).

8.3 As described in 6.9, the CS1990 results and subsequent follow-up pilot studies suggest that there are spatial limitations in the mapping of those habitats which are characteristically found in more upland, unenclosed landscapes. This has led to a fundamental change in the way change is to be detected and reported in those Broad Habitats which are broadly characteristic of enclosed, lowland landscapes versus those of more unenclosed, upland areas. The former will be mapped using CS1990 level coding and are to be known as ***Mappable Broad Habitats*** (or *Mappable BAPs*) whereas the latter will only be mapped at the Broad Habitat level and will have additional plots recorded within them – these will be known as ***Plottable Broad Habitats*** (or *Plottable BAPs*).

8.4 The list of **Mappable** and **Plottable** Broad Habitats is shown in the following table:

	'Mappable BAPs'		**'Plottable BAPs'**
1	Broadleaved, mixed and yew woodland		
2	Coniferous woodland		
3	Boundary and linear features		
4	Arable and horticulture		
5	Improved grassland		
6	Neutral grassland		
		7	Calcareous grassland
		8	Acid grassland
		9	Bracken
		10	Dwarf shrub heath
		11	Fen, marsh, and swamp
		12	Bog
13	Standing open water and canals		
14	Rivers and streams		
		15	Montane habitats
		18	Supra-littoral rock
		19	Supra-littoral sediment
		26	Inland rock
27	Built up areas and gardens.		

8.5 Surveyors will be supplied with the following paperwork:

1. **Base map** - OS 1:10,000 base map – enlarged to ? – waterproof paper
2. **Theme maps** – five - scale as above – transparent paper – linework and ID code from 1990
   2a - Physiography
   2b – Agriculture and semi-natural vegetation.
   2c – Forestry, woodland and trees
   2d – Boundaries – recorded lengths are separated by a dot on the map.
   2e – Buildings, Communication and Recreation
3. **BAP map** - map of BAP habitats on ordinary paper – coloured for plottable BAPs.
4. **Data recording forms** - for each theme, sheets with CS1990 recording codes and space to record changes
5. (Copies of the) **1990 Recording sheets** (5 theme maps) and code sheets as completed in 1990– some in colour.
6. **Pond map** - copy of Lowland Pond Survey 1996 location maps – ordinary paper.
7. **Dot-grid** overlay.

Mapping change in *Mappable Broad Habitats* which are characteristic of lowland, enclosed landscapes

8.6 Mappable Broad Habitats that are characteristic of lowland, enclosed landscapes, will be shown on the **BAP map** (no. 3 in the above list) as uncoloured areas. All recording in these areas will relate to CS1990 methodology and codes (any translation to BAP categories will be done later).

8.7 Each feature that was described in 1990 will be shown on the **Theme map** with a unique code number. This code number matches those shown on the **Data recording forms** where the codes that were used to describe the feature in 1990 are also listed. Note that some unique codes (see 7.6) used by surveyors in 1990 occupied what were then vacant positions in the code list which have since been filled with standard codes. These unique codes have become renumbered in the database (all are over 1000) but will remain as written by the surveyor on photocopies of CS1990 field sheets.

8.8 Information for each mapping theme (physiography, agriculture/semi-natural vegetation, forestry/ woodlands and trees, boundaries, buildings/structures and communications) is recorded on a separate **Data recording form**. Each **Data recording form** has different columns reflecting the types of codes to be used for that theme. However, the first four columns are common to all forms:

- Parcel number: this is the unique number (within each square) which links the features on the Theme map with the codes printed on the **Data recording form**.

- New Parcel Number: this column is blank and has two functions:

  (i) where a change has taken place that is so radically different to the previous coded description, this column allows the surveyor to give a new number to the feature and create a new row of codes at the bottom of the **Data recording form**. Effectively, it allows re-numbering of a feature. The convention for re-numbering is to precede the new number with an initial letter indicating the theme in question (P#, A#, F#, B#, S#).

(ii) where a new feature is to be recorded, then this column allows the surveyor to give a new number to the feature and create a new row of codes. The convention for re-numbering is as above (P#, A#, F#, B#, S#).

- CS1990 Parcel Code: this column gives an alphabetic code which links the feature being described on the **Data recording form** to the photocopied CS1990 recording form (FAB).

- Primary Code: this column gives the CS1990 Primary Code, as held in the database, for the feature.

8.9 Other columns include descriptive codes for the feature concerned, together with blank columns to allow changes to be recorded.

8.10 Surveyors must decide if there is any change since 1990, in terms of any of the codes used:

- if there is no change, then the surveyors should tick the box next to each given code on the **Data recording form** (see Parcel No 128 in following example), tick the relevant polygon on the **Theme map** (to show that it has been completed) and move on.

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1		Species 1 Cover value		Etc.	Universal Codes	New BAP Code
128		I	101	✓		148	✓	175	✓			
129		H	101			147		176				
130		H	101			147		176				

- where the given code is no longer appropriate for the feature, then:

(i) if a different code is appropriate, then the new code should be entered into the box next to the old code (see Parcel number 129 in following example)

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code		Primary code % cover	Other & Unique Codes	Species 1		Species 1 Cover value		Etc.	Universal Codes	New BAP Code
128		I	101	✓			148	✓	175	✓			
129		H	101	✓			147	✓	176	*175*			
130		H	101				147		176				

(ii) if it is believed that the given code was incorrect (e.g. recorded incorrectly by a 1990 surveyor), then the new code should be entered into the box next to the old code and the old, incorrect code is to be circled (see Parcel number 129 in following example) (**IMPORTANT: it is not necessary to determine the source of the discrepancy; a comparison with what is recorded on the Data recording form is all that is necessary**).

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code		Primary code % cover	Other & Unique Codes	Species 1		Species 1 Cover value		Etc.	Universal Codes	New BAP Code
128		I	101	✓			148	✓	175	✓			
129		H	101	✓			147	✓	(176)	*175*			
130		H	101				147		176				

(iii) if the code is no longer appropriate and needs to be removed from the **Data recording form** without being replaced, then a cross (X) should be entered in the box next to the old code (see Parcel number 129 in following example).

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code		Primary code % cover	Other & Unique Codes	Species 1		Species 1 Cover value		Etc.	Universal Codes	New BAP Code
128		I	101	✓			148	✓	175	✓			
129		H	101	✓			147	X	176	X			
130		H	101				147		176				

(iv) if the above (iii) is true but it is believed that the old code was incorrect, then a cross should be entered in the adjacent box and the old code is to be circled (see Parcel number 129 in following example).

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code		Primary code % cover	Other & Unique Codes	Species 1		Species 1 Cover value		Etc.	Universal Codes	New BAP Code
128		I	101	✓			148	✓	175	✓			
129		H	101	✓			(147)	X	(176)	X			
130		H	101				147		176				

N.B. If there is a change from a feature shown on one **Theme map** to a feature shown on another **Theme map**, then (a) on the data recording form relevant to the feature as previously described, the new parcel number should be entered in the *New Parcel Number* column against the old parcel number and (b) full details of the new parcel number should filled in on the **Data recording form** relevant to the new feature.

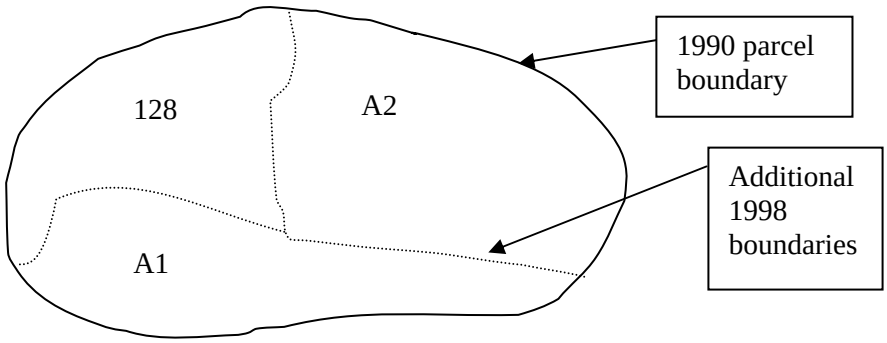
- where the feature has changed so radically that it is quicker, clearer or otherwise necessary to give a new coded description on a new line, then:

(i) if the feature being described is still the same in terms of its mapped extent (ie no change in area, length etc), then a new row should be completed at the foot of the **Data recording form** (or on a new, blank **Data recording form**). First, a cross should be entered in the *New Parcel Number* column, next to the parcel number in the original row. Then, the original parcel number should be entered into the *Parcel Number* column in the new row. The remaining columns in the new row should be completed with appropriate codes (see two Parcels numbered 128 in following example).

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value	Etc.	Universal Codes	New BAP Code
128	X	I	101			148	175			
129		H	101			147	176			
130		H	101			147	176			
128			*102*			*155*	*175*			

(ii) if the feature being described has changed in terms of its mapped extent and has sub-divided (ie become several features), then:

(a) if one of the new subdivisions can be coded in the same way as in 1990, then the original row on the **Data recording form** can be used to describe that part of the old feature, and one or more new rows are created for the new part(s) of the feature (which also need to be shown on the **Theme map** (see map and Parcel numbers 128, A1 and A2 in the following example).



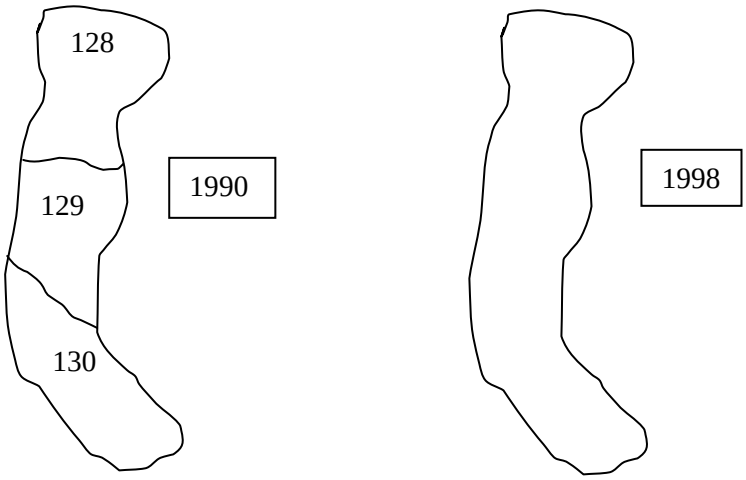
Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value	Etc.	Universal Codes	New BAP Code
128		I	101	✓		148 ✓	175 ✓			
129		H	101			147	176			
130		H	101			147	176			
128	*A1*		*101*			*148*	*176*			
128	*A2*		*101*			*148*	*177*			

(b) if none of the new subdivisions is the same as in 1990, then a cross should be entered in the *New Parcel Number* column, next to the parcel number in the <u>original</u> row (see Parcel number 128 in following example).

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value	Etc.	Universal Codes	New BAP Code
128	*X*	I	101			148	175			
129		H	101			147	176			
130		H	101			147	176			
128	*A1*		*101*			*148*	*176*			
128	*A2*		*102*			*155*	*175*			
128	*A3*		*102*			*155*	*176*			

In both cases, in the new row, a <u>new</u> Parcel number (prefixed by the appropriate alpha code) should be entered into the *New Parcel Number* column and the <u>original</u> parcel code entered into the *Parcel Number* column. The rest of the row is then completed with appropriate codes.

(ii) if the feature being described has changed in terms of its mapped extent because several features have become amalgamated, and can be described using the same codes, then a single new code (with alpha prefix) can be placed in the *New Parcel Number* column of <u>each</u> of the <u>old</u> rows, and a new row created to describe the single new parcel code (see maps and Parcel numbers 128, 129, 130 and A1 in following example).



Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value	Etc.	Universal Codes	New BAP Code
128	*A1*	I	101			148	175			
129	*A1*	H	101			147	176			
130	*A1*	H	101			147	176			
131		ZZZ								
132		ZZZ								
	A1		*102*			*155*	*175*			

- any <u>new</u> feature should be marked/drawn (with an identifying number, including alpha prefix) on the **Theme map**, and it's descriptive codes entered into spare boxes at the bottom of the **Data recording form**.

N.B. ticks on the **Theme map** should only be used to indicate that the feature has been checked, not that it is necessarily correct.

8.11 The success of this approach will depend on surveyors being realistic about whether change has taken place (or, indeed, whether a mistake was made in the 1990

recording). It is believed that change is most easily detected in the field and not by comparing two independent estimates 'back in the lab'. Good training and quality control are vital in this respect.

8.12 Because it is not possible to legislate for every separate circumstance of change in the countryside, there has to be some flexibility in the way change is recorded (ie more than one of the above illustrations can be used to indicate a change). The key point is that information on the **Theme map** or **BAP map** relates logically to information on the **Data recording form**.

Ponds

8.13 IMPORTANT: Included in the paperwork for some squares is the **Ponds map** (a photocopied map of where ponds were recorded in the Lowland Pond Survey 1996). These maps are for those lowland squares in GB which had ponds recorded in 1990 and a handful of 'non-pond' squares. Surveyors should make sure that all ponds, in upland or lowland Britain are recorded and note **changes from 1990** (using the 1996 map where appropriate). The Lowland Pond Survey definition of ponds should be checked carefully as it has changed from that used in 1990.

Mapping *Plottable Broad Habitats* in generally upland, unenclosed landscapes

8.14 In CS2000, mapping to be done in Plottable Broad Habitats will be at the broad habitat level (ie at a coarser scale than using CS codes) for the agriculture/ semi natural theme map. **Features from all other pages of the FAB will be mapped as for Mappable Broad Habitats.**

8.15 Time saved in this reduced mapping methodology will be put to establishing extra plots (see Section 9) as a baseline for monitoring more detailed change in future surveys.

Mapping change in areas of Plottable Broad Habitats shown on the agriculture page of the FAB

8.16 To map area change in Plottable Broad Habitats, surveyors need to compare the **BAP map**, (which shows the translation from 1990 CS codes to broad habitats) with what is on the ground in 1998:

- If there is no change, then the surveyor should tick the polygon on the **BAP map** to show that the area has been assessed,

- if there is a change, then

  (i) If the change is from one **Plottable** BAP type to another **Plottable** BAP type, and the extent of the feature is unchanged, then the area should be marked with the appropriate new BAP code on the BAP map only.

  (ii) If the change is from one **Plottable** BAP type to another **Plottable** BAP, and the extent of the feature has changed, then the surveyor should allocate to the new parcel a number (unique to the square and prefaced by the theme letter - P, A, F, B or S), mark this on the **BAP map** and then complete a new row in the relevant **Data recording forms**, writing the new BAP type in the *New BAP Code* column (see Parcel number A1 in following example).

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value	Etc.	Universal Codes	New BAP Code
128		I	101			148	175			
129		H	101			147	176			
130		H	101			147	176			
	A1									*10*

(iii) If the change is from a **Mappable** Broad Habitat to a **Plottable** Broad Habitat, and the extent remains the same, then this should be indicated on the relevant row in the **Data Recording Form** by putting a cross against the previous parcel code and entering a new BAP code in the relevant column (see Parcel number 128 in following example).

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value	Etc.	Universal Codes	New BAP Code
128	*X*	I	101			148	175			*9*
129		H	101			147	176			
130		H	101			147	176			

(iv) If the change is from a **Mappable** Broad Habitat to a **Plottable** Broad Habitat, but the extent has changed, then the surveyor should (a) for that part of the original parcel that is still mappable, complete the relevant row in the **Data recording form** and (b) allocate to the new parcel a number (unique to the square and prefaced by the theme letter - P, A, F, B or S), mark this on the **BAP map** and then complete a new row in the **Data recording forms**, writing the new BAP type in the *New BAP Code* column (see Parcel numbers 128 and A2 in following example).

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value		Etc.	Universal Codes	New BAP Code
128	✓	I	101	✓		148	✓	175 *176*			
129		H	101			147		176			
130		H	101			147		176			
	A2										*9*

(v) If the change is from a **Plottable** Broad Habitat to a **Mappable** Broad Habitat, then the surveyor should (a) mark the appropriate area on the **BAP Map** and mark a new code (prefaced by the theme letter - P, A, F, B or S) and (b) create a new line in the relevant **Data recording form**, using the new identifier code and then a full set of descriptive (see Parcel numbers 128 and A2 in following example).

- If there is a change which results in a new mosaic with one component being a **Plottable Broad Habitat**, then this should be indicated in the *New BAP Code* column, using successive rows where two or more code will not fit in a single cell (see Parcel number A2 in the following example). Where the new feature is a mosaic of **Plottable** and **Mappable** Broad Habitats, then the relevant BAP code should be shown for the **Plottable** Broad Habitat and a primary code should be used for the **Mappable** Broad Habitat (see Parcel number A3 in the following example).

N.B. all mosaics involving a Plottable Broad Habitat, should be treated as a Plottable Broad Habitat and extra U plots should be recorded.

Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value	Etc.	Universal Codes	New BAP Code
128		I	101			148	175			
	A2									10 12
	A3									9 101

- If there is an <u>additional</u> area of **Plottable** Broad Habitat, then this should be drawn on the BAP map, and then coded in as if a change had taken place (above).

8.17 To identify whether change has taken place, surveyors need to be able to recognise the broad habitats; the definitions in the following box have been drafted by ITE and modified in the light of comments by the conservation agencies.

<u>Montane</u>

8.18 <u>IMPORTANT</u>: The translation from CS1990 codes to BAP habitats was not possible for **Montane** so this type will have to be mapped *de novo* in 1998, in all squares in which it occurs.

List of 'unenclosed' Broad Habitat Types (end points to the key to vegetation and land cover codes)

7 – Calcareous grassland
Vegetation with scattered sedges, many calcicoles present in often species rich turf on calcareous soils usually rendzinas on chalk or limestone. Examples include *Lotus corniculatus, Linum catharticum, Sanguisorba minor, Carlina vulgaris, Sesleria albicans, Cirsium acaule.*

Includes CS primary code(s): 105 (Calcareous grassland)

8 – Acid grassland
Fine grasses predominate eg. *Agrostis, Festuca, Anthoxanthum* usually brown podzolic soils
Coarse grasses predominate eg. *Nardus, Molinia, Deschampsia flexuosa* usually on peaty-gley soils

Includes CS primary code(s): 102 (Upland grass) and 103 (Moorland grass)

9 - Bracken
Vegetation with a bracken canopy cover of 95 – 100%, irrespective of what species are growing below the bracken canopy.

Includes CS primary code(s): 156 (*Pteridium aquilinum*) with 95 - 100% cover

10 – Dwarf shrub heath
Sub-arctic indicators not present dominated by dwarf shrubs usually on podzolic soils but also on brown podzolics, shallow peats, rankers and gleys.

Includes CS primary code(s): 104 (Moorland - shrub heath)

11 – Fen, marsh, and swamp
Terrestrial vegetation growing on lowland peat soils often with or without scattered Alder or Willow. Species include *Carex paniculata, C. acutiformis, Iris pseudacorus, Phragmites australis, Eupatorium cannabinum, Lythrum salicaria, Scutelaria galericulata*.
Vegetation with less than 50% grass cover with species such as *Epilobium hirsutum, Urtica dioica* and *Filipendula ulmaria*.
Localised, narrow areas of vegetation, usually with several sedge species and species of wet soils. Includes *Briza media, Parnassia palustris, Carex hostiana, Carex dioica.*
Vegetation with many wetland species on nutrient rich, mainly inorganic soils. Some species maybe over 25cm in height however the sward will be dominated by a shorter turf of grazing tolerant species[3].
Localised narrow wet areas of vegetation or obvious flushing. Vegetation usually dominated by acidophilous species eg. *Sphagnum, Juncus effusus/articulatus/acutiflorus, Carex echinata, Ranunculus flammula, Stellaria alsine.*

Includes CS primary code(s): 113 (Fen) 114 (Marsh) 115 (Flush)

12 - Bog
Vegetation dominated by *Eriophorum vaginatum*
Vegetation dominated by other peatland species eg. *Tricophorum, Molinia, Sphagnum* and *Myrica*
Peat land species predominate eg. *Tricophorum, Molinia, Sphagnum* and *Myrica* usually on deep-peat soils or wet peaty rankers

Includes CS primary code(s): 7 (Peat hags) 8 (Current peat workings) 9 (Old peat workings) 111 (Blanket bog) 112 (Other bog)

15 - Montane
Sub-arctic indicators present eg. *J. trifidus, C. bigelowii, Racomitrium* usually on rankers or distinctive arctic-type soils

Includes CS primary code(s): 174 Sub-arctic (montane)

[3] *Molinia caerulea* maybe present sometimes at high cover but species poor, acidophilous vegetation well dominated by *Molinia* should be included under 103 Moorland grass.

18 – Supralittoral rock
Vegetation with some halophytes present usually on sea cliffs

Includes CS primary code(s): 106 Maritime vegetation

19 – Supralittoral sediment
Vegetation consisting virtually entirely of halophytes, usually on mud often much bare ground.
Vegetation growing on sand dunes including yellow dunes, grey dunes and slacks[4].

Includes CS primary code(s): 172 (Sand dune) 116 (Saltmarsh)

26 - Inland rock
Saxicolous (on rock) and chasmophytic (in crevices) vegetation on areas of land which have more than 50% rock (but not including sub-arctic – montane- heath – see 15).

Includes CS primary code(s): 1 (Cliff > 30m high) 2 (Cliff 5-30m high) 3 (Rock outcrop & cliff < 5m) 4 (Scree) 5 (Surface boulders) 6 (Limestone pavement) 10 (Soil erosion) 11 (Ground levelling) 432 (Quarries/mine)

[4] Machair should be coded according to the floristic composition of constituent parcels - this allows variation from place to place within a Machair landscape to be reflected in the land cover map and acknowledges that Machair has cultural and geographical, as well as floristic, connotations.

SECTION 9 - VEGETATION RECORDING IN PLOTS

General

9.1 In 1977/8, as part of the first ITE national sample survey, detailed information on plant species was collected from c. 2,500 plots and linear plots adjacent to some features (hedges, roads and streams). In 1990, the same plots were resurveyed again (as part of a monitoring programme looking at changes in the quality of land cover types, as well as overall changes taking place) and, additionally, a greatly expanded baseline of new plots was established so that a total of c. 11,500 plots were permanently marked in 508 squares.

9.2 In 1998, the previously established plots will need to be relocated (using metal plates, ground-based photographs and field-plans) and recorded. A further new baseline of plots, in certain situations, will also be established. All plots in upland or unenclosed situations will also be marked using Geographical Positioning Systems (GPS) for the first time (see Annex 1).

Method of recording vegetation

9.3 The survey requires recording from different sizes of vegetation plot and fuller descriptions of each are given below. However, the basic recording procedure is the same for all types of plot (except hedgerow diversity plots – see 9.70) and a standardised recording sheet has been devised (Figure 9.1). It has the following sections:

(a) Header - information on the broad environmental and management attributes of the plot should be recorded, according to the parameters listed.

b) Listed species - the main part of the form is taken up with a list of 200 common species of plants (herbs, grasses, bryophytes). Where any of these is present, then the species name should be ticked and, when appropriate, the number of nested plot recorded. On completion of recording, the estimated cover % should be written against each species, using 5% cover categories.

c) Unlisted species - a space remains at the foot of the form in which should be recorded the names, nested plot number, and cover %, for any other species which are not listed (using Latin names in general, but English/Common names should be used for agricultural crops)

(The species list from most plots is largely made up from the species already listed on the recording form with < 10% having to be added.)

9.4 In all cases a sketch should be included on the back of the recording sheet which shows the position of the plot and all relevant measurements and angles, as described below. All vascular plants should be recorded, together with a restricted list of bryophytes and lichens. The list of aggregates and restricted list is given in 9.109 onwards. Species which cannot be easily identified should be collected and pressed for later identification. Mosses/lichens growing on rocks/trees should be ignored.

Figure 9.1 Standard Recording sheet

Fig. 9.1

Square

200m2 (large) QUADRAT X1

Land use	Physiography	Slope	Aspect	Shade	Grazing
		flat slight moderate steep		none partial full	rabbits stock horses deer

Comments :

	Q	%	%		Q	%	%		Q	%	%		Q	%	%		Q	%	%
Bare ground				153 Erio vag				118 Crat mon				311 Ping vul				446 Trif dub			
213 Barley				228 Junc a/a				121 Crep sp.				315 Plan lan				448 Trif pra			
454 Wheat				230 Junc bul				590 Dact mac				316 Plan maj				449 Trif rep			
GRASSES				231 Junc con				132 Digi pur				324 Poly avi				841 Trip mar			
10 Agro can				232 Junc eff				136 Dros rot				328 Poly per				458 Ulex eur			
8 Agro rep				235 Junc squ				140 Empe nig				833 Poly vul				462 Urti dio			
11 Agro sto				260 Luzu c/m				141 Endy non				336 Pote ans				463 Vacc myr			
12 Agro ten				443 Tric cae				143 Epil hir				337 Pote ere				467 Vero arv			
20 Alop gen				***FERNS etc***				747 Epil mon				339 Pote rep				469 Vero cha			
21 Alop pra				41 Athy fil				144 Epil pal				342 Prim vul				471 Vero off			
28 Anth odo				53 Blec spi				150 Eric cin				343 Prun vul				472 Vero ser			
37 Arrh ela				137 Dryo dil				151 Eric tet				346 Prun spi				477 Vici sep			
562 Aven fat				138 Dryo fil				160 Euph sp.				350 Quer sp.				482 Viol pal			
56 Brac sy				147 Equi arv				168 Fili ulm				351 Ranu acr				849 Viol r/r			
58 Brom mol				348 Pter aqu				170 Frax exc				354 Ranu fic				490 Vero per			
61 Brom ste				***FORBS/WOODY Sp.***				177 Gali apa				355 Ranu fla				***MOSSES/LICHENS***			
123 Cyno cri				2 Acer pse				182 Gali pal				357 Ranu rep				850 Brac sp.			
124 Dact glo				4 Achi mil				183 Gali sax				370 Rosa sp.				512 Clad imp			
129 Desc ces				5 Achi pta				190 Gera mol				373 Rubu fru				106 Clad pyx			
130 Desc fle				18 Alli pet				193 Gera rob				375 Rum a'sa				513 Clad unc			
165 Fest ovi				26 Ange syl				195 Geum urb				376 Rum a'la				519 Dicr het			
166 Fest rub				29 Anth syl				197 Glec hed				837 Rume con				131 Dicr sco			
209 Holc lan				587 Arum mac				204 Hede hel				378 Rume cri				161 Eurh sp.			
210 Holc mol				47 Bell per				206 Hera sph				380 Rume obt				216 Hylo spi			
253 Loli mul				50 Betu sp.				207 Hier pil				381 Sagi sp.				222 Hypn cup			
254 Loli per				64 Call vul				208 Hier sp.				386 Samb nig				530 Loph sp.			
283 Moli cae				68 Camp rot				220 Hype pul				401 Sene jac				280 Mniu hor			
287 Nard str				69 Caps bur				223 Hypo/Leo				402 Sene vul				282 Mniu und			
304 Phle pra				70 Card h/f				238 Lami alb				405 Sile dio				535 Pell sp.			
319 Poa ann				71 Card pra				239 Lami pur				413 Sonc asp				314 Plag und			
321 Poa pra				92 Cent nig				240 Laps com				414 Sonc ole				318 Pleu sch			
847 Poa triv				96 Cera fon				243 Lath pra				415 Sorb auc				331 Poly com			
404 Sieg dec				97 Cham ang				255 Loni per				420 Stac syl				843 Poly jun			
SEDGES/RUSHES				98 Chen alb				256 Lotu cor				421 Stel als				279 Pseu pur			
74 Care bin				101 Chry opp				273 Matr mat				423 Stel hol				543 Rhac lan			
76 Care dem				103 Cirs arv				277 Merc per				424 Stel med				364 Rhyt lor			
78 Care ech				104 Cirs pal				286 Myri gal				427 Succ pra				365 Rhyt squ			
81 Care nig				105 Cirs vul				288 Nart oss				430 Tara agg				558 Spha g/f			
85 Care pan				113 Cono maj				296 Oxal ace				845 Thym dru				559 Spha g/t			
86 Care pil				114 Conv arv				302 Pedi syl				441 Tori jap				561 Spha r/t			
152 Erio ang				117 Cory ave				307 Pice sit				443 Tric cae				439 Thui tam			

OTHER SPECIES	Q	%	%		Q	%	%		Q	%	%

9.5 Estimates of cover should then be made within 5% categories. It is necessary to constantly check between partners that there is not a tendency to over or under estimate. Cover may be over 100% if several layers are present e.g. *Pteridium* (100%) over *Agrostis* (25%). Species with less than 5% cover are given a cover value of '1'.

9.6 Cover of tree species, if rooted in the plot, should be recorded in the normal way; there is no need to record any difference between seedlings and adult trees. Tree species which are overhanging the plot should have cover recorded in the second % cover column, in brackets. 'Bare ground' includes leaf litter and rock.

Plot types

9.7 The following types of plots are to be recorded in each square:

Code	Name	Other names	Where	Size	No. per square
Areal plots					
X[1]	Large	'Wally plot' Main	Random points in open polygons	200 m^2	5
Y[2]	Small	Targeted Habitat	Semi-natural vegetation	4 m^2	Up to 5
U[3]	Unenclosed		Unenclosed broad habitats	4 m^2	Up to 10
Linear plots					
B[2]	Boundary		Adjacent to large plots (X plots)	10 x 1 m	5
A[3]	Arable		Arable field margins	100 x 1 m	Up to 5
H[1]	Hedgerow		Alongside hedgerows	10 x 1 m	2
D[3]	Hedgerow diversity		Hedgerows	30 x 1 m	Up to 10
S[1]/W[2]	Streamside		Alongside running water courses	10 x 1 m	5
R[1]/V[2]	Roadside		Alongside roads and tracks	10 x 1 m	5
				MAX	52

[1] first recorded in 1978
[2] first recorded in 1990
[3] new in 1998-05-05

9.8 Of the 568 squares that will be surveyed in 1998, 60 will be 'new' and some plots will not have been marked on maps; the surveyor will need to apply rules (given below) to identify the location of these plots within the square.

(**N.B.** no plots should be located below the Mean High Water (MHW) mark.)

i. X PLOTS - LARGE, MAIN OR 'WALLY' PLOTS (X1 - X5) (and erosion scars)

Locating new plots (in new squares)

9.9 These large plots (200m^2 - 'Wally plots') will be marked on the maps in advance, and should be located on the ground as accurately as possible to the position shown on the map.

9.10 There will be instances where the land use has changed so that a vegetation plot is no longer appropriate eg a field has been developed into a housing estate. If the new land use is characterised by a vegetation in which a plot can be placed (eg golf-course) then the original position should be re-located and a plot should be recorded. Where the new land use clearly precludes the recording of vegetation, a new plot position should be selected as follows:

> Locate the boundary between the developed area of land and the nearest vegetated land cover type; locate a position on that boundary which is nearest to the original plot; take 20 (twenty) 1 m paces in the opposite direction to the original plot; record full details of the changes involved.

Relocating plots in 'old' squares

9.11 In most squares, the X plots will have been marked in 1990 using the following methods:

- Plans (including measurements and bearings) drawn on the back of the plot recording sheet
- Ground-based photographs
- Metal plates at the south-most corner of the plot (or in the field boundary)

(Always check sketched plans carefully in case there has been any deviation from the standard approach outlined here).

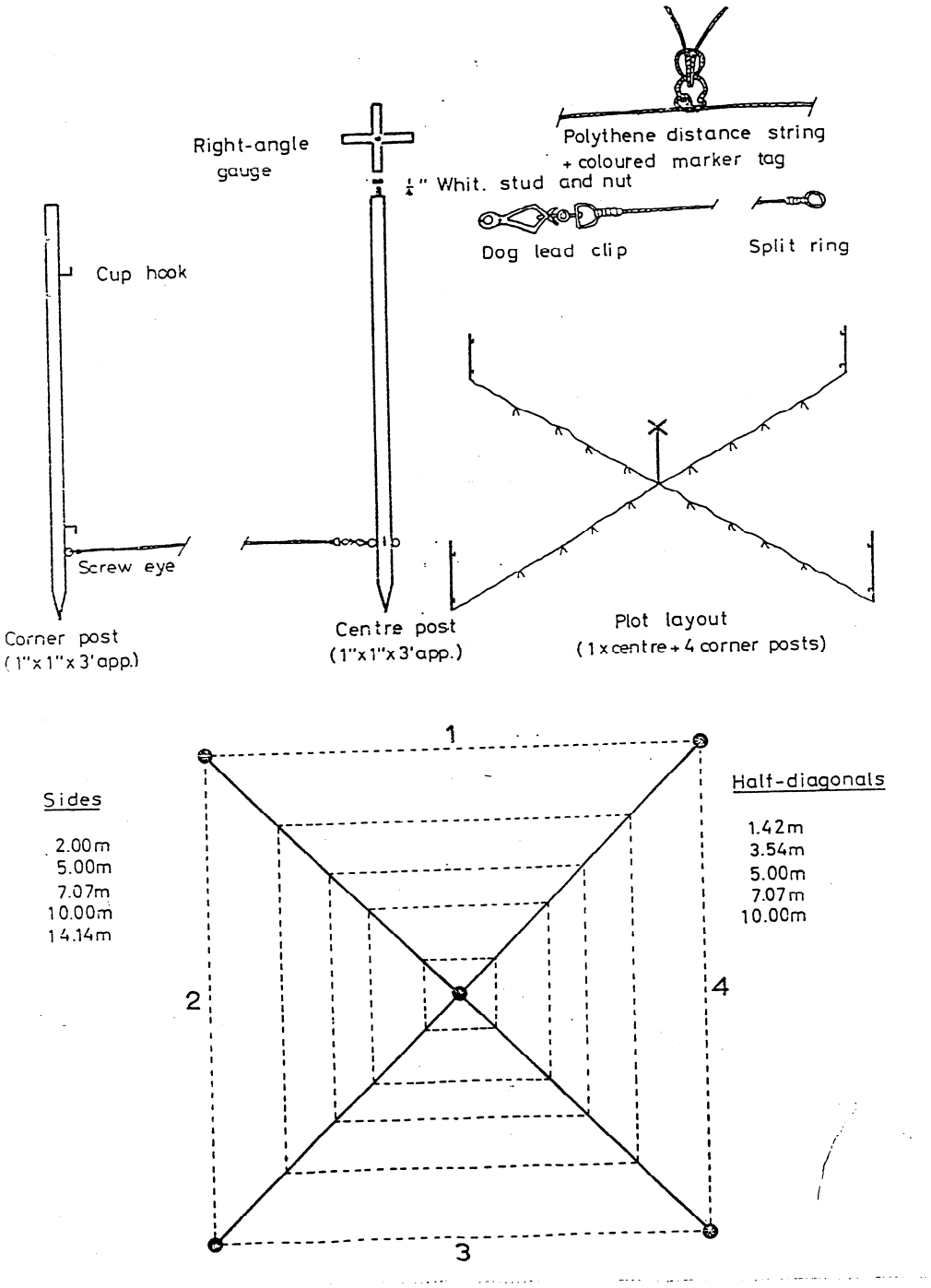
9.12 The metal plate is the proof of relocation. In a pilot study in 1991, 70% of all metal plates were found within five minutes, one year after burial. If the plate cannot be detected within 10 minutes of searching (or longer if time permits), then the plot should be located as well as possible using the plan and photograph, a new plate should be buried (see 9.18) and a note should be made on the plot recording sheet.

Laying out and recording

9.13 The vegetation plot is 200 m^2 and is set up by using the survey poles provided with the strings forming the diagonal of the square (Figure 9.2). The diagonals should be orientated carefully at right angles and the plot should be orientated with the strings on the North/South, East/West axes. The different nested plots shown in Figure 9.2 are marked by different coloured strings on the appropriate position of the diagonal.

(IMPORTANT: the plot strings stretch with use. Their length should be checked and adjusted if necessary, at weekly intervals.)

Figure 9.2 Design of X (Wally) Plot



9.14 Details of the plot should be entered at the top of the recording form according to the prompts given. Any additional comments, not covered elsewhere, should be entered in the space provided.

9.15 Using a pencil on the recording form provided, all species are recorded from the inner nested ($4m^2$) plot first, either by ticking the species names on the "top 200" list or by adding species names at the bottom of the recording form. A "1" should then be recorded in the column headed "Q" to show that the species was recorded in the first plot. The cover, in 5% bands, should then be shown in the second column (marked "%").

9.16 When the inner plot has been completed, the second nested plot should be examined and any additional species should be recorded using a "2" in the "Q" column. No cover estimate is made at this stage. Each additional nested plot (labelled 3 – 5)is examined in this way until all sizes of plots have been recorded. Only after a final check for any missed recordings is a final overall cover estimate made for all species with a cover of 5% or more in the whole $200m^2$ plot (ie including the inner $4m^2$).

9.17 If the plot falls in a field with a growing crop (whether harvested or not) then the plot should be moved to the edge of the field nearest to the original position. The new plot should be taken as being a 14m square (estimated, not measured), starting 3 metres into the crop (to avoid any edge effect). Access should be made using drill lines where possible and causing minimum disturbance to the crop (or where the crop may be on a future visit). The species list should be compiled from what can be seen in the crop - accuracy is difficult to achieve but samples must be taken from arable crops however possible.

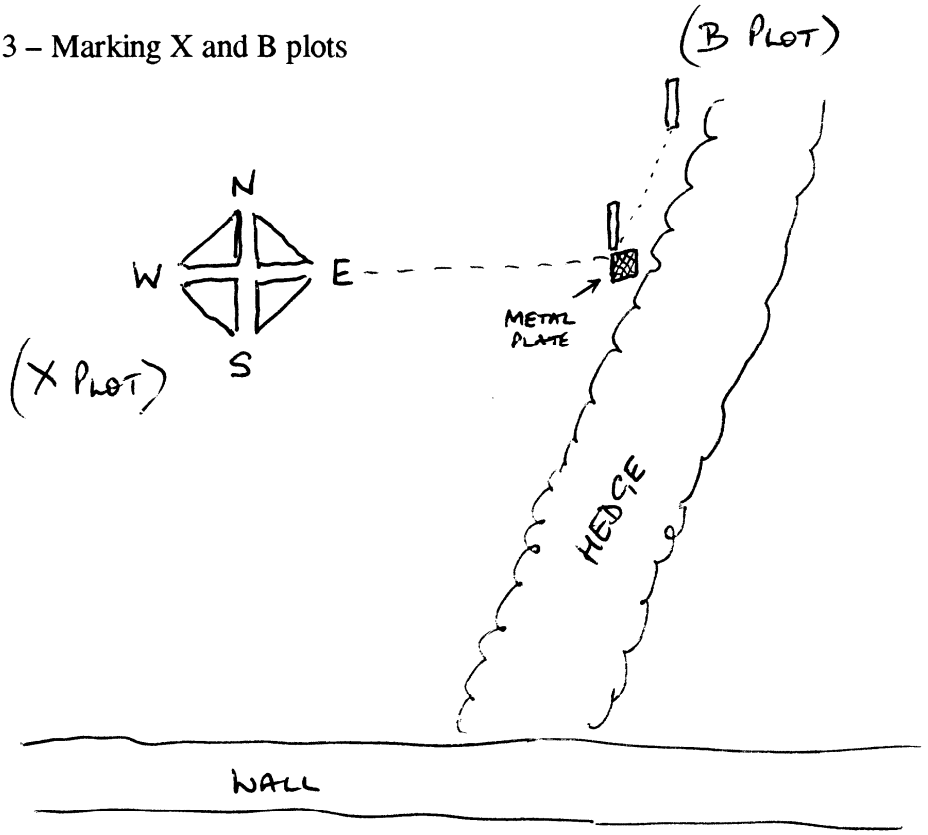
Permanent marking

9.18 Wherever possible, the plot should be marked with a metal plate immediately adjacent to the south corner of the plot (and sloping away from the plot). This should be possible in most unenclosed land and in woodlands. The plate should not be within the plot itself; it should be driven into the ground at an angle of 45 degrees until the top edge is just below ground level (aligned to give maximum likelihood of easy relocation with a metal detector). Wooden stakes may be suitable in woodlands and moorland situations where metal plates would be difficult to re-locate.

9.19 Elsewhere, in cultivated land or wet habitats, plots should be marked by inserting a plate at the nearest field boundary, along a cardinal bearing line (Figure 9.3). The distance of the boundary from the plot should be measured from the centre of the plot to the centre of the boundary. In semi-enclosed areas where plate burial is inappropriate and where boundaries are more than 100 metres away, there should be an attempt to mark the plot by reference to an obvious local feature, such as a boulder or tree where the plate should be buried (N.B. see Boundary Plots for definitions of field boundary)

9.20 In all cases, the position of the plot, and marker plate(s) should be sketched on the reverse of the recording sheet, and annotated with distances (measured with a tape) and, if measurements are not possible, compass bearings (not corrected for magnetic deviation). All distances and bearings should be taken from the centre of the plot to easily recognisable, and permanent, features in the surrounding landscape. A print photograph should be taken (see Section 11 -Photography).

Figure 9.3 – Marking X and B plots



RECORDING EROSION SCARS

Background

A number of organisations have suggested that there has been a marked increase in soil erosion in the uplands over the last 10 to 20 years. These views are largely based on anecdotal evidence although data from upland tarns in the Lake District suggests increased rates of sedimentation over the last 20 years. The Royal Commission on Environmental Pollution's report on the Sustainable Use of Soils also highlighted the issue and stressed the need for better information. In an effort to assess the situation MAFF have contracted a consortium comprising ADAS, SSLRC, ITE and IFE to collate available information and collect new field data from sample areas. The study, now in its second year, is based on field and aerial photographic survey of sample areas, and determination of variation in sedimentation rates over time in upland lakes and sediment transport in streams. CS2000 provides a means of collecting potentially valuable additional information from a wide range of land types distributed throughout GB. This will aim to use simple recording of visual evidence of erosion scars within the survey squares to assess frequency of occurrence and explore relationships to land cover and soil type. Although the current MAFF supported study is focused on the uplands, the Ministry has funded parallel work in the lowlands. It has been

decided that data will be collected from all the CS 2000 sample squares to provide national cover and to input data to the upland study and comparative data for the earlier lowland studies.

Features of an erosion scar

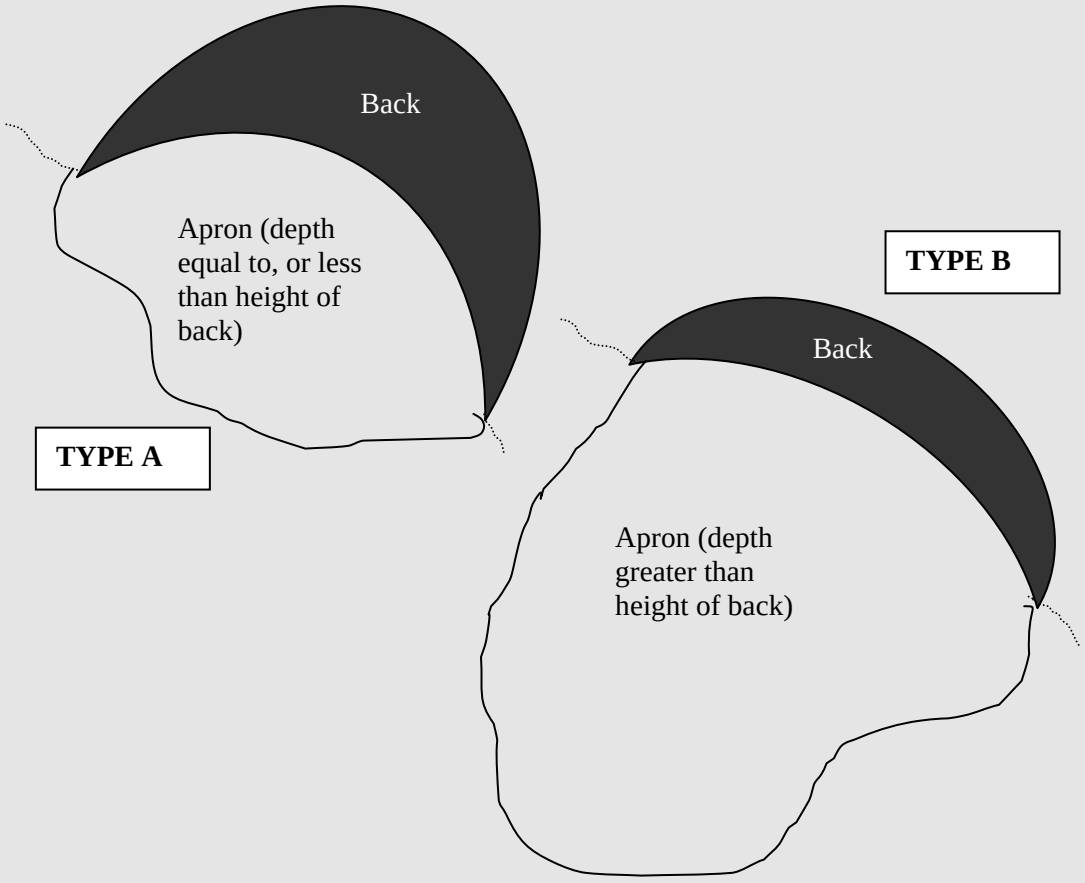
Erosion scars are areas of soil (including peat) that have been eroded by animals (typically sheep but also by cows and other animals). They tend to have a more or less vertical back face and a horizontal or sloping apron in front of the face (see examples below). There are often hoof prints in the apron area and sometimes wool around the back face where sheep have been scratching on the banks of the scar. Scars can be of any size from a few centimetres across to a whole hillside. Only **un-vegetated** soil erosion areas (back and/or apron) constitute a scar.

There are two types of scar to be recorded:

Type A – where the depth of the apron is equal to or less than the height of the back – these scars tend to be stable.

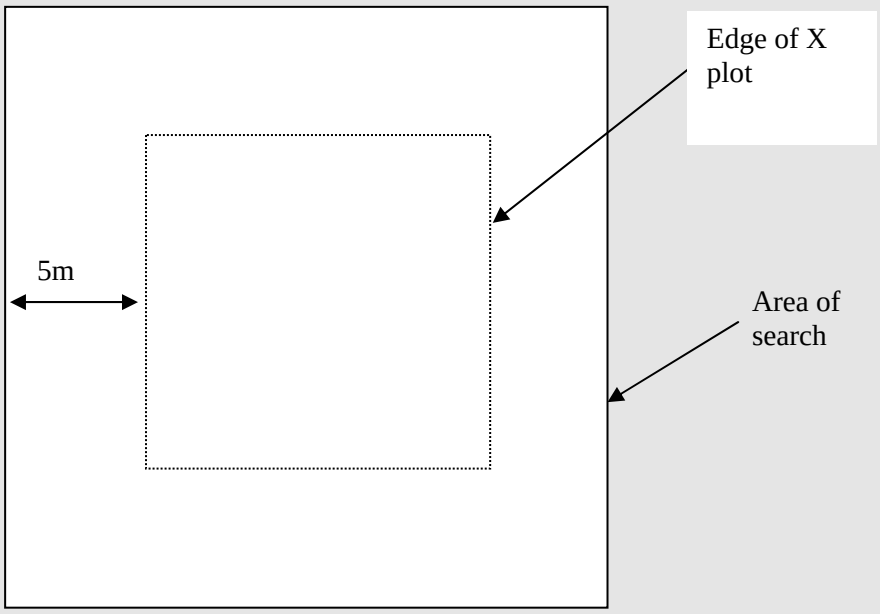
Type B – where the depth of the apron is greater than the height of the back – these tend to be loose, expanding scars.

Examples of Type A and Type B scars



Where to search for scars

The area of search is within and around X plots. The presence or absence of any erosion scars which lie within 5 m of the edge of an X plot (only – no other plot type) should be recorded on the recording form (see example below). No estimate of the number of scars is necessary.



Where to record scars

The presence of scars should be recording on the Scar Recording Form with a simple tick (presence) or cross (absence) for each type of scar as follows:

Square no. ……1234…….

Plot No	Type A scars	Type B scars
X 1	✓	✓
X 2	x	x
X 3	x	x
X 4	x	✓
X 5	x	x

ii. Y PLOTS – SMALL, TARGETED OR HABITAT PLOTS (Y1 - Y5)

9.21 For the first time in 1990, five plots were established as a baseline for monitoring vegetation change in semi-natural habitats. In 1998, these will be re-recorded and, in new squares, baseline plots will also be established.

Location in New squares

9.22 Five small plots (2m x 2m) should be placed in natural or semi-natural land cover types in each square. They will be placed by the surveyor according to the following guidelines:

1 The five plots should be placed in five different land cover types, where these are available, additional to those types that have already been represented by the five large plots.

2 The plot locations should be determined after all land cover mapping has been completed and may be placed in habitat parcels of any size.

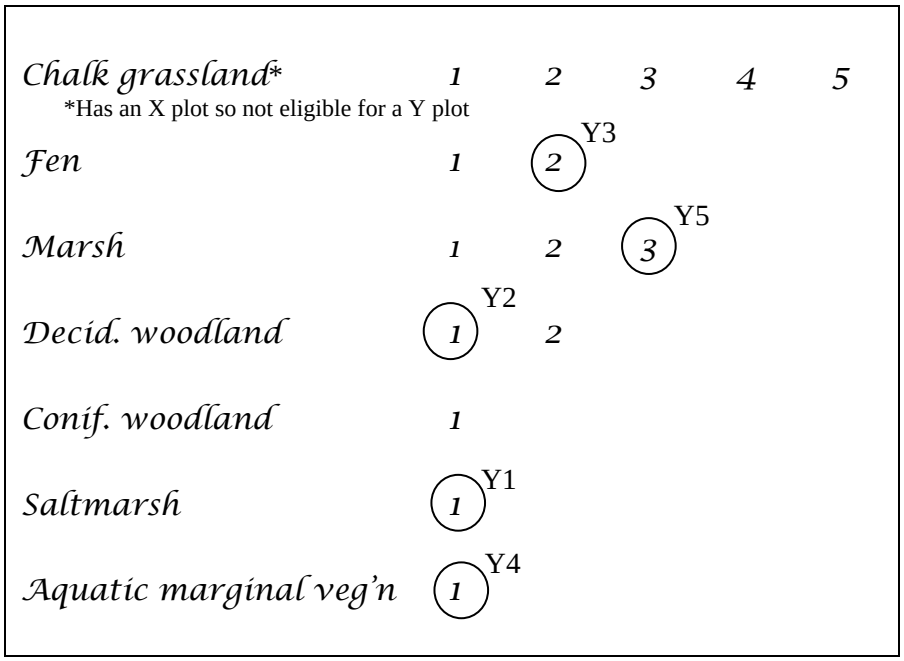
3 During the mapping phase, the presence of small areas of natural or semi-natural vegetation which are below the size of a minimum mappable unit should be noted (and mapped, if helpful), to expand the range of possible Y plot locations. Land cover categories which are additional to the mapping codes might include:

Strand-line vegetation
Dune slack
Dune grassland
Dune scrub
Machair
Inland saltmarsh
Inundation grassland
Ultrabasic vegetation
Calcareous flush
Acid/neutral flush
Bryophyte dominated springs
Montane heath
Rock ledges

4 If the total number of different semi-natural and natural land cover types exceeds five, then random numbers should be used to draw five types for sampling (remembering not to sample those already represented within the large plots). Where there is more than one area of a type, then the largest area should be chosen.

5 If there are fewer than five additional land cover types available in which to place the plots, then the placing of plots will be proportional to the size of land cover types available (ie the larger land cover types receive more plots). This can be done by dividing the areas of each type into "mappable areas" and comparing sizes.

6 In all cases, a complete record of suitable habitats should be recorded, together with the frequency of each. The five plot numbers should be indicated on the same list, as shown in the following example:



Relocation in Old squares

9.23 The plots will have been marked using metal plates, ground-based photographs ground-plans. The plots should be re-located as in the case of X plots (above). The following description of how to lay out, record and mark plots is important in new squares and also aids understanding of how plots were set up previously in old squares.

Laying out and recording

9.24 The plot should be in the 'centre of gravity' of the habitat - this is a large element of judgement involved but efforts should be made to avoid bias in positioning of the plot. If the centre of gravity is not representative of the habitat type (eg rock boulder in middle of flush), then re-randomise the plot location.

9.25 If the plot is put into a linear feature within which a 2x2 m plot will not fit then the area should be made up to $4m^2$ by extending the length - this should be clearly depicted with measurements in the sketch on the back of the recording sheet.

9.26 The survey poles should be used to mark out the corners of the plot by reference to the first set of marker strings (equivalent to the inner nested plot of the large plots). As with large plots, the poles should be orientated along north/south, east/west axes. However, in a linear feature, this may not be possible and the main axis of the plot should be measured and recorded.

9.27 The species present in the square should be recorded in the same way as for the inner nested plot of the large plots and a cover estimate made.

Permanent marking

9.28 In many cases it will be possible to place the plate immediately adjacent to the survey pole at the south point of the plot, but just outside (6") the plot boundary. If the plate has to be placed elsewhere, around the perimeter of the plot, then this should be clearly shown on the associated sketch.

9.29 If it is not possible to place the plate adjacent to the plot, then it should be placed at the nearest possible location and distances and angles measured to show the precise location.

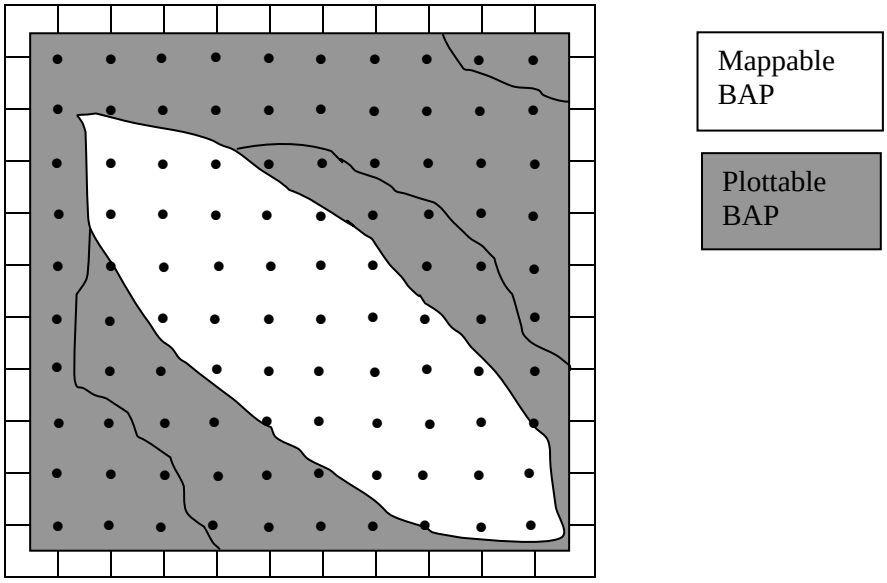
iii. U PLOTS - UNENCLOSED PLOTS (U1 – U10)

9.30 These plots are being introduced into the CS methodology for the first time in 1998 (see 6.9 and 6.10). Up to 10 plots will be established in any Plottable Broad Habitats that occur within the square. The plots will be 2 x 2 m in all instances, irrespective of the habitat in which they are located.

Location in all squares

9.31 It is necessary to have completed the mapping at broad habitat level (including any changes in these) before any plots are established (ie. plots must be allocated according to the 1998 broad habitat map).

9.32 The number of plots depends on the proportion of the square that is occupied by Plottable Broad Habitats. If the whole square comprises Plottable Broad Habitats, then 10 U plots will be established; if half the square is made up of these habitats, then 5 U plots will be placed. A dot grid is provided to allow estimation of the proportion of the square which is made up of unenclosed habitat types (and thence the number of plots to be established). Thus, in the example below, about 63% of the square is in the Plottable Broad Habitat area and so 6 plots can be allocated.



9.33 Once the number of plots has been determined, then the plots are distributed among the different broad habitats, as follows:

- If there are more plots available than there are different broad habitats, then:

  (i) At least one plots is placed in each Broad Habitat (to ensure representation of all Plottable Broad Habitats present within the square).

(ii) The remaining plots are then allocated to the habitats in proportion to their area, as shown in the following example where 6 plots are available for placement:

Plottable BAP type	% of plottable BAP area	Compulsory plots	Allocation of remaining 3 plots	Total plot allocation
8	63	1	63% of 3 = 2	3
9	30	1	30% of 3 = 1	2
10	3	1	3% of 3 = <1 (=0)	1

- If there are more broad habitat types present than there are plots available, then the plots are allocated randomly to the habitat types but, not more than one per type.

N.B. all mosaics are treated as one single BAP category, irrespective of their component parts.

9.34 Once it is known how many plots are to be placed in each habitat type, then plots should be placed at random points, within each habitat, on the overlay grid (chosen using the random number tables provided). Where a Broad Habitat type is not 'hit' by any grid point, then the plot should be located in the centre of gravity of the largest parcel of that Broad Habitat type.

N.B. no plot should be placed within 10 m of an existing Y plot

Laying out and recording

9.35 If the plot is put into a linear feature within which a 2x2 m plot will not fit then the area should be made up to $4m^2$ by extending the length - this should be clearly depicted with measurements in the sketch on the back of the recording sheet.

9.36 The survey poles should be used to mark out the corners of the plot by reference to the first set of marker strings (equivalent to the inner nested plot of the large plots). As with large plots, the poles should be orientated along north/south, east/west axes. However, in a linear feature, this may not be possible and the main axis of the plot should be measured and recorded.

9.37 The species present in the square should be recorded in the same way as for the inner nested plot of the large plots and a cover estimate made.

Permanent marking

9.38 In many cases it will be possible to place the plate immediately adjacent to the survey pole at the south point of the plot, but just outside (6") the plot boundary. If the plate has to be placed elsewhere, around the perimeter of the plot, then this should be clearly shown on the associated sketch.

9.39 If it is not possible to place the plate adjacent to the plot, then it should be placed at the nearest possible location and distances and angles measured to show the precise location.

9.40 As with other plots, the U plot should be marked with a metal plate immediately adjacent to the south corner of the plot, a photograph should be taken and GPS readings made.

LINEAR PLOTS

General rules for linear (10 x 1m) plots:

1. **No two linear plots of the same type should be placed within 10 m of each other on the same linear feature.**

2. **No two linear plots of different types should overlap.**

3. **The 1 metre width should be measured across the surface of the terrain so that, on a bank, the true horizontal width, as viewed from above, would be less than 1 metre.**

iv. B PLOTS - BOUNDARY PLOTS (B1 - B5)

9.41 For the first time in 1990, five plots were established as a baseline for monitoring vegetation change in field boundaries. In 1998, these will be re-recorded and, in new squares, baseline plots will also be established.

Location in New squares

9.42 In enclosed land only, a boundary linear plot is to be recorded at the boundary marker of each of the 5 x 200m^2 plots (see Figure 9.3).

9.43 In this context, a boundary is taken to be any physical feature that has a length and which is an interface between the land cover of the 200m^2 plot and any other land cover type. This might include a hedge, wall, fence, ditch, embankment etc. It will not include land cover which is associated with the management practice of the field eg headlands.

9.44 In general the Boundary plot will take precedence over other types of linear plot. If two plots would otherwise end up in the same location, then the Boundary plot would be laid out and the other linear feature moved to the nearest permissible length of boundary which was at least 10m away. The exception is where a linear plot has previously been located in the same position as a Boundary plot would fall. In this case the Boundary plot would be moved to the next nearest length of boundary on a different cardinal bearing.

9.45 The marker plate for the 200m^2 plot should have been positioned at the boundary nearest to the plot and should be lying on one of the cardinal points of the compass, as measured from the centre of the plot.

Relocation in Old squares

9.46 The plots will have been marked using metal plates, ground-based photographs and ground-plans. The plots should be re-located as in the case of X plots (above).

Laying out and recording

9.47 The linear plot should be laid out with the marker plate on the right side of the plot when you are facing it from the field. In most cases the feature recorded will be vertical, ie. a hedge, wall or fence - in these cases the plot should occupy the 1m strip running outwards from the centre of the feature (except a wall where the 1m is from the base) . In some cases where there is no vertical feature, but a grass strip, the plate should be buried 1m in from the edge of the field (crop), and the linear plot should be recorded in the 1m adjacent to the edge (see Figure 9.4).

9.48 Where the boundary is composed of several different elements eg hedge with ditch, then the laying out procedure should be decided by reference to the dominant vertical feature eg hedges/walls/fences are dominant to ditches which are dominant to grass strips. Once the dominant feature has been identified and the plot laid out accordingly, then recording takes place in the 1m strip, irrespective of whether it includes part of another linear feature. (N.B. different rules apply in the case of H, S/W, R/V plots - see below)

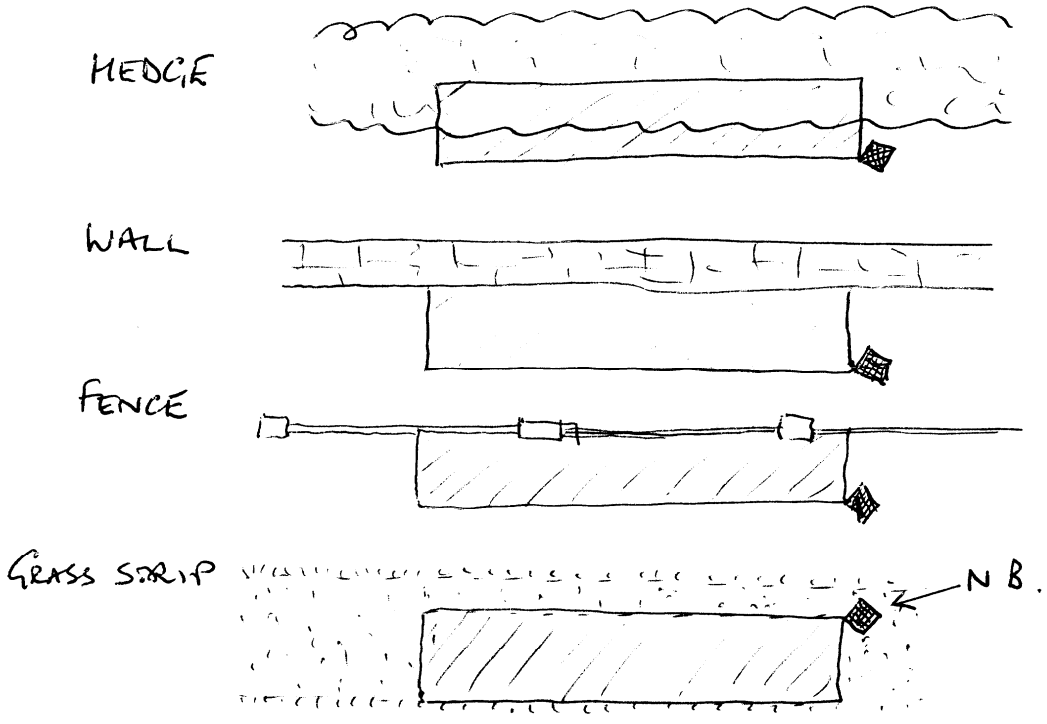
9.49 Boundary plots which are adjacent to large ditches or dykes should be located at the water's edge, and not at the top of the bank. Where a field is immediately adjacent to a curtilage, then the boundary plot should run from the curtilage into the field.

9.50 All species within the plot are recorded using standard recording forms and cover estimates made.

Permanent marking

9.51 In some cases, the plate used to mark the Boundary plot may also be serving to mark (remotely) the adjacent X plot. In other cases, a separate plate will need to be buried for the Boundary plot. Note that in either case, the plot lies to the left of the marker when viewed from the field.

Figure 9.4 - Laying out a Boundary plot in different circumstances



v. A PLOTS - ARABLE FIELD MARGIN PLOTS (A1 – A5)

9.52 Arable field margin plots are being recorded for the first time in 1998. The purpose of establishing these plots is to record changes in the arable weed population at the edge of cultivated fields. It is reckoned that the non-crop plant diversity increases towards the edge of a field and the field edge may contribute an important source of biodiversity.

Location/Relocation

9.53 The A plots will only be located adjacent to those Boundary plots (see above) which border arable fields; thus up to 5 A plots per square are possible.

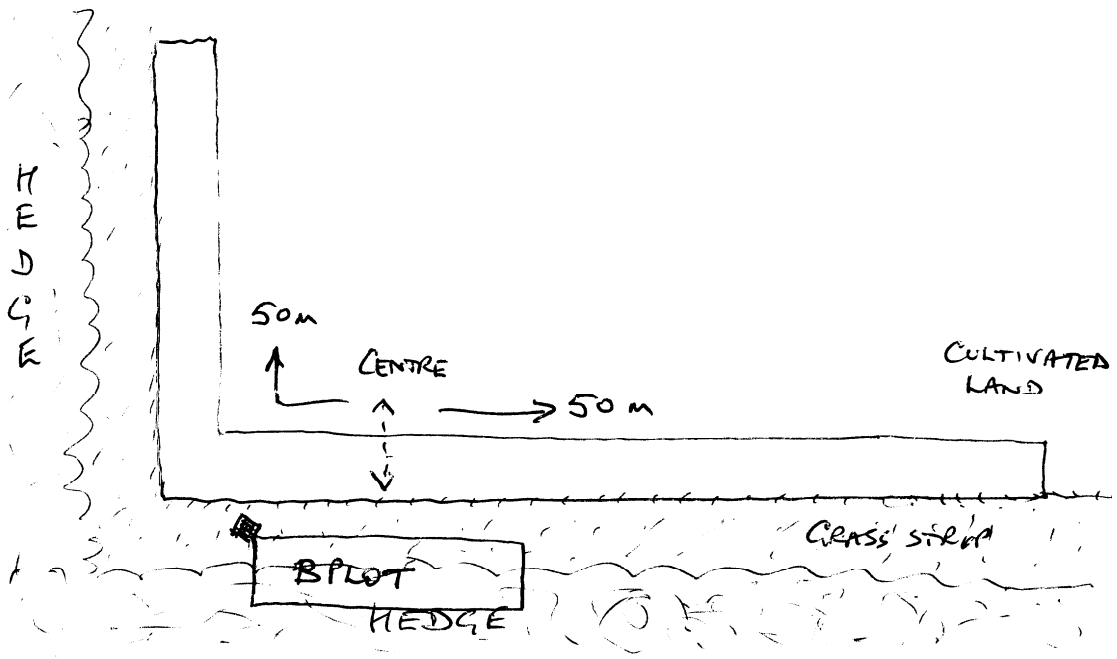
9.54 The A plots are 100 x 1 m where the 1 m is the outermost cultivated meter of the field and the 100 m is centred on the B plot.

9.55 The plot should always extend 50 m outwards from the B plot even if this means continuing along a second side of the field

Laying out and recording

9.56 It is unrealistic to mark out the exact dimensions of A plots. Instead, the 50m tape should be run out in each direction (successively) from the centre of the B plot (Figure 9.5). A plot pole or cane, with a 1 metre mark, should then be used to check the width of the plot as it is walked and recorded.

Figure 9.5 - laying out an arable field margin plot



9.57 All species within the plot are recorded using standard recording forms (but cover estimates are not required).

Permanent marking

9.58 There is no need to permanently mark the plot as location is determined by the already marked B plot.

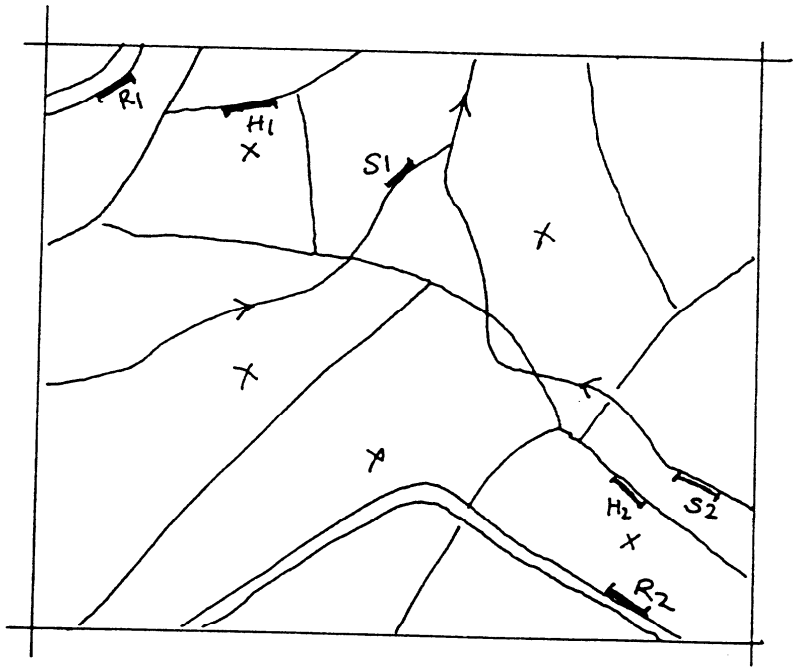
vi. H PLOTS - HEDGEROW PLOTS (H1 - H2)

9.59 The two hedgerow plots in each square were first recorded in some squares in 1978 and in others in 1990. Similarly, in new squares in 1998, two hedgerow plots will be established if hedgerows are present.

Location in New squares

9.60 The linear plots (2 each for hedgerows, streamsides and roadsides) are 10 x 1 m; they should be located as close as possible to the two large plots (200m^2) which are furthest apart (see Figure 9.6). They must then be marked on the map provided.

Figure 9.6 - location of linear plots in 1977/78



9.61 On reaching the linear feature, from the 200m^2 plot, the 10m plot is laid out to the left and the 1m width extends out towards the field from the centre of the hedge.

9.62 Where the nearest feature is ineligible (because it is not wide enough, or is confused by the presence of a different type of linear within its width – see 9.67) then a new location should be chosen at the nearest permissible position. Any changes should be noted and clearly marked on sketch maps.

Relocation in Old squares

9.63 In the case of already established plots, the original positions will be marked on the map - they should be relocated as closely as possible. As with other marked plots, if the metal plate cannot be found within 10 minutes searching, then the plot should be located as well as possible using the plan and photograph, a new plate should be buried (see 9.69) and a note should be made on the plot recording sheet.

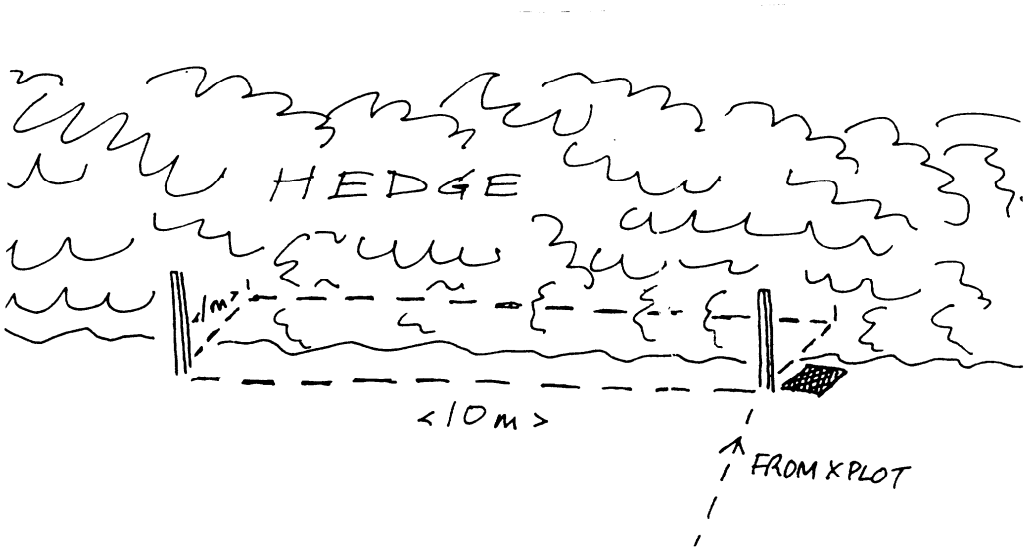
9.64 If there is no longer a hedgerow at the position marked, then this should be indicated on the map and the plot should be moved to the nearest hedgerow - this new plot should be renamed (H3, H4 etc) and marked on the map.

9.65 If one or both hedges are not marked on the map but hedges exist in the square, they should be added using the methodology described above for new squares. However 2 plots should not be nearer than 10m to each other, so if there is not more than 20m of continuous hedge in the square, only one plot should be recorded.

Laying out and recording

9.66 The position of the plots should be temporarily marked with a survey pole at each end, one metre out from the centre of the hedge (see Figure 9.7). A measuring tape can be used to mark the outer edge of the plot.

Figure 9.7 - laying out a hedgerow plot



9.67 If there is not a clear metre between the centre of the hedge and another linear feature, eg ditch, then the hedge plot should be relocated at the nearest permissible location.

9.68 All species should be recorded on the standard recording sheet and cover estimates made.

Permanent marking

9.69 Each plot should be permanently marked with a metal plate at the right hand end of the plot when you are facing it from the field - the location of the plate should be indicated on a sketch with distances from a marked feature, eg. gate.

vii. D PLOTS - HEDGEROW DIVERSITY PLOTS (D1 – D5)

9.70 The hedgerow diversity plots are being recorded for the first time in 1998. The overall purpose is to set up a baseline of plots to monitor woody species diversity and the presence of rarer woody species.

Location/Relocation

9.71 In all squares where hedgerows are present, then 10 D plots need to be recorded. Each plot is 30 m long and includes the full width of the hedgerow.

9.72 The position of the D plots cannot be decided until mapping of all hedgerows has been completed (because plot selection depends on knowing where all hedgerows are).

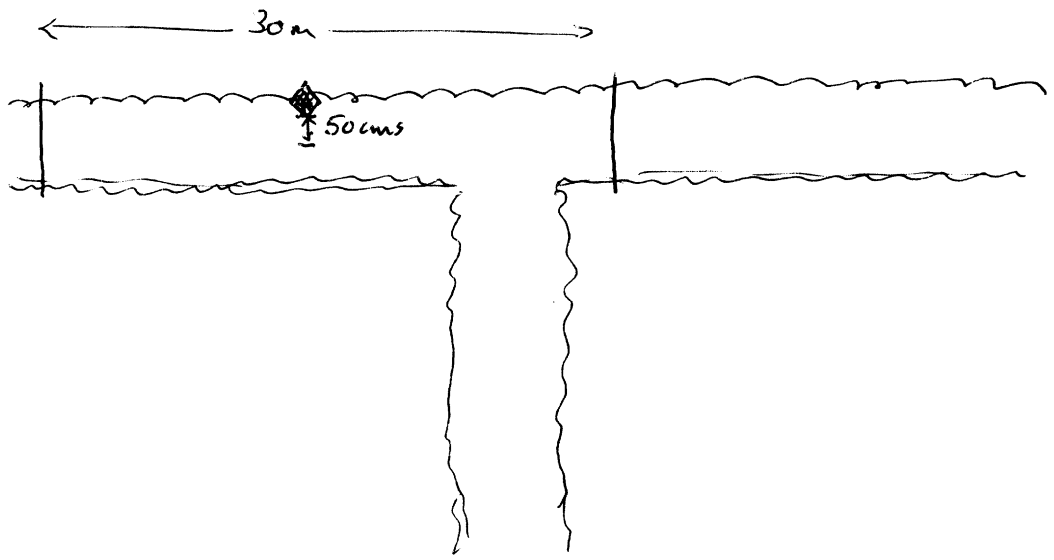
9.73 Two of the 10 plots must incorporate the existing H plots and comprise the 10 m H plot at the centre with extensions of 10 m at each end.

9.74 The other 8 plots are located by placing the **D plot template** over the boundaries page of the FAB. For each point on the template, the nearest point on a mapped hedgerow should form the centre point of one of the 8 extra plots.

Laying out and recording

9.75 The plot does not need to be fully marked out but, rather, the tape should be used to check the length of the plot (15 m in each direction from the centre point) (see Figure 9.8).

Figure 9.8 - Laying out a hedgerow diversity plot



9.76 All woody species present in the hedgerow should be recorded on the appropriate plot sheet, together with an estimate of overall canopy composition. Woody species includes rose and climbers such as honeysuckle but not bramble (if in doubt about whether a species is truly 'woody', record it anyway). You may need to record from both sides of the hedge if it is tall or wide.

Permanent marking

9.77 The 8 extra plots should be permanently marked (metal plates, photographs and plot diagrams) at the centre point along the 30 m length. The plate should be buried 50 cms out from the centre line of the hedge and the plan should indicate clearly on which side the plate is buried and photographs taken.

viii. S & W PLOTS - STREAMSIDE PLOTS (S1 - S2; W1 - W3)

9.78 Streamside plots is a convenient name given to those linear plots which lie alongside running water features (mainly rivers and streams but also canals and ditches). The S and W prefixes refer to the different origins of the plots:

S plot two **S**treamside plots were established in 256 1 km squares in 1978, using a random allocation procedure (and were re-recorded in 1990) – two S plots were also recorded in all new squares in 1990,

W plots three additional **W**aterside plots were placed in all squares in 1990 to increase representation of other waterside types.

9.79 As happened with new squares in 1990, all five plots will need to be established in all new squares in 1998

Location in New squares

S plots

9.80 The two linear S plots are 10 x 1 m; they should be located as close as possible to the two large plots ($200m^2$) which are furthest apart (see Figure 9.6). They must then be marked on the map provided.

9.81 On reaching the linear feature, from the $200m^2$ plot, the 10m plot is laid out to the left and the 1m width extends landwards from the point where it appears that water reaches when the watercourse is full (but not flooded). Only permanent water courses should be included; ditches may be included if they appear to be normally wet.

9.82 Where the nearest feature is ineligible (because it is not wide enough, or is confused by the presence of a different type of linear within its width) then a new location should be chosen at the nearest permissible position. Any changes should be noted and clearly marked on sketch maps.

W plots

9.83 These waterside plots should be used to ensure that different types of ditches/streams/ rivers are sampled where they exist. If all types are not represented, then samples should be allocated according to the total lengths of the different types present (ie the type with the longest length has most plots). If possible, the variation within more common types should be expressed in the choice of plots.

The following categories are recognised :

River or canalised river
Stream
Canal
Non-roadside ditch
Roadside ditch (as defined for map codes 53 - 58)

9.84 Dry ditches should not be included. The first priority is to ensure that there is at least 1 plot in each category existing in the square, including the 2 original plots S1 & S2. The second priority is to include as much variation as possible so that lengths of stream with species assemblages not covered by the existing plots are sampled.

9.85 The plots should be located in the centre of that part of the 'waterway' type which lies within the square. If there is only one type of waterway then all 5 plots should be placed along its length, providing that it is long enough to put them more than 10m apart. The plots should not be put within 10m of each other.

9.86 The position of these plots must be marked with plates and sketched as for S1 & S2. The type of ditch/stream/river adjacent to the plot should be indicated on the recording sheet.

Relocation in Old squares

9.87 In the case of squares recorded in 1990, the original positions of both S and W plots will be marked on the map - they should be relocated as closely as possible. If the stream or ditch is dry then the plot should still be recorded, but the state of the watercourse should also be noted on the recording sheet.

9.88 If one or both stream plots are not marked but streams, rivers or ditches exist in the square, they should be added using the methodology described above (for New squares). However 2 plots should not be nearer than 10m to each other, so if there is not more than 20m of stream/ditch/river in the square, only one plot should be recorded.

9.89 If the plot coincides with a Boundary plot, then it should be moved to the nearest permissible length of stream/river/ditch so that no part of the plot is within 10 metres of the Boundary plot.

9.90 Streams that have dried out in a temporary/seasonal drought, should be used if the usual presence of water has influenced the species composition of the streamside.

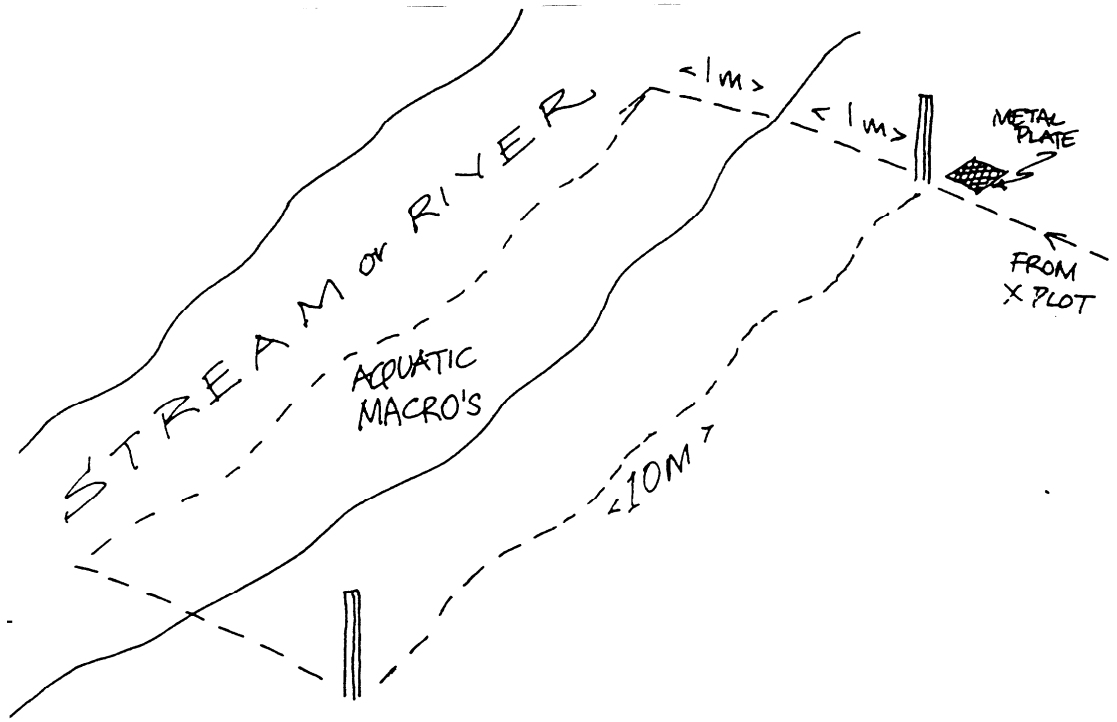
Laying out and recording

9.91 The position of the plots should be marked with a plate at the right end of the plot when you are facing it from the field (see Figure 9.9) - the location of the plate should be indicated on a sketch with distances from a marked feature, eg. gate.

9.92 The waterside edge of the plot should be along what appears to be the normal highest point that water reaches (ie excepting flood situations). All species found within a 1 metre width from this edge should be recorded and marked on the standard recording form with a "1" in the "Q" column.

9.93 **In addition** to the 10m x 1m plot, a further linear plot of the same size should be recorded on the water side, to record species which are rooted or floating in the water (not rooted on the bank of the stream/river) - species in this additional plot should be recorded using the standard form but with a "2" in the "Q" column. If the waterway is less than 1m wide then record additional species but also make a note of the average width of the waterway over the ten metres.

Figure 9.9 - laying out a Streamside plot



ix. R & V PLOTS - ROADSIDE AND VERGE PLOTS (R1 - R2; V1 - V3)

9.94 Roadside plot is a convenient name given to those linear plots which lie alongside transport routes (mainly roads and tracks). The R and V prefixes refer to the different origins of the plots:

R plots two **R**oadside plots were established in 256 1 km squares in 1978, using a random allocation procedure (and were re-recorded in 1990)

V plots three additional **V**erge plots were placed in the 256 1 km squares in 1990 to increase representation of other transport types,

9.95 As happened with new squares in 1990, all five plots will need to be established in all new squares in 1998

Location in New squares

R plots

9.96 The two linear R plots are 10 x 1 m; they should be located as close as possible to the two large plots ($200m^2$) which are furthest apart (see Figure 9.6). They must then be marked on the map provided.

9.97 On reaching the linear feature, from the $200m^2$ plot, the 10m plot is laid out to the left and the 1m width extends from the road edge, away from the carriageway.

9.98 Where the nearest feature is ineligible (because it is not wide enough, or is confused by the presence of a different type of linear within its width) then a new location should be chosen at the nearest permissible position. Any changes should be noted and clearly marked on sketch maps.

V plots

9.99 The 'verge' plots should be used to ensure that different types of transport route are sampled where they exist. If all types are not represented, then samples should be allocated according to the total lengths of the different types present (ie the type with the longest length has most plots). If possible, the variation within more common types should be expressed in the choice of plots.

The following categories are recognised :

i. 'A' and 'B' roads including dual carriageways (red and brown)
ii. Yellow roads if tarmac
iii. Constructed tracks and non-tarmac roads

(motorways are excluded from this classification)

9.100 The first priority is to ensure that there is at least 1 plot in each category of road present in the square, including the 2 original verge plots R1 & R2. The second priority is to include as much variation as possible so that lengths of verge with species assemblages not covered by the existing plots are sampled. The plots should be located in the centre of the verge type. If there is only one type of verge then all 5 plots will be on that verge, providing that it is long enough to put them more than 10m apart.

9.101 The position of these plots must be marked with plates and sketched as for R1 & R2.

9.102 The type of road or track adjacent to the plot should be indicated on the recording sheet.

Relocation in Old squares

9.103 In the case of squares recorded in 1990, the original positions of both R and V plots will be marked on the map - they should be relocated as closely as possible. If the road or track is no longer present, then a new plot should be placed using the guidelines used for New squares (see 9.96 above).

9.104 If one or both verges are not marked but road verges exist in the square, they should be added using the methodology described above. However 2 plots should not be nearer than 10m to each other, so if there is not more than 20m of road verge in the square, only one plot should be recorded.

9.105 Verge plots should not be located where the verge is less than 1m wide; instead the nearest verge with a 1 metre width should be located.

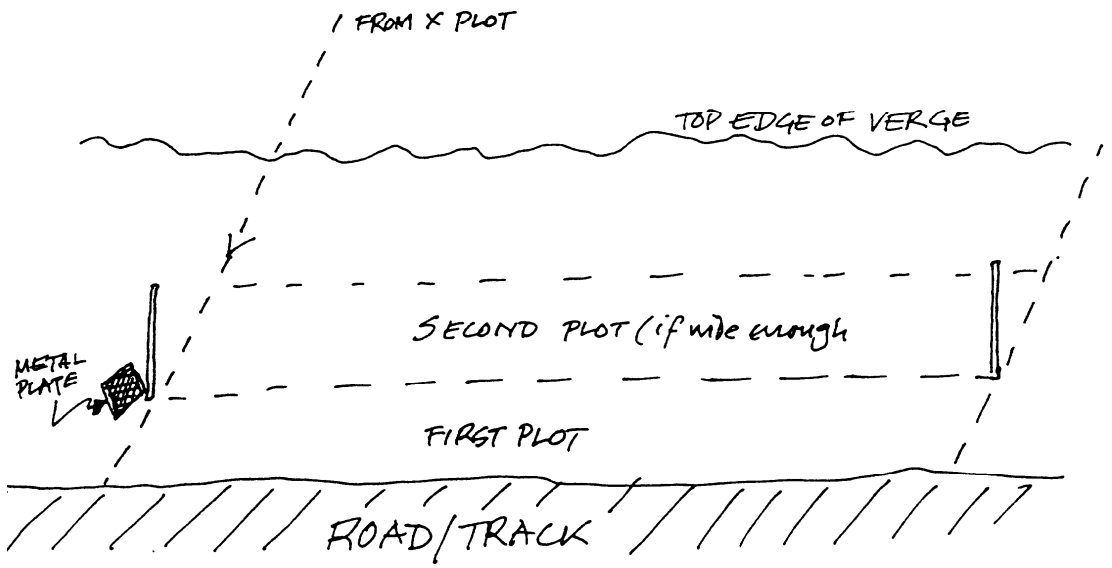
Laying out and recording

9.106 The position of the plots should be marked with a plate at the right end of the plot when you are facing it from the field (see Figure 9.10) - the location of the plate should be indicated on a sketch with distances from a marked feature, eg. gate. As it may be necessary to move the plot to the other side of the road (because the first verge is not wide enough) it should be made clear which side of the road is recorded. (In such cases, the plate is still on the right hand side of the plot when viewed from the X plot).

9.107 The roadside edge of the plot should start at the interface between soil and tarmac, not where overhanging vegetation starts.

9.108 Where the verge is more than 2m wide (from the edge of the road, to 1m from the centre of the next feature, ie. hedge, wall, fence or ditch) then a **supplementary verge plot** should be recorded adjacent to the first to sample the vegetation between 1m and 2m from the roadside. However, only additional species should be recorded and a number '2' recorded in the "Q" column of the standard recording sheet. If there are no additional species, then this should be noted accordingly.

Figure 9.10 - laying out a Roadside plot



GUIDELINES ON SPECIES IDENTIFICATION

9.109 Using the same criteria as were used in 1978 and 1990, the following section gives some guidelines on species identification. Nomenclature follows Clapham, Tutin and Warburg to maintain consistency with earlier surveys. Conversion to Stace names can be carried out within the database, post-survey, where needed.

Aggregations/Combinations

9.110 Surveyors are expected to record to the species level. However, there are certain species which are notoriously difficult to separate out from closely related examples of the same genus. It is therefore necessary, in order to remain consistent with previous surveys, to allow certain combinations to be recorded.

9.111 The combinations were determined on the basis of experience, where it is considered that unless good specimens are available it is not possible to identify the species accurately. A number of the species combinations have similar ecological amplitudes e.g. *Cardamine hirsuta/flexuosa*. Where the separate species name is known unequivocally, then it should be used; otherwise, the combination name should be used. However, species marked with an asterisk (*) should <u>always</u> be shown in combination.

9.112 The following are acceptable combinations:

Alchemilla agg. (except for *A alpina*)
Arctium spp.
Betula spp.
Callitriche spp.
**Cardamine hirsuta/flexuosa*
Chenopodium spp.
Dactylorhiza spp.
Dryopteris spp. *Epilobium tetragonum/obscurum*
(Small) *Euphorbia* spp.
Euphrasia spp.
Hieracium spp. (except *pilosella*)
Juncus articulatus/acutiflorus
Luzula multiflora/campestris
Mentha spp.
Myosotis spp.
Poa trivialis/nemoralis
Polygala serpyllifolia/vulgaris
Quercus spp.
Rhinanthus spp.
Rosa spp. (except *R. arvensis, R. pimpinellifolia*)
Rumex conglomeratus/sanguineus
Sagina spp.
Taraxacum spp.
Tilia spp.
**Viola riviniana/reichenbachiana*
Viola hirta/odorata
Non suckering elms *(U. glabra)*
Suckering elms *(U. procera)*

9.113 If an individual cannot be identified to species level (despite all efforts), then the genus and 'spp.' Should be recorded. Particular care should be taken if a taxon is found which is nationally scarce or atypical for the region.

Bryophytes and Lichens

9.114 Only the following bryophytes and lichens should be recorded (with their individual cover values). No other bryophytes or lichens should be recorded, nor any additional cover values, individually or collectively.

Atrichum undulatum
Aulacomnium palustre
Brachythecium rutabulum
Breutelia chrysocoma
Bryum spp.
Calliergon cuspidatum
Campylopus atrovirens
Campylopus pyriformis/flexuosa
Cladonia arbuscula
Cladonia impexa
Cladonia pyxidata/coccifera
Cladonia uncialis
Dicranella heteromalla
Dicranum majus
Dicranum scoparium
Drepanocladus spp.
Eurhynchium spp.
Fissidens spp.
Hylocomium splendens
Hypnum cupressiforme
Leucobryum glaucum
Lophocolea spp.
Mnium hornum
Mnium undulatum
Pellia spp.
Peltigera canina
Philonotis spp.
Plagiothecium undulatum
Pleurozium schreberi
Polytrichum commune
Polytrichum formosum
Polytrichum juniperinum/piliferum
Pseudoscleropodium purum
Rhacomitrium lanuginosum
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Rhytidiadelphus triquetrus
Sphagnum (green/fat)*
Sphagnum (green/thin)*
Sphagnum (red/fat) *
Sphagnum (red/thin)*
Thuidium tamariscinum
* see following Section.

Sphagna

The simple classification above includes the following species (following AJE Smith, *The moss flora of Britain and Ireland* (1978) :

Green/Fat	**Green/Thin**	**Red/Fat**	**Red/Thin**
S. compactum	sect. Cuspidata*	*S. magellanicum*	*S. capillifolium*
S. molle	*S. fimbriatum*	*S. subnitens*	*S. russowii* (red form)
S. palustre	*S. fuscum*		*S. warnstorfii*
S. papillosum	*S. girgensohnii*		
S. squarrosum	*S. recurvum*		
S. strictum	*S. russowii* (green form)		
S. subsecundum (Sect.)	*S. quinquefarium*		
S. teres	(* includes *S. recurvum* and *S. cuspidatum*)		

The top 200 species

9.115 The 200 most frequent species in the ITE 1977/78 survey are listed on the field recording sheets; they are abbreviated and their full names are as follows:

CROPS:

213	BARLEY	*Hordeum vulgare*	454	WHEAT	*Triticum aestivum*

GRASSES:

8	*Agro rep*	*Agropyron repens (Elymus repens)*	130	*Desc fle*	*Deschampsia flexuosa*
10	*Agro can*	*Agrostis canina*	165	*Fest ovi*	*Festuca ovina*
11	*Agro sto*	*Agrostis stolonifera*	166	*Fest rub*	*Festuca rubra*
12	*Agro ten*	*Agrostis tenuis (A.capillaris)*	209	*Holc lan*	*Holcus lanatus*
20	*Alop gen*	*Alopecurus geniculatus*	210	*Holc mol*	*Holcus mollis*
21	*Alop pra*	*Alopecurus pratensis*	253	*Loli mul*	*Lolium multiflorum*
28	*Anth odo*	*Anthoxanthum odoratum*	254	*Loli per*	*Lolium perenne*
37	*Arrh ela*	*Arrhenathrum elatius*	283	*Moli cae*	*Molinia caerulea*
562	*Aven fat*	*Avena fatua*	287	*Nard str*	*Nardus stricta*
55	*Brac syl*	*Brachypodium sylvaticum*	304	*Phle pra*	*Phleum pratense*
58	*Brom mol*	*Bromus mollis (B.hordeaceus*)	319	*Poa ann*	*Poa annua*
61	*Brom ste*	*Bromus sterilis*	321	*Poa pra*	*Poa pratensis*
123	*Cyno cri*	*Cynosurus cristatus*	847	*Poa triv*	*Poa trivialis*
124	*Dact glo*	*Dactylis glomerata*	404	*Sieg dec*	*Sieglingia decumbens (Danthonia d.)*
129	*Desc ces*	*Deschampsia cespitosa*			

SEDGES & RUSHES:

74	*Care bin*	*Carex binervis*	228	*Junc a/a*	*Juncus articulatus/acutiflora*
76	*Care dem*	*Carex demissa*	230	*Junc bul*	*Juncus bulbosus*
78	*Care ech*	*Carex echinata*	231	*Junc con*	*Juncus conglomeratus*
81	*Care nig*	*Carex nigra*	232	*Junc eff*	*Juncus effusus*
85	*Care pan*	*Carex panicea*	235	*Junc squ*	*Juncus squarrosus*
86	*Care pil*	*Carex pilulifera*	260	*Luzu c/m*	*Luzula multiflora /campestre*
152	*Erio ang*	*Eriophorum angustifolium*	443	*Tric cae*	*Trichophorum caespitosum (Scirpus caespitosus)*
153	*Erio vag*	*Eriophorum vaginatum*			

FERNS:

41	*Athy fil*	*Athyrium filix-femina*	138	*Dryo fil*	*Dryopteris filix-mas*
53	*Blec spi*	*Blechnum spicant*	147	*Equi arv*	*Equisetum arvense*
851	*Dryo dil*	*Dryopteris dilatata*	348	*Pter aqu*	*Pteridium aquilinum*

FORBS/WOODY SPECIES:

2	*Acer pse*	*Acer pseudoplatanus*	286	*Myri gal*	*Myrica gale*
4	*Achi mil*	*Achillea millefolium*	288	*Nart oss*	*Narthecium ossifragum*
5	*Achi pta*	*Achillea ptarmica*	296	*Oxal ace*	*Oxalis acetosella*
18	*Alli pet*	*Alliaria petiolata*	302	*Pedi syl*	*Pedicularis sylvatica*
26	*Ange syl*	*Angelica sylvestris*	307	*Pice sit*	*Picea sitchensis*
29	*Anth syl*	*Anthriscus sylvestris*	311	*Ping vul*	*Pinguicula vulgaris*
587	*Arum mac*	*Arum maculatum*	315	*Plan lan*	*Plantago lanceolata*
47	*Bell per*	*Bellis perennis*	316	*Plan maj*	*Plantago major*
50	*Betu* sp.	*Betula* spp.	833	*Poly vul*	*Polygala vulgaris*
64	*Call vul*	*Calluna vulgaris*	324	*Poly avi*	*Polygonum aviculare*
68	*Camp rot*	*Campanula rotundifolia*	328	*Poly per*	*Polygonum persicaria*
69	*Caps bur*	*Capsella bursa-pastoris*	336	*Pote ans*	*Potentilla anserina*
70	*Card h/f*	*Cardamine hirsuta/flexuosa*	337	*Pote ere*	*Potentilla erecta*
71	*Card pra*	*Cardamine pratensis*	339	*Pote rep*	*Potentilla* reptans
92	*Cent nig*	*Centaurea nigra*	342	*Prim vul*	*Primula vulgaris*
96	*Cera hol*	*Cerastium holosteoides (C.vulgatum, C.fontanum)*	343	*Prun vul*	*Prunella vulgaris*
97	*Cham ang*	*Chamaenerion angustifolium (Epilobium angustifolium)*	346	*Prun spi*	*Prunus spinosa*
98	*Chen alb*	*Chenopodium album/polyspermum*	350	*Quer* sp.	*Quercus* spp.
101	*Chry opp*	*Chrysosplenium oppositifolium*	351	*Ranu acr*	*Ranunculus acris*
103	*Cirs arv*	*Cirsium arvense*	354	*Ranu fic*	*Ranunculus ficaria*
104	*Cirs pal*	*Cirsium palustre*	355	*Ranu fla*	*Ranunculus flammula*
105	*Cirs vul*	*Cirsium vulgare*	357	*Ranu rep*	*Ranunculus repens*
113	*Cono maj*	*Conopodium majus*	370	*Rosa* sp.	*Rosa* spp.
114	*Conv arv*	*Convolvulus arvensis*	373	*Rubu fru*	*Rubus fruticosus*
117	*Cory ave*	*Corylus avellana*	376	*Rum a'la*	*Rumex acetosa*
118	*Crat mon*	*Crataegus monogyna*	375	*Rum a'sa*	*Rumex acetosella*
121	*Crep* spp.	*Crepis* spp.	837	*Rume con*	*Rumex conglomeratus*
590	*Dact mac*	*Dactylorchis maculata* agg.	378	*Rume cri*	*Rumex crispus*
132	*Digi pur*	*Digitalis purpurea*	380	*Rume obt*	*Rumex obtusifolius*
136	*Dros rot*	*Drosera rotundifolia*	381	*Sagi* sp.	*Sagina* spp.
140	*Empe nig*	*Empetrum nigrum*	386	*Samb nig*	*Sambucus nigra*
141	*Endy non*	*Endymion non-scriptus (Hyaeinthoides n-s)*	401	*Sene jac*	*Senecio jacobaea*

143	*Epil hir*	*Epilobium hirsutum*	402	*Sene vul*	*Senecio vulgaris*
747	*Epil mon*	*Epilobium montanum*	405	*Sile dio*	*Silene dioica*
144	*Epil pal*	*Epilobium palustre*	413	*Sonc asp*	*Sonchus asper*
150	*Eric cin*	*Erica cinerea*	414	*Sonc ole*	*Sonchus oleraceus*
151	*Eric tet*	*Erica tetralix*	415	*Sorb auc*	*Sorbus aucuparia*
160	*Euph* sp.	*Euphrasia* spp.	420	*Stac syl*	*Stachys sylvatica*
168	*Fili ulm*	*Filipendula ulmaria*	421	*Stel als*	*Stellaria alsine*
170	*Frax exc*	*Fraxinus excelsior*	423	*Stel hol*	*Stellaria holostea*
177	*Gali apa*	*Galium aparine*	424	*Stel med*	*Stellaria media*
182	*Gali pal*	*Galium palustre*	427	*Succ pra*	*Succisa pratensis*
183	*Gali sax*	*Galium saxatile*	430	*Tara* agg	*Taraxacum* agg.
190	*Gera mol*	*Geranium molle*	845	*Thym dru*	*Thymus drucei (Thymus praecox arcticus)*
193	*Gera rob*	*Geranium robertianum*	441	*Tori jap*	*Torilis japonica*
195	*Geum urb*	*Geum urbanum*	446	*Trif dub*	*Trifolium dubium*
197	*Glec hed*	*Glechoma hederacea*	448	*Trif pra*	*Trifolium pratense*
204	*Hede hel*	*Hedera helix*	449	*Trif rep*	*Trifolium repens*
206	*Hera sph*	*Heracleum sphondylium*	841	*Trip mar*	*Tripleurospermum maritimum*
207	*Hier pil*	*Hieracium pilosella*	458	*Ulex eur*	*Ulex europaeus*
208	*Hier* spp.	*Hieracium* spp.	462	*Urti dio*	*Urtica dioica*
220	*Hype pul*	*Hypericum pulchrum*	463	*Vacc myr*	*Vaccinium myrtillus*
223	*Hypo/Leo*	*Hypochaeris* spp.*/Leontodon* spp.	467	*Vero arv*	*Veronica arvensis*
238	*Lami alb*	*Lamium album*	469	*Vero cha*	*Veronica chamaedrys*
239	*Lami pur*	*Lamium purpureum*	471	*Vero off*	*Veronica officinalis*
240	*Laps com*	*Lapsana communis*	490	*Vero per*	*Veronica persica*
243	*Lath pra*	*Lathyrus pratensis*	472	*Vero ser*	*Veronica serpyllifolia*
255	*Loni per*	*Lonicera periclymenum*	477	*Vici sep*	*Vicia sepium*
256	*Lotu cor*	*Lotus corniculatus*	482	*Viol pal*	*Viola palustris*
273	*Matr mat*	*Matricaria matricarioides (Chamomilla suaveolens)*	849	*Viol r/r*	*Viola riviniana /reichenbachiana*
277	*Merc per*	*Mercurialis perennis*			

MOSSES/LICHENS:

850	*Brac* sp.	*Brachythecium* sp.	314	*Plag und*	*Plagiothecium undulatum*
512	*Clad imp*	*Cladonia impexa*	318	*Pleu sch*	*Pleurozium schreberi*
106	*Clad pyx*	*Cladonia pyxidata /coccifera*	331	*Poly com*	*Polytrichum commune*
513	*Clad unc*	*Cladonia uncialis*	843	*Poly jun*	*Polytrichum juniperinum*
519	*Dicr het*	*Dicranella heteromalla*	279	*Pseu pur*	*Pseudoscleropodium purum*
131	*Dicr sco*	*Dicranum scoparium*	543	*Rhac lan*	*Rhacomitrium lanuginosum*
161	*Eurh* sp.	*Eurhynchium* spp.	364	*Rhyt lor*	*Rhytidiadelphus loreus*
216	*Hylo spl*	*Hylocomium splendens*	365	*Rhyt squ*	*Rhytidiadelphus squarrosus*

222	*Hypn cup*	*Hypnum cupressiforme*	558	*Spha* g/f	*Sphagnum* (green/fat)
530	*Loph* sp.	*Lophocolea* spp.	559	*Spha* g/t	*Sphagnum* (green/thin)
280	*Mniu hor*	*Mnium hornum*	560	Spha r/f	Shpagnum (red/fat)
282	*Mniu und*	*Mnium undulatum*	561	*Spha* r/t	*Sphagnum* (red/thin)
535	*Pell* sp.	*Pellia* spp.	439	*Thui tam*	*Thuidium tamariscinum*

SECTION 10- SAMPLING

10.1 There are three types of sampling being carried out within CS2000: soil sampling, *Calluna* sampling and freshwater biota sampling. The first and second of these are being carried out by CS2000 field surveyors but the third is being done by accredited Institute of Freshwater Ecology (IFE) staff, at about the same time as the rest of the survey.

I. SOIL SAMPLING

Background

10.2 The Royal Commission on Environmental Pollution report on soil sustainability stressed the need for the assessment and monitoring of soil quality and identified the development of indices of soil biological activity and diversity as a key research priority. The major difficulty in developing such indices is the need for baseline data from which a set of standards can be developed. Such a dataset requires strategic development and the proposed programme of work is seen as the first major step in this process. CS2000 will provide a national, spatially referenced set of soil samples which will be collected from the same squares used in the 1978 survey which provide a representative number of samples from each ITE Land Class and Land Cover type.

10.3 In each of these squares, five replicate samples will be taken for soil chemistry analyses (pH, loss on ignition and heavy metal concentrations), soil fauna diversity assessments and soil microbiological status. These samples will be sent to ITE Merlewood where they will be processed and stored for subsequent analyses.

10.4 In summary, each set of samples will consist of three cores taken using plastic piping, two being short and one long (see 10.6).

10.5 It is important that the two shortest pipes (for soil fauna diversity assessments and soil microbiological status) are processed as quickly as possible as they have a relatively short "shelf-life". To enable this, these two samples will be sent by First Class post while the longest pipe (soil chemistry) sample will be collected from field teams by each regional co-ordinator from whom Soil Ecology staff at Merlewood will collect by car.

Equipment and distribution

10.6 All items marked with an asterisk (*) in the list are distributed to each team by the regional co-ordinators. Items marked with a hash (#) are distributed to each team in an order corresponding to the allocation of squares amongst the field teams. All the other items are part of the standard equipment provided by CS2000.

* Cool box (to be kept in boot of car)
* Trowel
* Long blade knife
  Measuring tape
  Lump hammer
  Aluminium plate

Large plastic bag labelled with corresponding ITE square number with the following inside:
- 5 padded stamped addressed (SAE) envelopes, addressed to ITE Merlewood, with square and 'X' plot number in left hand bottom corner, each containing three sealable plastic bags.
- 5 long black pipes (15 cm long x 5 cm diameter)
- 10 short white pipes (8 cm long x 4 cm diameter) and 20 white plastic end caps **(N. B. Envelopes and bags are numbered according to the ITE square and X plot numbers)**

* One large plastic bag containing spare envelopes, bags and pipes

Sampling procedure

10.7 Three soil samples will be taken using one **black** pipe (15 cm length x 5 cm diameter) and two **white** pipes (8 cm length pipes x 4 cm diameter) at approx. 15 cm N of the north corner of the centre plot (2 x 2 m) in each X-plot of every square. Sampling procedures for each pipe type are detailed below. The two white pipes, capped and in sealed plastic bags, should be posted to ITE Merlewood as soon as possible in the SAEs provided. After sampling, the larger black pipes in plastic bags should, ideally, be kept in a cardboard box in the boot of a car until collected by the regional co-ordinators. If there are problems with taking any of the soil samples or there is a need to make any specific comment on the sampling then a written note should be put in the envelope (e.g. "*large tree roots - 1st soil core taken 1 m N of centre plot*").

Detailed sampling procedure

At the centre plot (2 x 2 m) in each X-plot (see Figure 10.1)

1. Locate the North corner of the centre plot.

2. Locate the spot 15 cm north of this corner (USEFUL TIP = use the black core for distance as it is 15 cm long) and mark the spot. Move vegetation, as required, to gain access to the soil surface. If the vegetation and/or roots are too dense then move the sampling point to the nearest convenient point. Write this location on a note and put the note in the plastic bag along with the pipe.

3. Take the **first** soil sample at this point using the long black pipe and the following steps :

    - Take a black pipe out of the plastic bag
    - Hold the pipe upright on the soil surface
    - Using the knife around the bottom edge of the pipe, cut vertically down into the soil and through any roots to a depth of more than 5 cm
    - Push pipe into the soil until it stands upright
    - Place an aluminium plate on the top of the pipe and hold onto one corner of the plate
    - Using the lump hammer, firmly but carefully drive the pipe into the soil until the aluminium plate is level with the soil surface; if you are doing this in pairs then one person can hold the corner of the plate while the other hammers the plate from the opposite corner - please be careful not to hammer fingers or heads !!!

- Use the trowel to remove the pipe from the soil, being careful not to lose soil from the bottom or top of the pipe (especially in sandy soils)
- Scrape any lumps of soil from the exterior of the pipe using the knife
- Place into the appropriately labelled plastic bag and seal
- Store this sample in a cardboard box the boot of the car until it is collected by your regional co-ordinator

4. At 15 cm to the East of the first soil sample, take the **second** soil sample using one of the short white pipes (8 cm long x 4 cm diameter), as follows:

   - Take one of the white pipes from the plastic bag
   - Move vegetation, as required, to gain access to the soil surface
   - Hold the pipe upright on the soil surface
   - Using the knife around the bottom edge of the pipe, cut vertically into the soil and through any roots to a depth of more than 5 cm
   - Push pipe into soil until it stands upright
   - Place an aluminium plate on the top of the pipe and hold onto one corner of the plate
   - Using the lump hammer, carefully drive the pipe into the soil until the aluminium plate is level with the soil surface; again, if you are doing this in pairs then one person can hold the corner of the plate while the other hammers the plate from the opposite corner.
   - Use the trowel to remove the pipe from the soil, being careful not to lose soil from the bottom or top of the pipe (especially in sandy soils)
   - Scrape any lumps of soil from the exterior of the pipe using the knife
   - Remove any stones and soil which protrude from the bottom end of the pipe.
   - Push the white caps into each end of the pipe
   - Place the pipe into the appropriately labelled bag and seal
   - Place the bag into the envelope with the pipe **lengthways** across the bottom of the envelope. This is important as it allows the package to fit into a post box.

5. At 15 cm to the West of the first soil sample, take the **third** and final soil sample using the second white pipe, using the same method as in 4 above.

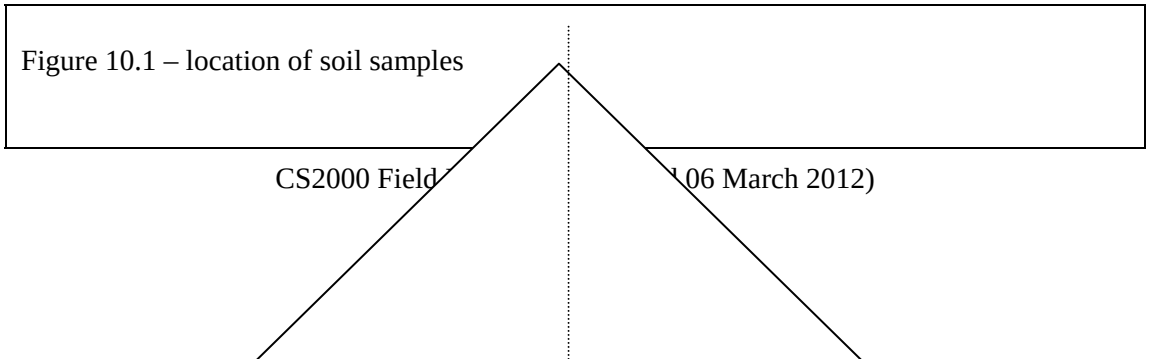
6. Seal the envelope with the two capped and bagged white pipes inside.

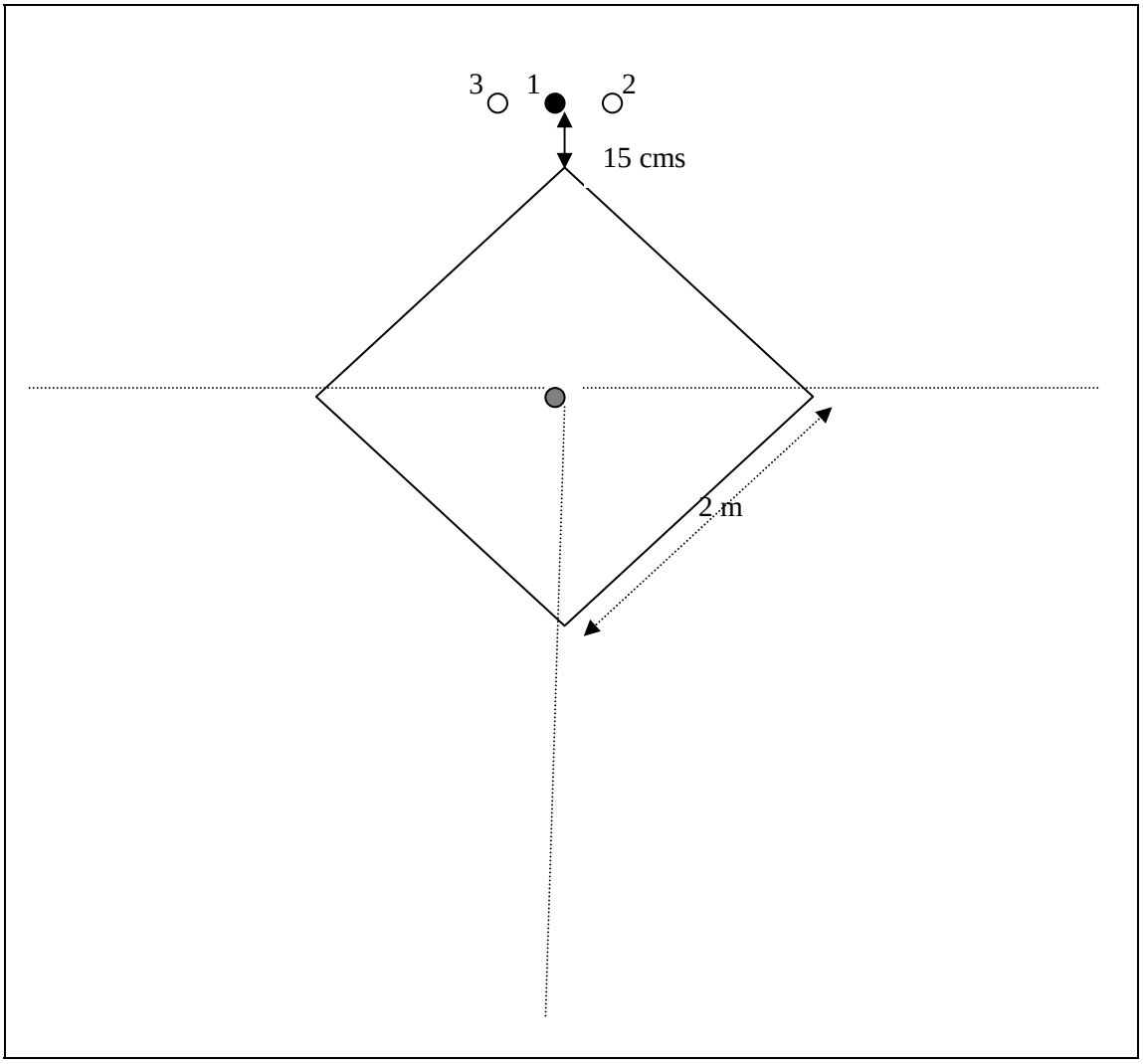
7. When back at the car, store the envelope in the cool box and the black core in a cardboard box.

8. At the first opportunity, post the envelope into a post box or at a post office.

9. Repeat for each centre plot in each X-plot (giving a total of five soil sampling locations in each square).

Figure 10.1 – location of soil samples




3
1
2
15 cms
2 m

II. CALLUNA SAMPLING

Background

10.8 A number of recent studies have shown a clear relationship between *Calluna vulgaris* foliar nitrogen concentrations and nitrogen deposition data. The aim of this work is to establish whether it is possible to use foliar nitrogen concentrations to identify regions in GB where nitrogen deposition is exceeding empirically derived critical loads of nitrogen for *Calluna vulgaris*. CS2000 provides a suitable way of collecting a number of samples from throughout GB as a basis for such an analysis.

Collection of samples

10.9 To collect samples, the following steps should be undertaken in every 1km square in which *Calluna vulgari*s occurs, within plots or elsewhere (but always strictly within the square).

1. Fill in the label on the sample collection bag using a ball point pen. Please write clearly (using capital letters).

2. Select current year's growth (CYG) ie the lighter green shoots at the tip of the growing shoots. If in doubt about identifying CYG, cut about the top 5 cm from the end of the growing shoots. Shoots should be selected, at random, from a number of *Calluna vulgaris* plants growing in the area.

3. Cut (with scissors provided), or break off, CYG shoots (30 - 50 g fresh weight total - approximately two large handfuls) and place them into the bag provided.

4. If the sample is very wet please leave the bag open in your vehicle and/or your room overnight to allow the sample to dry out a little before sealing the bag.

5. Fold the top of the sample bag over and seal with the sticky label provided; do not squash the sample bag completely flat ie allow air to circulate into the bag.

6. Place the sealed sample bag in the addressed envelope provided.

<u>Despatching samples to ITE Merlewood</u>

10.10 Once the sample has been collected, then one of the following steps should be taken:

1. If you are "reporting-in" to an ITE research station during the week. Store your *Calluna* samples carefully and arrange for them to be despatched to ITE Merlewood from the research station.

2. If you will not be "reporting-in" to an ITE research station during the week please post the sample direct to ITE Merlewood, as soon as possible. You should obtain a receipt for the postage and then reclaim this on your T & S form.

III. FRESHWATER SAMPLING

10.11 Surveyors need to be aware that specially trained field surveyors, working under the direction of the Institute of Freshwater Ecology' may be working in the square at the same time as the ITE staff. IFE will be liaising with co-ordinators to arrange suitable times for this work.

SECTION 11- PHOTOGRAPHY

11.1 Surveyors will be provided with cameras (one per team) and an initial stock of films (further films should be bought and claimed for on T & S claim forms). Print films should be used to photograph every vegetation plot in order to show its general appearance and its position relevant to local landmarks or other reference features.

11.2 As far as possible, reference features should be:

- obvious,
- unique,
- permanent
- not so distant that they cannot be seen when future visits are made in bad weather.

11.3 Each photograph should include the square and plot numbers (123/X3, 123/V2 etc), written on the plastic board provided which should be placed in a prominent position at the edge of plot, preferably covering the position of the marker plate.

11.4 Photographs should be composed such that up to half of the frame is filled by the plot (depending on the angle of view) and reference features are obvious. The photograph must be close enough to the marker board to ensure that the letters/numbers are visible. Large amounts of sky should not be photographed (they provide little information and often adversely affect the light readings of the plot location).

11.5 Examples of how this should be done (and how they should not be done) will be on display at the Field Training Course.

SECTION 12- PROCEDURES AFTER SURVEY

12.1 At the end of a day's surveying, it is essential to read through the data sheets and check that no feature has been omitted.

12.2 If absolutely essential, then the data may be transposed onto fresh maps and recording forms but this is inadvisable and should only be carried out in the event of damage or spoiling of the original map.

12.3 Arrangements should be made to transport FABs, and samples, back to ITE Stations as soon as possible.

Annex 1 - Collecting GPS data

Step 1) Battery power and satellite check

Turn the GPS on (ON/OFF key).

If the EXTERNAL POWER screen does not come on, check that the leads are correctly fitted and that the battery has not run dry. Connect the spare battery that is supplied.

Press POS, then use the DOWN arrow to get to the screen showing number of satellites; there should be at least four before you start logging. This screen also gives the PDOP value (measurement of error). PDOP should ideally be below 6.

Step 2) Recording a stationary or moving feature

To record a stationary position (i.e. at each vegetation plot position):

Press DIF button
2
ENTER

To record a moving position (i.e. along a new boundary in upland areas): You will have to walk along the boundary that you wish to record. Make sure you start recording at the very beginning of the feature and finish at the very end.

Press DIF button
3
ENTER

Step 3) Creating your own file name

Every plot or feature to be recorded with the GPS must have its own data file. Unfortunately we will not be able to use the default file name of month, day, type and number of file, as we have no way of telling from the default option which square is being surveyed. Therefore you will have to add your own file name in the following way.

At the display
DIRECT DATA TO:
0518S001.PSE (default file name of Month, day, file number)

Press CLEAR to enter your file name.

Your file name needs to be made up of the following elements
Square number and the plot id, so if you are surveying square 501 and recording plot X4 the file will be 501X4.PSE

If you are recording a new feature such as a new fence or hedge the file name will include the square number and a reference that it is a feature e.g. 501F1.MOB. Please make a note of the mobile file name somewhere on the FAB and indicate which feature it belongs to. There are 15 options in the attribute list for recording new features according to which theme and what type of feature they are.

Step 4) Check sampling rate

DESCRIPTOR: (no need to add anything in this window)
press ENTER to confirm

DATA SAMPLING RATE
POSITION 1 SEC
RAW DATA 1 SEC
press ENTER to confirm

Step 5) Add the plot or feature name

ATTRIBUTE:
DONE 00

DONE - ENTER

If you know which short cut number refers to the plot identifier (see reference sheet) then type in that number and press ENTER. If you do not, then cycle through the menu using the right toggle button until you find the plot id that you require.

Once you have the correct plot id press ENTER, this will put an * next to the attribute to confirm it.

Press ENTER again to move to the logging screen.

Step 6) To start logging

PRESS ENTER OR
CLR TO CONT ATT

Press ENTER to confirm that you want to start logging or
Press CLEAR if you wish to return to last screen

Logging screen
ENTER TO STOP
T 00 : 00 Ps 0
L 00 : 00 C 00 : 00

T records the total time the system is logging: L records the lapsed time: C records the longest consecutive logging time.

Step 7) To stop logging

Once you have collected enough data press ENTER to stop logging

PRESS ENTER TO STOP LOGGING
CLEAR TO CONT
Press ENTER to confirm stop logging or CLEAR to return to logging screen and start logging again

STAT STOPPED.
T 05 : 00 Ps 0

L 04 : 30 C 04 : 30

Once you reach this screen you may turn the receiver off until you wish to start logging again. Press ON/OFF button twice.

General GPS operations

Battery recharging
Connect the battery charger to the battery lead (2 pin connector) and charge the battery until you see the green light come on.
If you are changing batteries over make sure that the terminals are the correct way round. Brown lead to red terminal. Blue lead to black terminal.

ALMANAC collection
If the GPS has an out of date almanac a new one will be automatically down loaded from the satellites it's logging. An 'A' will appear in the bottom right hand corner of the screen. Leave the GPS on until the 'A' has disappeared, to down load a new almanac will usually take between 10 and 20 minutes depending on how many satellites are available.

PDOP
Position dilution of precision is a measurement of the possible position error that is related to geometric quality. In general, the farther apart the satellites being used are, the lower the PDOP and the greater the accuracy of the fix. A fix obtained from satellites that are close together may not be so accurate.
Therefore when logging data try and wait until the PDOP is at a level that is as low as possible.
GOOD PDOP in 3D < 6
POOR accuracy in 3D 6-9.9

Obstructions
The GPS may have problems receiving the signals from the satellites if tall objects such as hedges, building and trees are blocking its view. One solution to this may be to remove the GPS aerial from the unit and add the aerial extension cable. The aerial could now be temporarily fixed to a Wally pole with an elastic band and elevated above the height of the obstruction. NB make sure that the aerial is directly above the point that you wish to record.

Using the Magellan key pad
If you wish to use the Magellan key pad to enter a number or alpha code use the grey buttons that correspond to the figure you want. Then right toggle through the options until you get to the figure you wish to use.
I.e. to enter 501X4.PSE press the 5 key and right toggle three times to 5, next push the 0 key and right toggle until you see the 0.
If you make a mistake use the CLEAR button to back space and start again.

Recording stationary positions i.e. plot location
When you come to a plot try and place the GPS down somewhere that is not too obstructed by trees or hedges. The GPS needs a clear view of the sky for the signals to be received from the satellites.
In an unobstructed position leave the receiver recording for 3 to 5 minutes, the recording time will have to be greater if the sky is obstructed.

Attribute reference list

The attribute reference list enables you to quickly key in the correct number that corresponds to the plot id that you want to record, this will save you having to scroll through the list to find the one at the very end.
I.e. if you wish to record plot D1 then you can key in the numbers 33 followed by ENTER this will then jump straight to the D1 on the list. Press ENTER to confirm this selection.

Attribute reference sheet

1	X1	36	D4	
2	X2	37	D5	
3	X3	38	D6	
4	X4	39	D7	
5	X5	40	D8	
		41	D9	
6	Y1	42	D10	
7	Y2			
8	Y3	43	S1	
9	Y4	44	S2	
10	Y5	45	W1	
		46	W2	
11	U1	47	W3	
12	U2			
13	U3	48	R1	
14	U4	49	R2	
15	U5	50	V1	
16	U6	51	V2	
17	U7	52	V3	
18	U8			
19	U9	53	AGRI AREA	AGRI refers to Agriculture page of FAB
20	U10	54	AGRI LINE	
		55	AGRI POINT	
21	A1			
22	A2	57	BDY LINE	BDY refers to Boundaries page of FAB
23	A3			
24	A4	59	FSTY AREA	FSTY refers to Forestry page of FAB
25	A5	60	FSTY LINE	
		61	FSTY POINT	
26	B1			
27	B2	62	STR AREA	STR refers to Buildings/Structures page of FAB
28	B3	63	STR LINE	
29	B4	64	STR POINT	
30	B5			
31	H1	65	PHY AREA	PHY refers to Physiography page of FAB
32	H2	66	PHY LINE	
		67	PHY POINT	
33	D1			
34	D2			
35	D3			