



CS Technical Report No.1/07
Field Mapping Handbook

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1. BACKGROUND

The most geographically comprehensive element of the survey is basically a mapping exercise. Surveyors are asked to record information on habitats and landscape features for a 1km square on a series of maps held on a GIS system. Editing tasks will be carried out using a comprehensive range of pre-determined options which relate directly to a key to vegetation types, Broad and Priority Habitats, landscape features and previous data collected on that 1km square for Countryside Survey.

CS2007 builds on previous methodologies as well as introducing some refinements. In order to report land cover change by Broad (as in CS2000) and Priority Habitats (not done previously) at a country as well as a UK level the survey will:

1. Focus on mapping change in both habitats and landscape features
2. Map Priority Habitats (PH's) as well as Broad Habitats (BH's)
3. Collect more detailed information (than in CS2000) in unenclosed, largely upland, habitats
4. Map new squares in Wales

For the first time ever, Countryside Survey 2007 data is going to be collected in digital format. In the preparation of the GIS data model to be used in this survey the 5 previous themes (forestry, agriculture/natural vegetation, boundaries, structures and physiography) have been amalgamated so that surveyors will be editing a digital map representing all features in the square.

Mapping change only

As in CS2000, for previously surveyed squares surveyors are to be provided with data from earlier surveys and instructed to map change in land cover and landscape features. Surveyors will be asked to indicate genuine change and changes that highlight where, in their opinion, earlier mapping (or subsequent data processing) resulted in the mis-allocation of polygons (mapped areas), linear features or point features to the wrong BH. This is a key role for surveyors in this survey as they will be both mapping change as well as correcting the data.

Reporting by 'Broad' and 'Priority' Habitats

To meet some of the monitoring and reporting requirements of the UK Biodiversity Action Plans, once again the results from CS2007 will be presented according to an agreed framework based on 'Broad Habitats'. This time mapping will also be by 'Priority Habitats' (PH). As some of these are too rare or scattered to be detected by a sample survey of this type, previous data has been used to obtain statistical estimates and carry out a power analysis to see which PHs can be effectively reported.

Changes to mapping Broad Habitats in upland, unenclosed landscapes

Follow-up studies to CS1990 showed that there were real difficulties in defining the extent and location of upland polygons whose boundaries are more likely to be fuzzy and convoluted because they are defined by changes in species composition rather than a linear boundary feature such as a fence, hedge or wall. In CS2000 BHs were classified into Unenclosed or enclosed habitats thus:

Unenclosed Habitats: Calcareous grassland, Acid grassland, Bracken, Dwarf shrub heath, Bog, Fen, Marsh and Swamp, Inland rock, Montane.

Enclosed habitats: Broadleaved and mixed yew woodland, Coniferous woodland, Boundary and linear features, Arable and horticulture, Improved grass, Neutral Grass, Rivers and streams, Standing open waters and canals, Urban, Supra-littoral sediment, Supra-littoral rock, Littoral sediment, Littoral rock.

In CS2000 a new way of mapping unenclosed BHs was introduced because of the difficulties in spatial definition encountered in previous surveys. A much simpler mapping system was introduced where polygons were larger and the only information recorded was the BH. It has been found subsequently (particularly because of the desire to report on PHs as well as BHs and the requirement to provide consistent information on common standards monitoring attributes) that insufficient detail was recorded using this method, so in CS2007 all habitats will be described in more detail.

As there is no detailed attribute information available from 1998 in unenclosed habitats, where available, data from CS1990 has been combined with data from CS2000 to provide more detail on habitats and species present. This will enable surveyors to identify particular areas of PH and provide support for decisions about the correctness of the CS2000 BH allocation and the allocation to be applied in 2007. For example, where a site was allocated to the Bog BH in 1998 but contained species typical of the Blanket Bog PH in 1990 and still does in 2007, the surveyor will be able to indicate that the site has been continuously Blanket Bog PH. In this instance the surveyor would therefore leave the polygon assignment to the Blanket Bog PH unchanged.

Surveyors will be asked to record/change/validate vegetation attributes for each polygon in 2007, including habitat and species information (where present). Mapping carried out in CS2007 will be less detailed than in 1990 in the unenclosed uplands but more detailed than in CS2000. For some PH, this will be the first survey in which they will be mapped hence new baseline information will be recorded.

Mapping new squares in Wales

An extra 60 new squares have been added to the survey to enable country level reporting on habitats for Wales

Mapping methods in 2007 need to reflect the goals above but also need to take account of the strategic need to maintain a time-series of detailed, disaggregated environmental surveillance data that provides for a wide range of scientific applications and future shifts in policy emphasis.

2. STRUCTURE OF THE 2007 EDITABLE POLYGON/HABITATS LAYER

Enclosed habitats

In enclosed, largely lowland, habitats, surveyors will edit polygons mapped and defined in the 1998 survey. Surveyors will be able to select the appropriate BH, validate, change and newly apply primary and secondary attributes. They will also be able to select, where relevant, from a subset of PHs. Since Priority Habitats nest into BHs, a polygon can be newly attributed as PH even though it's BH and habitat attributes remain the same as previously. This is because many PHs are being recorded for the first time in this survey and so constitute new baseline information.

Unenclosed habitats

Presentation of spatial data for editing in unenclosed habitats is complicated. Firstly, follow-up analyses of change after CS2000 showed that some assignments of polygons to BH in 1998 may need correcting as a result of ambiguity in the vegetation key or post survey data processing, i.e. surveyors will need to back-correct the 1998 map in some places. As outlined above, more finely resolved CS1990 data will be amalgamated with the coarser mapping units resolved in CS2000. This will provide more detail on vegetation type and species presence both to identify particular areas of PH and to support decisions about the correctness of the CS2000 BH allocations. Surveyors will be asked to record/change/validate vegetation attributes for each polygon in 2007, including habitat and species information (where present). The incorporation of 1990 data means that polygons of the same BH in the CS2007 dataset may be differentiated on the basis of vegetation type/species level differences. In the CS2007 survey surveyors will be asked to merge adjacent polygons of the same vegetation type (see key) and record dominant species i.e. polygons will be based on areas of uniform vegetation type, though there may be patches with different species compositions within the polygon.

The role of the field keys to habitats and woodland types/features

Two keys are provided in the handbook. Each solves the problem of assigning surveyed areas and features to the units of a classification.

Key to Broad and Priority Habitats (Vegetation Key)

Based on plant species composition, patches of discrete vegetation (polygons) are assigned primary (and selected secondary attributes) and allocated by the surveyor to Broad and Priority Habitats. The key allows all vegetation stands to be keyed to a BH and to all PH's apart from those known as habitat complexes (i.e.those for which final definition requires the application of an agreed GIS mask to surveyed areas; and coastal PHs for which CS is unrepresentative because the limit of survey is Mean High Water Spring tide).

Application of the key to an area of uniform habitat (or mapped polygon) gives the evidence upon which to base any decision about retaining or changing the habitats and attributes of that polygon.

Key to woodland types/features

Vegetation featuring woodland and scrub comprises a range of types from; scattered trees, hedges, lines of trees or patches of scrub through to large blocks of woodland. These different structures can be classified according to strict definitions relating to attributes such as width, number of trees and canopy cover. This key allows the surveyor to allocate woody vegetation to the correct feature. So why do this? At present, only certain woody features (Woodland/forest, Belt of trees and Clump of trees) can be assigned to the Broadleaved Woodland BH and constituent PHs. Thus a line of Alder does not qualify as Wet Woodland PH and neither does a line of Ash or Oak trees. Both would be assigned to the Boundaries & Linear Features BH. Similarly, scattered trees indicates a minor role for the woody vegetation such that the BH, primary and secondary attributes are assigned to the herbaceous vegetation and scattered trees indicated as an additional secondary attribute only. This key also allows features such as lines of trees or hedges to be allocated to Woody Linear Features (WLFs). A detailed section on the mapping of WLFs is included in the Linears section.

How will the two keys be used?

The first key that surveyors use when faced with a woody feature or area will be the Key to woodland types/features. With experience the decision to record a woodland feature in a particular way will be made rapidly and surveyors will often only quickly refer to part of a key to confirm their mapping decision. If surveying an area of woodland or scrub, the surveyor will need to first establish that tree

or shrub canopy cover is over 25%. If so, the surveyor then needs to determine whether the primary attributes Belt of trees, Clump of trees, Woodland/forest apply and hence whether the patch could be assigned to a woodland BH (and potentially) a woodland PH. If any of the three attributes apply then the patch can be keyed out using the vegetation key based on its canopy species composition.

3. THE VEGETATION KEY

As surveyors may need to refer to previous data sets to support a decision about change and to better understand the data on the tablet, the key below features the list of primary and secondary attributes which were used in the surveys carried out for CS2000 by name

Vegetation may only be sparsely present, for example on rock exposures, peat hags or in urban environments. If no vegetation is present the BH will likely be Urban, Inland Rock or one of the coastal types. Exercise common sense. Remember that ALL land must be allocated to a BH or PH. If no vegetation is present consult the BH and attribute descriptions and edit/add attributes accordingly.

CS2007 FIELD SURVEY KEY AND ALLOCATION RULES TO BROAD AND NON-COASTAL PRIORITY HABITATS

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		Numbered links plus Broad and Priority Habitats	Primary attributes	NVC units (indicative list only)
1a	Total vegetation cover may be variable but where present consists of over 75% herbaceous species.	2		
1b	Vegetation cover consisting of over 25% canopy cover of trees or shrubs over 1m high.	17		
1c	Vegetation with over 25% cover of dwarf shrubs, less than 1m. Includes dwarf <i>Ulex europaeus</i> , <i>Ulex galii</i> and <i>U. minor</i> , <i>Calluna</i> , <i>Erica</i> spp., <i>Vaccinium</i> spp. <i>Empetrum</i> and <i>Arctostaphylos</i> . Does not include <i>Salix repens</i> in dune slacks.	22		
1d	Saxicolous (on rock) and chasmophytic (in crevices), non-coastal vegetation cover less than 50% with residual cover being <u>rock</u> . Includes species such as <i>Cryptogamma crispa</i> , <i>Cystopteris fragilis</i> , <i>Gymnocarpium robertianum</i> and <i>Asplenium trichomanes</i> . Includes scree, mine spoil and other unvegetated rock surfaces that may be sparsely vegetated- see attribute descriptions.	Inland Rock (BH 16)	<i>Rock vegetation</i>	OV38-40

<p>1e Unvegetated e.g. sea/other water bodies, bare rock or peat, artificial surfaces/built land. See 2c for ploughed land. See guidance notes for post-clearfell vegetation</p>	<p>Exit key -not vegetation</p>		
<p>2a Vegetation consisting of Bracken at $\geq 95\%$ cover with or without a sparse herbaceous understorey. Stands that have not yet peaked in seasonal biomass should still be recorded as dense Bracken if you believe peak cover is likely to be at least 95%. Note that bracken can occur in amongst boulders. In these situations judgement is required as to whether the area that can support plant growth is so dominated by bracken that the polygon should be mapped as BH 9 but Surface boulders or Scree added as attributes. Alternatively consider a mosaic.</p>	<p>Dense Bracken (BH 9)</p>	<p><i>Bracken at 95- 100% cover</i></p>	<p>U20, W25</p>
<p>2b Bracken <95% cover or absent – the species code for Bracken plus cover intervals should be used in conjunction with any other primary and secondary attributes and relevant BH e.g. Acid grassland. Hence, the underlying species assemblage requires further keying.</p>	<p>3</p>		<p>U20, W25, other grasslands and heaths</p>
<p>2c Vegetation consisting of crops (including grass leys in arable rotation). Note that ploughed land should be indicated as such but a primary attribute used to reflect the previous crop where this can be identified. If not possible, use ‘ploughed land’ as a primary attribute (also see guidance notes for Orchards).</p>	<p>Arable and Horticultural (BH 4)</p>	<p><i>Arable crop types listed in drop-down box</i></p>	
<p>3a Coastal vegetation containing halophytic species¹.</p>	<p>4</p>		

¹ Coastal BH are not keyed further to Priority Habitat because CS is not a representative sample of these localised habitats.

<p>3b Vegetation not as above.</p>	<p>5</p>		
<p>4a Vegetation consisting of frequent to dominant halophytes, usually on mud often much bare ground.</p>	<p>Saltmarsh Priority habitat (BH 21 Littoral sediment)</p>	<p><i>Saltmarsh</i></p>	
<p>4b Vegetation with halophytes prominent. On sea cliffs.</p>	<p>Maritime cliffs and slopes vegetation Priority Habitat (BH 18 Supra-littoral rock)</p>	<p><i>Maritime cliffs and slope vegetation</i></p>	
<p>4c Vegetation growing on sand dunes including yellow dunes, grey dunes and slacks².</p>	<p>Sand dune Priority Habitat (BH 19 Supra-littoral sediment)</p>	<p><i>Sand dunes</i></p>	
<p>4d Generally linear vegetation, just above the high-tide mark, consisting of halophytes such as <i>Cakile maritima</i>, <i>Agropyron junceiforme</i> and <i>Honkenya peploides</i>. Sometimes with generalist ruderals such as <i>Stellaria media</i> and <i>Rumex obtusifolius</i>.</p>	<p>Strandline/Coastal vegetated shingle Priority Habitat (BH 19)</p>	<p><i>Strandline vegetation</i></p>	

² 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.

<p>5a Pulse-disturbance vegetation. Includes assemblages whose species composition suggests disturbance in the past but with no evidence of being subject to recent sustained management cycles that involve grazing with or without mowing. Two specific groups of plant assemblage are included here. Firstly, wetland tall-herb including reedbeds, sedge swamps and tall-herb dominated gaps in wet woodland plus emergent aquatic vegetation that is often zoned and on the fringes of waterbodies. The second group includes very diverse ‘clearance’ communities of dry soils assembling in response to previous unpredictable disturbance. Often found in urban situations, in woodland gaps and clearfell or on linear features but including setaside – see guidance notes for further details.</p>	<p>6</p>		
<p>5b Press-disturbance vegetation. Includes all grazed upland and lowland grasslands along with meadows and silage fields. Also included are those amenity grasslands which maybe rabbit grazed but are generally managed by frequent repeated mowing. Also included are areas of monocot rather than dwarf shrub dominated bogs and heaths – see guidance notes for further details. Plant assemblages may reflect wet to dry, acid to calc conditions but the common feature is that they experience a relatively stable, cyclic disturbance regime where biomass is removed by annual cutting or/and continuous grazing at varying intensities.</p>	<p>8</p>		
<p>6a Wetland tall herbs frequent to dominant.</p>	<p>6c-g</p>		
<p>6b Wetland tall herbs occasional to absent.</p>	<p>7a-c</p>		
<p>6c Terrestrial vegetation growing on lowland peat soils often with or without scattered Alder or Willow. Species include <i>Carex paniculata</i>, <i>C. acutiformis</i>, <i>C.rostrata</i>, <i>C.elata</i>, <i>C.riparia</i>, <i>Iris pseudacorus</i>, <i>Filipendula ulmaria</i>, <i>Phragmites australis</i> (but not virtually pure stands), <i>Equisetum fluviatile</i>, <i>Eupatorium cannabinum</i>, <i>Lythrum salicaria</i>. See guidance notes.</p>	<p>Fen Priority Habitat (BH 11 Fen, Marsh, Swamp)</p>	<p><i>Fen</i></p>	<p>S1-S28 (but not S4) M27, M28, OV26</p>

6d	Aquatic vegetation where macrophytes persist as emergents within standing water. Species include <i>Typha</i> spp., <i>Schoenoplectus</i> , <i>Ranunculus fluitans</i> , <i>Sparganium</i> spp, <i>Sagittaria</i> , <i>Hippuris</i> and others. Does not include beds of floating and submerged aquatics eg. <i>Chara</i> spp., <i>Potamogeton</i> spp., <i>Ceratophyllum</i> spp.	Aquatic macrophytes (BH Rivers and streams)	<i>Aquatic macrophytes</i>	
6e	Stands dominated by <i>Phragmites australis</i> in standing saline or freshwater.	Reedbeds Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Reedbed</i>	S4, S24, S25, S26
6f	Vegetation fringing open water often developed as a narrow (<0.5m wide or <0.25ha in extent) part of a hydrosere between standing water and upslope vegetation. Species include <i>Valeriana officinalis</i> , <i>Epilobium hirsutum</i> , <i>Filipendula ulmaria</i> , <i>Oenanthe crocata</i> , <i>Stachys palustris</i> and <i>Lythrum salicaria</i> .	Aquatic marginal vegetation (BH 11 Fen, Marsh, Swamp)	<i>Aquatic marginal vegetation</i>	
6g	Fertile, wetland tall-herb vegetation with less than 50% grass cover. Dominated by characteristic species such as <i>Epilobium hirsutum</i> , <i>Urtica dioica</i> , <i>Filipendula ulmaria</i> , <i>Phragmites</i> , <i>Arrhenatherum</i> .	Fen Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Tall herb wetland vegetation</i>	OV26
7a	Mid to late-successional pulse-disturbance vegetation consisting entirely of long-lived perennials with little or no open ground. Vegetation with over 50% grass cover. <i>Arrhenatherum</i> , <i>Dactylis</i> and <i>Elymus repens</i> usually dominate but scattered shrubs and tall herbs maybe present particularly along linear features such as road verges, field boundaries, tracksides and ditchbanks.	Neutral Grassland (BH 6)	<i>Tall unmanaged neutral grass</i>	OV23, OV25, OV27, MG1

7b	Early-successional pulse-disturbance vegetation dominated by annual weeds as well as perennial species usually with some open ground present. Open ground usually conspicuously present. Actual species composition dependent upon starting point. Unsovn setaside will usually key out here. Indicators include <i>Poa annua</i> , <i>Plantago major</i> , <i>Agrostis stolonifera</i> , <i>Polygonum aviculare</i> , <i>Persicaria maculosa</i> , <i>Anisantha sterilis</i> , <i>Stellaria medi</i> and a diverse range of arable weeds. Excludes weed assemblages with managed crops present. These key out at 2c .	Arable and Horticultural BH (BH 4) or Urban (BH 17)	<i>Annual/early successional with open ground</i>	OV21-23
7c	Vegetation containing some annual weeds but consisting mainly of long lived perennials including some grasses but <50% cover. Some shrubby species may be present as infrequent juveniles. Species include <i>Urtica dioica</i> , <i>Galium aparine</i> , <i>Chamaerion angustifolium</i> , <i>Cirsium arvense</i> , <i>Arrhenatherum elatius</i> and <i>Poa trivialis</i> . Includes stands dominated by invasive aliens such as <i>Reynoutria japonica</i> , <i>Impatiens glandulifera</i> and <i>Heracleum mantegazzanum</i>	Neutral Grassland (BH 6)	<i>Perennial vegetation, tall herb/grass</i>	OV24
8a	Vegetation usually dominated by palatable grasses with a rich or poor suite of accompanying herbs that indicate neutral, dry or damp soils. Calcareous or acid indicator species infrequent, rare or absent. Neutral indicators include <i>Trifolium repens</i> , <i>Lolium perenne</i> , <i>Stellaria media</i> , <i>Cynosurus cristatus</i> , <i>Trifolium pratense</i> , <i>Centurea nigra</i> , <i>Lotus corniculatus</i> , <i>Cerastium fontanum</i> , <i>Rumex acetosa</i> , <i>Ranunculus repens</i> , <i>Juncus inflexus</i> , <i>Juncus effusus</i> , <i>Montia fontana</i> , <i>Glyceria fluitans</i> , <i>Poa trivialis</i> , <i>Agrostis stolonifera</i> , <i>Juncus bufonius</i> and <i>Alopecurus geniculatus</i> .	9		
8b	Calcareous indicators of wet or dry ground present eg. <i>Galium verum</i> , <i>Briza media</i> , <i>Carlina vulgaris</i> , <i>Cirsium acuale</i> , <i>Sanguisorba minor</i> , <i>Sesleria albicans</i> , <i>Helianthemum nummularia</i> , <i>Cirsium dissectum</i> , <i>Carex pulicaris</i> , <i>C.flacca</i> , <i>C.panicea</i> , <i>Eriophorum latifolium</i> , <i>Gymnadenia conopsea</i> .	10		
8c	Acid indicators present (includes a large range of acid grassland, moorland, heath and peatland species).	11		

<p>8d Vegetation dominated by coarse grasses e.g. <i>Arrhenatherum</i>, <i>Elymus repens</i> and <i>Dactylis glomerata</i>.</p>	<p>Neutral Grassland (BH 6)</p>	<p><i>Tall unmanaged neutral grass</i></p>	<p>MG1</p>
<p>9a Productive grasses and <i>Trifolium repens</i> usually (see below) predominate mainly <i>Lolium</i>, <i>Phleum</i>, <i>Dactylis</i>, <i>Cynosurus</i>, <i>Holcus</i> and the larger <i>Festuca spp.</i> <i>Agrostis capillaris</i>, <i>Cynosurus cristatus</i> and <i>Anthoxanthum odoratum</i> may be present at the less fertile end of the gradient. In wet grasslands <i>Juncus effusus</i>, <i>Deschampsia cespitosa</i>, <i>Glyceria fluitans</i>, <i>Alopecurus geniculatus</i> and <i>Festuca arundinacea</i> may be abundant. Varies from pure grass to moderately species rich grassland but hay meadow Priority Habitat indicators are always rare or absent. Some fields may be dominated by <i>Ranunculus</i> and/or <i>Trifolium repens</i>.</p>	<p>19</p>		
<p>9b Cover of grass species <i>Trifolium repens</i> and sown <i>T. pratense</i> usually less than 50%. Typically rich in forb species with frequent Priority Habitat lowland meadow indicators including <i>Lathyrus pratensis</i>, <i>Lotus corniculatus</i>, <i>Leucanthemum vulgare</i>, <i>Galium verum</i>, <i>Primula veris</i>, <i>Centaurea nigra</i>, <i>Leontodon hispidus</i>, <i>Ranunculus bulbosus</i> or on flood meadows some of <i>Caltha palustris</i>, <i>Sanguisorba officinalis</i>, <i>Filipendula ulmaria</i> and <i>Alopecurus pratensis</i>. Note that vegetation dominated by <i>F.ulmaria</i> keys out at 6e.</p>	<p>Lowland hay meadows Priority Habitat (BH 6 Neutral Grassland)</p>	<p><i>Herb-rich grassland</i></p>	<p>MG4, MG5, MG8</p>
<p>9c Cover of grass species and clover usually less than 50% with a high proportion of Priority Habitat upland meadow indicators such as <i>Geranium sylvaticum</i>, <i>Alchemilla spp.</i>, <i>Trisetum flavescens</i>, <i>Conopodium majus</i> and <i>Anthoxanthum odoratum</i>.</p>	<p>Upland hay meadows Priority Habitat (BH 6 Neutral Grassland)</p>	<p><i>Herb-rich grassland</i></p>	<p>MG3</p>

<p>9d Neutral flushes typically picking out enriched springlines and water seepage zones in lowland or upland situations. Acidic and calcareous indicators are absent or rare. Characteristic species include <i>Agrostis stolonifera</i>, <i>Calliergon cuspidatum</i>, <i>Lotus uliginosus</i>, <i>Montia fontana</i>, <i>Alopecurus geniculatus</i>, <i>Juncus articulatus</i>, <i>J.bufo</i>, <i>Glyceria fluitans</i>, <i>Ranunculus acris</i>.</p>	<p>Fen, Marsh, Swamp Broad Habitat (BH 11)</p>	<p><i>Flush</i></p>	
<p>9e Not as above.</p>	<p>10</p>		
<p>10a Vegetation on dry ground with scattered sedges and many calcicoles present. Can be relatively species poor but often species rich with >50% forb cover. On calcareous soils, usually rendzinas on chalk or limestone in lowland Britain. Indicators include <i>Bromus erectus</i>, <i>Brachypodium pinnatum</i>, <i>Linum catharticum</i>, <i>Sanguisorba minor</i>, <i>Carlina vulgaris</i>, <i>Cirsium acaule</i>, <i>Hippocrepis comosa</i> and <i>Asperula cynanchica</i>, <i>Filipendula vulgaris</i>, <i>Galium verum</i>, <i>Briza media</i>, <i>Koeleria macrantha</i> and <i>Helianthemum nummularia</i>.</p>	<p>Lowland Calcareous Grassland Priority Habitat (BH 7 Calcareous Grassland)</p>	<p><i>Lowland Calcareous grassland</i></p>	<p>CG1-CG9</p>
<p>10b As 10a but often low in species richness. Often dominated by <i>Sesleria albicans</i> with <i>Festuca ovina</i>, <i>Thymus praecox</i>, <i>Galium sternerii</i> and <i>Agrostis capillaris</i> characteristic. Stands may comprise a confusing mix of calcicoles and acidophiles. Montane forms sometimes contain Arctic-Alpine plants, such as <i>Alchemilla alpina</i>, <i>Polygonum viviparum</i> and <i>Silene acaulis</i>. <i>Dryas octopetala</i> is also locally indicative.</p>	<p>Upland Calcareous Grassland Priority Habitat (BH 7 Calcareous Grassland)</p>	<p><i>Upland Calcareous grassland</i></p>	<p>CG9-CG14, U5c</p>
<p>10c Rush or/and <i>Molinia</i> dominated vegetation usually on peat or peaty-gley soils with <i>Juncus acutiflorus</i> and/or <i>subnodulosus</i> abundant. Usually on level ground in lowland or marginal uplands. Acid indicators may be present but especially notable are uncommon assemblages of rich fen species such as <i>Juncus subnodulosus</i>, <i>Craex pulicaris</i>, <i>C.hostiana</i>, <i>Cirsium dissectum</i>, <i>Epipactis palustris</i>, <i>Crepis paludosa</i>, <i>Geum rivale</i>, <i>Briza media</i>, <i>Gymnadenia conopsea</i> and</p>	<p>Purple Moor Grass and Rush Pastures Priority Habitat (BH 11 Fen, Marsh, Swamp)</p>	<p><i>Purple moor grass rush pasture</i></p>	<p>M22, M24, M26</p>

	<i>Serratula tinctoria</i> . Typically found in Norfolk, Somerset Levels, Wales and SW England and locally in the Pennines and Lake District.			
10d	Localised areas of vegetation, often visibly associated with seepage zones where water movement is vertical (topogenous mires) or lateral (soligenous mires). Usually with several sedge species and species of wet soils. Includes <i>Briza media</i> , <i>Schoenus nigricans</i> , <i>Pinguicula vulgaris</i> , <i>Parnassia palustris</i> , <i>Carex hostiana</i> , <i>Carex dioica</i> , <i>Drosera anglica</i> , <i>Eriophorum latifolium</i> , <i>Primula farinosa</i> . Often with abundant <i>Molinia</i> .	Fen Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Flush</i>	M9-14
10e	Not as above	11		
11a	Rush or/and <i>Molinia</i> dominated vegetation usually on peaty-gley soils with <i>Juncus acutiflorus</i> or <i>Juncus effusus</i> abundant to dominant. Indicators of rich fen are absent. Instead typical species include <i>Galium palustre</i> , <i>Cirsium palustre</i> , <i>Hypericum undulatum</i> , <i>Ranunculus flammula</i> , <i>Agrostis canina</i> , <i>Mentha aquatica</i> , <i>Achillea ptarmica</i> , <i>Equisetum palustre</i> , <i>Cardamine pratensis</i> , <i>Epilobium palustre</i> and <i>Angelica sylvestris</i> ³ .	Purple Moor Grass and Rush Pastures Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Purple moor grass rush pasture</i>	M23, M25
11b	Not as above.	12		
12a	Localised narrow wet areas of vegetation or obvious flushing. Vegetation usually dominated by acidiphilous species eg. <i>Sphagnum</i> spp, <i>Juncus effusus/articulatus/acutiflorus</i> , <i>Carex echinata</i> , <i>Ranunculus flammula</i> , <i>Stellaria alsine</i> , <i>Carex rostrata</i> , <i>Carex nigra</i> . Often bryophyte rich.	Fen Priority Habitat (BH 11 Fen, Marsh, Swamp)	<i>Flush</i>	M4-8

³ Species-poor *Molinia* stands when associated with upland bog systems and flushes or laggs of lowland raised bogs will key out as Moorland grass or be included pragmatically in a wider blanket bog unit. Similarly, grazed Fertile and Acid grasslands in the uplands and west of Britain can have a frequent to dominant overstorey of *Juncus effusus* and should be placed in those BH rather than in Purple Moor grass and Rush Pastures. Hence, to qualify as Purple Moor grass and Rush pasture PH the stand must have a reasonable representation of the listed indicator species.

<p>12b Vegetation with many acid indicators. Not associated with clearly defined flushes and depressions but characterising larger, more extensive drier or wetter ground. Hence, all bogs with low cover of dwarf shrub heaths plus upland and lowland acid grasslands key out here.</p>	<p>13</p>		
<p>13a Sub-arctic indicators present, for example prostrate <i>Salix herbacea</i> and <i>Calluna</i>, <i>Juncus trifidus</i>, <i>Carex bigelowii</i>, <i>Arctostaphylos alpinus</i>, <i>Loiseleuria procumbens</i>, <i>Juniperus communis ssp. Nana</i>, <i>Empetrum nigrum ssp hermaphroditum</i> and <i>Racomitrium lanuginosum</i>. Includes montane, snowbed and sub-arctic sedge and rush communities on raw thin podzols, rankers and semi-skeletal soils.</p>	<p>Montane (BH 15)</p>	<p><i>Sub-arctic (Montane)</i></p>	<p>U7-12, U14-15, H13-15, H17, H19, H20, H22, W20</p>
<p>13b Cover of peatland species over 25%. Indicators include <i>Tricophorum</i>, <i>Molinia</i>, <i>Sphagnum</i>, <i>Eriophorum spp.</i>, <i>Juncus squarrosus</i> and <i>Myrica</i>. Usually on deep-peats or wet peaty rankers. <i>Juncus effusus</i> and <i>J. acutiflorus</i> scarce or absent.</p>	<p>14</p>		
<p>13c Peatland species under 25% on variable soil types. <i>Juncus effusus</i>, <i>J.conglomeratus</i> and <i>J.acutiflorus</i> can be abundant.</p>	<p>15</p>		
<p>14a Peat largely >0.5m deep, where this is possible to establish. Scattered to dominant <i>Eriophorum vaginatum</i> often with <i>Sphagnum</i> spp and/or <i>Rubus chamaemorus</i>.</p>	<p>Blanket bog PH⁴ (BH 12Bog)</p>	<p><i>Blanket Bog</i></p>	<p>M1-M3, M17-M20, (on deep peat H9, H12, M15-16, M25)</p>
<p>14b Vegetation dominated by other peatland species eg. <i>Tricophorum</i>, <i>Molinia</i>, <i>Sphagnum</i>, small sedges and <i>Myrica</i>. <i>E.vaginatum</i> absent.</p>	<p>16</p>		

⁴ Blanket bog is differentiated in Scotland by an SNH GIS mask. In England & Wales, an altitude mask COULD be applied though none yet exists. Hence, Blanket Bog, Raised Bog and Other Bog are keyed out on floristic grounds but national estimates of extent further reflect the spatial restriction of the range of each habitat by application of GIS masks.

15a	Fine grasses predominate in generally in dry situations eg. <i>Agrostis curtisii</i> , <i>Festuca ovina</i> and <i>Anthoxanthum odoratum</i> usually on brown podzolic soils or rankers. Acid indicators present eg. <i>Galium saxatile</i> , <i>Potentilla erecta</i> , <i>Pleurozium schreberi</i> and <i>Rumex acetosella</i> .	Acid Grassland (BH 8)	<i>Acid grassland</i>	U2, U4
15b	Coarse grasses predominate generally in upland wet situations eg. <i>Nardus</i> , <i>Molinia</i> , <i>Deschampsia flexuosa</i> and <i>Juncus squarrosus</i> usually on peaty-gley soils. Includes species poor <i>Molinia</i> dominated upland bog slopes and flushes, and the laggs around lowland raised bogs.	Moorland grass (BH 8 Acid Grassland)	<i>Moorland- grass</i>	U5, U6, U7, U13
15c	Grassland that can include a high proportion of bare ground or with a high proportion of <i>Cladonia</i> spp and small annuals such as <i>Erophila verna</i> , <i>Aphanes arvensis</i> and <i>Myosotis ramosissima</i> . Found on nutrient poor sandy soils or shingle in the lowlands below 300m. Typical species are <i>Festuca ovina</i> , <i>Galium saxatile</i> , <i>Sedum acre</i> , <i>Rumex acetosella</i> , <i>A. capillaris</i> and <i>Potentilla erecta</i> . Also includes lowland stands dominated by <i>Agrostis curtisii</i> and <i>Deschampsia flexuosa</i> . <i>Carex arenaria</i> locally present but only on inland stands.	Lowland Dry Acid grassland Priority Habitat (BH 8 Acid grassland)	<i>Acid grassland</i>	U1-U3, SD10b, SD11b
16a	Sub-arctic indicators not present. Dominated by dwarf shrubs e.g. <i>Calluna</i> , <i>Erica</i> , usually on podzolic soils but also on brown podzolics, shallow peats, rankers and gleys.	22		
16b	Species of wet peat soils predominate. Indicators include <i>Tricophorum</i> , <i>Molinia</i> , <i>Sphagnum</i> , <i>Eriophorum</i> spp., <i>Narthecium ossifragum</i> , <i>Juncus squarrosus</i> and <i>Myrica gale</i> . Usually on deep-peats or wet peaty rankers. Valley bogs and other peat-based topogenous and soligenous mires key out here if with <=25% cover of Dwarf Shrubs. See guidance notes.	Bog Broad Habitat (BH 12)	<i>Other Bog</i>	M21, M25
16c	Peatland species predominate eg. <i>Tricophorum</i> , <i>Eriophorum angustifolium</i> , <i>Sphagnum</i> spp, <i>Vaccinium oxycoccus</i> and <i>Andromeda polifolia</i> . Often in lowland areas in unimproved/unafforested areas of flood plains. All lowland bog elements that appear to have a groundwater or riverine source to their water table should, depending on their species	Lowland raised bog Priority Habitat (BH 12 Bog)	<i>Other Bog</i>	M1-M4, M17-M20

	composition, key out as flushes (12a or 10d) or at 16b or 26d . Purely rainfed bog systems should key out here. This separation may be difficult. A good indicator is the location of the bog on level ground with a gently domed structure and an absence of calcicolous and mesotrophic wetland species.			
17a	Less than 20% conifers in canopy (excluding yew but includes juniper).	21		
17b	More than 20% coniferous in canopy (excluding yew but includes juniper)	18		
18a	Over 25% canopy cover of <i>Pinus sylvestris</i> .	<i>P.sylvestris</i> woodland ⁵ (BH 2 Coniferous Woodland)	<i>Belt or Clump of trees or Woodland/Forest</i>	W18-19 and all planted stands
18b	Not as above	Coniferous Woodland (BH 2)	<i>Belt or Clump of trees or Woodland/Forest</i>	
19a	Palatable grasses dominate mainly <i>Lolium</i> , <i>Phleum pratense</i> , <i>Dactylis</i> , <i>Cynosurus</i> , <i>Holcus</i> . Grass cover usually over 75%. Broadleaved species restricted mainly to <i>Trifolium repens</i> , <i>Ranunculus</i>	Improved Grassland (BH 5)	<i>Fertile Grass</i>	MG6, MG7

⁵ A GIS mask for the accepted native range of *Pinus sylvestris* will be applied to delimit the Native Pinewood Priority Habitat. Verification against the Stevens & Carlisle map can also be undertaken post-survey.

repens, *Plantago major*, *Taraxacum*, *Rumex obtusifolius* and *Stellaria media*. Fertile but wetter situations may support occasional *Juncus effusus* or *J.inflexus*, *Glyceria fluitans*, *Agrostis stolonifera* and *Poa trivialis*, but accompanying species will always indicate high fertility.

<p>19b Palatable grasses predominate, usually <i>Lolium</i> and <i>Phleum pratense</i> 25% or below and other grasses more prominent such as <i>Cynosurus</i>, <i>Agrostis capillaris</i>, <i>Trisetum</i>, <i>Bromus hordeaceus</i> and <i>Anthoxanthum</i>. Semi-improved but wetter situations may support abundant <i>Juncus effusus</i> or <i>J.inflexus</i>, <i>Glyceria fluitans</i>, <i>Agrostis stolonifera</i> and <i>Poa trivialis</i>. Total grass cover usually between 50 and 75%. Forbs up to 50% cover and associated with less fertile soil eg. <i>Plantago lanceolata</i>, <i>Rumex acetosa</i>, <i>Ranunculus acris</i>, <i>R.repens</i>, <i>Prunella vulgaris</i>, <i>Achillea millefolium</i>, <i>Potentilla anserina</i>, <i>Cirsium palustre</i> and <i>Cardamine pratensis</i>. However, indicators of the two hay meadow Priority Habitats will be rare or absent.</p>	<p>20</p>		
<p>20a Recently sown mixtures of light grasses for agri-environment schemes or habitat creation/restoration such as <i>Anthoxanthum</i>, <i>Poa pratensis</i>, <i>Festuca rubra</i>, <i>Cynosurus</i> and <i>Trisetum</i>. 50-100% grass cover. Herb species rare or absent. Often on sown field margins.</p>	<p>Neutral Grassland (BH 6)</p>	<p><i>Recently sown neutral grass</i></p>	
<p>20b As above but with high cover of sown mixtures of legumes such as <i>Trifolium pratense</i>, <i>T.hybridum</i> and <i>Lotus corniculatus</i>. Often on sown field margins.</p>		<p><i>Recently sown neutral grass</i></p>	
<p>20c Not as above.</p>	<p>Neutral Grassland (BH 6)</p>	<p><i>Semi- improved neutral grass</i></p>	<p>MG6, MG9-13</p>

<p>21a Scrub on sand dunes and shingle.</p>	<p>Supralittoral sediment (BH19)</p>	<p><i>Sand dune</i></p>	
<p>21b All other broadleaved woodland (see guidance notes for Orchards).</p>	<p>24</p>		
<p>22a <i>Ulex europaeus</i> > 25%.</p>	<p>Broadleaved woodland (BH 1)</p>	<p><i>Belt of trees or Woodland/ Forest</i></p>	<p>W23</p>
<p>22b Any of <i>Erica</i> spp., <i>Calluna</i>, <i>Empetrum</i>, <i>Vaccinium</i> or <i>Ulex minor/gallii</i> (co-)dominate but not in coastal situations. Species of wet/deeper peats absent eg. <i>Myrica</i>, <i>Narthecium</i>, <i>Eriophorum</i> spp. and <i>Sphagnum</i> spp absent. Soils generally thin peaty podzols or rankers.</p>	<p>Dry Heath⁶ (BH 10 Dwarf Shrub Heath)</p>	<p><i>Dwarf Shrub heath</i></p>	
<p>22c As above but heathland on sand dunes and shingle.</p>	<p>Supralittoral sediment (BH19)</p>	<p><i>Sand dune</i></p>	
<p>22d As above but heathland on maritime cliffs.</p>	<p>Maritime cliff and slope Priority Habitat (BH18)</p>	<p><i>Maritime vegetation</i></p>	
<p>22e Not as above.</p>	<p>23</p>		
<p>23a Dwarf Shrub Heath with occasional to frequent indicators of wet conditions such as <i>Erica tetralix</i>, <i>Sphagnum</i>, <i>Molinia</i> and/or <i>Narthecium</i> but lacking high cover of <i>Sphagnum</i>, <i>Eriophorum</i> spp and <i>Rubus chamaemorus</i>. Peat largely <0.5m in depth where this can be established. This is a difficult</p>	<p>Wet heath (BH 10 Dwarf Shrub Heath)</p>	<p><i>Dwarf Shrub heath</i></p>	<p>M15, M16</p>

⁶ Discrimination between Upland and Lowland heath PH rests on application of altitude-based GIS masks applied post-survey.

	separation to make particularly regarding degraded ombrogenous mires where low abundance of bog indicators may reflect overgrazing, burning and drainage rather than thinner, drier peats.			
23b	Peat largely >0.5m, where this is possible to establish. Scattered to dominant <i>Eriophorum vaginatum</i> often with <i>Sphagnum</i> spp and/or <i>Rubus chamaemorus</i> .	Blanket Bog Priority Habitat ⁷ (BH 12 Bog)	<i>Blanket Bog</i>	M1-M3, M17-M20, (on deep peat H9, H12, M15-16, M25)
23c	Species of acid peat soils predominate eg. <i>Tricophorum</i> , <i>Eriophorum angustifolium</i> , <i>Sphagnum</i> spp, <i>Vaccinium oxycoccus</i> and <i>Andromeda polifolia</i> . Often in lowland areas in unimproved/unafforested areas of flood plains. All lowland bog elements that appear to have a groundwater or riverine source to their water table should, depending on their species composition, key out as flushes (12a or 10d) or at 16b or 26d . Purely rainfed bog systems should key out here. This separation may be difficult. A good indicator is the location of the bog on level ground with a gently domed structure and an absence of calcicolous and mesotrophic wetland species.	Lowland raised bog Priority Habitat (BH12 Bog)	<i>Lowland raised bog</i>	M1-M3, M17-M20

⁷ Blanket bog is differentiated in Scotland by an SNH GIS mask. In England & Wales, an altitude mask could be applied though none yet exists. Hence, Blanket Bog, Raised Bog and Other Bog are keyed out on floristic grounds but national estimates of extent further reflect the spatial restriction of the range of each habitat by application of GIS masks.

<p>23d Species of acid peat soils predominate eg. <i>Tricophorum</i>, <i>Molinia</i>, <i>Narthecium ossifragum</i>, <i>Sphagnum</i> and <i>Myrica</i> usually on deep-peat soils or wet peaty rankers. Valley bogs and other topogenous and soligenous mires key out here. See guidance notes.</p>	<p>Bog (BH 12)</p>	<p><i>Other bog</i></p>	<p>M21</p>
<p>24a $\geq 50\%$ canopy cover of <i>Alnus glutinosa</i> or $\geq 50\%$ cover of <i>Salix</i> spp. Willow.</p>	<p>Wet woodland Priority Habitat (BH 1 Broadleaved Woodland)</p>	<p><i>Belt of trees or woodland/ Forest (plus secondary attributes see guidance)</i></p>	<p>W1-W7</p>
<p>24b $\geq 25\%$ canopy cover of <i>Fagus sylvatica</i> (Beech) or $\geq 25\%$ canopy cover of <i>Taxus baccata</i> (Yew)</p>	<p>Lowland beech Priority Habitat⁸ (BH 1 Broadleaved Woodland)</p>	<p><i>Belt of trees or woodland/ Forest (plus secondary attributes see guidance)</i></p>	<p>W12-W15</p>
<p>24c $\geq 25\%$ canopy cover <i>Fraxinus excelsior</i> or $\geq 25\%$ canopy cover of <i>Ulmus</i> spp</p>	<p>Upland Mixed Ash or Lowland Mixed Deciduous Priority</p>	<p><i>Belt of trees or woodland/ Forest (plus</i></p>	<p>W8-W9, W13</p>

⁸ GIS masks delimiting the accepted native range for Beech will be used to constrain the range of the Priority Habitat.

<p>24d $\geq 75\%$ canopy cover of native <i>Quercus</i> spp or $\geq 75\%$ canopy cover of native <i>Betula</i> spp.</p>	<p>Habitat⁹ (BH 1 Broadleaved Woodland)</p> <p>25</p>	<p>secondary attributes see guidance)</p>	
<p>24e Not as above.</p> <p>25a $\geq 95\%$ canopy cover of native <i>Betula</i> spp in Scotland.</p> <p>25b Not as above.</p>	<p>Broadleaved Woodland (BH 1)</p> <p>Northern Birchwood Priority Habitat (BH 1)</p> <p>Upland Oak Woodland Priority Habitat or Lowland</p>	<p><i>Belt of trees or woodland/ Forest (plus secondary attributes see guidance)</i></p> <p><i>Belt of trees or woodland/ Forest (plus secondary attributes see guidance)</i></p> <p><i>Belt of trees or woodland/ Forest (plus</i></p>	<p></p> <p>W10e, W11, W17</p> <p>W10e, W11, W17, W16b</p>

⁹ GIS masks delimiting the accepted upland and lowland ranges of each Priority Habitat will be applied post-survey for the purposes of mapping and estimating extent given adequate representation in the sample.

Mixed Deciduous Priority Habitat ⁹ (Broadleaved woodland BH 1)	secondary attributes see guidance)
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Further guidance notes:

Pulse-disturbance vegetation: This will often be a difficult separation to make but refers to early to mid-successional vegetation that may still be undergoing species compositional turnover and either assembling in response to a single infrequent disturbance episode such as flooding, drawdown, fire, felling and natural gap formation in woodlands, or the cessation of disturbance e.g. urban derelict land and gardens, new landfill caps, mine spoils and reclaimed land or apparently fallow arable. Also included here are the annual to less frequently mown communities of boundaries and linear features including hydroseres around waterbodies. Local 'rough' areas of amenity grassland on school playing fields, golf courses and churchyards may also fall into the groups outlined. Their defining feature is that indicators of annual or more frequent mowing and prolonged grazing are generally absent. Assemblages here may often be variable in height but usually typified by tall grasses and herbs not tolerant of grazing or agricultural mowing regimes. Hence, the vegetation is usually more than 25cm in average height. Variation in species composition may however be large and unpredictable given the dynamic and spontaneous nature of the colonisation and establishment phases. Even so, nitrophiles will often be very well represented given the association with fertile lowland soils, gardens, arable land and urban environments. In most situations, the actual area of these kinds of vegetation stands will be <0.25ha and hence below the minimum mappable unit. Vegetation arising after woodland has been clearfelled can be extensive yet pose a problem in terms of its assignment to habitat types. In upland plantations that have been harvested, the vegetation will inherit aspects of the pre-existing bog or heath but species richness and vegetated cover maybe low because only a subset of species are in the seedbank and little time may have elapsed since felling. In addition, the vegetation may be protected from grazing. This can result in coarse mosaics of regenerating shrubs, bare ground, bryophyte patches and scattered bog and heath plants. Based on the species present, such areas are likely to be mosaics of other bog, blanket bog and heath. Significant stands of ferns, *Chamerion angustifolium* and other tall-herbs may warrant a mosaic with Perennial vegetation, tall herb/grass, which keys out at 7c and has been allocated to the Neutral Grassland BH.

Press-disturbance vegetation: There is no naturally sharp distinction between these communities and pulse-disturbance types. Plant assemblages may reflect wet to dry, acid to calc conditions but the common feature is that they experience a relatively stable annual disturbance regime where biomass is removed by annual cutting or/and continuous grazing at varying intensities. Hence, all grazed upland and lowland grasslands are included here along with meadows and silage fields. Also included are those amenity grasslands which may be rabbit grazed but are generally managed by very frequent mowing. Also included here are areas of monocot rather than dwarf shrub dominated bogs and heaths that may typically be managed less intensively than agricultural lowland grasslands but may nevertheless experience frequent, predictable biomass removal by grazing. Surveyors will often find it difficult to effect the separation between **5a** and **5b**. This simply reflects real difficulties in establishing mapped boundaries when species vary individualistically and the environment varies continuously.

4. KEY TO WOODLAND TYPES/FEATURES

TREE FORM		
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
4. Individual trees more than 50m apart?	YES – see Individual Trees under Point Features pg 100	NO – Step 5
5. Less than 0.25 ha with canopy >20% area	YES – see Clump of trees (BH/PH if >20x20m else Point Features pg 100)	NO – Step 6
6. Linear feature (area ratio 1:4 and <4 trees wide)?	YES – Step 7	NO – Step 8
7. Single tree width?	YES – see Woody Linear Features under Linears (pg 100)	NO – Belt of Trees (BH/PH)
8. Canopy cover less than 20%?	YES – Step 9	NO – Woodland/Forest (BH/PH)
9. Trees less than 50m apart (on average)?	YES – Scattered Trees options pg 93	NO - see Individual Trees under Point Features (pg 100)
SHRUBBY FORM		
10. Individuals more than 50m apart?	YES – Individual Scrub under Point Features (pg 100)	NO – Step 11
11. At least 20m line?	YES – Step 12	NO – Step 13
12. Single tree width?	YES – see Woody Linear Features under Linears (pg 110)	NO – Belt of scrub (BH/PH)
13. Canopy covers more than 25% of area?	YES – Patch of scrub (BH/PH if >20x20m else Point Features pg 100)	NO – Step 14
14. Individuals less than 50m apart on average?	YES – Scattered scrub	NO see Individual Scrub under Point Features (pg 100)

The woodland descriptions will be used to describe each 'woodland unit' (ranging from a single sapling to a forestry plantation). **The primary attributes referred to in bold (clump of trees, belt of trees, woodland/forest) can be assigned to Broad or Priority Habitats (see below).** 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. Trees should be recorded as points or areas of woodland from all recreation land such as golf courses and playing fields (except in urban situations). Tree species (with apical dominance leading to the formation of recognised trunks) of all sizes should be recorded, as should shrubby species (comprising scrub).

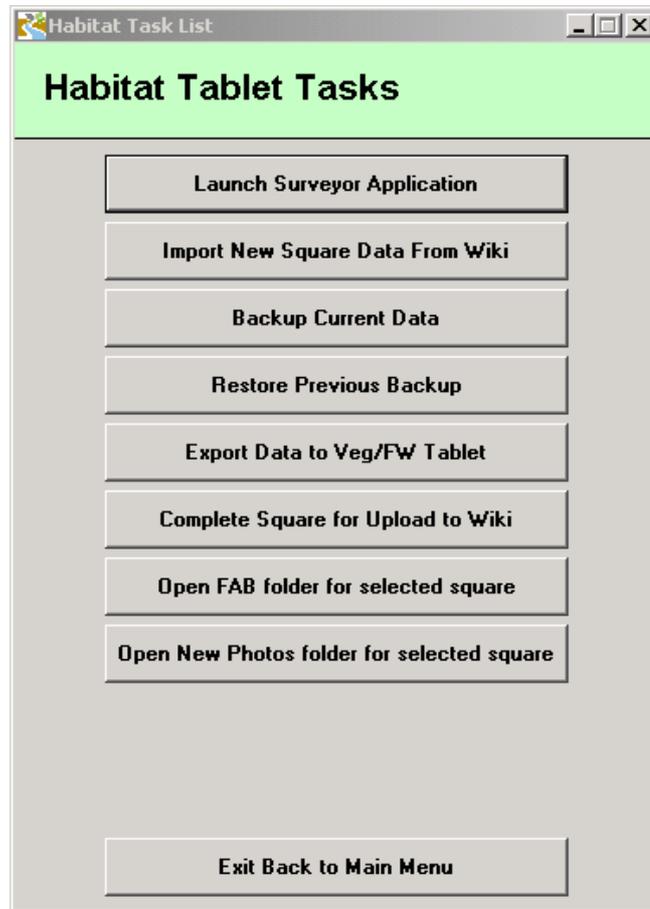
Cover types - all occurrences of trees should be allocated to one of the forestry feature attributes and qualified by secondary attributes e.g. species and species cover. If any one area of trees includes distinct variation in age or species composition the unit should be sub-divided into blocks and coded separately.

5. USING THE DIGITAL MAPPING SYSTEM

A digital system has been specially developed for CS2007 and is called CS Surveyor, it is based on a system developed by the Forestry Commission but has been customised as part of a joint collaboration between CEH and ESRI. The system development has been very rapid and recent and consequently has not been as thoroughly tested as we would like so it is possible that surveyors will come across bugs or issues in the field. PLEASE telephone the helpdesk on **01524 595812 or 0773869398** to discuss problems, you can also log your fault on the Wiki under the fault logging session. Updates to methodology will appear under the Latest News section and should be checked regularly by surveyors.

The use of a digital system enables surveyors to ensure that each of the mapped components have been visited and to record whether change has occurred against each of them. This requirement to record change will affect the way the mapping is carried out as it is a compulsory element of the survey enforced by the digital system when any changes are made to mapped habitats and features. As pointed out in the 'Background' section above surveyors will be asked to indicate genuine change and changes that highlight where, in their opinion, earlier mapping (or subsequent data processing) resulted in the mis-allocation of polygons (mapped areas), linear features or point features to the wrong BH. This is a key role for surveyors in this survey as they will be both mapping change as well as correcting the data.

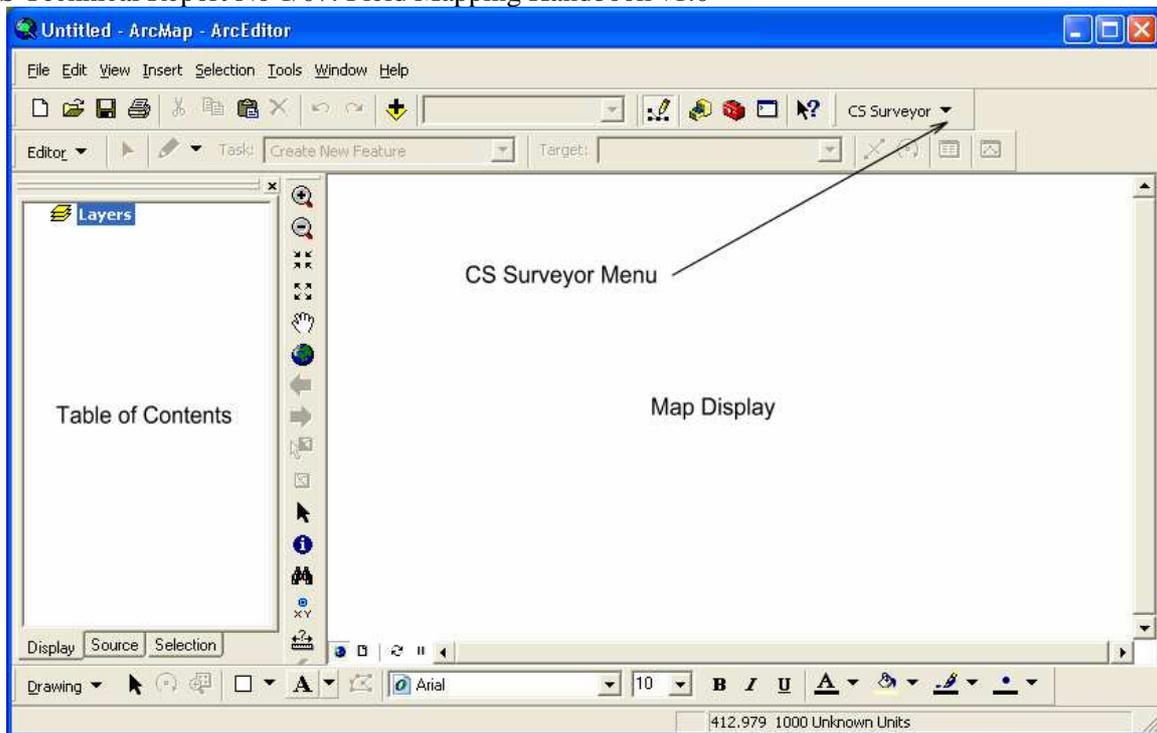
Open Arcmap using Habitats task manager and clicking on Launch Surveyor application. Choose square to edit.



Basic ArcMap

ArcMap is the GIS program, upon which CS Surveyor is built.

Surveyors are not required to have a basic knowledge of how ArcMap operates, since CS Surveyor includes all of the tools required to allow capture of all necessary data for the Countryside Survey. This introduction will illustrate how to navigate around ArcMap and use the tools and buttons needed to do so.



The ArcMap Interface

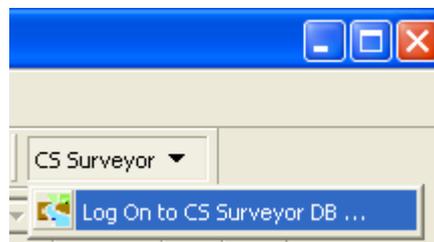
There are two main parts to the ArcMap interface, the Table of Contents, and the Map Display.

The Table of Contents displays Layers of data, which are held in a Data Frame.

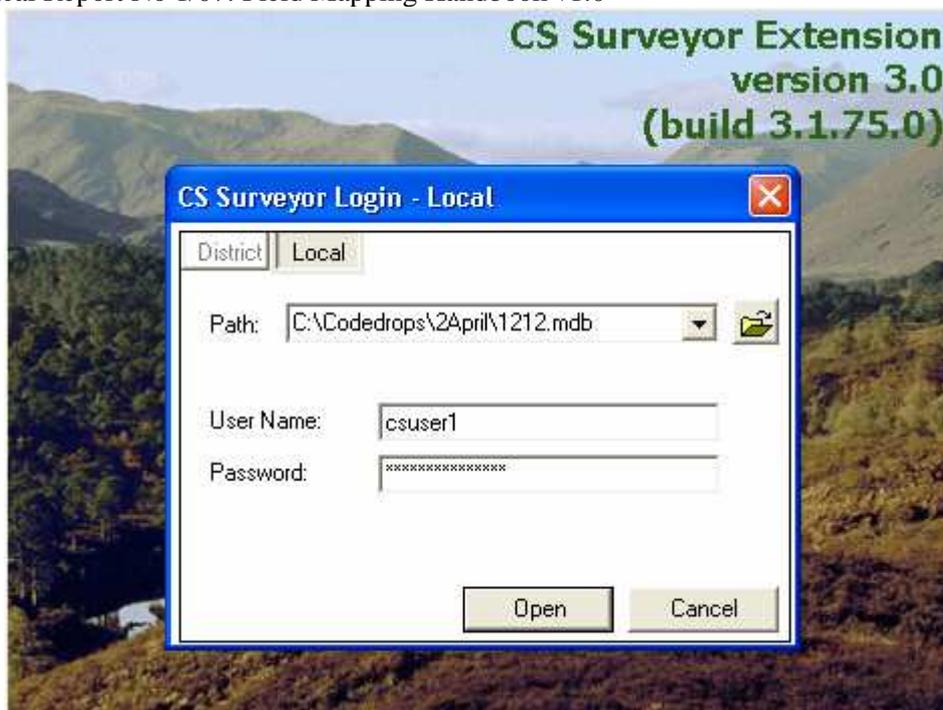
The Map Display shows the geographical representation of the data which is held in the Table of Contents.

The CS Surveyor extension also adds a menu item in the ArcMap interface, to allow the surveyor to access the main functions of the program.

When ArcMap has started up, start and log on to the CS Surveyor extension. This is done from the ArcMap toolbar.

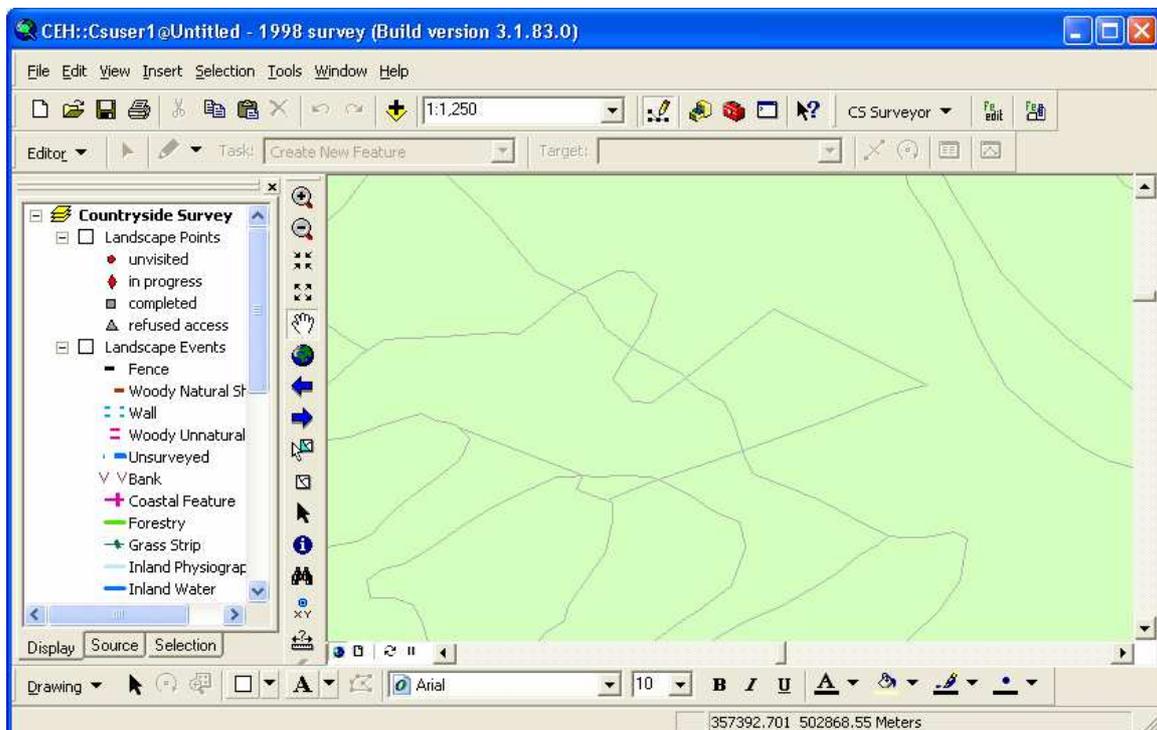


The CS Surveyor Extension welcome screen opens. Check that the path to the database is correct, enter your username and password to log on to the extension.



When you have successfully logged on, the CS Surveyor Extension loads into the GIS, and shows the relevant survey square in the map screen.

ArcMap with CS Surveyor

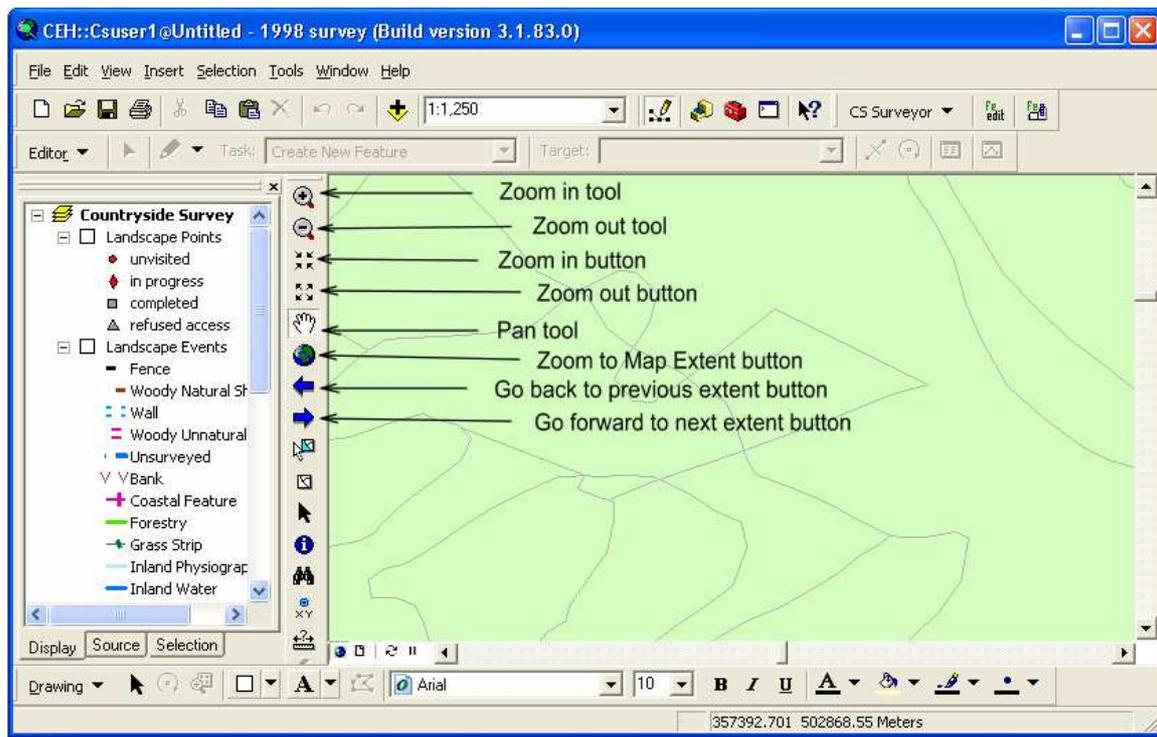


The ArcMap Interface with CS Surveyor running

When CS Surveyor is started, it automatically loads in the data required to allow the surveyor to view and edit the location and attributes of point features, linear features, and polygon features.

A data frame named Countryside Survey holds the various data layers with their symbology pre-set to ensure their visibility, and usability.

Navigation tools and buttons in ArcMap



ArcMap navigation tools and buttons

The Zoom in tool allows the user to click at a chosen point on the map display, the result is the map zooms in and is re-centred on the clicked point. Alternatively a zoom box can be dragged across the map display to zoom in to the extent of the box.

The Zoom out tool allows the user to click at a chosen point on the map display, the result is the map zooms out and is re-centred on the clicked point. Alternatively a zoom box can be dragged across the map display to zoom out re-centred on the box.

The Zoom in button makes the map display zoom in centred on the mid point of the display.

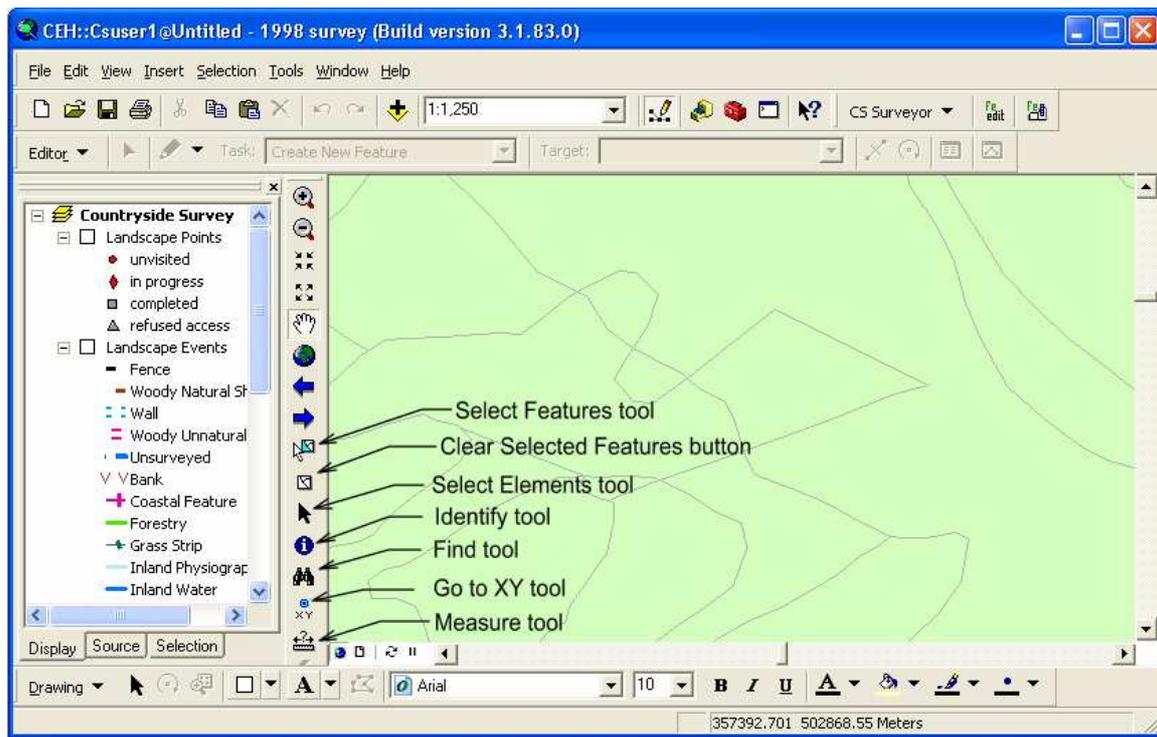
The Zoom out button makes the map display zoom out centred on the mid point of the display.

The Pan tool allows the user to pan the map in any chosen direction over the map display.

The Zoom to map extent button zooms the map display out so that all layers in the data frame are displayed. In CS Surveyor this will normally be the extent of the 1km square.

The Go back to previous extent and Go forward to next extent buttons allow the user to scroll back and forwards between previous and next extents on the map display.

Other tools and buttons in ArcMap tools toolbox



ArcMap navigation tools and buttons

The Select Features tool allows the user to select a feature, or features, from one or more layers of data in the map display.

The Clear Selected Features button, clears any selected features.

The Select Elements tool allows the selection, moving and resizing of graphics, text and similar elements.

The Identify tool allows the user to view the attributes of any feature in the map display, without selecting or de-selecting the feature.

The Find tool allows the user to search for a feature by a particular value of an attribute.

The Go to XY tool allows the user to navigate to a point by entering a set of X and Y co-ordinates.

The Measure tool allows the measurement of approximate lengths and areas on the map display.

6. METHODOLOGY FOR MAPPING POLYGONS (HABITAT AREAS)

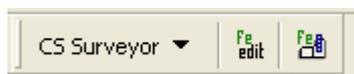
To edit areas you will need to be zoomed in to a scale of < 1:5000

Surveyors will need to click on each polygon in the CS2007 layer and either confirm that the polygon accurately represents what they see in the field, or change accordingly. Countryside Survey is primarily concerned with reporting extent and change of Broad and Priority Habitat types. Spatial accuracy is not a key aspect of the survey and therefore surveyors are asked to concentrate on the extent to which the data accurately represents the habitats in the survey square rather than their exact locations. Where necessary, surveyors can indicate errors in spatial accuracy by changing the attributes and or shapes and sizes of polygons and recording Error change against those polygons.

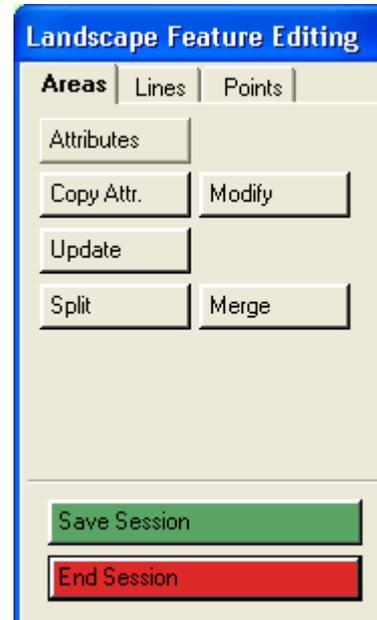
The task that surveyors will most commonly be carrying out in the field is checking and confirming and /or changing the attributes assigned to each polygon by previous surveyors.

Area Editing

Click on the Edit button in the ArcMap toolbar to begin an edit session. This will open the Landscape Feature Editing toolbox, which has 3 tabs which enable the user to edit each of landscape feature types.



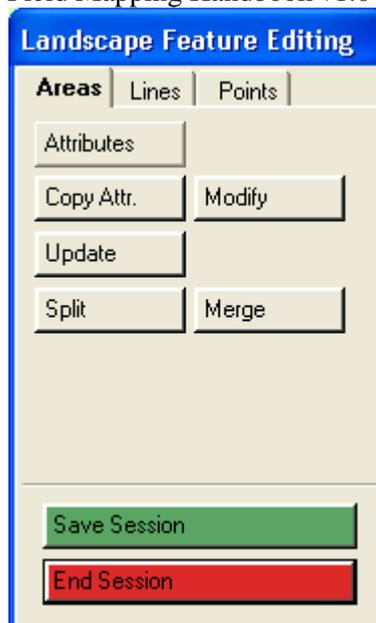
Edit button on ArcMap toolbar



Landscape Feature Editing Toolbox

Each feature type has its own selection of tools, these are designed to allow the surveyor to manipulate features to reflect change in the landscape.

The surveyor can use any of the tools, and edit Areas, Lines, and Points, without leaving an edit session. Click the Areas tab in the Landscape Feature Editing toolbox:



The surveyor can edit the attributes of an area, copy attributes from a source to target areas, split an area, merge areas together, modify the boundaries of areas, and update areas using a copied shape or digitised sketch .

6.a Editing Area attributes

Checking attributes

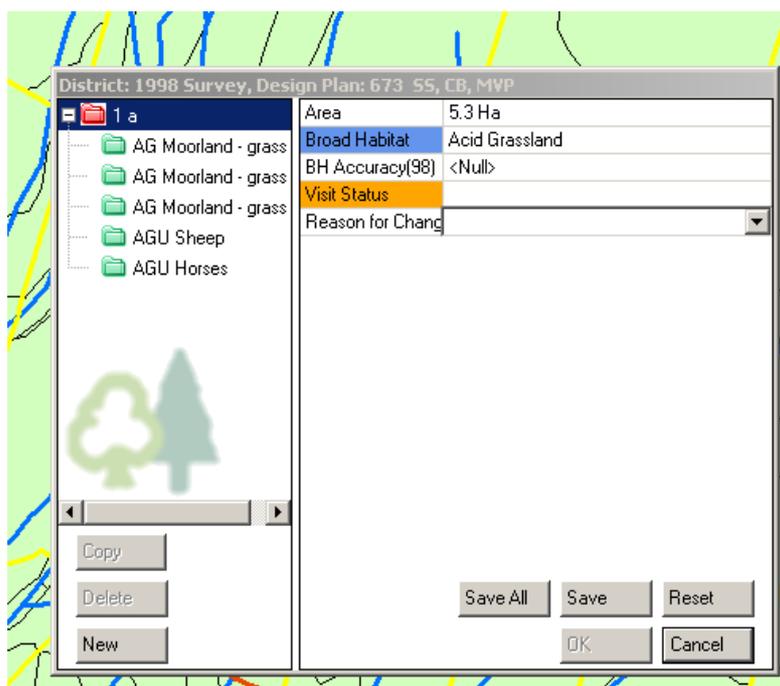
The attributes of an area or feature are all the possible descriptors for that feature including; Broad or Priority Habitat, Change status, habitat type, species and physiography. The keys above provide detailed guidance on how to assign areas to particular vegetation types (on the basis of indicator species physiography and other factors). The listed Broad and Priority Habitats below provide more detailed habitat descriptions and also indicate where the relevant attributes for each habitat are to be found within the digital recording system.

Editing Area Attributes

Click on the Attributes tab in the Landscape Feature Editing toolbox.

Zoom or pan to the location on the map display to select an area for attribute update. Select by clicking or dragging a selection box over it. The selected area is shown highlighted in yellow. The attribute editor will open, and details should be entered for the area. Fields requiring mandatory values are shown in orange, and those for which values are optional are shown in blue if you attempt to move on without filling in a mandatory field you will be given an error message.

6.a.i Polygon Level Attributes



Area: the area of the polygon is given

Broad (Priority) habitat: Surveyors should choose the appropriate Broad or Priority habitat for 2007 using the vegetation key and the additional information on Broad and Priority habitats. The default setting will be the BH from 1998, you may need to reassess after viewing the component level attributes so don't forget what the original 1998 was.

BH (Broad Habitat) Accuracy – was the polygon allocated to the right BH in 98 (allocation ok)? Were the attributes right or wrong?

- **Broad habitat ok, attributes ok**
- **Broad Habitat ok, attributes wrong**
- **Broad Habitat wrong, attributes ok**
- **Broad Habitat wrong, attributes wrong**
- **New baseline for Priority Habitat** (Some of the PH's were not recorded separately last time and would have just been recorded as part of the Broad habitat)
- **Not previously surveyed**

Reason for Change:

- **Error change-** surveyor was mistaken previously
- **No change**
- **No previous code**
- **Real change**

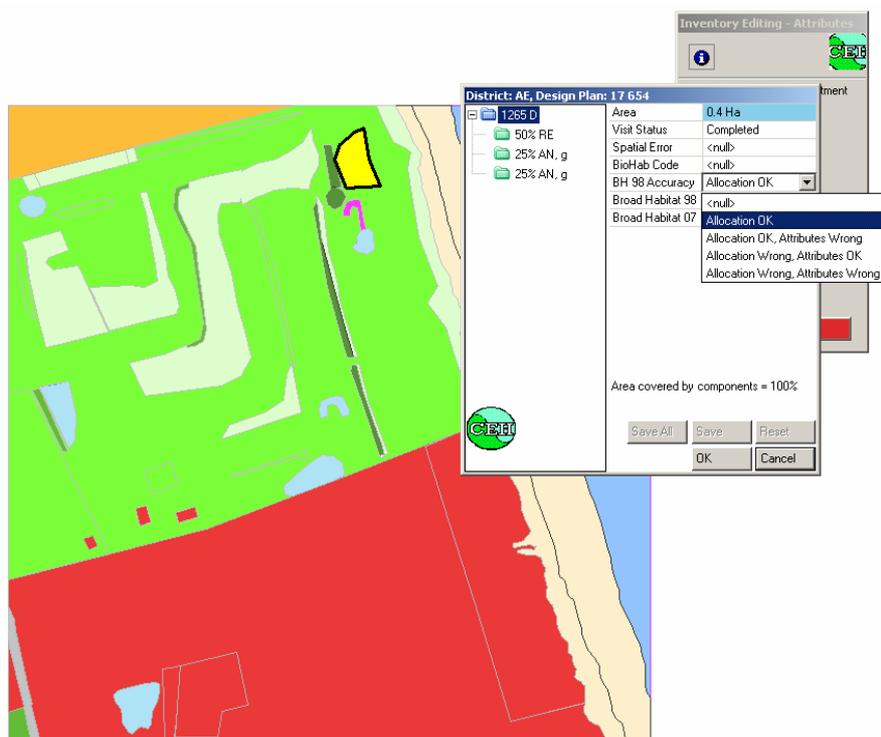
In the case of error or real change where the polygon can be assigned to new Priority Habitat it is more important to select Broad Habitat accuracy rather than new baseline which can be deduced from new map codes.

Visit status:

- **In progress**
- **Completed**
- **Refused access**

6.a.ii Determining Change

It is important that surveyors indicate whether observed changes in primary and secondary attributes are the result of genuine change since the last surveyor or whether there was an error previously.



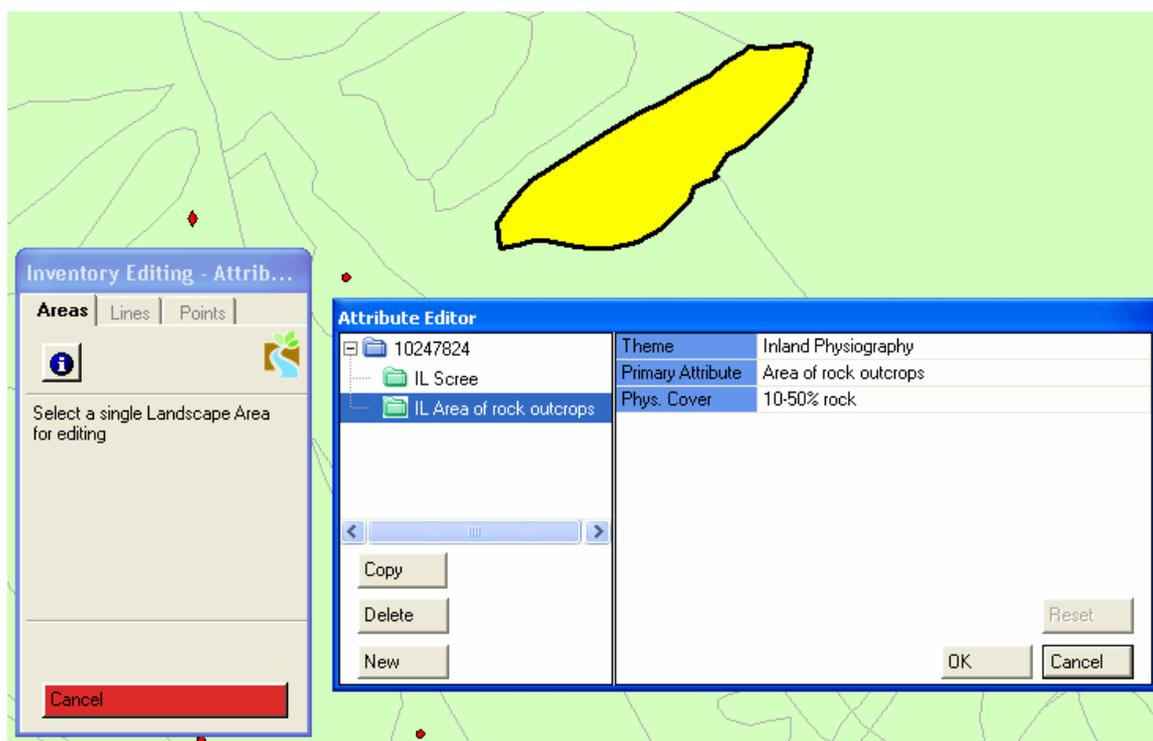
- a. Does the 1998 allocation still apply? i.e. no change has occurred. If so leave as is.
- b. Does a new allocation apply because change has occurred since 1998? This is REAL change.
- c. Does a new allocation apply because the allocation for 1998 is judged to have been wrong then and would also be wrong now? This is ERROR change and amounts to a correction of the 1998 data. N.B. in unenclosed habitats habitat descriptor & attribute data comes from the 1990 survey whereas in enclosed habitats attribute data comes from the 1998 survey.

Unenclosed habitat data will be 17 years old and appreciable vegetation change could have occurred. (See attached table/box for guidelines on significant ecological change). This **MUST** be taken into consideration when deciding if change is **REAL** or **ERROR**.

- d. Does a **NEW BASELINE** Priority Habitat code apply? In this situation the new attribute reflects a newly applied subdivision of the surveyed land-cover. For example, discriminating upland hay meadow from Neutral grassland even though both are included in the Neutral grassland BH.

6.a.iii Component Level Attributes

An area may have more than one component. Components can be added, copied, or deleted, and attributes of components can be edited. These edits are all undertaken in the Landscape Areas Attribute Editor toolbox.



Area Attribute Editing showing selected area and Attribute Editor dialog

To add a new component, click on an existing component and click the **New** button in the attribute editor summary pane on the left.

To **copy** components, click on an existing component, and click the **Copy** button in the attribute editor summary pane.

To **delete** a component, click on the component to select it, and click the Delete button.

When two or more components have the same primary attribute e.g. moorland grass then you can only change the primary attribute if you select all of the same components with the same attribute, i.e. if you select only one of the components you will only be able to select secondary attributes such as species.

***Areas can only have their attributes updated one area at a time.
Each area must contain at least one component.***

Theme – organises primary and secondary attributes into intuitive groups (e.g. physiography, agriculture/natural vegetation) to make selection easier and control dependent attributes. On the tablet surveyors will choose the appropriate attributes from the complete list of attributes under each theme

INLAND PHYSIOGRAPHY: Primary attribute and Physiographic feature cover

INLAND WATER: Primary attribute

COASTAL FEATURE: Primary attribute

AGRICULTURE/NATURAL VEGETATION: associated fields include Primary attribute, Primary qualifier (optional), vegetation type, Species and Species cover

AGRICULTURAL CROPS: associated fields include Primary attribute (these will be agriculturally related i.e. mostly crops) , Primary qualifier (optional), vegetation type, Species and Species cover

AGRICULTURE/NATURAL VEGETATION USE: Primary attribute

FORESTRY: associated fields include Primary attribute, Primary qualifier (optional), Modal DBH, vegetation type, Species and Species cover

FORESTRY FEATURE: Primary attribute only

FORESTRY USE: Primary attribute only

RECREATION: Primary attribute only

STRUCTURES: Primary attribute only

TRANSPORT: Primary attribute, road verge a and b.

WIDE LINEAR FEATURE: Primary attribute only

UNSURVEYED/MISSING DATA: No fields

DELETED FEATURE: No fields

Vegetation type – organises species into groups (e.g grasses) to aid selection.

Species – as described.

Cover/proportion – choose from <10%, 10-25%, 25-50%, 50-75%, 75-100%

Primary qualifier –relates to specific terms which support the primary attribute

e.g. ley, amenity grass, parkland

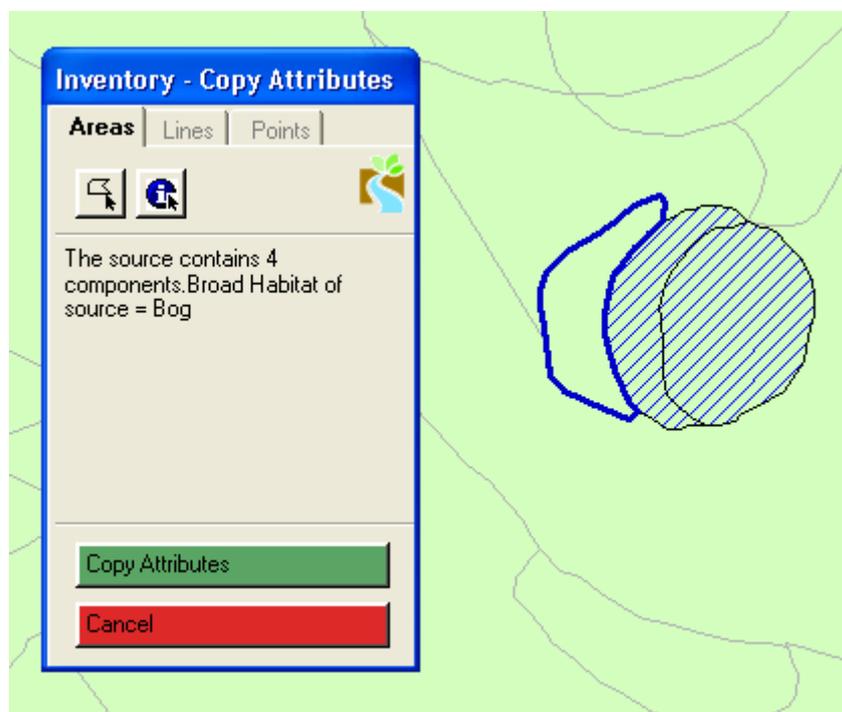
6.b Copy Area

Choose **Copy Attr.** Button from Landscape Feature Editing toolbox. Zoom or pan to the location on the map display to select one or more areas which will be target areas, and have attributes of another area copied to them.

Select areas by clicking on each area or dragging a selection box over them. The selected target areas are shown highlighted with a blue hatch. The surveyor can change the selection of target polygons by clicking on selected areas to de-select them, or clicking on additional areas to add them to the selection.

Now select an area which will be used as the source area to copy attributes from. The selected source area will be highlighted with a thick blue boundary.

The surveyor can change the source area chosen by selecting a different source area.



Click **Copy Attributes**. The attributes of the source area will be copied to the target areas. The attribute editor will open, and details should be checked for each area. Target areas will now have the same attributes as the source area.

***There can only be one source area, there can be many target areas.
Attributes copied to target areas overwrite all currently held attributes at both area and component level.***

Changing shape & size – if the polygon in the data no longer represents the vegetation patch due to a change in its extent or shape, surveyors will be able to use the following edit functions:

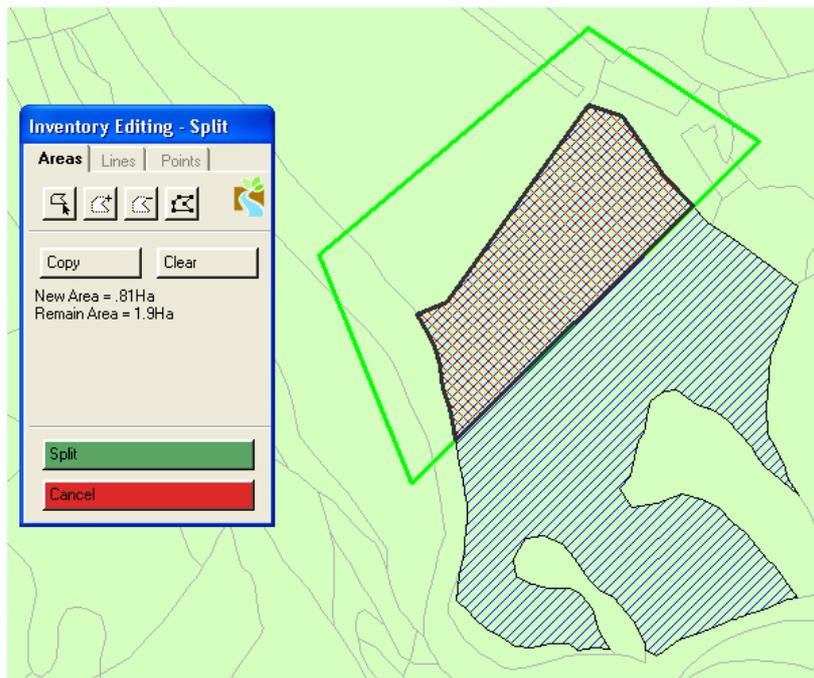
6.c Split Areas

Click 'split' on the edit menu box, click on the select polygon icon, Zoom or pan to the location on the map display where the area is to be split. Click or drag a selection box to select the area to be split. The selected area is shown highlighted with a blue hatch.

Using the sketch tool, digitise the split polygon, ensuring the split line is in the correct location. Using a series of join-the-dots type editing with the stylus, start just outside the polygon and touch the screen, lift the stylus off the screen and move to where you want the next 'dot' to be, carry on across the polygon until you are out the other side, then carry on until you can complete a polygon that will include all the bit you want to split out. Double tap to finish (this is not easy and may need a few attempts – if so make sure the stylus hits the same point). The area which will be split is shown highlighted with a blue/red cross hatch.



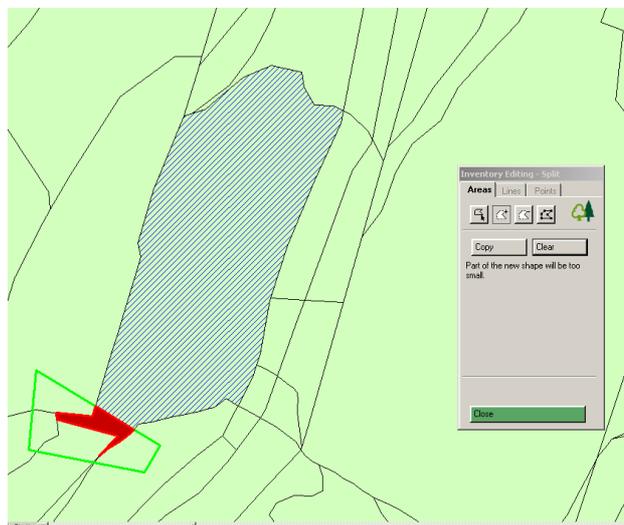
Sketch Tool



Split Area showing area to be split off

Click split to complete the spatial edit.

If the part to split is too small (i.e. below the minimum mappable unit) it will be highlighted in bright red.



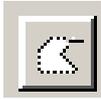
Click 'clear' on the dialogue box and start again.

If everything is OK the part to be split will show in red hatching. The attribute editor will open, with each part of the split area being highlighted in turn, the surveyor should input attributes for the split areas to complete the edit.

If you have drawn the shape and it is large enough but you are not happy with the shape and

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want to start again click 'clear' on the dialogue box and repeat.

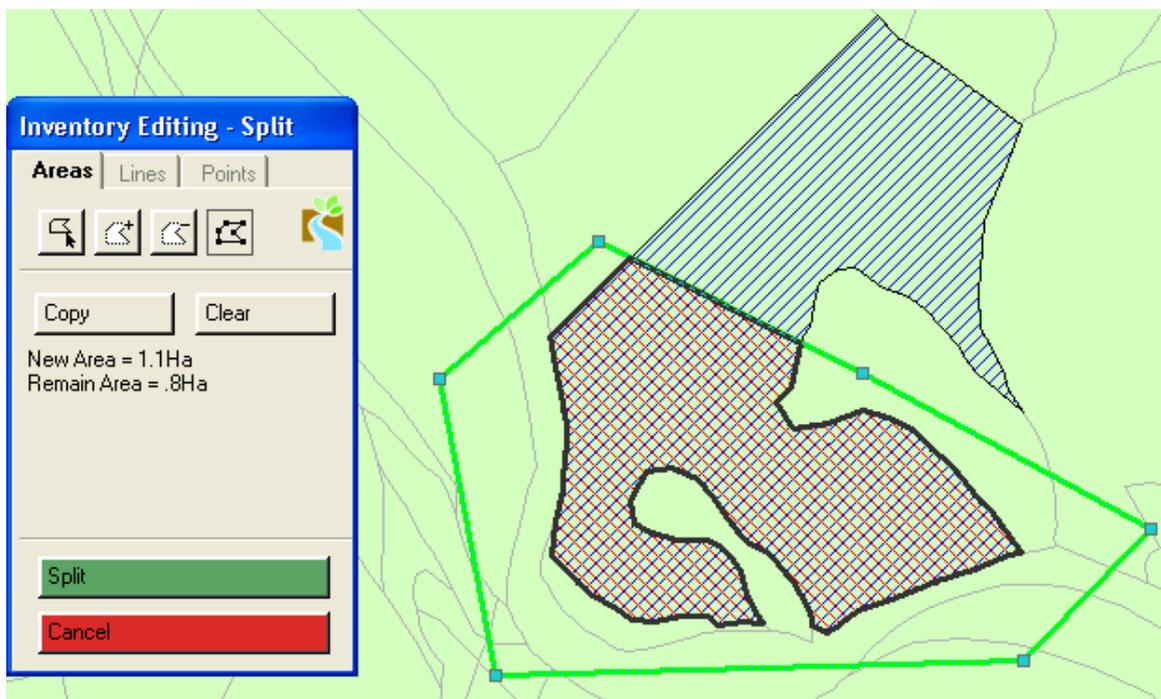
If you want to remove a piece of the polygon you have just created click on the shape with a minus sign.



6.c.i Modifying the Edit Sketch

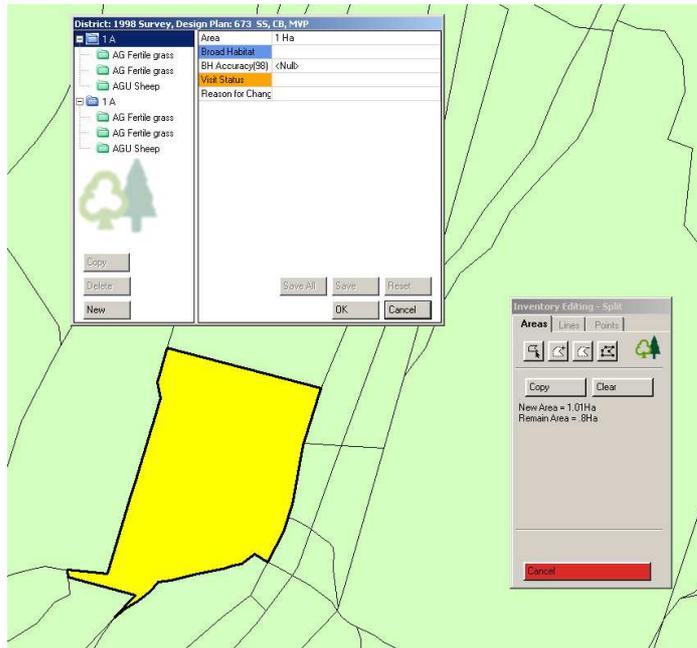
If the edit sketch created to split an area is not satisfactory in terms of shape, then it can be modified by moving its vertices to create the final shape.

Click on the vertex edit tool, the edit sketch now has vertices shown as edit handles. The edit sketch can now be modified, with vertices added, deleted, and moved, until the surveyor is satisfied that the edit sketch will produce the split required.



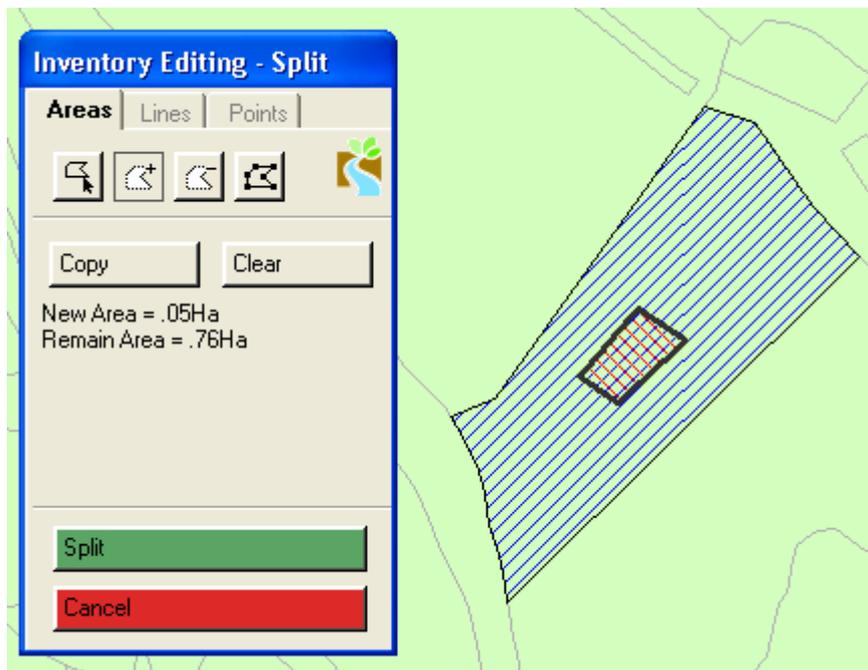
Edit sketch with vertices shown – ready to modify

When you have created the split shape the attribute editor will open, with each part of the split area being highlighted in turn, the surveyor should input attributes for the split areas to complete the edit.



Split Area – Creating a doughnut polygon

This edit should be done as a standard split, but since the intended result is to cut the split polygon from within the selected polygon, then it should be digitised accordingly.



Split edit sketch to create doughnut polygon

6.c.ii Using the Copy Tool

Existing polygons from other map layers, for example OS Mastermap, can be copied and used to make a Split Area edit sketch polygon.

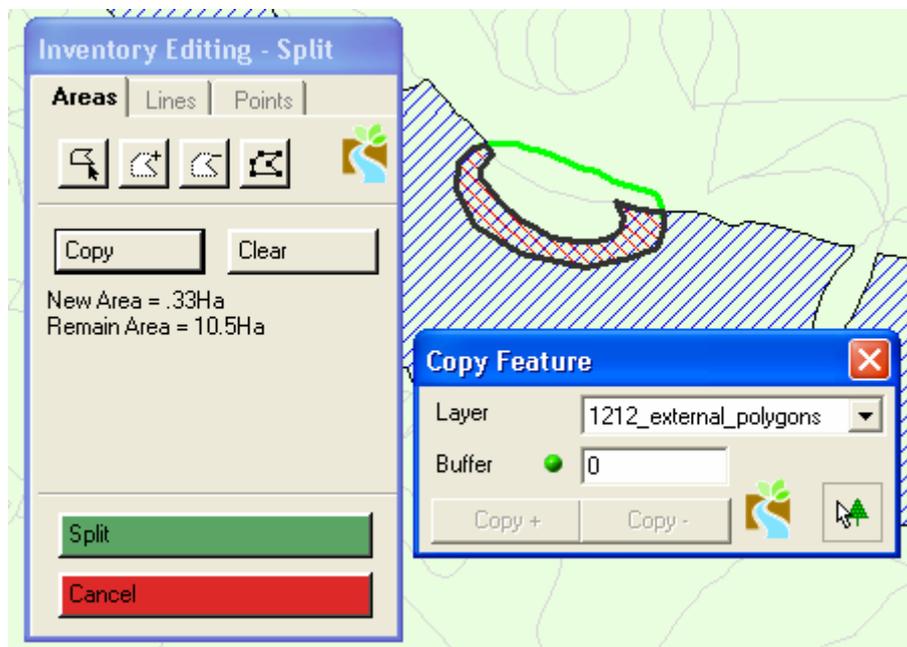
Zoom or pan to the location on the map display where the area is to be split. Click or drag a selection box to select the area to be split. The selected area is shown highlighted with a blue hatch.

Click the Copy button in the Inventory Editing – Split toolbox to open the Copy features toolbox. Select the layer you wish to copy features from, this must be a polygon layer, and select the feature you wish to copy.

The selected feature is shown with a heavy blue outline. Click the Copy+ button to include this feature in the edit sketch, the polygon is now shown with a heavy green outline, to indicate that it is part of the Split edit sketch. Select other features in the same way, clicking Copy+ to add more features to the edit sketch, and Copy- to remove features from the edit sketch.

The edit sketch can be further refined using the edit vertex tool, as described above in Modifying the Edit Sketch.

Areas to be split are shown with a heavy black outline, and a red/blue cross hatch.



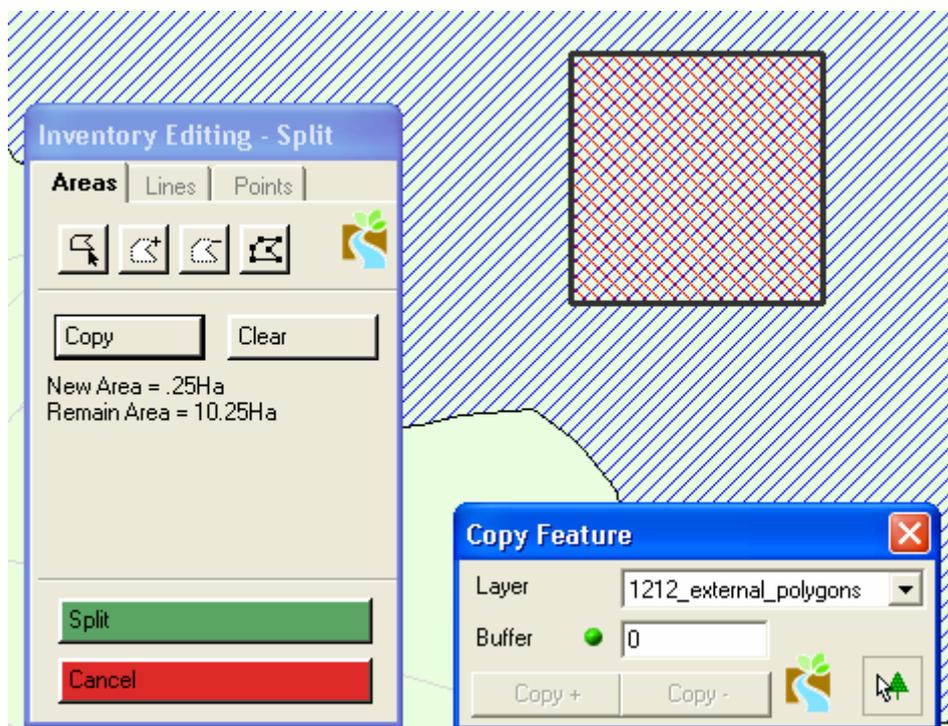
Edit sketch made by using the Copy Features tool

Click split to complete the spatial edit.

The attribute editor will open, with each part of the split area being highlighted in turn, the surveyor should input attributes for the split areas to complete the edit.

The copy tool is particularly useful if a polygon exists on another map layer, OS Mastermap

for example, and the surveyor wishes to use this to create an identical polygon within the Landscape Areas layer. The example shown below illustrates a rectangle, copied from an external data set named 1212_external_polygons, and ready to be split from the surrounding Landscape Area polygon.



Edit sketch made by using the Copy Features tool

Areas can only be split one at a time.

A Split can be digitised across and around a polygon to create a simple split or within a polygon creating a doughnut polygon.

6.d Merge Areas

Before carrying out a merge, the surveyor will have satisfied him/her self that the attributes of the areas to be merged are identical.

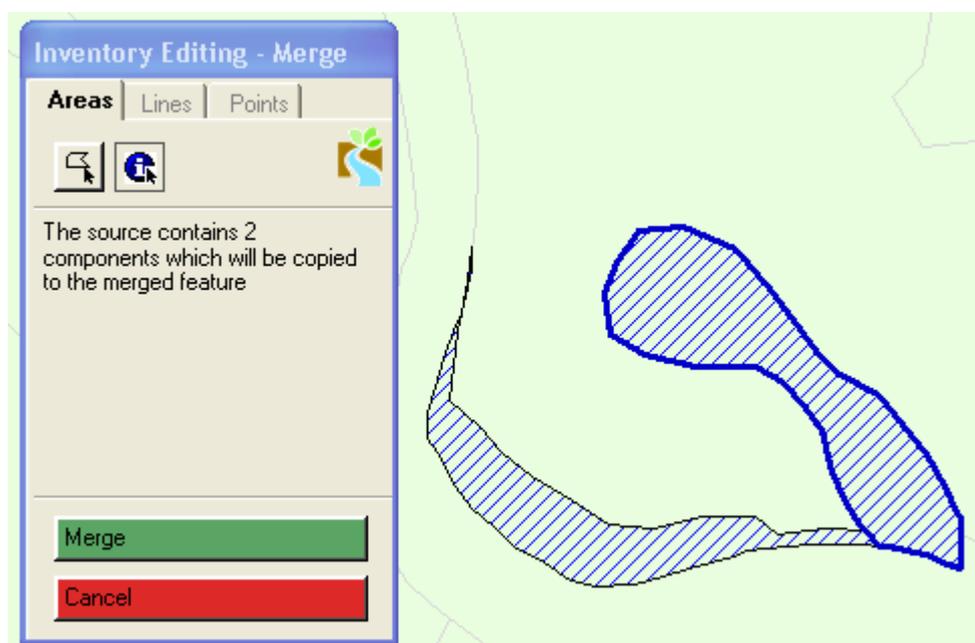
Additionally **the Reason for Change value must be input**, in every area to be merged. Other mandatory fields will also have to be updated as part of this process. Should the Reason for Change field not have valid input, then the software will not permit the edit to continue, and the area when selected will be highlighted in red.

After the polygons have been merged all of which have had their previous reason for change recorded the new polygon has a mandatory requirement for BH accuracy and reason for

change even though a new polygon has been created. Surveyors should record BH wrong, attributes wrong for BH98accuracy and No previous code under reason for change.

Zoom or pan to the location on the map display where the areas are to be merged. Click or drag a selection box to select the areas to be merged. The selected areas are shown highlighted with a blue hatch.

If required, select the polygon, from within those selected to merge, whose attributes should be used in the new merged polygon. (If not, then the merged polygon is given a single Unsurveyed/Missing Data component, and input is required by the surveyor.)



Areas selected to be merged – using attributes of highlighted area

Click the Merge button to complete the spatial edit.

The attribute editor will open, with the new merged area being highlighted in yellow, the surveyor should check attributes for the merged area to complete the edit.

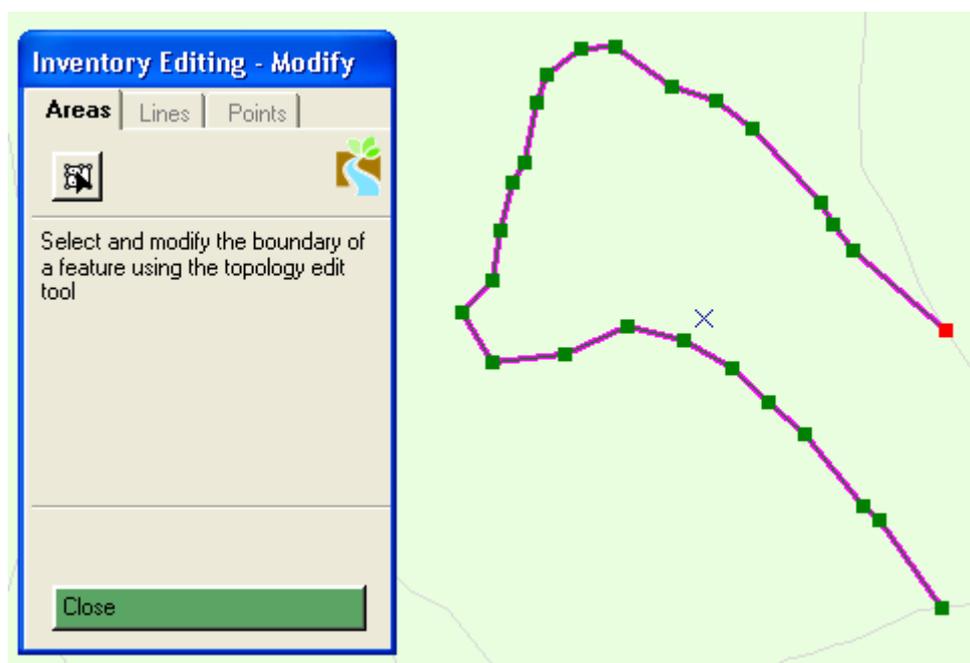
Many areas can be merged together, but attributes can only be copied from one of the areas to be merged.
Attributes copied to merged areas overwrite all currently held attributes at both area and component level.

6.e Modify Area

Zoom or pan to the location on the map display where the area is to be modified. Click on or drag a selection box over the boundary between two polygons, which is to be modified.

The selected boundary is shown highlighted in mauve, and edit handles are shown along its length. Using the topology edit tool the edit sketch can now be modified, with vertices added, deleted, and moved, until the surveyor is satisfied that the edit sketch reflects how the boundary is on the ground.

Note that the vertices at the end of the shared boundary cannot be edited at this point, since they are shared nodes – they share their topology with other features, and can only be modified in Shared Node Modify.



Boundary selected for Modify edit

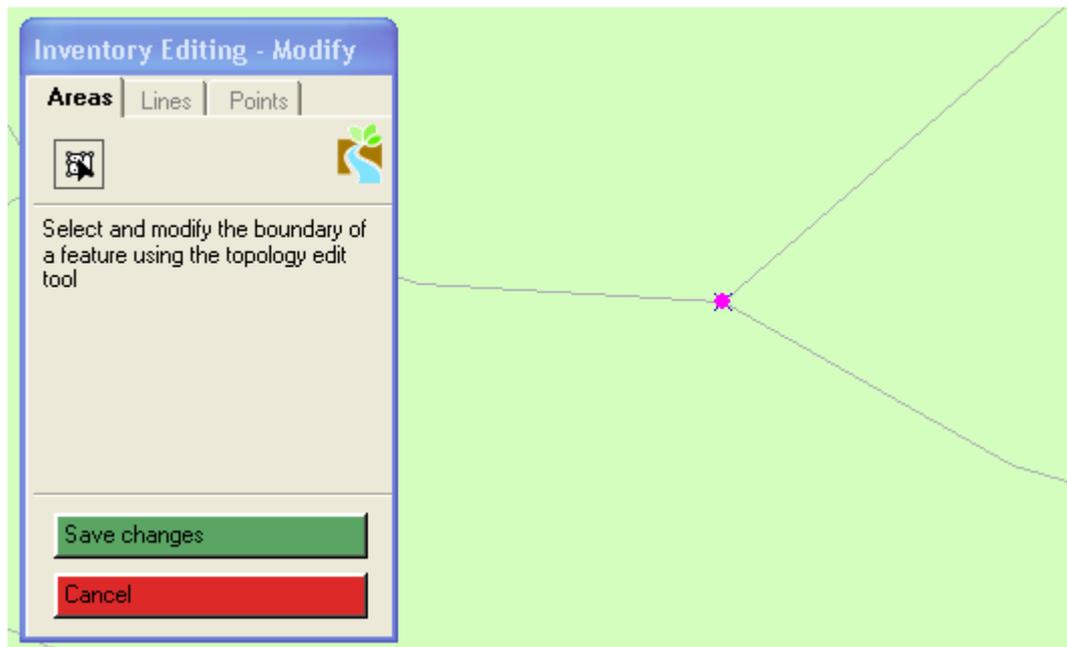
Click to one side of the boundary to see how the edited boundary will be changed as a result of the edit.

Click Save Changes to save the spatial edit.

The attribute editor will open, with each part of the modified area being highlighted in turn, the surveyor should input attributes for the split areas to complete the edit.

Shared Nodes – These can only be modified if selected individually as a node, for modify editing.

Using the topology edit tool, select a shared node to modify by clicking carefully on the node (use the keyboard shortcut of n to prevent the selection of a boundary rather than the node).



Shared node which has been modified – ready to save changes

Drag the node to its new position, the adjoining polygon boundaries will move along with the node as it is moved.

Click on Save Changes to save the spatial edit.

The attribute editor will open, with each part of the modified area being highlighted in turn, the surveyor should input attributes for the split areas to complete the edit.

***Only the boundary between two polygons is edited using Modify.
The points at the end of an edit boundary are shared nodes, and these can only be edited using shared node modify.***

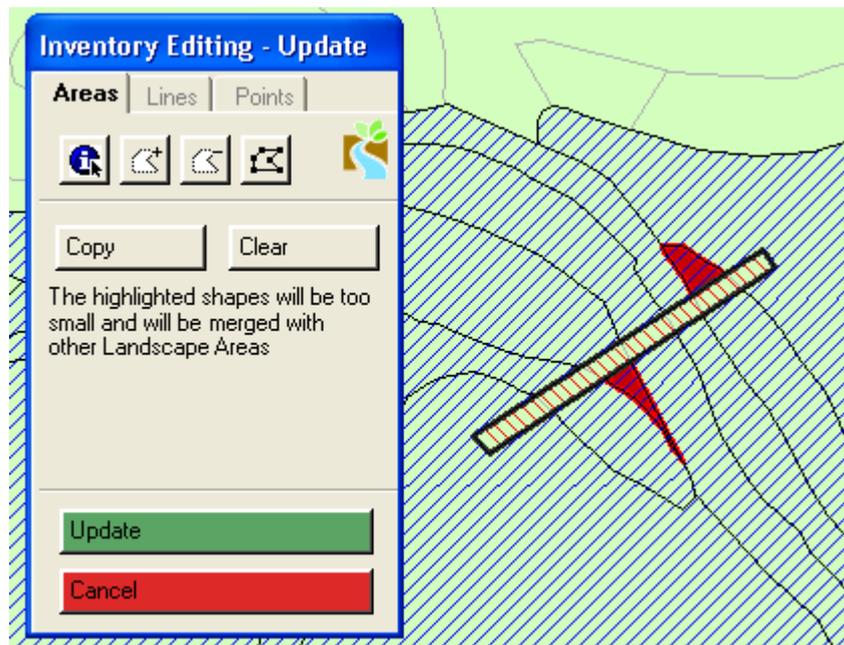
6.f Update Areas Edit

The update edit creates a new landscape area by splitting existing polygons, and then merging the split areas together.

Zoom or pan to the location on the map display to create an update polygon.

Digitise an update polygon on the map display, the areas which it intersects are highlighted with a blue hatch, the new area enclosed by the update polygon is shown highlighted with a red hatch and a black boundary. Any small areas which are below the minimum permitted

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polygon size as a result of the update edit are shown in red, and will be merged with an adjacent polygon when the edit is completed.



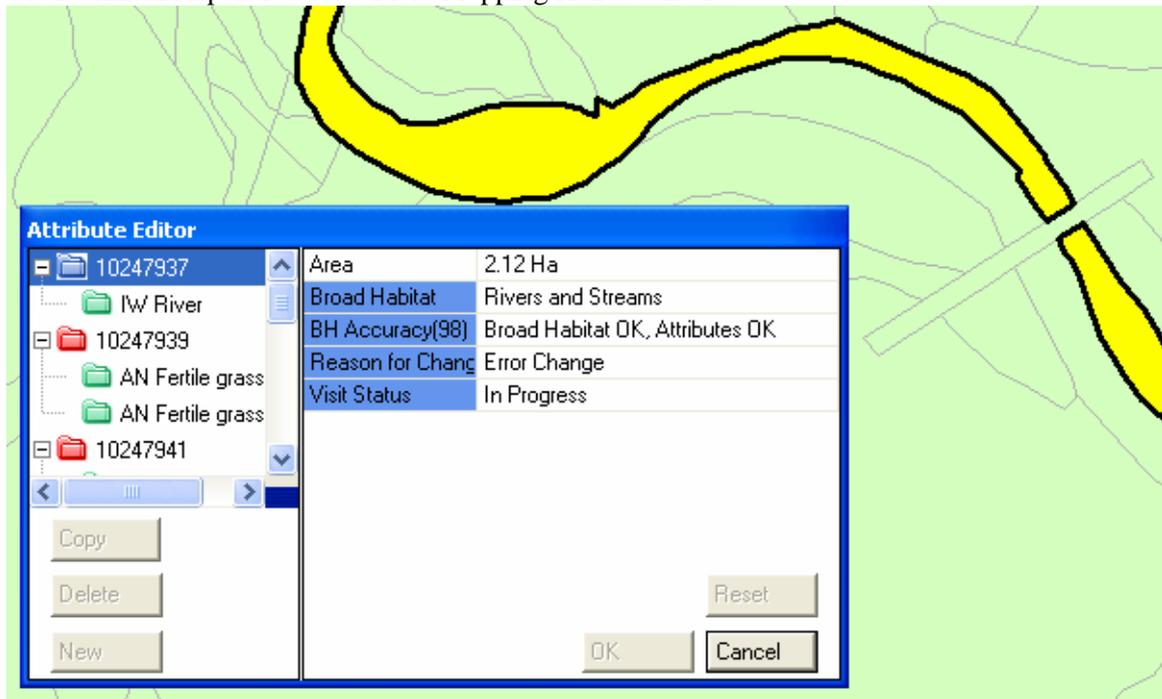
Update polygon showing interaction with affected areas

At this stage, the update polygon is an edit sketch, so can be modified using the vertex edit tool, see instructions for use of this tool in Split Polygon above. Additionally the update polygon can be created from polygons copied from other layers, for example OS Mastermap, using the Copy Features Tool. See instructions for use of this tool in Split Polygon above.

One of the polygons intersected by the update edit may be selected to have its attributes copied into the new update area. Alternatively if no area is chosen, then the new area is created with a single Unsurveyed/Missing Data component.

When the surveyor is satisfied that the update polygon is the correct shape, click the Update button to complete the spatial edit.

The attribute editor will open, with each area affected by the update edit being highlighted in turn, the surveyor should input attributes for the updated, and new areas to complete the edit.



Attribute edits post update edit

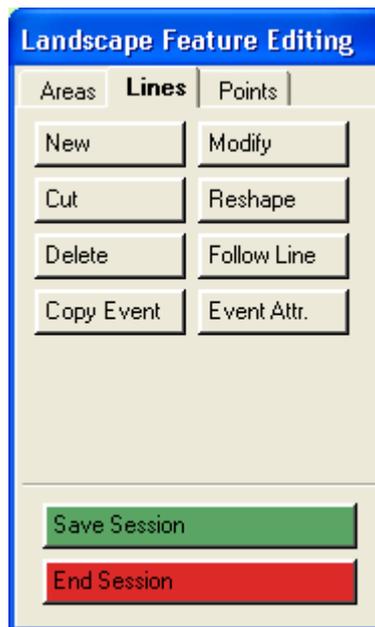
Update can be used in place of a series of Split and Merge edits as an effective way of including a new area which intersects many existing areas.

Any landscape area feature which will be deleted as a result of an update edit, must have a value in the Reason for Change field.

7. Saving edits in CS Surveyor- Logging off and closing Arcmap

Stop Editing

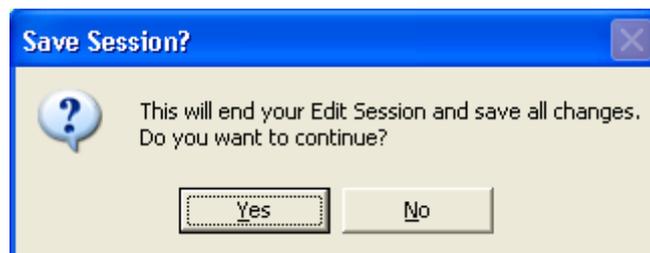
At the end of editing in CS Surveyor, the Landscape Feature Editing toolbox will be open, as shown below.



The surveyor has two options to exit from the CS Surveyor edit session, Save Session, and End Session.

Click on Save Session in order to save the edits which have been undertaken and stop editing.

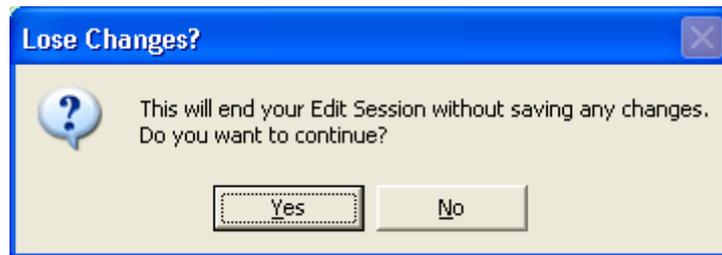
NOTHING THAT YOU HAVE DONE WILL BE SAVED UNLESS YOU CLICK ON SAVE SESSION. YOU SHOULD COME OUT OF YOUR SESSION AND SAVE CHANGES AT REGULAR INTERVALS.



A confirmation dialog opens

Click Yes to end the edit session, and save all changes.

Click on End Session to discard all edits undertaken, and exit from edit session.

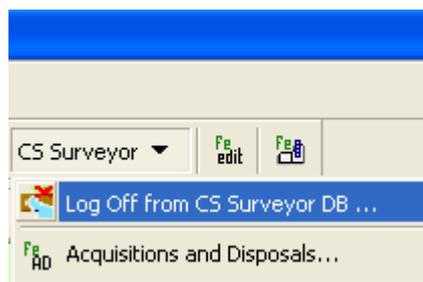


A confirmation dialog opens

Click Yes to end the edit session, and discard all changes.

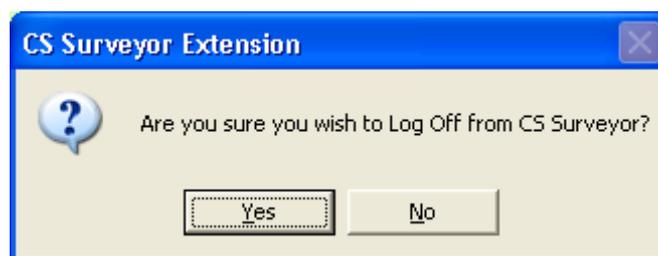
CS Surveyor saves all the changes, editing is closed, and the main ArcMap screen opens.

Log off from the CS Surveyor Database

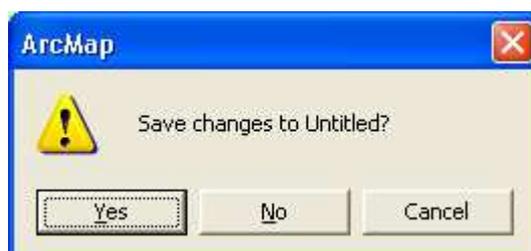


Click the CS Surveyor Menu in ArcMap and choose Log Off from CS Surveyor DB...

Choose Yes at the confirmation dialog



At the prompt to save changes to the untitled ArcMap document:



Choose No.

8. BROAD & PRIORITY HABITATS and PRIMARY AND SECONDARY ATTRIBUTES FOR POLYGONS (MAPPED AREAS)

General rules for mapping areas

1. **If a polygon contains woodland with a continuous cover it always goes to a woodland Broad/Priority habitat regardless of other components.**
2. **The minimum mappable area is 1/25th ha (400m²)- 20m x 20m, the feature measures at least 5m in all directions e.g. 5m x 80m (otherwise it is a length and marked with a line). No vegetation should be mapped as a separate unit unless it comprises this area.**
3. **The ONLY case in which an area <MMU should be mapped is where part of a much larger bigger polygon e.g. a field of wheat, protrudes into the edge of a square. The system will prevent you from creating an area which is less than the MMU.**
4. **A new polygon should be created when a new habitat occurs i.e. if a primary attribute/habitat type changes. If there is a change in species composition but this does not lead to a change in habitat type then a new polygon should not be created.**
5. **Only features above a minimum mappable unit in size (i.e. exceeding 1/25th ha) excepting ponds should be recorded within woodland.**
6. **For each Habitat type you should record at least two species even if they are of low cover, the maximum number of species to be recorded is 4.**

In this next section detailed descriptions of Broad and Priority and 'other' Habitats to which the key leads are given. Within each Broad Habitat primary and secondary attributes relevant to that Broad Habitat are listed by the theme under which they appear on the tablet. [N.B. after each attribute below, the permitted recording unit i.e. Area, Line or Point is indicated by the letters, A, L and P]

Non-Native species

There is concern about the prevalence of invasive non-native species in the countryside. We would like surveyors to look out for the following non-natives and to record them where they occur within a habitat (**and cover an area over the MMU**). Note that occurrences of these species can also be used to qualify mapped areas of any habitat type.

Brassica napus (rape)

Buddleia davidii

Epilobium brunnescens

Heracleum mantegazzianum

Impatiens glandulifera

Mimulus guttatus

Reynoutria japonica

Rhododendron ponticum

Symphoricarpos albus

Woodland Broad and Priority Habitats

Areas of woodland (polygons) should be assigned to the following two Broad or Priority Habitats. Woodland is different to other habitat types because as well as being assigned a habitat type it can also be described as a **feature or 'type'** of woodland e.g. belt of trees, scattered trees etc (see key above). Broad or Priority Habitat can be assigned at both the polygon and component levels. At the component level the **feature or 'type'** of woodland is the primary attribute and the habitat type can be a primary qualifier (see below). This is particularly useful where a mosaic of woodland types within one Broad Habitat is recorded.

9. BROAD HABITAT 1: BROADLEAVED MIXED AND YEW WOODLAND

This Broad Habitat is used for broadleaf woodland which does not fall into PH. The Broadleaved Mixed and Yew Woodland BH includes *Ulex europaeus* scrub but not *U.gallii* or *U.minor* scrub.

Note that if any one area of trees includes distinct variation in age or species composition, then the unit should ONLY be sub-divided into blocks and coded separately if there is a change in habitat type. For example, simply going from an elm to sycamore dominated patch would not warrant a new polygon boundary but if it was from sycamore to beech-dominated this would key out as a patch of Broadleaved Woodland BH plus a patch of Lowland Beech PH hence the two polygons would need to be identified as separate units.

Priority Habitats

Lowland beech and yew woodland

Beech can grow on both acidic and calcareous soils, although its association with yew tends to be most abundant on the calcareous sites. In the UK beech is considered native only in

southern England and southern Wales. The canopy can include mixtures of beech, ash, sycamore (non-native), oak, yew and whitebeam. In some areas, this woodland type occurs as intricate mosaics with lowland mixed deciduous woods. Bramble (*Rubus fruticosus*) forms a characteristic ground layer on neutral-slightly acidic soils. Holly is the main understorey species, less often yew, on acidic soils. It is common in (but not confined to) the High and Low Weald, the Chilterns plateau, the New Forest, the Cotswolds and the Wye Valley. The main corresponding National Vegetation Classification (NVC) plant communities associated with this habitat type are W12 *Fagus sylvatica* - *Mercurialis perennis* woodland (base-rich soils), W14 *Fagus sylvatica* - *Rubus fruticosus* woodland (mesotrophic soils), W15 *Fagus sylvatica* - *Deschampsia flexuosa* woodland (acidic soils). Yew stands fall into W13 *Taxus baccata* woodland.

Lowland wood-pasture and parkland

The presence of this habitat type will be determined post-survey. However there is a parkland secondary forest attribute which surveyors can apply to indicate mature trees scattered across typically grazed grasslands in an extensive managed estate setting.

Upland mixed ashwoods

The term upland mixed ashwoods is used for woods on base-rich soils in the north and west, in most of which ash is a major species, although locally oak, birch, elm, small-leaved lime and even hazel may be the most abundant species. Yew may form small groves in intimate mosaics with the other major tree species and alder may occur where there are transitions to wet woodland. Upland in the name reflects the abundance of this type of woodland on base-rich soils in upland Britain rather than to the altitude at which individual sites occur indeed some are only just above sea level.

In terms of National Vegetation Classification (NVC) plant communities this habitat is characterised by W8 *Fraxinus excelsior* - *Acer campestre* - *Mercurialis perennis* woodland, sub communities d. *Hedera helix*, e. *Geranium robertianum*, f. *Allium ursinum* and g. *Teucrium scorodonia*, and W9 *Fraxinus excelsior* - *Sorbus aucuparia* - *Mercurialis perennis* woodland, together with W13 *Taxus baccata* woodland for the yew groves on the Carboniferous and Magnesian limestones. Less frequent sub-communities that may occur in mosaic with the above are the relatively dry alder- ash stands W7c and the more southerly and eastern sub-communities of W8 (a-c).

Upland oakwood

Upland oakwoods are characterised by a predominance of oak (most commonly sessile, but locally pedunculate) and birch in the canopy, with varying amounts of holly, rowan and hazel as the main understorey species. The amount of birch in the woods tends to increase in north-west Scotland. Most oakwoods also contain areas of more alkaline soils, often along streams or towards the base of slopes where much richer communities occur, with ash and elm in the

canopy. It is found throughout the north and west of the UK with major concentrations in Argyll and Lochaber, Cumbria, Gwynedd, Devon and Cornwall.

Wet woodland

Wet woodland occurs on poorly drained or seasonally wet soils, usually with alder, birch and willows as the predominant tree species, but sometimes including ash, oak, pine and beech on the drier riparian areas. It is found on floodplains, as successional habitat on fens, mires and bogs, along streams and hill-side flushes, and in peaty hollows. Wet woods frequently occur in mosaic with other woodland key habitat types and with open key habitats such as fens. In terms of National Vegetation Classification (NVC) plant communities this habitat is characterised by W1 *Salix cinerea* - *Galium palustre* woodland, W2 *Salix cinerea* - *Betula pubescens* - *Phragmites australis* woodland, W3 *Salix pentandra* - *Carex rostrata* woodland, W4c *Betula pubescens* - *Molinia caerulea* woodland: *Sphagnum* sub-community, W5 *Alnus glutinosa* - *Carex paniculata* woodland, W6 *Alnus glutinosa* - *Urtica dioica* woodland, and W7 *Alnus glutinosa* - *Fraxinus excelsior* - *Lysimachia nemorum* woodland. Some birch stands classified as W4 are relatively dry and in management terms better treated alongside other extensive birch stands. As a provisional division, sub-communities W4a and W4b are better associated with Upland/Northern Birchwoods.

Broad and Priority Habitats are selected at the polygon level. At the component level all woodland attributes should be recorded under the Forestry theme in the following fields;

Theme: Forestry

Primary attribute: (one from)

Belt of scrub (A, L): 2 to 4 bushes wide with a width to length ratio of at least 1:4, parallel-sided and with a maximum width of 50m. Linear feature if <5m wide.

Belt of trees (A, L): 2 to 4 trees wide with a width to length ratio of at least 1:4, parallel-sided and with a maximum width of 50m. Linear feature if <5m wide.

Belt of trees width > 20m (A): 2 to 4 trees wide with a width to length ratio of at least 1:4, parallel-sided and with a maximum width of 50m. Width of belt >20m.

Clump of trees: a small woodland or group of trees (6 or more) and of less than 0.25 ha.

Dead lying trees (A, L, P)

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

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.

Ploughed: 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.

Ride/firebreak

Woodland/Forest (A): an area of trees of more than 0.25 ha (but see Belt) and a crown cover of more than 20% (see 285 for areas fenced and ploughed ready for afforestation).

Primary qualifier: All of the above Broad and Priority Habitats and:

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

Null

Modal DBH: should be used in conjunction with any of the species attributes describing either individuals or areas of shrubs or trees and, in the case of areas refers to the average DBH of the species making up the top canopy. This should be recorded in the following categories: <3cm, 3-20cm, 21-50cm, 51-75cm, >75cm.

Vegetation type: Trees

Species:

Alder	Elder	Hornbeam	S.Chestnut
Ash	Elm	Lime	Sycamore
Beech	Field maple	Oak	Willow
Birch	Gorse	Poplar	
Bramble	Hawthorn	Rowan	

Mixed Broadleaved: *This attribute indicated that the stand was not associated with a woody dominant that covered >25% of the canopy. This attribute may still apply but in any event the stand needs to have new information provided that indicates at least 1 but up to 4 of the most abundant species in the canopy.*

Unspecified Broadleaf: *(do NOT give species).*

Species Cover: these are for use with the tree species attributes and should refer to the percentage cover of the dominant canopy layer, as if viewed from above. No more than three attributes should be used to describe the canopy of any one polygon. This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

Associated features of woodland which should be added as additional components where relevant under the themes, Forestry Features and Forestry Use are listed below.

Theme: Forestry Features

Primary attribute(s): (one from)

Deer fences

Felling/Stumps: (coppice should be recorded here)

Fenced (single trees)

Grazing (stock): to be used if there is any evidence of agricultural stock using the feature for

grazing.

Grazing/browsing (non-stock): to be used if there is any evidence of grazing,

Grey squirrel damage

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.

Open glade and rides

Pheasants and pheasant pens

Planted: Planted may be used with any of the cover types where it is obvious that planting has taken place, rather than self-seeding.

Pollarded/Shredded

Regrowth - cut stump: applies to isolated regenerating trees

Signs of recent management

Staked trees: to be used for isolated trees only and not where 288 applies.

Tree protectors: light-weight plastic tubes (about 1 m high) which provide protection as well as a favourable micro-climate for planted trees.

Underplanting: where semi-natural woodland has been under-planted with standard exotic or native species.

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.

Theme: Forest Use

Primary attribute(s): (one from)

Landscape

Nature conservation

Public recreation

Sporting

Shelterbelt

Timber production

Guidance notes for Orchards

Surveyors need to be aware that there is a new emphasis on recording orchards in CS2007 as traditional orchards are under consideration to be a PH. This will require adding information to existing attribute data in an attempt to locate traditional orchards. This will usually mean simply adding Orchard (found under Theme: Agricultural Crops) to an existing polygon mapped as scrub, woodland or scattered trees.

Although the vegetation of interest will include trees or shrubs, individuals will vary in their

density so that when a stand was mapped it may have been mapped with a non-woody attribute and BH plus a scattered trees forestry attribute, or mapped entirely as woodland or scrub. In both cases, information can be used to infer the management intensity of the stand and hence a possible separation of traditional from modern intensive orchards. The Orchard attribute should therefore always be applied as an additional attribute. In intensive orchards where bare herbicide-cleared soil is present between trees, the BH should be Arable and Horticulture and the primary attribute should be Orchard.

Where orchards occur as part of curtilage around houses and farm buildings, use Gardens/ground with trees as the habitat descriptor and orchard as an additional attribute.

10. BROAD HABITAT 2: CONIFEROUS WOODLAND

The Broad Habitat includes all coniferous woodland that is not native pine woodland PH.

Priority Habitat

Native pine woodland

Native pine woodlands are relict indigenous forests dominated by self-sown *Pinus sylvestris* which occur throughout the central and north-eastern Grampians and in the northern and western Highlands of Scotland. The main tree species is Scots pine although birches *Betula spp.*, rowan *Sorbus aucuparia*, alder *Alnus glutinosa*, willows *Salix spp.*, bird cherry *Prunus padus* are also found. Sessile oak *Quercus petraea* also occurs infrequently, mainly in the north-east of Scotland. A shrub understorey, where browsing levels are low, includes common juniper *Juniperus communis*, aspen *Populus tremula*, holly *Ilex aquifolium* and hazel *Corylus avellana*.

Broad and Priority Habitats are selected at the polygon level. At the component level all woodland attributes should be recorded under the Forestry theme in the following fields;

Theme: Forestry

Primary attribute: as for BH 1

Primary Qualifier: Broad and Priority Habitat as above, parkland.

Modal DBH: as for BH

Vegetation Type: Trees

Species:

Fir - Douglas

Pine - Scots

Larch

Spruce - Norway

Pine - Corsican

Spruce - Sitka

Pine - Lodgepole

Unspecified conifer

Mixed conifers: This attribute indicated that the stand was not associated with a woody dominant that covered >25% of the canopy. This attribute may still apply but in any event the stand needs to have new information provided that indicates at least 1 but up to 4 of the most abundant species in the canopy.

Species Cover: as for BH 1

See also associated features of woodland under the themes, Forestry Features and Forestry Use as listed under BH 1 (above).

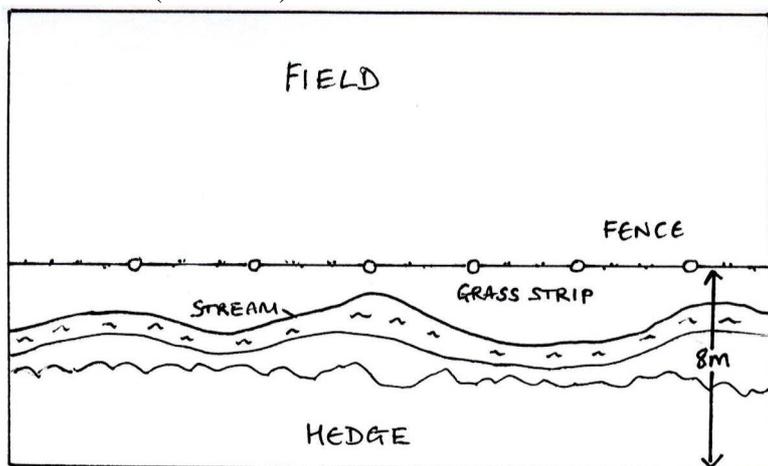
11. BROAD HABITAT 3: BOUNDARIES AND LINEAR FEATURES

Most features will be assigned to this BH post-survey. This is because membership of the BH is determined by the type of attribute eg. fence, hedge etc. Where a combination of linear features is wide enough to form an area e.g. ditch, line of trees, fence, wall, then these should be mapped as areas and assigned to this Broad Habitat. The Broad Habitat is selected at the polygon level.

Theme: Wide Linear feature

Primary attribute:

Wide linear feature: this should be used either where a single event (see Mapping linear features section) on a linear feature is greater than 5m wide and so should be recorded as an area or where there are multiple events on a linear feature which combined are greater than 5m in width (see below). The events will be recorded in the linear mapping.



12. BROAD HABITAT 4: ARABLE AND HORTICULTURAL

The primary attributes for this BH are straightforward - young crops may be difficult to recognise (the notes following each attribute may help). The Broad Habitats is selected at the polygon level. At the component level all attributes should be recorded under the three agricultural themes in the following fields;

Theme: Agricultural Crops

Primary attribute(s): (one from)

Barley (A): - barley has dull green leaves and auricles.

Blanket herbicide (A)

Commercial horticulture (A): to include strawberries, salad crops, cabbages and onions etc.

Evening primrose (A)

Field Beans (A)

Flowers (A)

Hemp (A)

Kale (A)

Maize (A)

Miscanthus (A)

Oats (A): oat plants have broad soft glaucous leaves with no auricles.

Oilseed rape (A)

Orchard (A): commercial enterprises only – not to include, for example a few fruit trees in a back garden where orchards occur as part of curtilage (see note below) around houses and farm buildings, use Gardens/ground with trees as the primary attribute and Orchard as the secondary.

Other crop (A)

Peas (A)

Perennial crops (A): to include raspberries, currants and vineyards.

Phacelia (A)

Ploughed (A): the crop harvested before ploughing should be identified (from fragments that remain) and this attribute used as an extra description after the crop primary attribute. If no crop fragments can be found then use this as a primary attribute.

Potatoes (A)

Rye (A)

Stubble (A)

Sugar beet (A)

Turnips/Swedens/Roots (A)

Undersown crop (A): may be organic, often cereal crops undersown with a lolium perenne/trifolium repens ley.

Unidentified cereal (A)

Wheat (A): wheat plants have broad, glaucous blades with auricles

Primary qualifier:

Field edge/Headland

Null

Vegetation type: Null

Species: Null

Species cover: Null

Theme: Agriculture/Natural Vegetation

Primary attribute:

Annual/early successional with open ground (A): includes unsown setaside and apparently

fallow land dominated by annual weed species often with much open ground present. Perennials may be present but if they are a significant component of the vegetation cover it implies greater time since last disturbed and a Neutral Grassland category would likely be more appropriate. This code should be used as the primary and an additional agricultural use code can be used to signify setaside.

Setaside (A): 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 a field; 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. As it is impossible to be sure that an area of land is setaside apart from receiving confirmation from the farmer it would be better to use the primary attribute above.

Primary qualifier: do not record or Null

Vegetation type: likely to be Forbs or Grasses

Species: BRC list dependent on vegetation type chosen

Species cover: categories as above

Other features on arable land – Margins

Agricultural margins will be recorded according to their composition. The most common types of margin likely to be encountered are perennial grass margins, with or without supplementary wildflowers. These margins will be recorded as areas of Neutral and or Improved grassland. Other rarer types include:

- Uncropped strips, usually cultivated each year;
- Wild bird seed cover e.g. kale, quinoa
- Pollen and nectar mixes, usually with a high proportion of legumes;

The most popular margin options are likely to be 6m in width and these may be additive, i.e. one type of 6m margin immediately adjacent to another type. They should be mapped as areas where they exceed the MMU.

13. BROAD HABITAT 5: IMPROVED GRASSLAND

This is an extensive Broad Habitat comprising of low botanical quality grassland with high grazing value. The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural vegetation and the Agriculture/Natural vegetation use themes in the following fields;

Theme: Agriculture/Natural Vegetation

Primary Attribute(s):

Fertile grass (A): Species-poor, grass dominated swards, often sown for agricultural or recreational use, or created by modification of unimproved grasslands by fertilisers and selective herbicides. They are particularly characterised by the abundance of rye grass *Lolium spp.* and white clover *Trifolium repens*. Amenity grasslands e.g. playing fields should also be recorded in this BH but should also be recorded as amenity grassland.

Primary Qualifier(s): (one from)

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 attribute 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.

Amenity grass >1ha (A): This should be used as a secondary descriptor with fertile or neutral grassland as a primary. It is used to describe 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. Golf courses should be recorded separately.

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.

Anthills on grassland

Ridge and furrow present

Null

Vegetation type: likely to be Grasses.

Species: In previous surveys major agricultural grasses and semi-natural ground cover species were recorded if they covered 25% or more of a mapped unit, irrespective of the number of canopies present (ie total cover can reach more than 100%). This meant that species rich parcels where no species reached 25% had no associated species recorded. We would like surveyors to include at least 2 species for each polygon even if they are present at <10% cover (N.B. This means having at least 2 components for each polygon containing major agricultural grasses and semi-natural ground cover species). This ensures that ALL vegetated

polygons are associated with at least 2 species records. Where there are more than 2 abundant species the maximum number to be recorded will be 4. A comprehensive BRC species list will be available to select from, but will depend on the vegetation type selected.

Species Cover: These cover % attributes should be used with the species attributes and, where a mosaic of vegetation categories exists, with land cover types. Usually, no more than four cover attributes may be used to describe any area. This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

Theme:Agriculture/Natural vegetation Use

Beef: cattle which tend to be of stocky build and do not have udders - should also include 'sucklers' (0-6 mths) and 'rearsers' (6 mths onwards)

Cattle (unspecified): only to be used if it is not possible to determine whether the cattle are dairy or beef (**note:** this attribute was used for 'breeder' cattle in 1990).

Dairy: cattle which have udders – especially Fresians –

Deer: only to be used if there is firm evidence including presence of animals or dung, artificial feeds, estate information

Goats

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 attributes should be used, rather than not using a attribute.

Horses

Pigs

Sheep

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.

Use unknown (A): should be used if the primary use of the land cannot be identified.

14. BROAD HABITAT 6: NEUTRAL GRASSLAND

This Broad Habitat covers a wide range of vegetation types. The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural vegetation theme.

Priority Habitats

Lowland hay meadow

Cover of grass species and clover are usually less than 50%. Typically rich in forb species with frequent PH **lowland** meadow indicators including *Lathyrus pratensis*, *Lotus*

corniculatus, *Leucanthemum vulgare*, *Galium verum*, *Primula veris*, *Centaurea nigra*, *Leontodon hispidus*, *Ranunculus bulbosus* or on flood meadows some of *Caltha palustris*, *Sanguisorba officinalis*, *Filipendula ulmaria* and *Alopecurus pratensis*.

Upland hay meadow

The habitat comprises the single NVC community MG3, *Anthoxanthum odoratum* - *Geranium sylvaticum* grassland and is characterised by a dense growth of grasses and herbaceous dicotyledons up to 60 - 80 cm high.

Broad Habitat: Neutral grassland

Theme: Agriculture/Natural Vegetation

Primary attribute(s): (one from)

Perennial vegetation: tall herb/grass(A): Vegetation containing some annual weeds but consisting mainly of long lived perennials with grass cover less than <50% cover. Species include *Urtica dioica*, *Galium aparine*, *Chamaerion angustifolium*, *Cirsium arvense*, *Bromus sterilis* and *Poa trivialis*. Includes stands dominated by invasive aliens such as *Reynoutria japonica*, *Impatiens glandulifera* and *Heracleum mantegazzanum*.

Recently sown neutral grass(A): Recently sown mixtures of fine-leaved grasses such as *Anthoxanthum*, *Poa pratensis*, *Festuca rubra*, *Cynosurus* and *Trisetum*. 50-100% grass cover. Herb species rare or absent. Often on sown field margins.

Semi-improved Neutral grassland (A): This includes all semi-improved and unimproved grassland occurring on circum-neutral soils. It includes enclosed and managed grassland such as pastures, a range of grasslands which are inundated with water periodically, permanently moist or even waterlogged grassland, where the vegetation is dominated by grasses, and tall and unmanaged grassland. There was no category 'neutral grassland' in previous surveys so many areas of this type of grassland may have been described as fertile grass and may have been assigned either to the Improved or Neutral grassland BHs.

Tall unmanaged neutral grass(A): Long-lived perennials with little or no open ground. Vegetation with over 50% grass cover. *Arrhenatherum*, *Dactylis* and *Elymus repens* usually dominate but scattered shrubs and tall herbs may be present (eg. *Artemisia vulgaris*, *Cirsium arvense*, *Cirsium vulgare*, *Digitalis purpurea*, *Heracleum sphondylium*, *Chamaerion angustifolium* N.B. does not include wetland indicators e.g. *Filipendula ulmaria*, *Epilobium hirsutum*, *Urtica dioica*, *Filipendula ulmaria*, *Phragmites*). Associated with linear features such as road verges, field boundaries, tracksides and ditchbanks but in these situations will only be mapped if >MMU or >5m wide.

Priority Habitats

Theme: Agriculture/Natural Vegetation

Primary attribute(s):

Lowland hay meadow

Upland hay meadow

Primary Qualifier(s): (if required, one from)

Ley

Amenity grass

Mown

Anthills on grassland

Ridge and furrow present

Null

Vegetation type: likely to be Grasses/Forbs.

Species: as for BH 5.

Species Cover: as for BH 5.

15. BROAD HABITAT 7: CALCAREOUS GRASSLAND

This Broad Habitat is uncommon. The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural vegetation theme.

Priority Habitats

Lowland calcareous grassland

This PH is defined as the first nine calcareous grassland National Vegetation Classification communities, CG1 to CG9. With the exception of CG9, *Sesleria albicans* - *Galium sternerii* grassland, which straddles both lowlands and uplands, these communities are largely restricted to the warmer and drier climates of the southern and eastern areas of the United Kingdom.

Upland calcareous grassland

Most examples occur above 250-300 m altitude, but the habitat is also found within unenclosed moorland at lower elevations, and descends to sea level in north-west Scotland. It comprises the NVC communities CG9 to CG14. These include upland forms of *Sesleria*

albicans grassland (CG9), *Festuca ovina* - *Agrostis capillaris* swards (CG10, CG11 and CG12), and *Dryas octopetala* communities (CG13 and CG14). Montane forms of calcareous grassland are often enriched by a distinctive assemblage of Arctic-Alpine plants, such as *Alchemilla alpina*, *Polygonum viviparum* and *Silene acaulis*.

Theme: Agriculture/Natural Vegetation

Broad habitat

Primary attribute:

Calcareous grassland (A): Vegetation with scattered sedges, many calcicoles present in often species rich turf on calcareous soils usually rendzinas on chalk or limestone. Indicators include *Bromopsis erecta*, *Lotus corniculatus*, *Linum catharticum*, *Sanguisorba minor*, *Carlina vulgaris*, *Sesleria albicans*, *Helianthemum nummularium*, *Cirsium acaule*. These vary from mostly coastal grasslands through to upland and mountain grasslands rich in arctic-alpines.

Priority habitat

Primary attributes

Lowland calcareous grassland

Upland calcareous grassland

Primary Qualifier(s): (if required, one from)

Mown

Anthills on grassland

Ridge and furrow present

Null

Vegetation type: likely to be Grasses/Forbs.

Species: as for BH 5.

Species Cover: as for BH 5.

16. BROAD HABITAT 8: ACID GRASSLAND

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural vegetation theme.

Priority Habitat

Lowland acid grassland

It is defined as both enclosed and unenclosed acid grassland throughout the UK lowlands

(normally below c. 300m). Includes the *Festuca ovina* - *Agrostis capillaris* - *Rumex acetosella* (U1), *Deschampsia flexuosa* (U2), *Agrostis curtisii* (U3) and *Festuca ovina* - *Agrostis capillaris* - *Galium saxatile* (U4) NVC grassland plant communities. Inland vegetation, but not coastal dunes. It is characterised by a range of plant species such as *Galium saxatile* *Festuca ovina*, *Agrostis capillaris*, *Rumex acetosella*, *Carex arenaria*, *Deschampsia flexuosa*, *Agrostis curtisii* and *Potentilla erecta*, with presence and abundance depending on community type and locality.

Theme: Agriculture/Natural Vegetation

Broad habitat Acid grassland

Primary attribute(s):

Acid grassland (A): Fine grasses predominate in generally in dry situations eg. *Agrostis curtisii*, *Festuca ovina* and *Anthoxanthum odoratum* usually on brown podzolic soils or rankers. Acid indicators present eg. *Galium saxatile*, *Potentilla erecta*, *Pleurozium schreberi* and *Rumex acetosella*

Moorland grass (A): Dominated by coarser grass species, 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.

Priority Habitat

Primary Attribute

Lowland acid grassland

Primary Qualifier(s): (if required, one from)

Anthills on grassland

Ridge and furrow present

Null

Vegetation type: likely to be Grasses/Forbs.

Species: as for BH 5.

Species Cover: as for BH 5.

17. BROAD HABITAT 9: BRACKEN

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural vegetation theme. As this Broad Habitat is defined by a very high cover of one species very few other attributes are required.

Theme: Agriculture/Natural Vegetation

Primary attribute:

Bracken: This primary descriptor should only be used where vegetation consists of Bracken at $\geq 95\%$ cover with or without a sparse herbaceous understorey. Stands that have not yet peaked in seasonal biomass should still be recorded as dense Bracken if you believe peak cover is likely to be at least 95%. If cover of bracken is less than this then it should be recorded as the underlying vegetation (probably acid grassland) with bracken as a species and its cover value recorded.

Primary Qualifier(s): do not record or Null

Vegetation type: Forbs.

Species: Pteridium aquilinum.

Species Cover: 95-100%.

18. BROAD HABITAT 10: DWARF SHRUB HEATH

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural vegetation theme. The **Priority Habitats** are upland and lowland dwarf shrub heath, these will be allocated post survey using a GIS mask.

Theme: Agriculture/Natural Vegetation

Primary attribute:

Dwarf shrub heath (A): Includes vegetation dominated by species from the heath family or dwarf gorse species. It includes the moss and lichen dominated heaths of the East Anglian Breckland but not of mountain summits which should be included in the "Montane habitats" BH type. Heathland characterised by presence of *Erica* spp., *Calluna*, *Empetrum*, *Vaccinium* or *Ulex minor/gallii*. Dry and wet heath are included in this category so there may be occasional to frequent indicators of wet conditions such as *Erica tetralix*, *Sphagnum*, *Molinia* and/or *Narthecium* but wet heath differentiated from blanket bog by absence of species of wet/deeper peats.

Primary Qualifier:

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

Null

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody

Species: BRC list according to selected vegetation type

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

Theme: Agriculture/Natural vegetation Use

Grouse: only to be used if there is firm evidence including presence of birds or droppings.

19. BROAD HABITAT 11: FEN/MARSH/SWAMP

This BH includes vegetation that is ground water fed; and permanently, seasonally or periodically waterlogged on peat, peaty or mineral soils where grasses do not predominate. It also includes emergent vegetation or frequently inundated vegetation occurring over peat or mineral soils. The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural vegetation theme.

Priority Habitats

Fen Priority Habitat

This habitat includes the primary attributes **Fen** and/or **Flush**: **Fen:** Fens are minerotrophic peatlands that receive water and nutrients from the soil, rock and ground water. Species include *Carex paniculata*, *C. acutiformis*, *C.rostrata*, *C.elata*, *C.riparia*, *Iris pseudacorus*, *Filipendula ulmaria*, *Phragmites australis* (but not virtually pure stands), *Equisetum fluviatile*, *Eupatorium cannabinum*, *Lythrum salicaria* and *Epilobium hirsutum*. **Flush:** Localised, usually narrow areas (which may coalesce where adjacent) influenced by lateral water movement. Calcareous flushes are dominated by species such as *Linum catharticum*, *Carex hostiana* and *C. dioica*, *Campyllum 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.

Purple moor grass rush pasture

Purple moor grass and rush pastures occur on poorly drained, usually acidic soils in lowland areas of high rainfall in western Europe. Purple moor grass *Molinia caerulea*, and rushes, especially sharp-flowered rush *Juncus acutiflorus*, are usually abundant. Key species associated with purple moor grass and rush pastures include: *Hypericum undulatum*, *Carum*

verticillatum, *Cirsium dissectum*, *Crepis paludosa*, *Platanthera chlorantha*, *Galium palustre*, *Cirsium palustre*, *Ranunculus flammula*, *Agrostis canina*, *Mentha aquatica*, *Achillea ptarmica*, *Equisetum palustre*, *Cardamine pratensis*, *Epilobium palustre*, *Juncus subnodulosus*, *Carex pulicaris*, *C.hostiana*, *Epipactis palustris*, *Geum rivale*, *Gymnadenea conopsea*, *Serratula tinctoria* and *Angelica sylvestris*.

Reedbed

Reedbeds are wetlands dominated by stands of the common reed *Phragmites australis*, wherein the water table is at or above ground level for most of the year. They tend to incorporate areas of open water and ditches, and small areas of wet grassland and carr woodland may be associated with them.

Theme: Agriculture/Natural Vegetation

Broad Habitat Fen, Marsh, Swamp

Primary attribute(s):

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*.

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 fertile grassland, with *Juncus effusus* and no wetland indicators.

Tall-herb wetland vegetation (A): only wetland tall herb species e.g. *Filipendula ulmaria*, *Epilobium hirsutum*, *Urtica dioica*, *Filipendula ulmaria*, *Phragmites*, (not including non-wetland tall herb species such as *Artemisia vulgaris*, *Brassica sp.*, *Chenopodium album*, *Cirsium arvensis*, *Cirsium vulgare*, *Digitaria purpurea*, *Heracleum sphondylium*, *Triplospermum maritimum*, *Chamaerion angustifolium*)

Priority Habitat

Primary attribute(s)

Fen (as above)

Purple moor grass rush pasture (as above)

Reedbed (as above)

Primary Qualifier: do not record or Null.

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

20. BROAD HABITAT 12 : BOG

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural vegetation and Inland Physiography themes.

Priority Habitats

Blanket bog

The term blanket 'bog' strictly applies only to that portion of a blanket 'mire' which is exclusively rain-fed. Peat depth is very variable, with an average of 0.5-3 m being fairly typical but depths in excess of 5 m not unusual. The principal vegetation (NVC) types covered are M1, M2, M3, M15, M17, M18, M19, M20 and M25, together with their intermediates. Other communities, such as flush, fen and swamp types, also form an integral part of the blanket bog landscape but should be mapped separately if areas are greater than the MMU (20x20m). Dominant species include *Calluna vulgaris*, *Erica tetralix*, *Trichophorum cespitosum*, *Eriophorum vaginatum* and *Sphagnum* species, *Rubus chamaemorus* is typically, although not exclusively, confined to high altitude bogs, *Arctostaphylos alpinus* to northern bogs, and *Schoenus nigricans*, as an ombrotrophic species, to western bogs. Even the various bog moss *Sphagnum* species, which are a constant element of most blanket bog communities, are not entirely cosmopolitan and indeed are largely replaced by *Racomitrium lanuginosum* over extensive areas in the north and west, particularly in the Western Isles. For mapping purposes, the most important defining feature is dominant to occasional *E.vaginatum*.

Lowland raised bog

In the UK lowland raised bogs are a particular feature of cool, rather humid regions such as the north-west lowlands of England, the central and north-east lowlands of Scotland, Wales and Northern Ireland, but remnants also occur in some southern and eastern localities, for example Somerset, South Yorkshire and Fenland. Plant communities that are typical of natural raised bogs include the bog pool communities M1 to M3 and M18 *Erica tetralix* - *Sphagnum papillosum* raised and blanket mire. In addition a number of communities, including M15 *Scirpus cespitosus* - *Erica tetralix* wet heath, M19 *Calluna vulgaris* - *Eriophorum vaginatum* blanket mire, M20 *Eriophorum vaginatum* blanket and raised mire, M25 *Molinia caerulea* - *Potentilla erecta* mire. Peatland species predominate eg. *Trichophorum*, *Eriophorum angustifolium*, *Sphagnum* spp, *Vaccinium oxycoccus* and *Andromeda polifolia*. Often in lowland areas in unimproved/unafforested areas of flood plains. A good indicator is the location of the bog on level ground with a gently domed structure and an absence of calcicolous and mesotrophic wetland species.

Broad Habitat Bog

Theme: Agriculture/Natural Vegetation

Primary attribute:

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 raised bogs and valley bogs but note that the soligenous mires dominated purely by *Molinia* and *Juncus* species would be included under **moorland grass** 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* and *Nardus stricta*. Indicative species include *Narthecium ossifragum*, *Drosera* spp., and *Pedicularis* ssp.

Theme: Inland Physiography

Primary attribute(s):

Peat hags (A): includes any bare or eroding peat which is not vegetated and should be qualified by a % cover attribute

Current peat workings (A): where peat has obviously been extracted in the current or previous season - should be qualified by a % cover attribute

Old peat workings (A): and may be qualified by a % cover attribute

Physiography cover: the following cover proportions should be used in conjunction with the primary attributes above and should relate to the percent of the area as seen from above: 95 - 100% peat, >50% peat, 10-50% peat.

Priority habitat

Theme: Agriculture/Natural Vegetation

Primary attribute(s)

Blanket Bog (as above)

Lowland raised bog (as above)

Primary Qualifier: do not record or Null.

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

21. BROAD HABITAT 13: RIVERS AND STREAMS

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Inland Water theme.

Theme: Inland Water

Primary attribute(s):

Canalised river (A): rivers which have been modified (eg sections straightened, banks smoothed), but which still follow the same basic direction as the natural watercourse.

River (A): defined as being more than 2.5m wide; a stream is less than 2.5m. (2.5 m would be a very brave leap).

22. BROAD HABITAT 14: STANDING OPEN WATERS AND CANALS

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Inland Water, Agriculture/Natural vegetation and Structures themes. Ponds occur in this BH and these will require detailed mapping in this survey.

Theme: Inland Water

Primary attribute(s):

Pond (A, P): –a body of standing water 25m² - 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). N.B. Ponds are a key feature of the survey in 2007, hence the following detailed section on the identification and mapping of ponds.

Pond, sampled: pond which will be sampled in this survey

Lake - natural (A, P): any inland water body bigger than a pond, should be mapped using this attribute.

Lake - artificial (A, P): usually distinguished by the presence of a dam or embankment.

Area of many small waterbodies

Canal (A): constructed where no watercourse existed previously.

Theme: Agriculture/Natural Vegetation

Primary attribute:

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

Primary Qualifier: do not record.

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

Theme: Structures

Primary attribute:

Gravel pit

Use:

Sporting/Recreational

Further Information on the identification and mapping of ponds

Overview

- During mapping every pond in every square needs to be identified, and basic attributes need to be recorded for every pond. Data will be recorded on a paper fieldsheet “CS2007 Pond Mapping Recording Sheet”, a copy is included at the end of this section.
- One pond in every square that contains ponds is then selected for a more detailed condition assessment, which consists of a survey of plants, environmental characteristics and water chemistry carried out by the freshwater surveyors. This pond is named the “survey pond” (Pond, sampled in Surveyor).
- As part of the mapping process you need to select the survey pond based on the list of all ponds in the square collected during mapping on the CS2007 Pond Mapping Recording Sheet. Full details of this process are given in the section entitled “Selecting one pond per square for condition survey”.
- This means the pond condition assessment cannot be carried out until all ponds in the square have been mapped.

Identifying ponds

The pond definition to be used for CS2007 is “*a body of standing water 25m² to 2ha in area which usually holds water for at least four months of the year*”.

Note, this includes ponds below the CS Minimum Mappable Unit area, and the data recorded for every pond includes an estimate of area for these small ponds.

In order to work out the size of a pond to see if it fits this definition you must correctly identify the outer boundary of the pond. This is defined as the *'upper level at which water*

stands in winter', so is probably a larger area than the current water area. The outer boundary can be identified from one or more characteristics. It is often best identified by a change in the distribution of wetland plants, particularly by a rapid transition to terrestrial species, often marked by a fringe of rushes. Where solid features such as trees, walls or pipes occur within the water area a “water mark” will usually be evident. In some cases, where willow trees are present thick bundles of fine roots out of the water can indicate the depth to which the roots have been submerged. Sometimes a break of slope is present at the winter waterline. If the pond has an outflow this will determine the upper winter water level.

The pond definition is deliberately broad and includes temporary waterbodies which may be dry at the time of survey. It also includes ponds of man-made and natural origin. It includes a variety of water body types such as quarry pools, heathland ponds, moats, small ornamental lakes, oxbow ponds, peat pools, pingos and dune slack pools. In some cases it will be difficult to identify ponds, to define their outer limits or to distinguish them from other water body types. Some help with these is given below.

Identifying temporary ponds

Ponds which are dry at the time of survey may be difficult to identify. The Lowland Pond Survey carried out in summer 1996 found 41% of ponds were dry or nearly dry (based on data from 150 Countryside Survey squares in lowland Britain). Ponds that are dry or nearly dry at the time of survey can be identified from the following features:

- wetland vegetation present;
- bare mud / deposits of soft sediment (may show poaching by stock);
- strandline deposits;
- a basin in which water will accumulate in winter;
- an evident break of bank slope; and
- water marks on trees / walls etc.

If it is evident from these signs that a currently dry area is a temporary pond that “*usually holds water for four or more months of the year*” then record it as a pond.

The images below show examples of temporary ponds when they are dry and wet, note how difficult they can be to spot when dry.



Distinguishing ponds from other standing waters - identifying ponds in fen, marsh and other mires

In areas of fen and marsh ponds may sometimes merge into the surrounding wetlands without an obvious boundary. In such cases it is sometimes still possible to identify a change from wetter to damp-ground vegetation. If the boundary is still difficult to locate, use a break of slope to define the pond and note this on the fieldsheet.

Distinguishing ponds from other standing waters - identifying ponds in bogs

In some blanket bogs it may be difficult to distinguish a pond because it is linked to many other small interconnected pools.

Where maps from CS2000 are not available the surveyor will need to decide where the pond boundary falls. Sometimes the decision will be fairly arbitrary. In this case it is important to define the pond so it can be easily identified again in the next round of Countryside Survey. It may help to use fixed features and define an area from that point (e.g. 30m x 30m area next to the corner of a boardwalk).

Identifying boundaries of connected ponds

Where waterbodies are connected by channels the surveyor will need to decide whether they are a single pond or multiple ponds. Factors to consider are the maximum winter water level, the width and depth of joining channels, and the similarity in type of the waterbodies. Waterbodies which would only be joined during occasional flood, or which are joined by small narrow channels should be considered as separate.

Distinguishing ditches from ponds

Where ditches contain standing water they may appear to fit the pond definition. A ditch can be defined as a man-made waterbody more than 20 times long than it is wide and these should not be recorded as ponds.

Distinguishing dammed streams from ponds

Where streams are dammed they should not be included as ponds if there is flow through them or if they are less than approximately 15 times the width of the stream.

Distinguishing flushes from ponds

Flushes tend to form on a slope and do not have a 'basin' form in which water will accumulate in winter.

Pond attributes to record

If a square currently contains ponds, or if a pond is shown on mapping from the previous round of Countryside Survey (CS2000) then the mapping surveyor will need to complete the "CS2007 Pond Mapping Recording Sheet" see section on POND SURVEY MAPPING at the end of this section.

23. BROAD HABITAT 15: MONTANE

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural Vegetation theme

Theme: Agriculture/Natural Vegetation

Primary attribute:

Sub-arctic (montane) (A): includes montane heath and snow bed communities which are dominated by prostrate *Salix* spp., *J. trifidus*, *C. bigelowii*, *Racomitrium*, and dwarf forb communities of *Alchemilla alpina*, and *Saxifrage* species. It also includes moss and lichen dominated heaths of mountain summits. It does not include montane dwarf shrub heaths, flushes, grasslands, and rock and scree communities that straddle the notional boundary of the

former treeline with little change in floristics and these should be treated as components of other BH types.

Primary Qualifier: do not record or Null.

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

24. BROAD HABITAT 16: INLAND ROCK

This BH includes both natural and artificial exposed rock surfaces where these are almost entirely lacking in vegetation, as well as various forms of excavations and waste tips. It includes inland cliffs, ledges and caves, screes, limestone pavements, quarries and quarry waste. It also includes Calaminarian grassland. The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Inland Physiography, Agriculture/natural vegetation and Structures themes.

Priority Habitat

Limestone pavement

Broad Habitat

Theme: Inland Physiography

Primary attribute(s):

Cliff >30m high (A, L): a vertical or near-vertical face of rock

Cliff 5-30m high (A, L):

Rock outcrop & cliff <5m (A, L, P): areas of bare rock should be included here together with a % cover category (12-14)

Area of rock outcrops

Scree (A): more or less unstable loose or shattered rock on slopes

Surface boulders (A, P): boulders are defined as >50 cms in any direction and should be mapped as an area with a % cover attribute (12-14)

Soil erosion (A, L, P): includes both human and natural erosion in any situation

Physiography cover: The following cover proportions should be used in conjunction with the primary attributes above and should relate to the percent of the area as seen from above (this excludes many cliffs, for example).

95 - 100% rock:

>50% rock:

10-50% rock:

Theme: Agriculture/Natural Vegetation

Primary attribute:

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 *Cryptogramma crispera*, *Cystopteris fragilis* and *Asplenium trichomanes*. Not including vegetation with sub-arctic species (see montane, above). This attribute may need to be used in a mosaic (ie with another primary attribute).

Priority habitat

Primary Attribute

Limestone pavement (A): are of both geological and biological importance. The vegetation is rich in vascular plants, bryophytes and lichens and varies according to geographical location, altitude, rock type and the presence or absence of grazing animals. Limestone pavement vegetation may also contain unusual combinations of plants, with woodland and wood-edge species well-represented in the sheltered grikes. The clints support plants of rocky habitats or are often unvegetated. In the absence of grazing, scrub may develop.

Primary Qualifier: do not record or Null

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

Theme: Structures

Quarry/Mine (A, P)...:

Use:

Commercial

Industrial

25. BROAD HABITAT 17: URBAN

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Structures, Recreation, Transport and Agriculture/Natural Vegetation themes.

Curtilage: A curtilage is an area of ground that is associated with a building and which has a use linked with that building e.g. gardens, 'grounds', forecourts etc.

Theme: Structures

Primary attribute(s): (one from)

Agricultural Curtilage: area of ground associated with agricultural buildings

Allotments (A): community gardens, usually used for growing vegetables.

Amenity grass >1Ha: Should be recorded as Improved grassland.

Building (A, P): usually present on the map. Gardens/Grounds apply to curtilages associated with residential or other buildings. Gardens/Grounds may be mapped and attributed in groups if they are all alike.

Car park (A)

Embankment (A): to be used for any constructed embankment in any situation eg motorway, reservoir etc.

Garden Centre/Nursery (A)

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.

Garden/grounds without trees (A)

Glasshouse (A): refers to commercial, large-scale enterprises, not greenhouses at the bottom of gardens.

Gravel pit

Hard standing/concreted/gravel area

Other land (A, L, P): for use in exceptional circumstances; try and use other primary attributes first. Always qualify.

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

Quarry/mine

Waste domestic

Waste Commercial

Use: (these use codes will be attached to the above primary codes and are mandatory)

Agricultural: covers all buildings used for agricultural purposes including the farmhouse if occupied by a farmer or farm-worker.

Commercial: includes all buildings devoted to selling things, including shops, garages, hotels, pubs, commercial offices etc.

Educational/Cultural: includes schools, establishments of further education, museums, theatres and cinemas.

Industrial: those used for the manufacture of goods and include workshops, warehouses and associated buildings such as stores.

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.

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.

Religious: confined to places of worship including Churches, Mosques and Synagogues, and their curtilages eg graveyards, cemeteries etc.

Residential: covers all domestic living area (except farm houses, see agricultural, above).

Sporting/Recreational:

Theme: Recreation (these are generally areas deliberately set aside for recreational purposes)

Angling (A, P): any signs of angling eg notices, platforms etc.

Boat - inland water (A, P): any evidence that a boat is used on a piece of water, e.g. boathouse, moorings etc.

Boating area (A, P)

Camp site (A)

Golf course (A)

Horsiculture (A, P): any signs of horses used for recreational purposes eg jumps, schooling rings etc

Launch site (A, P)

Other designated area (A, L, P)

Other playing fields (A)

Other recreation (A, L, P)

Race track (A)

Static caravan(s) (A, P)

School playing fields (A)

Tennis courts (A, P)

Touring caravan park (A)

Theme: Transport

Constructed track (A, L) : includes any track which has been manufactured using stone or hard material

Railway track/land (A, L): to include tracks, yards, sidings and their associated curtilages (e.g. banks and 'verges').

Road (tarmac) (A, L): includes any road, whether private or not, which is totally tarmac across its width.

Unconstructed track (A, L): those tracks which are not defined as above ie no construction has been involved along their length.

Road Verge A: this refers to the width of the verge across the ground surface and should be recorded in the following categories: No verge, Verge <1m, Verge 1-5m, Verge >5m.

Road Verge B: as above.

Theme: Agriculture/Natural Vegetation

This type of vegetation can also be assigned to the Urban BH.

Annual/early successional with open ground (A): Early-successional pulse-disturbance vegetation containing annual weeds as well as perennial species usually with some open ground present. Open ground usually conspicuously present. Actual species composition dependent upon starting point. Unsown setaside will usually key out here. Indicators include *Poa annua*, *Plantago major*, *Agrostis stolonifera*, *Polygonum aviculare*, *Dactylis glomerata*, *Taraxacum* agg. *Stellaria media*. Excludes weed assemblages with managed crops present.

26. BROAD HABITAT 18: SUPRA-LITTORAL ROCK

Supralittoral rock occurs above high water mark, in areas influenced by wavesplash and sea-spray. Features that may be present include vertical rock, boulders, gullies, ledges and pools, depending on the wave exposure of the site and its geology. Salt-tolerant species are the characteristic colonisers. Typical plants in such areas include *Cochleria officinalis*, *Plantago maritima*, *Tripleurospermum maritimum*, *Sedum rosea*, *Ligusticum scoticum*, *Silene maritima*, *Armeria maritima*, *Crithmum maritimum*, *Plantago coronopus* and, in some rich areas, Arctic species such as purple saxifrage *Saxifraga oppositifolia* and *Silene acaulis*. The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural Vegetation and Coastal features themes.

Priority Habitat

Maritime (cliffs and slopes) vegetation

This habitat type is found on sea cliffs or other coastal situations and usually herb-rich due to salt spray. Halophytes always present eg *Plantago maritima*, *Plantago coronopus*, *Armeria maritima* and *Tripleurospermum maritimum*.

Broad Habitat Supra-littoral rock

Theme: Agriculture/Natural Vegetation

Primary attribute:

Maritime vegetation

Theme: Coastal features (coastal features should only be mapped above Mean High Water Mark).

Primary attribute:

Cliff > 30m high (A, L)

Cliff 5-30m high (A, L)

Rock outcrop & cliff <5m (A, L, P): to be used when the rock is outcropping base rock, as opposed to

Rocky/Boulder shore (A, L): used when the shore is of shattered rocks or boulders >10cm diam (ie grapefruit-size)

Priority habitat

Theme: Agriculture/Natural Vegetation

Primary attribute:

Maritime cliffs and slopes

Primary Qualifier: do not record.

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

27. BROAD HABITAT 19: SUPRA-LITTORAL SEDIMENT

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural Vegetation and Coastal features themes.

Priority Habitats

Sand dune (vegetated)

Sand dune vegetation should be recorded where the area is vegetated at 25% or greater, otherwise the physiography attribute sandy shore (36) should be used. Typical species include *Ammophila arenaria*, *Leymus arenarius*, *Elymus farctus*, *Viola tricolor*, and *Euphorbia portlandica*. Dune slacks should also be included with typical species such as *Salix repens*.

Strandline vegetation

Vegetation will establish on shingle beaches when there is a matrix of finer material such as

sand or silt, and where the structure is stable. Herb-rich open pioneer stages colonise the seaward edge with species such as *Crambe maritima*, *Lathyrus japonicus*, *Armeria maritima*, *Glaucium flavum* and *Eryngium maritimum*.

(Machair: is a distinctive sand dune formation that is only found in the north and west coast of Scotland and in western Ireland. The main habitats of machair are dry grassland, damp grassland, marsh and standing water and the vegetation broadly described as a herb-rich sward. Early colonisers are *Ammophila arenaria*, *Halimione portulacoides* and *Carex arenaria*, followed by *Trifolium pratense* and *Lotus corniculatus*, which fix nitrogen making the soil more suitable for herbs and grasses. CS surveyors should record Machair as its component parts, they should NOT classify to Machair as this will be done post-survey.)

Broad Habitat

Theme: Agriculture/Natural Vegetation

Primary attribute:

Sand-dune vegetated

Strandline vegetation

Theme: Coastal features

Primary attribute:

Pebble/Gravel shore (A, L):

Sandy shore (or un-vegetated dune) (A):

Priority Habitat

Theme: Agriculture/Natural Vegetation

Primary attribute:

Sand dune (vegetated)

Strandline

Primary Qualifier: do not record.

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

28. BROAD HABITAT 21: LITTORAL SEDIMENT

The Broad Habitat is selected at the polygon level. At the component level all attributes should be recorded under the Agriculture/Natural Vegetation and Coastal features themes.

Priority Habitats

Saltmarsh

This PH should only be recorded where the area is vegetated, otherwise bare mud (Physiography section) is appropriate. Typical species include *Salicornia*, *Puccinellia*, *Triglochin maritima* and *Aster tripolium*. In complex situations which cannot be mapped, the polygon should be assigned to a mosaic and proportions of 'bare mud' and vegetated ground in a polygon indicated.

Mudflats

Broad habitat

Theme: Coastal features

Primary attribute:

Bare mud (A)

Priority Habitat

Theme: Agriculture/Natural Vegetation

Primary attribute:

Saltmarsh

Mudflats

Primary Qualifier: do not record.

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

29. BROAD HABITAT 22: SEA

The Broad Habitat Sea is selected at the polygon level. At the component level the primary attribute Sea should be recorded under the Coastal features themes.

Theme: Coastal features

Primary attribute:

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

30. BROAD HABITAT: MOSAIC

If it is impossible to delimit an area of Broad and Priority Habitat because the habitats are spatially indistinguishable or within a wider area patches are smaller than the MMU then the polygon may be described as a mosaic. You will need to include the Broad/Priority Habitat description at the component level and against each primary code you will be asked to assign a percentage cover of the habitat. **The percentages for these must add up to 100%.**

Example

A mosaic of Bog and Dwarf Shrub Heath in an upland area would be assigned Mosaic at the polygon level with at least two components.

Component 1

Theme: Agriculture/Natural Vegetation

Primary attribute:

Other Bog

% area:

30%

Primary Qualifier: do not record.

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

Component 2

Theme: Agriculture/Natural Vegetation

Primary attribute:

Dwarf shrub heath

% area:

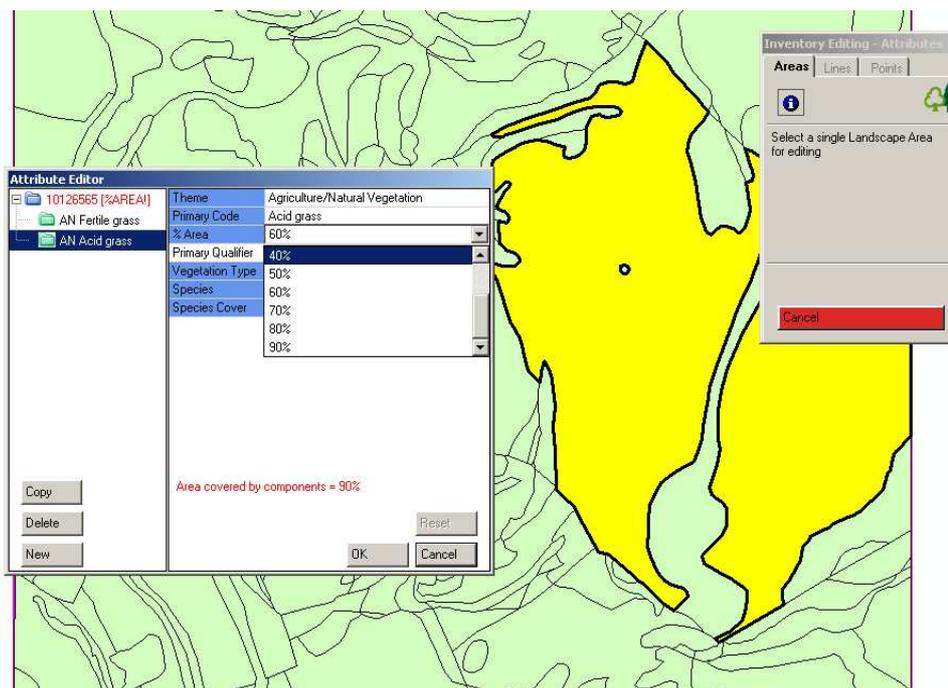
70%

Primary Qualifier: do not record.

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Species Cover: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.



31. NON-SPECIFIC PRIMARY ATTRIBUTES

All of the following can be recorded under a range of Broad/Priority Habitats;

Theme: Inland Physiography

Bare ground/disturbance/bare soil

For the following primary attributes the species composition of the field layer beneath the scattered trees or shrubs determines the Broad/Priority Habitat.

Physiography cover: The following cover proportions should be used in conjunction with the primary attribute above.

95 - 100% bare ground:

>50% bare ground:

10-50% bare ground:

N.B. This was not possible at the start of CS2007 so surveyors were asked to record the % cover as rock – for want of a bare ground option.

Theme: Forestry

Scattered trees (A): 6 or more trees which do not make a wood or clump (see definitions) because their crowns are not contributing 20% 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).

Scattered trees – 2-5 (A, P): 2-5 trees which do not make a wood or clump (see definitions) because their crowns are not contributing 20% 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).

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

Theme: Inland Water

Signs of drainage

32. POND SURVEY MAPPING

Pond attributes to record on Pond Mapping recording Sheet

If a square currently contains ponds, or if a pond is shown on mapping from the previous round of Countryside Survey (CS2000) then the mapping surveyor will need to complete the “CS2007 Pond Mapping Recording Sheet”. One line on the sheet needs to be completed for every pond in the square, and for ponds that were previously recorded but are no longer present. For every pond the following attributes need to be recorded:

- i) Pond polygon ID – this will be available from the Surveyor mapping system. If for any reason it is not available put the fullest Grid Reference possible.
- ii) Area of pond (maximum winter water level) in m². Note – this is already recorded on the tablet PC if the pond is above the Minimum Mappable Unit (MMU) size. It also needs to be recorded here because it may be different from the PC record if (i) it meets the pond definition but is below the MMU size (i.e. is between 25 m² and 400 m²), or (ii) the pond falls on the boundary of the square – here record the entire area of the pond, not just the area within the square.
- iii) Does the pond contain water? Record Yes or No, if only wet mud is present record No.
- iv) If the pond is shown on the CS2000 map, but is now lost give the reason for loss, where L = land drainage, I = infilling, B = built over, O = other (list in notes), U = unknown
- v) If the pond is not shown on the CS2000 map give the reason why, where N = the pond is in an areas of the square that was not previously mapped, C = the pond has been created since then, and U = the pond was not recorded for an unknown reason – note leave this blank if this is a new Countryside Survey square so it has not been mapped at all.
- vi) If this is a new pond (i.e. C was recorded in the previous column) then give the reason (or reasons) for creation if any evidence can be seen: F = fishing, S = shooting, W = wildfowl, L = wildlife, G = golf hazard, X = ornamental fish, O = other (list in notes), U = unknown.

Record any additional notes in the notes column.

As soon as all the ponds in a square have been recorded, you should carry out the process of identifying the survey pond and then give this fieldsheet to the freshwater surveyors so they can carry out the condition survey.

Selecting one pond per square for condition survey

Overview

If the survey square contains one or more ponds, a single pond per square will be surveyed to assess its condition. This pond is referred to here as the “survey pond” (‘Pond, sampled’ in Surveyor).

The survey pond needs to be randomly selected from the ponds available. To help with this, if the square has been surveyed previously for CS2000 a survey pond has been randomly pre-selected in advance. A list of preselected ponds will be available on the tablet PC called “preselected ponds.xls”. A shortcut to preselected ponds.xls will be provided on the tablet making its location obvious.

You will need to identify whether the pre-selected pond can be used or whether the pond selection process to randomly chose a survey pond needs to be applied in the field. This is because additional ponds may be recorded in the current survey that were not in the CS2000 dataset and it is important to include these ponds in the random selection process. You cannot do this until all the ponds in the square have been mapped and you have the completed CS2007 Pond Mapping Recording Sheet.

The pond selection process will need to be applied in the field if:

1. the square has not previously been mapped in CS2000,
2. mapping of the square for CS2007 has found new ponds in the square that were not recorded in CS2000 (e.g. because they are newly created, or in an area of the square that was not mapped in CS2007, or because they were not mapped for an unknown reason, i.e. if anything is recorded in the shaded column in the CS2007 Pond Mapping Recording Sheet)
3. the pre-selected pond no longer exists, or
4. access to the pre-selected pond has been refused.

The decision tree below explains this process.

Method for selecting a survey pond

1. Examine the completed Pond Mapping Recording Sheet.
2. If the square only contains one pond this will be the survey pond.
3. If it contains more than one pond select the survey pond use the table of random numbers Appendix 4 to select which pond number on the Pond Mapping Recording Sheet will be the survey pond.

4. Cross off the number used on the table below and on the next occasion use the next number in the row.

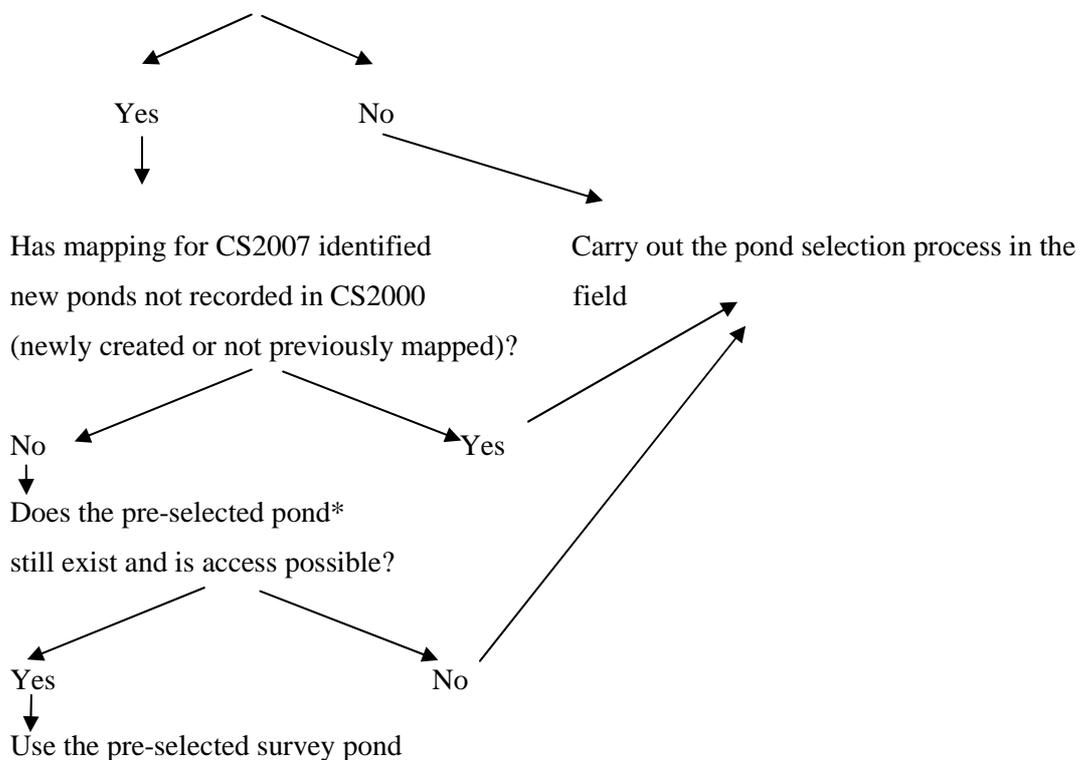
For example, if the square contains six ponds look in the table below at the row for six ponds in a square. The pond selected would be number five on the Pond Mapping Recording Sheet. On the next occasion where there were six ponds in a square the pond numbered one on the sheet would be selected.

For the few squares which contain more than 20 ponds pick a random number yourself before looking at the list of ponds.

It may be that in applying this process the pond finally selected for survey is the same one that was originally pre-selected. This is an acceptable outcome, the reason for reapplying the process would be to ensure that new ponds had the opportunity to be included through the random selection process.

Decision tree for deciding whether the pre-selected survey pond can be used, or whether the pond selection process needs to be carried out in the field.

Was the square mapped in CS2000?



Recording the pond selected

Fill in the section at the bottom of the Pond Mapping Recording Sheet as follows.

Record whether or not the pre-selected survey pond will be used as the survey pond.

If the pre-selected survey pond cannot be used, give the reason why:

A if additional ponds have been recorded in the square i.e. if anything is recorded in the shaded column showing reasons why ponds recorded now were not recorded in the CS2000 dataset,

B if the pre-selected pond no longer exists, or

C if access permission has been refused.

Circle the number of the pond which will be the survey pond in the first column of the form. Record the selected pond using the 'Pond sampled' primary attribute under the Inland Water theme on either the Areas or Points tab (depending on whether the pond is an area or a point) in the Landscape Feature Editing toolbox in Surveyor (on the tablet) to reflect the correct pond. The Survey pond details should also be filled in on the 'preselected ponds.xls' sheet on the tablet.

33. METHODOLOGY FOR MAPPING POINT FEATURES

Point features are individual landscape elements that occupy less than an area of 20x20m. Surveyors will need to click on each point in the CS2007 layer and either confirm that the point accurately represents what they see in the field, edit point attributes or delete the point accordingly. Spatial accuracy is not a key aspect of the survey but where necessary, surveyors can also move points. Points can also be added to indicate new features.

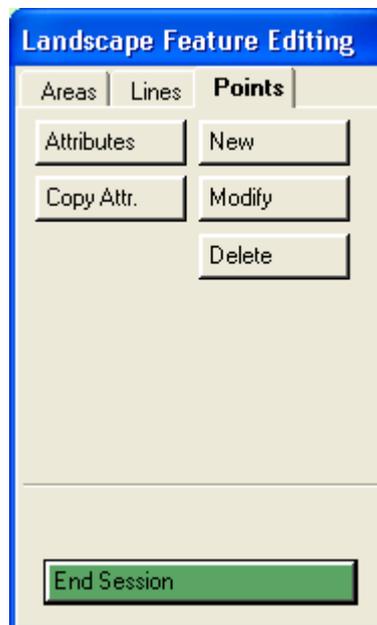
The task that surveyors will most commonly be carrying out in the field is checking and confirming and /or changing and adding to the attributes assigned to each point by previous surveyors.

Checking attributes

The attributes of a point feature are all the possible descriptors for that feature. Features which will be recorded as points on the map are listed below (POINT ATTRIBUTES). They include trees, standing water bodies and ponds and are listed under all the available themes.

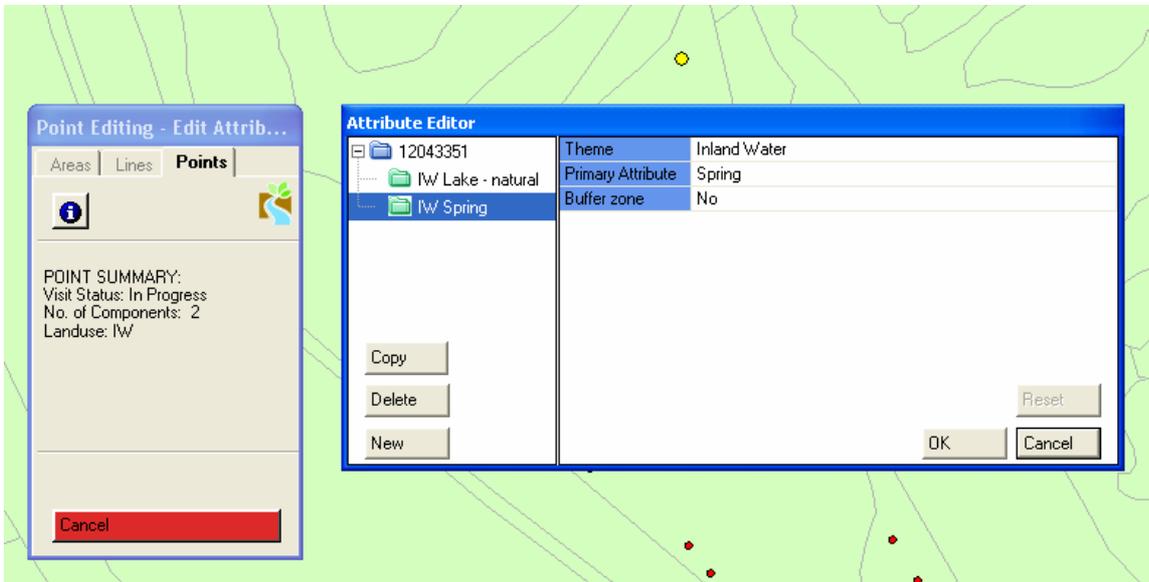
Checking and changing Point Attributes on the tablet

For all point editing tasks surveyors will need to click the Points tab in the Landscape Feature Editing toolbox:



Having clicked on the Attributes button the surveyors will then need to zoom or pan to the location on the map display to select a point for attribute update. Points can be selected by dragging a box around them as an alternative to trying to click on the point. The selected point is shown highlighted in yellow. The attribute editor will open, and details should be checked and/or changed for the point. Fields requiring mandatory values are shown in orange, and those for which values are optional are

A point may have more than one component. Components can be added, copied, or deleted, and attributes of components can be edited. These edits are all undertaken in the Landscape Points Attribute Editor toolbox.



Editing Point Attributes on the tablet

To add a new component, click on an existing component and click the New button in the attribute editor summary pane on the left.

To copy a component, click on an existing component, and click the Copy button in the attribute editor summary pane.

To delete a component, click on the component to select it, and click the Delete button.

On completing attribute edits and selecting 'Completed' from the visit status field at the point level the point will change in appearance (see below) when the map screen is refreshed.

- Landscape POINTS
 - unvisited
 - ◆ in progress
 - completed
 - ▲ refused access

The map must be at a scale of 1:5000 or less before the surveyor can select points for attribute update.

Points can only have their attributes updated one at a time.

Each point must contain at least one component.

100. POINT ATTRIBUTES

Definitions of tree/shrub features (Forestry theme) to be recorded as points:

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

Individual trees should be recorded as points from all recreation land such as golf courses and playing fields (except in urban situations). Where large numbers of individual trees are present the surveyor should use their judgement to ensure that this is adequately reflected in the dataset without spending inordinate amounts of time making a detailed map of each individual tree location.

Tree species (with apical dominance leading to the formation of recognised trunks) of all sizes should be recorded, as should shrubby species (comprising scrub). Veteran trees (maximum 2 of each species) should be recorded as outlined below.

Note on Buffer zones

Many landowners are being paid to 'buffer' the point features that you will be recording, i.e. protect them from the management of the adjacent field. Record Yes (for buffer present)/No against 'buffer zones' for each of these features.

Theme: Forestry

Primary attribute:

Individual trees (P) If greater than 50m apart trees should be recorded as individual trees. Similarly lines of trees of less than 20 m in length, trees standing singly in hedges and isolated coppice stools should be recorded as individual trees. Groups of 2-5 and ≥ 6 trees closer than 50m to one another should be recorded as scattered trees.

Individual scrub (P): an individual of a shrubby species or a tree in shrubby form more than 50m from another individual.

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

Scattered trees 2-5 (A, P): 2-5 trees which do not make a wood or clump (see definitions) because their crowns are not contributing 20% 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).

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

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.

Dead standing trees (P)

Dead lying trees

Buffer zone: Yes/no

Vegetation type: (choose **woody**)

Species: Access to BRC list of trees and shrub species

Species proportion: Individual tree, <10%, 10-25%, 25-50% , 50-75% , 75-95% , 95-100%

Modal DBH: Modal diameter at breast height should be recorded in the following categories; <3cm, 3-20cm, 21-50cm, 50cm-75cm, <75cm (change), 75-1m, 1m-2m, >2m. (N.B. DBH should be recorded where trunk is undamaged/not lumpy). For trees with multi-stems DBH will be measured at the highest point below where the tree forks, even if this is very close to the ground. If this is not possible DBH of individual stems should be recorded.

Theme: Veteran tree

In each square you are also asked to record up to 10 veteran trees (maximum 2 per species). Use the Rule of Thumb column in **Appendix 5** to decide whether a tree should be recorded as a veteran. Record the following details for (up to) the first two veteran trees of each species which you encounter in the square. Veteran trees can be part of a line of trees and should be marked with a point against which the following details are recorded on the tablet.

Primary attribute	Individual trees
Buffer zone	Yes/No
Vegetation type	Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody
Species	Access to BRC list of trees and shrub species
Modal DBH	<3cm, 3-20cm, 21-50cm, 50cm-75cm, <75cm (change), 75-1m, 1m-2m, >2m.
Veteran Tree type	Standard, Pollard or Lay
Epiphytic species cover	Rare, Present, Abundant
Ivy cover	<30% or >30%
% canopy live	(<25%, 25-49%, 50-89%, 90-100%)
Tree dead	Yes/No
Missing limbs	Yes/No
Dead wood attached	Yes/No
Dead, loose, missing bark	Yes/No
Tears, scars, lightning strikes	Yes/No
Hollow trunk or major rot sites	Yes/No

Theme: Inland Water

Of the inland water features to be recorded, ponds are the most difficult to define and the most important in this survey. Hence there is a detailed protocol regarding pond mapping included above.

Primary attribute:

Lake – Natural (A, P) : any inland water body bigger than a pond, should be mapped using this code

Lake – Artificial (A, P): usually distinguished by the presence of a dam or embankment

Spring (P): usually marked on the map but implies a continual supply of water at ground surface.

Well (A, L, P)

Gorge (L, P)

Waterfall

Pond (A, P): a body of standing water 25m²-2Ha in area which usually holds water for at least 4 months of the year (this is a standard definition of a pond but is obviously sometimes difficult to apply, particular attention should be paid to the type of the vegetation associated with the feature). Ponds are points when smaller than the minimum mappable unit of 20x20m and areas when over that size.

Pond, Sampled: as above, but this pond has been pre-selected for detailed sampling. If the pond mapping exercise reveals that the pre-selected pond needs re-selecting the pond attributes should be changed using the attribute editor.

Buffer zone: Yes/no

Theme: Inland Physiography

Primary attribute:

Rock outcrop & cliff <5m (A, L, P): areas of bare rock should be included here together with a % cover category (12-14)

Soil erosion (A, L, P): includes both human and natural erosion in any situation

Surface boulders (A, P): boulders are defined as >50 cms in any direction and should be mapped as an area with a % cover attribute (12-14)

Theme: Structures

Primary attribute:

Building (A, P): usually present on the map. Gardens/Grounds apply to curtilages associated with residential or other buildings. Gardens/Grounds may be mapped and attributed in groups if they are all alike.

Gravel pit

Other land

Quarry/Mine (A, P)

Waste domestic

Waste Commercial

Use:

Agricultural

Commercial

Educational/Cultural

Industrial

Public Service and Facilities

Religious

Residential

Sporting/Recreational

Theme: Coastal features

Rock outcrop & cliff <5m (A, L, P): areas of bare rock should be included here together with a % cover category (12-14)

Theme: Recreation

Angling (A, P): any signs of angling e.g. notices, platforms etc.

Boat - inland water (A, P): any evidence that a boat is used on a piece of water, e.g. boathouse, moorings etc.

Boating area (A, P)

Horsiculture (A, P): any signs of horses used for recreational purposes e.g. jumps, schooling rings etc

Launch site (A, P)

Other designated area (A, L, P)

Other recreation (A, L, P)

Static caravan(s) (A, P)

Tennis courts (A, P)

Theme: Forestry Features

Fenced (single trees)

Staked trees: to be used for isolated trees only.

Tree protectors: light-weight plastic tubes (about 1 m high) which provide protection as well as a favourable micro-climate for planted trees.

35. Other Point Editing tasks on the tablet

Create New Point

Having clicked on the Points tab in the Landscape Feature Editing toolbox click on the Create Point button. Zoom or pan to the location on the map display where the new point is to be added. Click Create New and click on the map display to create a new point. The new point is shown highlighted in yellow. Should the point need to be relocated, click on the map display to move it to its new

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position.

Click the Create Point button to finish the spatial edit.

The attribute editor will open, and details should be entered for the new point.

The map must be at a scale of 1:5000 or less before the surveyor can edit points.

Points cannot be added outside the survey square.

Points can only be added one at a time.

A point cannot be added within 5.0m of an existing point.

Every new point is created with a single Unsurveyed/Missing Data component.

Move Point

Having clicked on the Points tab in the Landscape Feature Editing toolbox click on the Move Point button. Zoom or pan to the location on the map display where the point is to be moved. Click Move and select the point to be moved by clicking on it, or dragging a selection box over it. The selected point is shown highlighted in yellow. Click on the map display to move it to its new position. The moved point retains its yellow highlight, but is shown in its new position.

The surveyor can chose to move a different point by making a new selection, the originally selected point will revert to its original position.

Click the Move Point button to finish the spatial edit.

The attribute editor will open, and details should be entered for the moved point On completing attribute edits and selecting 'Completed' from the visit status field at the polygon level the point will change in appearance (see below) when the map screen is refreshed.

The map must be at a scale of 1:5000 or less before the surveyor can move points.

Points cannot be moved outside the survey square.

Points can only be moved one at a time.

A point cannot be moved to within 5.0m of an existing point.

Delete Point

Having clicked on the Points tab in the Landscape Feature Editing toolbox click on the Delete Point button. Zoom or pan to the location on the map display where the point is to be deleted. Click Delete and select the point to be deleted by clicking on it, or dragging a selection box over it. The selected point is shown highlighted in yellow, provided it has a valid Reason for Change value – if not, then the point attributes must be edited prior to the delete edit, and the selected point will be highlighted in red.

The surveyor can select a different point to delete, and the originally selected point is no longer selected.

Click the Delete Point button to finish the spatial edit.

The point will be deleted, and the surveyor will be returned to the Landscape Editing Points toolbox.

The map must be at a scale of 1:5000 or less before the surveyor can delete points.

Points can only be deleted one at a time.

Points which do not have a valid Reason for Change value cannot be deleted.

Copy Point Attributes

Having clicked on the Points tab in the Landscape Feature Editing toolbox click on the Copy Attr. Button. Zoom or pan to the location on the map display to select one or more points which will be target points, and have attributes of another point copied to them.

Select points by clicking on each point or dragging a selection box over them. The selected target points are shown highlighted in yellow.

Now select a point which will be used as the source point to copy attributes from. The selected source point will be highlighted in blue.

The surveyor can change the source point chosen by selecting another source point.

Click Copy Attributes. The attributes of the source point will be copied to the target points. The attribute editor will open, and details should be checked for each point. On completing attribute edits and selecting 'Completed' from the visit status field at the polygon level the point will change in appearance (see below) when the map screen is refreshed.

The map must be at a scale of 1:5000 or less before the surveyor can select points to copy attributes.

There can only be one source point, there can be many target points.

Attributes copied to target points overwrite all currently held attributes at both point and component level.

40. METHODOLOGY FOR MAPPING LINEAR FEATURES

Linear features are landscape elements less than 5m wide that form lines in the landscape. CS reports on the length and condition (and changes in these over time) of a range of linear features including woody linear features, walls, fences and other linear features outlined below. Linear features have a minimum length of 20m and may include gaps of up to 20m.

Background

All linear features (minimum length 20m, maximum width 5m) should be recorded **unless** they form part of a curtilage or they are within the woodland canopy. However, linear features running along the edge of woodlands must be recorded. Linear features which form part of curtilage, (i.e. land intimately associated with buildings) at the boundary of urban and rural land should not be recorded. **N.B.** Some features which should have been represented as areas were consistently coded by some surveyors as lines in CS2000. Canals, canalised rivers and rivers should all appear as **areas** in the dataset. Surveyors are asked to correct any instances where these features appear as lines in the dataset.

Linear features on the GIS system will appear as continuous lines. Each continuous line represents a linear feature which may consist of a number of different parts named 'events' on Surveyor. These events may be either additive, e.g. a linear with both a fence and a woody linear feature running along its whole length, or replacements e.g. a field boundary in which the woody linear feature is replaced by fence where it is gappy.

Where the linear features (although individually each less than 5m wide) take up an area larger than the minimum mappable unit a polygon should be created and assigned the BH 'Boundary and Linear features' described as a **wide linear feature** (see BH 3 Boundaries and Linear features) . Each linear feature should continue to be collectively represented by a single line with multiple events e.g. two woody linear features (one a line of trees, the other a managed hedge), earth bank, ditch and fence. (This is to avoid the necessity of trying to accurately draw each component and assess its area).

Recording Events

Within the GIS system the different events on the linear features already mapped in the square will be defined (as below) and their extent given e.g. Fence, 30-70m, which describes the event as a fence between 30 and 70m along the length of the line along which it is mapped. Surveyors should be conservative about altering events on linear features and only alter where the data is seriously inaccurate. Any alterations to the linear features or events should be made using the Surveyor system to create a new line, cut a line, delete a line, modify the shape of a line, reshape a line, reshape a line to follow another feature and edit the attributes of the events along the linear feature. New lines should be drawn on the tablet as accurately as possible, using existing features for reference, as well as making full use of range finders, measuring tapes and compasses to position and measure them.

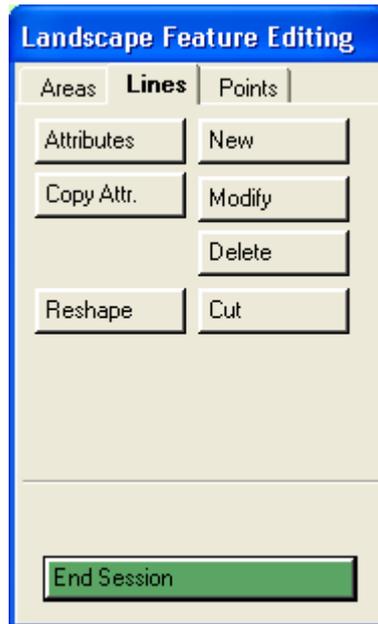
Where there is a step change in the events along a linear feature they should be coded and recorded as different events with their own set of attributes e.g. where a management of a WLF changes along its length resulting in a difference in height or where a section of hedge has a totally different species composition.

Checking event attributes

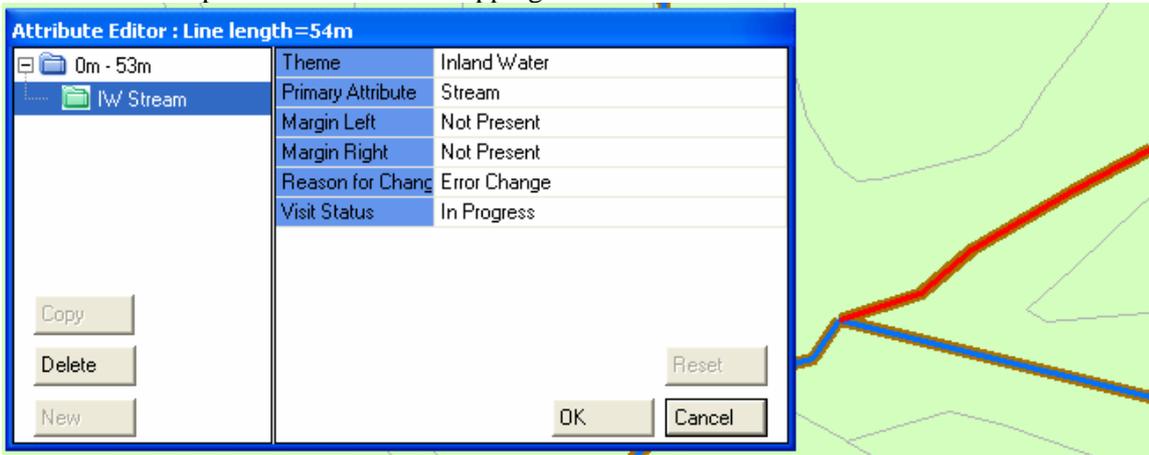
The attributes of an event are all the possible descriptors for that event. Features which will be recorded as events on the map are listed below (EVENT ATTRIBUTES). They include fences, walls, woody linear features etc and are listed under all the available themes.

41. Checking and changing Event Attributes on the tablet

For all Event editing tasks surveyors will need to click the Lines tab in the Landscape Feature Editing Toolbox.



Having clicked on the Attributes button the surveyors will then need to zoom or pan to the location on the map display to select a line for event attribute update. Lines can be selected by dragging a box across them as an alternative to trying to click on the line. The selected line is shown highlighted in red. The attribute editor will open, and details should be checked and/or changed for the linear feature. At the line level (top folder), only line length can be altered (see below). Event folders (which sit underneath the top folder) in the summary pane of the Attribute Editor are shown in red when they contain fields for which input is mandatory and in green when no input is required. Fields requiring mandatory values are shown in orange, and those for which values are optional are shown in blue.



Line with a single Event - Attribute Editing

42. Editing Event Attributes on the tablet

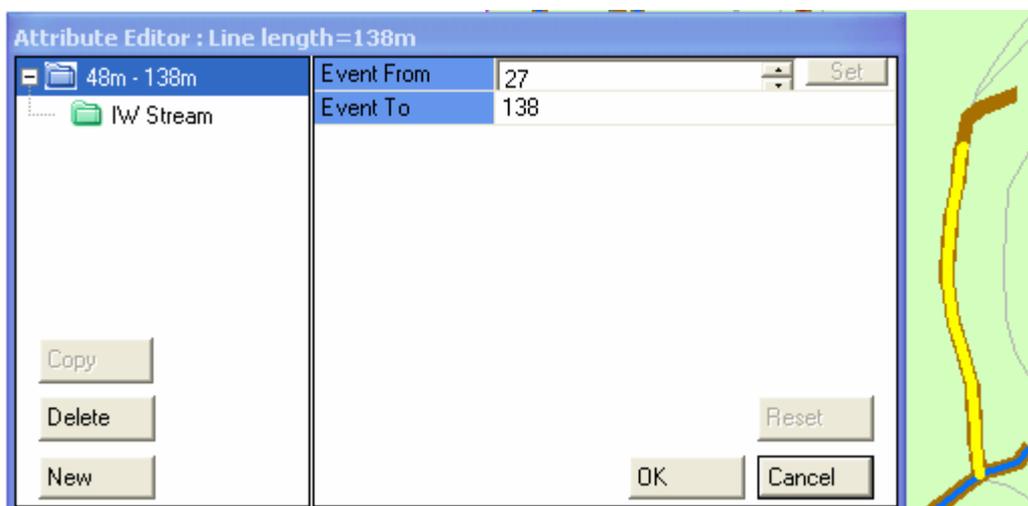
To add a new event, click on an existing event and click the New button in the attribute editor summary pane on the left.

To copy an event, click on an existing event, and click the Copy button in the attribute editor summary pane.

To delete an event, click on the event to select it, and click the Delete button.

Event length can be set using the keyboard with the cursor in the Event From or Event To fields in the Attribute Editor, or the increment/decrement buttons which are at the right hand end of these fields. Finally the length of an Event can be set on the map display, as follows:

Click the Set button which is accessed through the Attribute Editor, and is positioned immediately to the right of the Event From and Event To boxes. To position the 'Event From' point, click on that row in the Attribute Editor, select one end of the line (the number in the field will indicate whether you are at the Event From or the Event To end of the line). Moving the pen along the line will allow you to set the new starting point. Similarly to set the Event To point, click on that row in the Attribute Editor, select the To point along the line, and click. As the cursor is drawn along the line, the event length, which is highlighted in yellow, is shown following along the line.



Event from and to points being set on map display

On completing attribute edits the line will change in appearance based on the Theme Type when the map screen is refreshed.

The map must be at a scale of 1:5000 or less before the surveyor can select lines for event attribute update.

Lines can only have their event attributes updated one at a time.

Each line must contain at least one event.

Events must be a minimum of 5.0m long.

43. Copy Events

Zoom or pan to the location on the map display to select one or more lines which will be target lines, and have events from another line copied to them.

Click on the Copy Attr. Button and select target lines by clicking on each line or dragging a selection box over them. The selected target lines are shown highlighted in red.

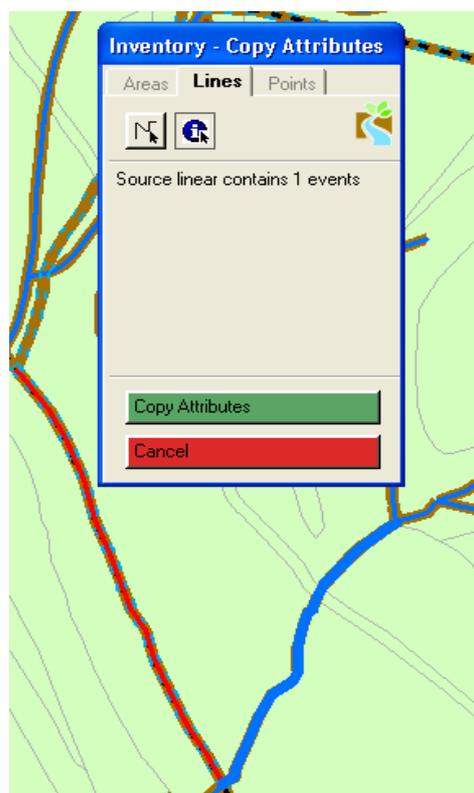
Now having clicked on the 'i' button, select a line which will be used as the source line to copy events from. The selected source line will be highlighted with a thick blue line.

The surveyor can change the source line chosen by selecting another source line.

Click Copy Attributes.

The attributes of the source line will be copied to the target lines. The attribute editor will open, and details should be checked for each line.

On completing copy line attribute edits, the target lines will have the same appearance as the source line when the map screen is refreshed.



Copy events showing source (left) and target (right) lines

The map must be at a scale of 1:5000 or less before the surveyor can select lines to copy attributes.

There can only be one source line, there can be many target lines.

Events copied to target lines are added to events already attributed to target lines.

44. LINEAR FEATURES - EVENT ATTRIBUTES

The following lists linear events and their available attributes alphabetically under the themes in which they occur.

Note on Margins

The margins will be additional to the cross compliance margin (N.B. not required in Wales), which is a 2m margin measured from the centre of the hedge that all landowners receiving the Single Farm Payment are required to retain at the edges of fields. Margin types are described in the Mapping areas section. The most popular margin options are likely to be 6m in width and these may be additive, i.e. one type of 6m margin immediately adjacent to another type.

Theme: Agriculture/Natural Vegetation

Primary attribute:

Perennial vegetation, tall herb/grass

Vegetation type: Bryophytes, Forbs, Grasses, Monocots (other), Sedges, Trees, Woody.

Species: BRC list according to selected vegetation type.

Proportion: This should be recorded in the following categories: <10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%.

Theme: Bank

Primary attribute:

Stone bank (L)

Earth bank (L)

Grass strip (L): to be used where a grass strip separates two fields with no vertical boundary.

Stone and earth bank (L)

Height	<1m, 1-2m, >2m-3m, >3m
Margin Left	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m
Margin Right	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m

Theme: Coastal features

Primary attribute:

Cliff 5-30m high (A, L, P)

Pebble/gravel shore (A, L)

Rock outcrop and cliff <5m (A, L, P)

Rocky/boulder shore (A, L)

No attributes are recorded with these features.

Theme: Fence

Primary attribute:

Wood only (L)

Iron only (L)

Wire on posts (L)

Other (L)

Height	<1m, 1-2m, >2m-3m, >3m
Condition	A - Excellent condition, B - Sound with minor defects, C - Major signs of advancing or potential deterioration, D - In early stages of dereliction, E - Derelict, F – Remnants*
Margin Left	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m
Margin Right	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m

Theme: Forestry

Primary attribute:

Belt of scrub (A,L): as above but consisting of scrub species

Belt of trees (A, L): 2 to 4 trees wide with a width to length ratio of at least 1:4, parallel-sided and with a maximum width of 50m. Linear feature if <5m wide.

Dead standing trees (L): Line of dead standing trees

Ride/Firebreak (L)

Modal DBH - diameter at breast height (DBH) for most trees along the length of the feature.	<3cm, 3-20cm, 21-50cm, 50cm-75cm, >75cm ,1-<2m, >2m
Staked trees - to be used for individual trees within the features	Yes or No
Tree protectors - light weight plastic tubes around 1m high to protect newly planted trees	Yes or No
Margin Left	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m,

	12m-20m
Margin Right	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m
Vegetation type	Trees/woody
Species	Access to BRC list of trees and shrub species
Proportion	<10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%

Theme: Grass strip

Primary attribute:

Grass strip

Width: <1m, 1-5

Margin Left: as above

Margin Right: as above

Theme: Inland Physiography

Primary attribute:

Cliff >30m high (A, L)

Cliff 5-30m high (A, L)

Rock outcrop and cliff >5m (A, L, P)

Soil erosion (A, L, P)

No attributes are recorded with these features.

Theme: Inland Water

Primary attribute:

Canal (A) – was previously recorded as a line, make sure to record as area only in this survey

Canalised river (A) – was previously recorded as a line, make sure to record as area only in this survey

Gorge (L, P)

Levee (A, L)

Other ditch (L): Linear excavations for the purpose of drainage – should be recorded even if dry at the time of the survey.

Other ditch, sampled

River (A) – was previously recorded as a line, make sure to record as area only in this survey

River, sampled (A) – was previously recorded as a line, make sure to record as area only in this survey

Roadside ditch (L): See other ditch, but beside a road

Roadside ditch, sampled

Stream (L): Defined as being <2.5m wide

Stream, sampled

Margin Left: as above

Margin Right: as above

Theme: Structures

Primary attribute:

Other land (A, L, P)

No attributes are recorded with this feature.

Theme: Transport

Primary attribute:

Footpath (exclusive): includes fenced or walled paths

Footpath (other)

Constructed track (L): includes any track which has been manufactured using stone or hard material

Unconstructed track (A, L): those tracks which are not defined as above ie no construction has been involved along their length.

Verge left: this refers to the width of the verge across the ground surface and should be recorded in the following categories: No verge, Verge <1m, Verge 1-5m, Verge >5m.

Verge right: as above.

Theme: Wall

Primary attribute:

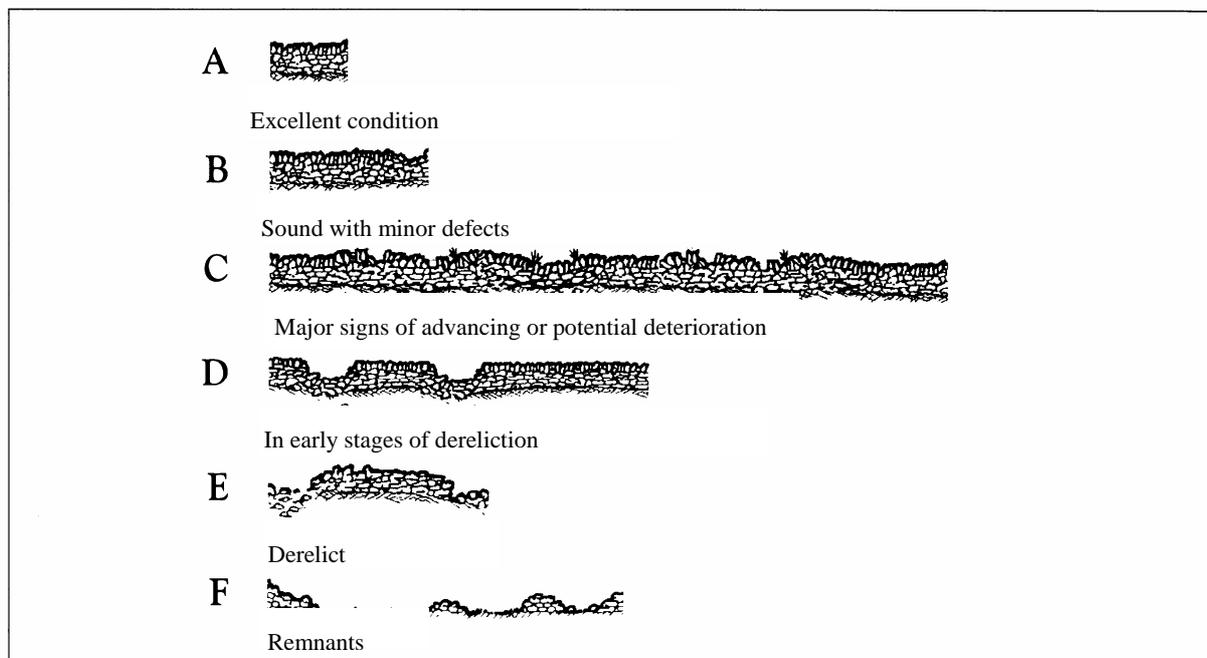
Dry-stone (L)

Mortared (L): includes dry-stone walls which have been capped with mortared stone.

Other (L)

Height	<1m, 1-2m, >2m-3m, >3m
Condition	A - Excellent condition, B - Sound with minor defects, C - Major signs of advancing or potential deterioration, D - In early stages of dereliction, E - Derelict, F – Remnants*
Margin Right	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m
Margin Left	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m

*(after ADAS report to Countryside Commission) – see Fig. 1 Condition of dry stone walls (adapted from Countryside Commission leaflet CCP 482)



45. Introduction to woody linear features

In most landscapes the linear features that are most important for biodiversity are the woody linear features. The term ‘woody linear features’ (WLFs) has been coined to account for the tremendous diversity of WLFs to be found in the countryside including everything from a traditionally managed hedge to a planted avenue of trees or a line of old scrub which may at one time have been a managed hedge. WLFs (as defined using CS methodology) fall into two broad categories based on the extent to which the trees within them take their natural shape.

- ‘Natural shape’ means unhindered/unmanaged growth for at least a decade. Where trees take their natural shape the feature will essentially be a line of trees or scrub.
- Where trees/scrub has been managed relatively recently the WLF will fall into the hedge category.

When coding a WLF, surveyors will be asked to decide primarily whether trees take their natural shape and will then provide relevant information (as below) against each of these feature types in order to enable us to group and assess the data appropriately.

Recording Woody Linear Features

Where gaps of 20m or over exist in these features they should be mapped either in individual sections of minimum length 20m (including gaps <20m) or as individual trees/scrub, as appropriate. Where woody linear features are greater than 5m wide at their base or more than one tree wide they should be mapped as a belt of trees or scrub (as appropriate). There is a field for belts of trees >5m in width.

When coding a WLF attributes will be recorded in the following fields alongside the length and position of the feature as represented by the line drawn in the GIS data (field as it appears in Surveyor is recorded in brackets):

The primary question for surveyors mapping Woody Linear Features is then:

'Do individual trees within the feature take their natural shape?' Yes (WLF natural shape), No (WLF unnatural shape).

Theme: WLF Natural shape

Primary attribute:

WLF Natural shape

Base height - Height of base of canopy	<2m or >2m
Modal DBH - diameter at breast height (DBH) for most trees along the length of the feature.	<3cm, 3-20cm, 21-50cm, 50cm-75cm, >75cm, 1-2m, >2m
Historic Management - are there signs of historic management?	Yes or No (e.g. layered base, old coppice stools, slanting main stems with large vertical branches)
Staked trees - to be used for individual trees within the features	Yes or No
Tree protectors - light weight plastic tubes around 1m high to protect newly planted trees	Yes or No
Margin Left	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m
Margin Right	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m
Vegetation Type	Trees/Woody
Species	Access to BRC list of trees and shrub species
Proportion	<10%, 10-25%, 25-50%, 50-75%, 75-95%, 95-100%

Theme: WLF Unnatural shape

Primary attribute:

WLF Unnatural shape

Height	<1m, 1-2m, 2-3m, >3m (change to different category), 3-4m, 4-6m, >6m
Base height - Height of base of canopy*	<2m or >2m
Species composition	mixed species, >50% hawthorn, >50% other
Evidence Man - Evidence of recent management	no recent management, newly planted, cutting e.g flail or saw [<3yrs], laying or coppicing [<5yrs], both of the preceding
Line of stumps - Is the WLF a line of stumps?	Yes or No
Vertical gappiness (% of breaks which extend from canopy to ground) along the WLF.	<10%, 10-<25%, 25-<50%, 50-<75%
Margin Left	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m,

	12m-20m
Margin Right	not present, <2m, 2m-<4m, 4m-<6m, 6m-<12m, 12m-20m
Staked trees - to be used for individual trees within the features	Yes or No
Tree protectors - light weight plastic tubes around 1m high to protect newly planted trees	Yes or No

* N.B. If >2m check that component woody species are cut or trimmed in shape, so are **not** in their natural shape. If they are in a natural shape record features for **WLF natural shape**.

A set of images on the this page and the next page illustrate the kinds of features you will encounter. They should be coded as follows (numbering follows from left to right top to bottom)

1. **WLF unnatural shape**/line of stumps –yes.
2. **WLF unnatural shape x 2** – for the section closest in the picture /Base height <2m/Line of stumps –no/Height <1m/ Horizontal gappiness- <10%/Species composition->50% hawthorn/ Evidence of management-cutting e.g flail or saw [<3yrs & margin widths (not possible to assess from this photo) for the section furthest away in the photo//Base height <2m/Line of stumps –no/Height -1-2m/ Horizontal gappiness- <10%/Species composition->50% hawthorn/ Evidence of management-cutting e.g flail or saw [<3yrs & Margin widths (not possible to assess from this photo).
3. **WLF unnatural shape** /Base height <2m/Line of stumps –no/Height -, >2m-3m / Horizontal gappiness- <10%/Species composition->50% hawthorn/ Evidence of management- laying or coppicing [<5yrs] & Margin widths (not possible to assess from this photo).
4. **WLF natural shape** /Base height <2m/Species composition->50% hawthorn/ Signs of historic management -yes (Modal DBH)- 3-20cm & Margins –not present.



(images courtesy of Colin Barr)

5. **WLF unnatural shape** /Base height <2m/Line of stumps –no/Height -, >2m-3m / Horizontal gappiness- <10%/Species composition->50% hawthorn/ Evidence of

management- cutting e.g flail or saw [<3 yr] & Margin not present near side, impossible to assess from this photo for far side. An earth bank linear feature (see below) would also be recorded as part of this linear feature.

6. (Feature on right of road) **WLF unnatural shape & WLF natural shape.**

WLF unnatural shape/Base height <2 m/Line of stumps –no/Height - <1 m / Horizontal gappiness- $<10\%$ /Species composition- $>50\%$ hawthorn/ Evidence of management-cutting e.g flail or saw [<3 yr] & Margin not present near side, impossible to assess from this photo for far side. **WLF natural shape** (recorded from the first tree)/Base height >2 m/Species composition – *Fraxinus excelsior* (possibly!)/ Signs of historic management-no/ Modal DBH-21-50cm& Margin not present near side, impossible to assess from this photo for far side.

7. **WLF unnatural shape**/Base height <2 m/Line of stumps –no/Height - <1 m / Horizontal gappiness- 25- $<50\%$ /Species composition- $>50\%$ hawthorn/ Evidence of management-cutting e.g flail or saw [<3 yr] & Margin not present either side.

8. **Individual trees** (gaps >20 m)

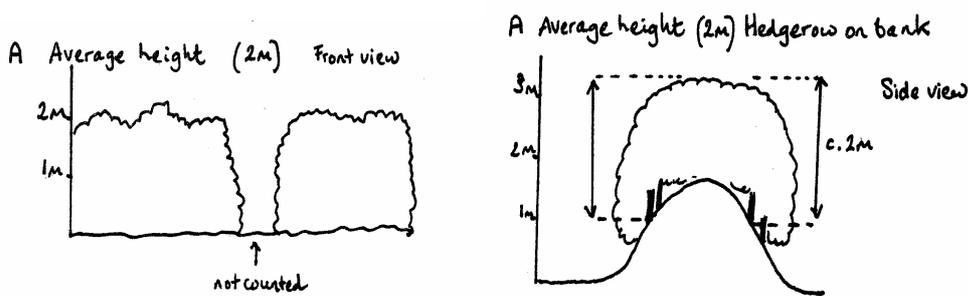


Fig. 2. Illustrations to help in the assessment of modal height (referred to here as average) in different circumstances N.B Modal differs from average as described above (i.e. it is NOT the heights of different features added together and then divided by the number of features).

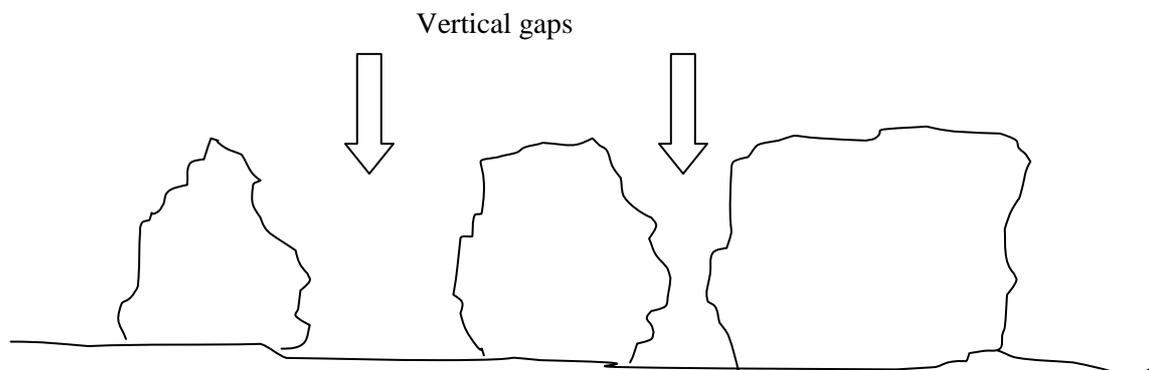


Fig. 3. Illustration of what is meant by vertical gappiness in WLFs.

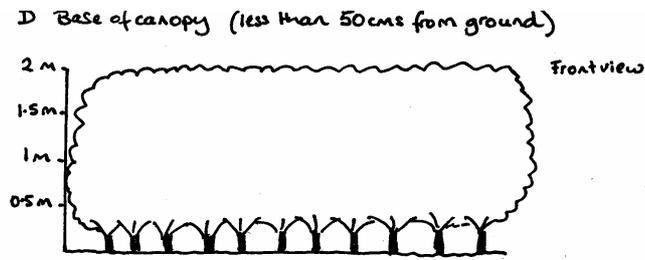


Fig. 4. Illustration showing Height of base of canopy (Base height)

47. Other Line Editing tasks on the tablet

For all Event editing tasks surveyors will need to click the Lines tab in the Landscape Feature Editing Toolbox.

48. Create New Line

Zoom or pan to the location on the map display where the new line is to be added. Click New and use the pen to click on the map display to create a new line. Double click to finish the edit sketch. The new line is shown highlighted in pink. Should the shape of the line need to be refined, use the vertex edit button to highlight the vertices and the pen to move them to the desired positions.

Click the Create Line button to finish the spatial edit.

The new line is created, and contains a single Unsurveyed/Missing Data event. In order to record an event on the linear feature, attribute editing protocols need to be followed as described above.

The map must be at a scale of 1:5000 or less before the surveyor can edit lines.

Lines cannot be added outside the survey square.

Lines can only be added one at a time.

Lines must be 5.0m long minimum.

A line cannot cross over itself.

When a line crosses another line, all of the lines are automatically split at the intersection point.

Every new line is created with a single Unsurveyed/Missing Data event which runs over the entire length of the line.

49. Modify Line

Zoom or pan to the location on the map display where the line is to be modified. Click on or drag a selection box over the line, which is to be modified.

The selected line is shown highlighted in pink, and vertices which can be used to edit the shape of the

line are shown along its length. Using the pen the sketch can now be modified, with vertices added (by holding the pen along the line and right clicking until a menu appears with Insert Vertex as an option), deleted (by selecting a vertex, right clicking and selecting Delete Vertex on the menu), and moved (by clicking on a Vertex until the symbol changes and dragging to a new location), until the surveyor is satisfied that the line reflects how the feature looks in the field.

Note that vertices at the end of shared boundaries cannot be edited at this point, since they are shared nodes – they share their topology with other features, and can only be modified in Shared Node Modify.



Line selected for Modify edit

Click to one side of the sketch to complete the modify, and view how the line will be changed as a result of the edit.

Click Save Changes to save the spatial edit and return to the Landscape Editing – Lines toolbox.

50. Shared Nodes – These can only be modified if selected individually as a node, click modify in the lines editing toolbox.

Using the pen, select a shared node to modify by clicking carefully on the intersection between two or more lines (or use the keyboard shortcut of n to prevent the selection of a boundary rather than the node). Be patient, it can be difficult to select a node but when you manage it the node is shown highlighted as a pink spot.



Shared node (marked with a pink cross) which has been modified – ready to save changes

Drag the node to its new position, the adjoining lines will move along with the node as it is moved. Click to one side of the sketch to complete the modify, and see how the edited lines will be changed as a result of the edit.

Click Save Changes to save the spatial edit and return to the Landscape Editing – Lines toolbox.

If a modify edit would result in a line, or an event which is less than the minimum linear feature length, the edit will not be permitted.

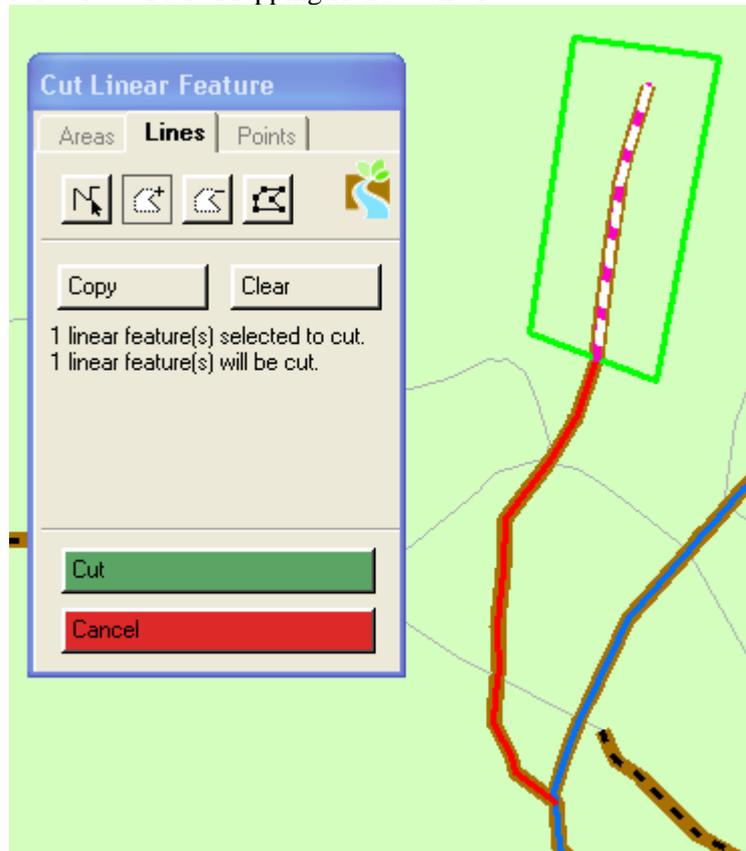
If the points at the end of a line are shared with another line, these can only be edited using shared node modify.

When using shared node modify the edit cannot cause any revised lines to intersect any other revised line.

When using shared node modify the edit cannot cause any revised lines to intersect any other linear feature.

51. Cut Line

Zoom or pan to the location on the map display where the line is to be cut. Click or drag a selection box to select the line to be cut. The selected line is shown highlighted in red. Using the sketch tool (polygon with a + sign) digitise the cut polygon along the line. The length which will be cut from the line is shown highlighted as a pink/white chain dotted line, and the length which will remain is shown in red.



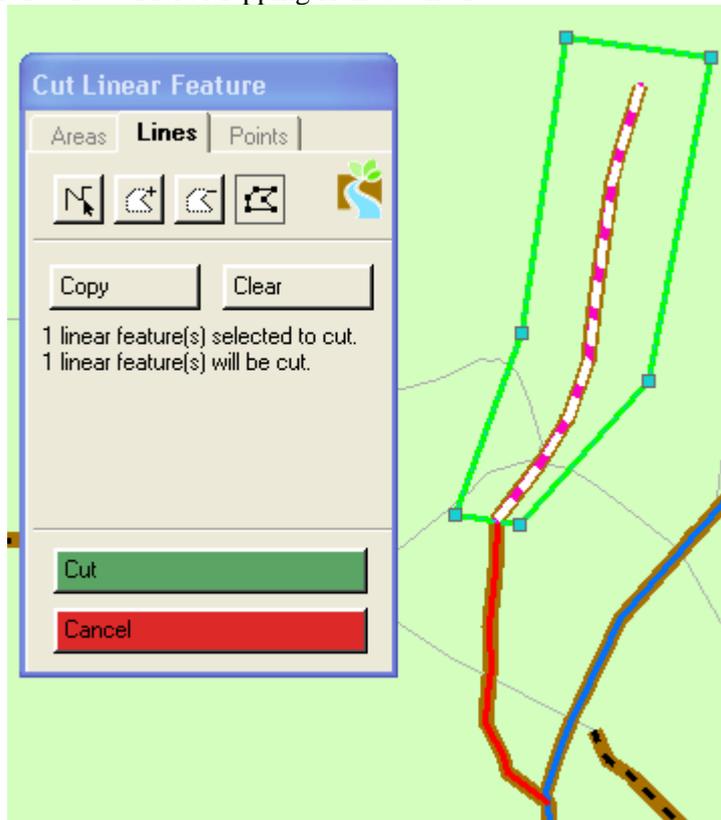
Line with cut polygon over a section – ready to cut

Click the Cut button to complete the spatial edit and return to the Landscape Editing – Lines toolbox.

52. Modifying the Edit Sketch

If the polygon created to cut a line is not satisfactory in terms of shape, then it can be modified by moving its vertices to create the final shape.

Click on the vertex edit button (polygon with vertices), the line now has vertices which can be used to modify the line by adding/deleting (using the right click) or moving until the surveyor is satisfied that the edit sketch will produce the cut required.



Edit sketch with vertices shown – ready to modify

Once the surveyor is satisfied that the edit will produce the required line click the Cut button to complete the spatial edit and return to the Landscape Editing – Lines toolbox.

53. Using the Copy Tool

Existing polygons from other map layers, for example OS Mastermap, can be used to make a Cut Line edit sketch polygon, e.g. if a linear feature has been eliminated from a field (represented by a polygon) this tool can be used to cut it accurately.

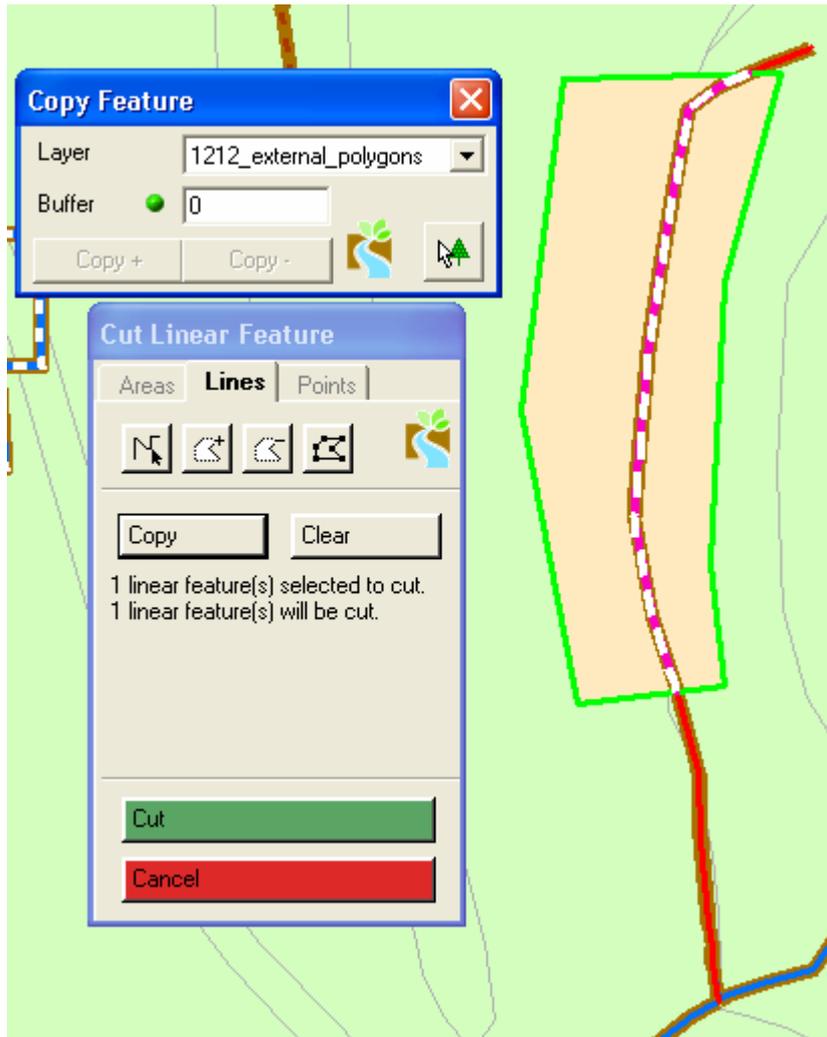
Zoom or pan to the location on the map display where the line is to be cut. Click or drag a selection box to select the line to be cut. The selected line is shown highlighted in red.

Click the Copy button in the Inventory Editing – Lines toolbox to open the Copy features toolbox. Select the layer you wish to copy features from (Landscape Areas) and select the feature you wish to copy.

The selected feature is shown with a heavy blue outline. Click the Copy+ button to include this feature in the edit sketch, the polygon is now shown with a heavy green outline, to indicate that it is part of the Cut edit sketch. Select other features in the same way, clicking Copy+ to add more features to the edit sketch, and Copy- to remove features from the edit sketch.

The edit sketch can be further refined using the edit vertex tool, as described above in Modifying the Edit Sketch.

The length which will be cut from the line is shown highlighted as a pink/white chain dotted line, and the length which will remain is shown in red.



Edit sketch made by using the Copy Features tool

Click the Cut button to complete the spatial edit and return to the Landscape Editing – Lines toolbox.

More than one line can be cut with a cut edit.

Lines can be cut in more than one place – user is given feedback if more than one linear feature will result of the edit.

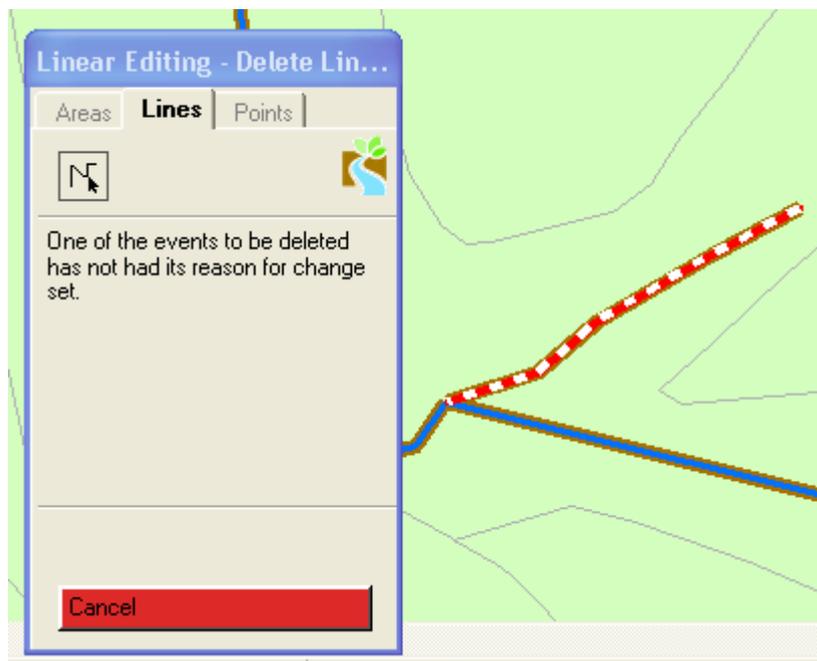
If a cut edit would result in a line, or an event which is less than the minimum linear feature length, the edit will not be permitted.

A line cannot be deleted by a cut edit.

54. Delete Line

Zoom or pan to the location on the map display where the line is to be deleted. Click Delete and select the line to be deleted by clicking on it, or dragging a selection box over it. The selected line is

shown highlighted in red, provided all events attached to the line have a valid Reason for Change value – if not, then the line attributes must be edited prior to the delete edit, and the selected line will be highlighted as a red/white chain dotted line.



Line selected for delete with no reason for change set on an event

The surveyor can select a different line to delete, and the originally selected line is no longer selected. Click the Delete Line button to finish the spatial edit.

The line, and all events associated with that line, will be deleted, and the surveyor will be returned to the Landscape Editing Lines toolbox.

The map must be at a scale of 1:5000 or less before the surveyor can delete lines.

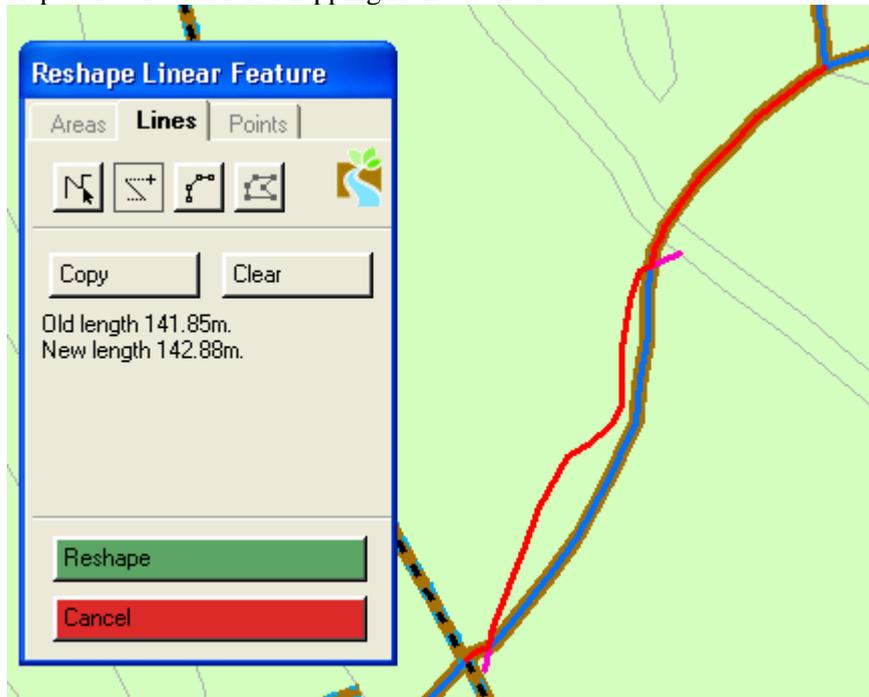
Lines can only be deleted one at a time.

Lines which have an event which does not have a valid Reason for Change value cannot be deleted.

55. Reshape Line 1 – following a digitised line

Having clicked on the Reshape button zoom or pan to the location on the map display where the line is to be reshaped. Click on or drag a selection box over the line, which is to be reshaped. The selected line is highlighted in red.

Click the reshape line button (zig-zag with +) and use the pen to draw a reshape line along the selected line, intersecting the line at the beginning and end of the edit. Double click to complete the reshape line edit sketch.



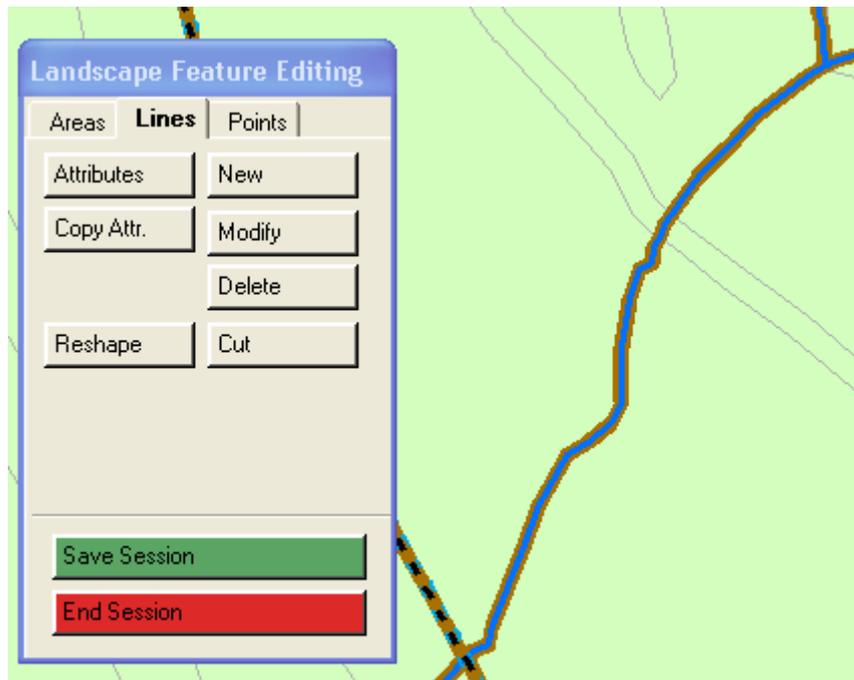
Reshape edit sketch along existing line

The reshape line is shown in red, the part of the line which will be deleted is shown as usual, and unaffected parts of the line are shown in red.

The surveyor can edit the reshape line by using the pen having clicked on the vertex edit button.

Click the Reshape button to complete the spatial edit.

The reshape edit is saved, and the surveyor is returned to the Landscape Editing – Lines toolbox.



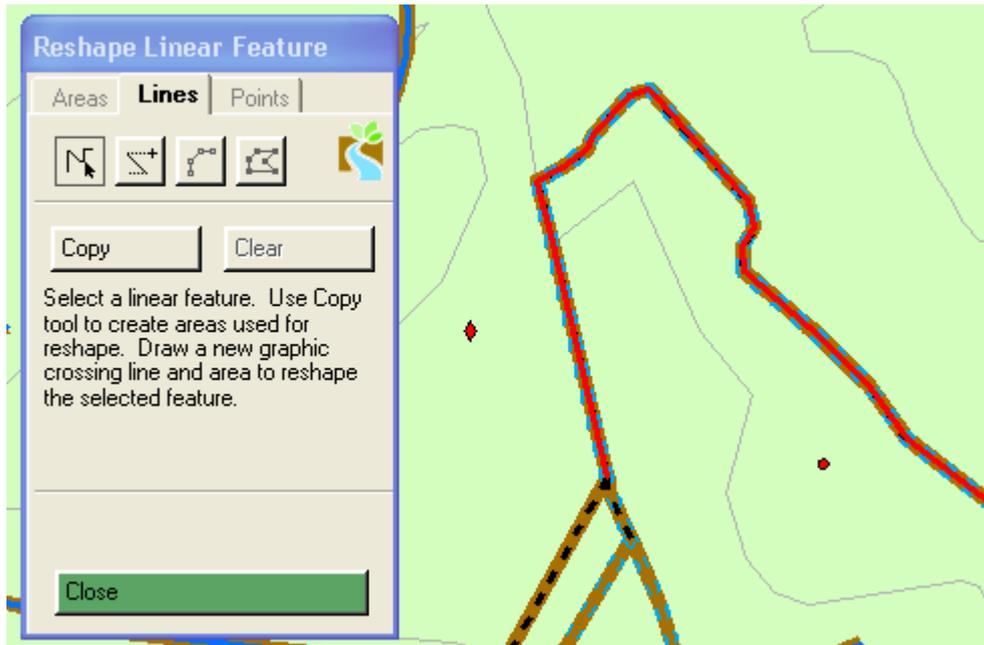
Completed reshape on a line

The map must be at a scale of 1:5000 or less before the surveyor can reshape a line.

If a reshape edit would result in a line, or an event which is less than the minimum linear feature length, the edit will not be permitted.

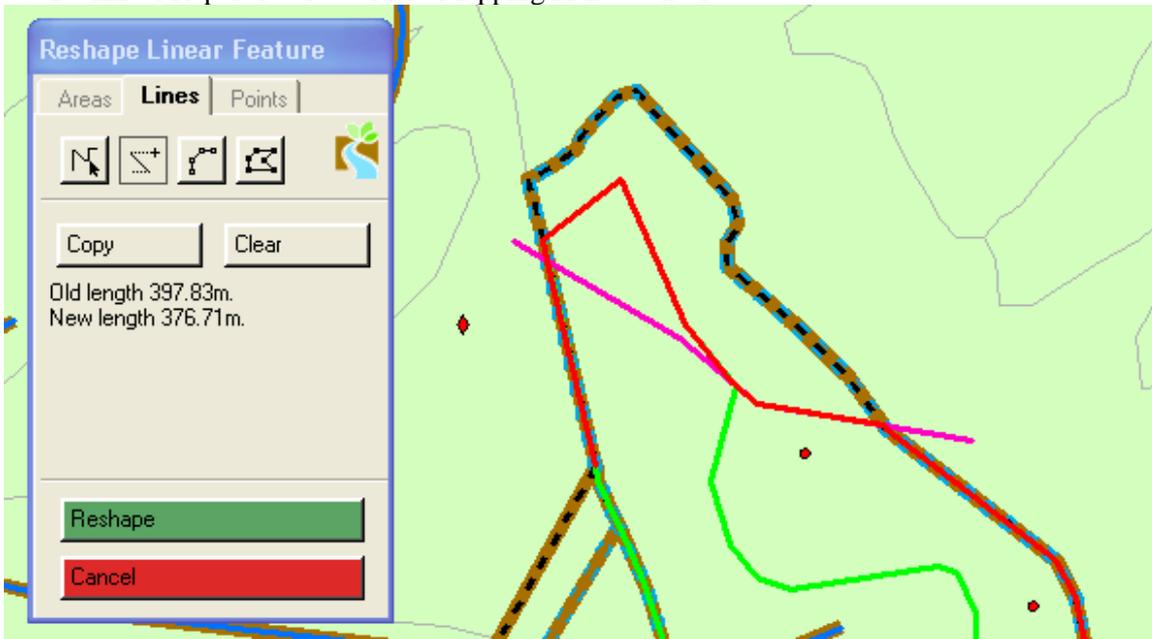
56. Reshape Line 2 – Following a copied line

Zoom or pan to the location on the map display where the line is to be reshaped. Click on or drag a selection box over the line which is to be reshaped. The selected line is highlighted in red.



Line selected for reshape follow line shown in red

Use the pen to draw a reshape graphic along the selected line, intersecting the line at the beginning and end of the edit. The reshape graphic must intersect the line to be reshaped, and any line or polygon boundary which is to be utilised for the reshape follow copied line operation. Use the Copy tool to select the feature required to use in the follow line edit.



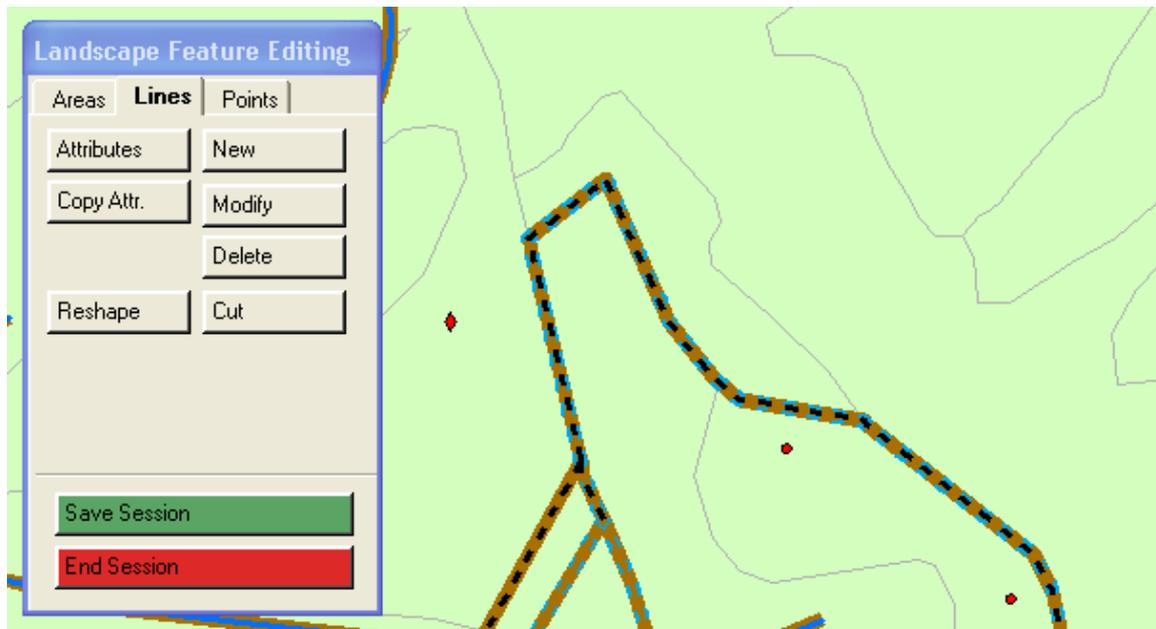
Reshape using landscape area boundary copied feature

The edit sketch graphic line is shown in pink – this defines the start and end points of the reshape. The original line remains unchanged. The line to be followed by the edit is shown in red – hence the red line previews the result of the edit.

The reshape graphic can be modified if need be, using the vertex edit button and the pen.

Click the Reshape button to complete the spatial edit.

The original line has been moved, to follow the landscape area boundary as shown below.



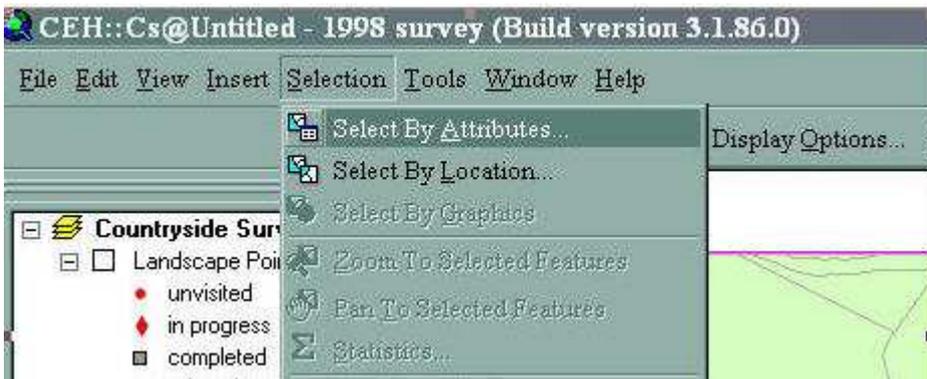
Completed reshape following copied line edit

The map must be at a scale of 1:5000 or less before the surveyor can reshape a line.

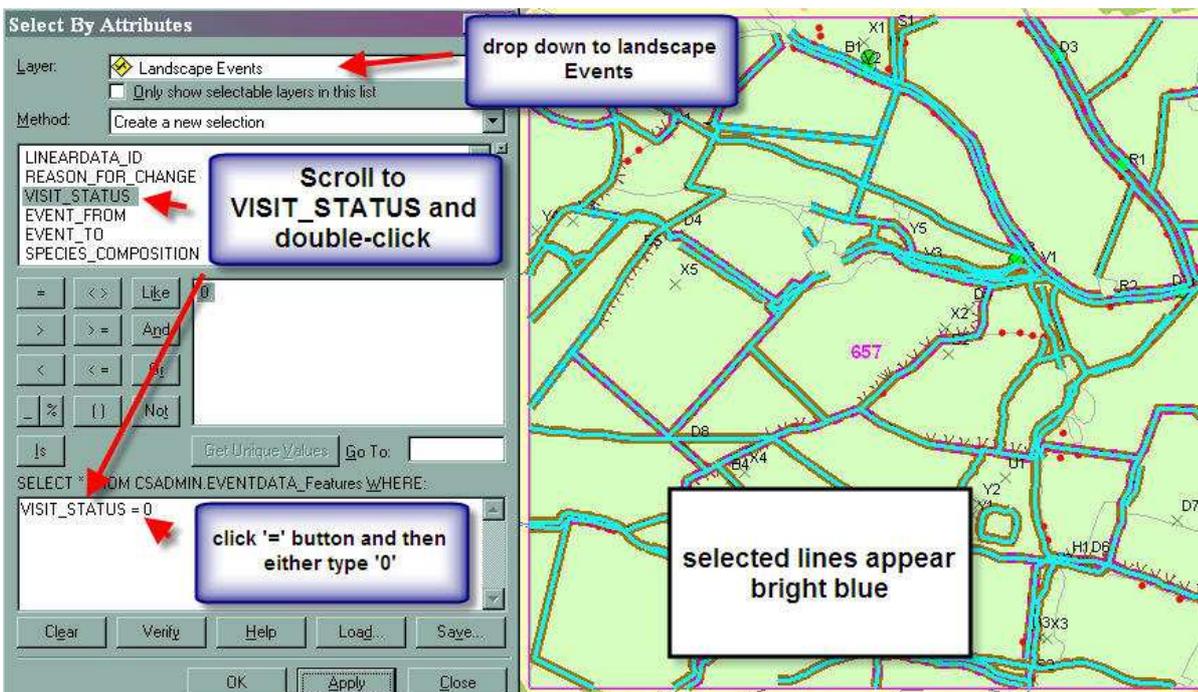
If a reshape edit would result in a line, or an event which is less than the minimum linear feature length, the edit will not be permitted.

57. Checking Visit status on linear features

Unfortunately the process for checking visit status on linear features is not as straightforward as it is for either points or areas. In order to check which linear features within a square have not been visited surveyors will need to click on the Select By Attributes field as shown below.

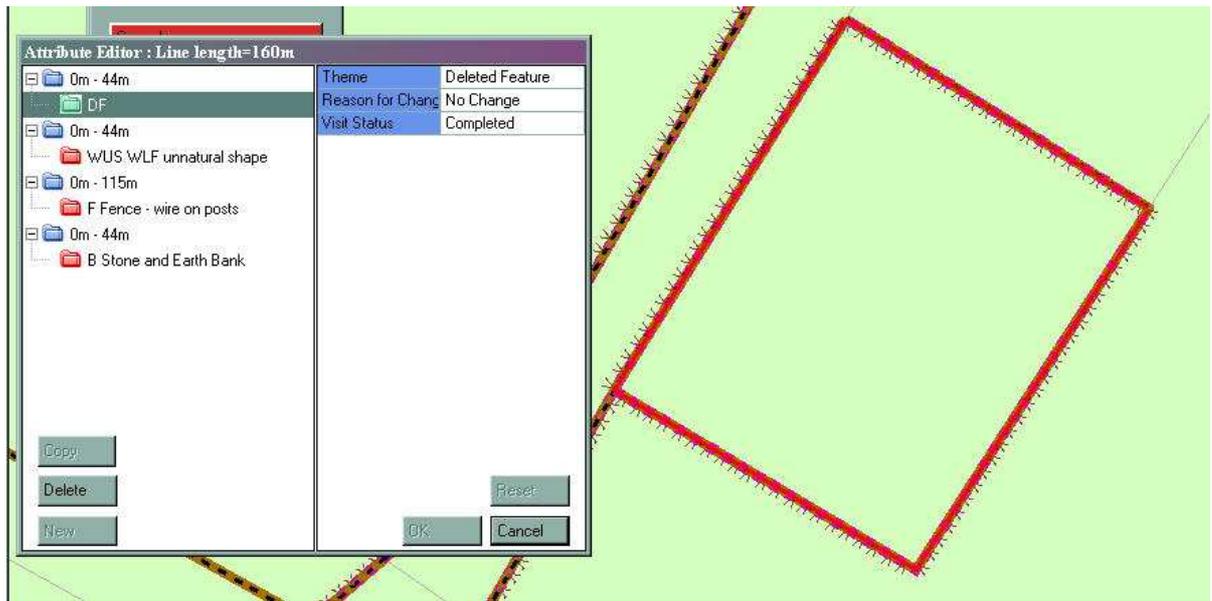


In the Select by Attributes Toolbar the surveyor will then need to click in the Layer field and select Landscape Events from the dropdown menu, then scroll to VISIT_STATUS and double click following which the VISIT_STATUS field will appear in the bottom window. The surveyor will then need to click on '=' on the buttons above, followed by '0' on the tablet keyboard (available at the bottom left of the screen). On clicking the 'Apply' button enabled at the bottom of the screen, unvisited lines will appear highlighted blue. See screen shot below.



Note on LOOP features

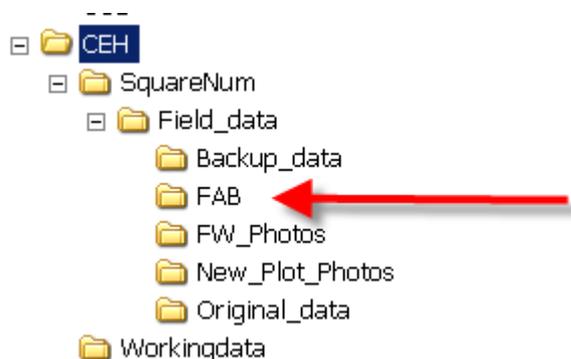
A loop feature looks like this:



There are 85 loops in the data (see Appendix 6 – additionally surveyors will be alerted to these loops when they download data from squares which have them). The event data for these loops is corrupted. Therefore surveyors need to adopt the following procedure in order to edit these loops. Change the theme on each of the events to Deleted Feature, Reason for Change: No Change, Visit Status: Completed. Once this has been done click on ok and save and then follow the delete line protocol above to delete each of the four lines. Surveyors then need to reinstate the feature as it is in the field by adding a line and the attributes of the events along it (both protocols are described above).

Appendix 1: Using old Field Assessment Booklets (FAB's)

Surveyors will be provided with electronic copies of the FAB's which it will be possible to look at if there are particular issues with a habitat, e.g. it is difficult to determine what type of change has occurred.



The old Fieldhandbook for CS2000 is also available electronically for reference on the tablet if you require more detail than is presented here for interpretation.

CS2000

Features were mapped in six themes in CS2000, Agriculture/Natural vegetation, Physiography, Buildings/Structures, Forestry, Boundaries and BH (only unenclosed BHs i.e. Acid grassland, Calcareous grassland, Bog, Fen, marsh,swamp, Heath, inland rock were mapped) and each theme had its own paper map. On this map each feature whether it was a line of trees or an area of habitat was given a unique identifying number within that theme and labelled with this number.

Information for each mapping theme was recorded on a separate **Data recording form**. Each **Data recording form** contains attribute data. The unique number (parcel number) from the mapping sheet is in the first column of the data recording form. The other columns are used to record attributes which are very similar to those used in CS2007 (there have been some additions and losses) such as primary attribute, species information but instead of being described in words a code number was assigned to each attribute. The code list for CS2000 is included in this handbook as Appendix 2.

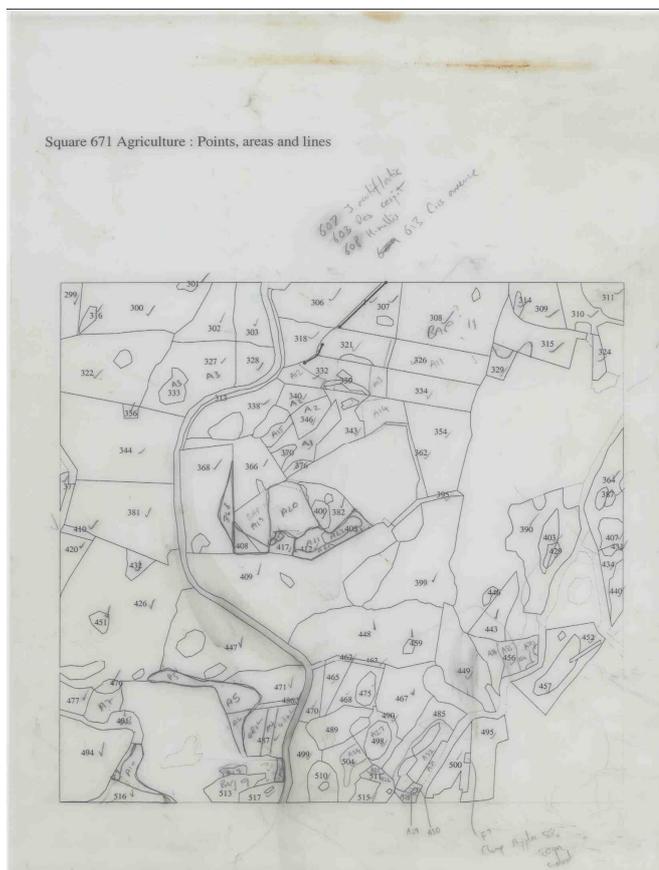
Parcel number	New Parcel Number	Parcel	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value	Etc.	Universal Codes	New BAP Code
128	I	CS1990	101	✓		148	✓	175	✓	
129	H		101			147		176		
130	H		101			147		176		

e.g. in Parcel number 128, the primary attribute is 101: fertile grassland, with species 148: Trifolium repens at 175: 25-50% cover.

When a feature had changed the surveyor was required to place a cross against the old attribute data and to input the new data. It was important that surveyors indicated what type of change had taken place i.e. 701 Genuine change or 702 mis-recording in 1990, this value was placed in the universal code column on the data sheet to indicate whether there had been real or genuine change.

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		702	

An example of a CS2000 theme map and associated data sheet can be seen below.



Parcel number	New Parcel Number	CS1990 Parcel Code	Primary code	Primary code % cover	Other & Unique Codes	Species 1	Species 1 Cover value	Species 2	Species 2 Cover value	Height for Calluna	Use 1	Use 2	Use 3	Number of Horses / Cows	Universal Codes	Notes
1	Y	134	134													
2	Y	134	134													
300	P	101	101			147	176									
301	P	101	101			147	176									
302	L	101	101			1113	175									
303	O	101	101			147	176									
306	L	101	101			1113	175									
307	Z	101	101			145	176									
308	Z	101	101			145	176									
309	AA	101	101			147	176									
310	L	101	101			1113	175									
311	L	101	101			1113	175									
313	ZZ	101	101													
314	AA	101	101			147	176									
315	AA	101	101			147	176									
316	P	101	101			147	176									
318	L	101	101			1113	175									
321	W	101	101			139	175									
322	P	101	101			147	176									
324	R	101	101			147	176									
326	W	101	101			139	175									
327	P	101	101			147	176									
328	P	101	101			147	176									
329	AA	101	101			147	176									
330	W	101	101			139	175									
333	W	101	101			147	176									
334	W	101	101			139	175									
335	HH	101	101			139	175									
339	W	101	101			139	175									
340	AA	101	101			139	175									
343	V	101	101			139	175									
344	O	101	101			147	176									
345	V	101	101			139	175									
354	S	101	101			147	176									
382	ZZ	135	135			153	175									
384	HH	101	101			139	175									
386	HH	101	101			139	175									
388	W	101	101			147	176									
370	V	101	101			139	175									
378	V	101	101			139	175									
381	L	101	101			1113	175									
382	AA	101	101			139	175									
387	HH	101	101			139	175									
390	OC	101	101			138	175									
395	ZT2	487	487													
399	T	101	101			147	176									
400	AA	101	101			139	175									
401	OC	101	101			138	175									
402	AA	101	101			139	175									
407	HH	101	101			139	175									

In the FAB folder the following types of document will be available

Front cover: self-evident

Back cover: similar to above!

Farmer information: extra information about the landowner e.g. farm management information

unique codes Codesheets: if surveyors could not find the relevant feature coded in the existing code sheet they created a new unique code and described the feature,

Ownership Map: previous ownership map, will look different to the current updated ones

Agriculture/Natural vegetation Map

Boundaries Map

Forestry Map

BAP Map

Physiography Map

Structures Map

Agriculture Codesheets

Boundaries Codesheets

Forestry Codesheets

Physiography Codesheets

Structures Codesheets

CS2007_plotmaps

Plot Photo (both sides as pdf) -see notes below

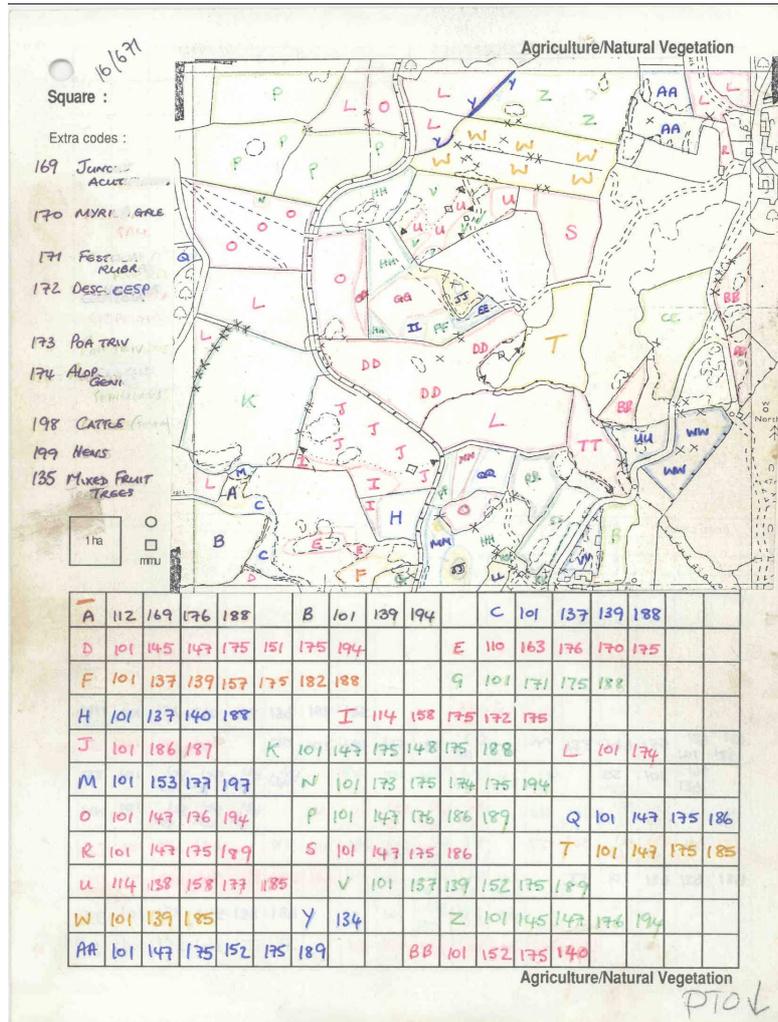
Aerial Photo

Plotsheets

1990

Features were mapped in five themes in CS1990, (Agriculture/natural vegetation, Forestry, Buildings/structures, Boundaries and Physiography.) there was no Broad Habitat mapping (as they hadn't been implemented then).

Mapping was done de Novo (from a blank sheet of paper) so there was no requirement to determine whether there had been change since the last survey. The map and the attributes were recorded on the same sheet of paper and it was a simpler system than used in 2000.



Appendix 2: CS2000 codes

PHYSIOGRAPHY/INLAND WATER/COASTAL

Inland physiographic features

- 1 Cliff >30m high (A, L)
- 2 Cliff 5-30m high (A, L)
- 3 Rock outcrop & cliff <5m (A, L, P)
- 4 Scree (A)
- 5 Surface boulders (A, P)
- 6 Limestone pavement (A)
- 7 Peat hags (A)
- 8 Current peat work's (A)

Coastal features

- 31 Cliff > 30m high (A, L)
- 32 Cliff 5-30m high (A, L)
- 33 Rock outcrop & cliff <5m (A, L, P)
- 34 Rocky/Boulder sh. (A, L)
- 35 Pebble/Gravel sh. (A, L)
- 36 Sandy shore (or un-vegetated dune) (A)
- 37 Bare mud (A)

38 Sea (A)

Inland water features

- 50 Pond (A, P)
- 51 Lake - natural (A, P)
- 52 Lake - artificial (A, P)
- 53 River (A, L)
- 54 Canalised river (A, L)
- 55 Canal (A, L)
- 56 Stream (L)
- 57 Roadside ditch (L)

58 Other ditch (A, L)

- 59 Spring (P)
- 60 Well (A, L, P)
- 61 Signs of drainage (A)
- 63 Gorge (P)
- 64 Levee (A, L)
- 65 Bank <1m
- 66 Bank <5m
- 67 Bank >5m

AGRICULTURE/NATURAL VEGETATION ETC

- 101 Fertile agric grass (A)
- 171 Herb-rich grassland (A)
- 102 Acid grassland (A)
- 103 Moorland - grass (A)
- 104 Dwarf shrub heath (A)
- 174 Sub-arctic (montane) (A)
- 135 Rock vegetation (A)
- 105 Calcar. grassland (A)
- 106 Maritime vegetation (A)
- ~~107 Lowland heath~~
- 108 Aquatic macroph. (A)
- 109 Aquatic marg. veg (A)
- ~~110 Raised bog~~
- 111 Blanket bog (A)
- 112 Other bog (A)
- 113 Fen (A)
- 114 Marsh (A)
- 115 Flush (A)
- 116 Saltmarsh (A)
- 172 Sand dune (veg'd) (A)
- 173 Strandline veg'n (A)
- 117 Wheat (A)

- 118 Barley (A)
- 119 Oats (A)
- 120 Sugar beet (A)
- 121 Turnips/Swedes/etc (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)
- 130 Flowers (A)
- 131 Commercial hortic. (A)
- 170 Perennial crops (A)
- 132 Orchard (A)
- 133 Unmanaged grass (A)
- 134 Tall herb vegetation (A)
- 135 Rock vegetation (A)
- 136 Ley
- ~~137 Unimproved grass~~
- ~~138 Forbs >10%~~

- 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*
- 170 Perennial crops
- 171 Herb-rich grassland
- 172 Sand dune
- 173 Strandline vegetation
- 174 Sub-arctic (Montane) Cover
- 175 25-50%
- 176 50-75%
- 177 75-95%
- 178 95-100%
- Heights (*Calluna* only)

- 179 <10cms
- 180 <30cms
- 181 <50cms
- 182 >50cms
- ~~183 <1.5m~~
- ~~184 >1.5m~~
- Uses etc
- 185 Beef
- 186 Dairy
- 187 Cattle (unspecified)
- 188 Dual purpose
- 189 Sheep
- 190 Goats (with no.)
- 191 Horses (with no.)
- 192 Pigs
- 193 Silage
- 194 Hay
- 195 Deer
- 196 Grouse
- 197 No apparent use (A)
- 198 Setaside

FORESTRY/WOODLAND/TREES

- 201 Individual trees (P)
- 202 Scattered trees (A, P)
- 203 Line of trees (L)
- 204 Belt of trees (A, L)
- 205 Clump of trees (A, P)
- 206 Woodland/Forest (A)
- 207 Individual scrub (P)
- 208 Scattered scrub (A, P)
- 209 Line of scrub (L)
- 210 Patch of scrub (A, P)
- 215 Closed canopy
- 216 Canopies not touching
- 217 Hedgerow tree(s)
- 218 Parkland
- Species (if >25%)
- 221 Fir - Douglas
- 222 Larch

- 223 Pine - Corsican
- 224 Pine - Lodgepole
- 225 Pine - Scots
- 226 Spruce - Norway
- 227 Spruce - Sitka
- 228 Unspecified conifer
- 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
- 251 Mixed conifers
- 252 Unspecified broadleaf
- Proportions
- 256 25-50%
- 257 50-75%
- 258 75-95%
- 259 95-100%
- Age
- 261 1-4 yrs

- 262 5-20 yrs
- 263 20-50 yrs
- 264 > 100 yrs
- 265 50-100 yrs
- 266 > 100 yrs
- Use
- 266 Timber production
- 267 Landscape
- 268 Sporting/Game
- 269 Public recreation
- 270 Nature conservation
- 271 Shelter
- Condition
- 275 Managed
- 276 Unmanaged - thriving
- 277 Unmanaged - improvable
- 278 Declining

BOUNDARIES

Walls

- 301 Dry-stone (L)
- 302 Mortared (L)
- 303 Other (L)
- 305 A - Stockproof and in excellent condition
- 306 B - Sound and stockproof with minor defects
- 307 C - Major deterioration
- 308 D - Early dereliction
- 309 E - Derelict
- 310 F - Remnants

Fences

- 311 Wood only (L)
- 312 Iron only (L)
- 313 Wire on posts (L)
- 314 Other (L)
- Hedges
- 321 >50% Hawthorn (L)
- 322 >50% Other (L)
- 323 Mixed hedge (L)
- Other
- 331 Stone bank (L)
- 332 Earth bank (L)

- 333 Grass strip (L)
- 334 Stone & earth bank (L)
- Descriptions
- 340 >3m high
- 341 2-3 m high
- 342 1-2m high
- 343 <1m high
- 351 Stockproof
- 352 Not stockproof
- 353 Filled gaps <10%
- 354 Filled gaps >10%
- 355 Signs of replacement

- 356 Signs of removal
- 357 Recently planted
- 358 Uncut
- 359 Derelict
- 360 Line of relict hedge
- 361 Laying (recent)
- 362 Flailing
- 363 Re-growth from stumps
- 364 Bracken present
- 371 Unfilled gaps <10%
- 372 Unfilled gaps >10%

Hedge shapes

- 374 Box-shaped hedge
- 375 Pointed box-shaped
- 376 Chamfered hedge
- 377 A-shaped hedge
- 378 Topped A-shaped hedge
- 379 Round topped hedge
- 380 Untopped hedge

BUILDINGS/STRUCTURES/COMMUNICATIONS

- 401 Building (A, P)
- 402 Garden/grounds with trees (A)
- 403 Garden/grounds without trees (A)
- 434 Agric. curtilage (A)
- 404 Public open space (A)
- 405 Amenity grass >1ha (A)
- 406 Allotments (A)
- 407 Car park (A)
- 408 Glasshouse (A)
- 409 Garden Cen./Nurs. (A)

- 410 Embankment (A)
- 411 Other land (A, L, P).....
- Use
- 421 Residential
- 422 Commercial
- 423 Industrial
- 424 Public Service & facilities
- 425 Institutional
- 426 Educational/Cultural
- 427 Religious
- 428 Agricultural

- 429 Sporting/Recreational
- 430 Waste - domestic (A, P)
- 431 Waste - industrial (A, P)
- 432 Quarry/Mine (A, P)...
- 433 Gravel pit (A, P)
- (434 Agricultural curtilage)
- Description
- 441 New
- 442 Vacant
- 443 Derelict
- Communications
- 451 R'way track/land (A, L)

- 452 Road (tarmac) (A, L)
- 453 Verge <1m
- 454 Verge <5m
- 455 Verge >5m
- 456 Constructed track (L)
- 457 Unconstructed track (L)
- 458 Footpath (exclusive) (L)
- 459 Footpath (other) (L)
- Surface
- 460 satisfactory throughout
- 461 parts in poor condition
- 462 impassable/difficult

RECREATION

Designated

- 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 c'van park (A)
- 509 Camp site (A)
- 510 Launch site (A, P)
- 511 Other designated area ...

- (A, L, P)
- Non-designated
- 521 Horsiculture (A, P)
- 522 Angling (A, P)

- 523 Boat inland water (A, P)
- 524 Other (A, L, P)

UNIVERSAL

- 888 New to map

- 999 No longer on map

Change reliability

- 701 Genuine change.

- 702 Mis-recording in 1990.

Appendix 4

CS Technical Report No. 157: Field Mapping Handbook v1.0

Table of random numbers to use for selecting survey ponds	
Number of ponds in square	Pond to be selected as the survey pond
2	2 1 2 2 2 1 2 2 1 2 1 1 1 2 2 2 2 2 1 1 2 1 1 2 2 1 2 1 1 1 1 2 1 1 2 1 1 1 1 2 1 1 2 2 2 2 1 2 1 1 1 2 2 1 2 1 1 1 2 1 2
3	3 3 3 1 1 3 2 2 3 1 2 3 1 2 2 2 2 2 2 2 1 3 3 1 1 3 1 3 2 3 1 2 3 1 2 2 3 2 1 1 2 3 3 3 3 3 3 1 2 1 1 3 3 2 1 2 3 3 2 1 1 1 2 3 1
4	3 3 2 2 4 3 2 3 1 2 2 2 4 4 4 3 3 3 2 4 3 2 4 4 3 3 1 1 4 2 4 3 4 2 1 3 4 2 4 4 3 4 3 4 1 4 4 3 3 4 4 2 1 4 2 1 4 4 1 1 3 3 1 4 1 1
5	3 5 2 3 2 2 4 1 2 1 5 2 4 3 1 1 2 1 3 2 1 2 5 5 4 5 3 4 1 2 4 1 1 3 5 4 5 2 2 4 5 3 4 1 2 1 3 2 4 5 3 4 4 4 3 4 4 1 2 3 3 1 4 5 2 2
6	5 1 3 6 1 2 3 4 1 4 5 3 4 1 5 1 3 4 1 1 5 5 4 3 1 6 6 6 4 4 4 4 6 1 3 1 6 3 6 6 6 3 6 6 2 1 4 1 2 2 2 3 4 6 5 4 5 2 5 2 6 5 3 3 6 5
7	3 7 7 3 2 4 5 5 5 1 3 6 5 6 2 7 4 6 6 5 2 5 7 3 7 2 4 1 1 3 2 3 1 7 4 4 4 7 6 4 5 5 1 2 3 7 5 7 2 2 4 6 5 4 7 3 5 6 3 6 3 6 2 6 5 1
8	7 6 3 2 3 2 3 2 3 4 2 6 4 1 8 3 6 4 2 6 8 3 13 8 7 8 2 1 4 5 7 2 2 3 5 5 2 7 3 2 4 7 8 8 4 3 5 7 2 7 6 2 5 3 5 7 8 8 3 3 1 6 1 5 1
9	7 7 1 3 1 8 1 9 7 8 6 6 8 6 7 1 1 9 9 2 3 7 9 6 6 8 5 2 7 7 7 7 9 4 3 9 6 2 7 4 5 6 7 4 7 7 8 2 5 2 7 9 5 6 6 7 3 3 2 9 4 5 6 3 2 4
10	9 9 4 5 6 6 1 10 2 8 7 6 10 4 8 8 9 7 7 1 9 6 5 4 7 8 8 6 2 3 8 6
11	5 9 4 7 3 11 2 5 10 9 8 8 7 9 11 1 9 10 5 2 1 5 2 4 8 9 4 3 10 1
12	5 8 2 5 5 8 6 6 3 5 12 7 2 10 4 4 4 2 12 12 6 2 12 10 5 4 2 10 9
13	10 4 2 9 9 13 5 7 1 6 6 8 2 13 8 10 10 10 6 10 11 4 9 9 11 2 9 3
14	3 6 11 10 10 3 2 14 2 3 5 11 5 13 2 4 14 2 6 4 8 1 13 6 6 3 2 10
15	5 3 6 2 13 13 5 15 7 11 15 5 3 14 15 1 4 2 13 10 9 2 4 14 5 13 3
16	2 13 13 8 13 3 15 5 8 11 13 1 16 13 2 14 15 1 6 2 6 10 13 14 6 15
17	12 17 9 15 7 3 1 13 9 14 12 4 10 10 11 16 16 6 15 16 8 1 2 5 16 7
18	10 13 4 13 14 8 3 6 3 11 1 13 16 18 11 10 9 16 8 17 8 15 1 1 4 3
19	14 2 6 4 5 2 5 18 1 19 7 1 1 11 10 13 5 16 15 8 13 2 9 14 4 2 2
20	6 8 1 18 9 19 16 11 16 18 7 5 17 7 5 13 20 4 5 2 18 1 11 5 15 5 2

Appendix 5: Girth sizes of veteran trees: rules of thumb

Species	Max girth (m)	Potentially interesting (32% of max girth)	Valuable (47% of max girth)	Truly ancient (62.5% of max girth)	Rule of thumb if species over girth value = notable
Buxus sempervirens	0.8	0.26	0.38	0.50	> 0.5
Arbutus unedo	1.2	0.38	0.56	0.75	> 0.5
Mespilus germanica	1.5	0.48	0.71	0.94	> 0.5
S. x thuringiaca	1.5	0.48	0.71	0.94	> 0.5
Ilex aquifolium	1.8	0.58	0.85	1.13	>1
Sorbus aria agg	1.9	0.61	0.89	1.19	>1
Sorbus intermedia agg	2	0.64	0.94	1.25	>1
Pyrus pyraeaster	2	0.64	0.94	1.25	>1
Alnus incarna	2	0.64	0.94	1.25	>1
Populus alba	2	0.64	0.94	1.25	>1
Sorbus aucuparia	2.5	0.80	1.18	1.56	>1
Sorbus latifolia agg	2.7	0.86	1.27	1.69	>1
Sorbus torminalis	2.8	0.90	1.32	1.75	>1
Malus sylvestris	3	0.96	1.41	1.88	>1
Crataegus monogyna	3	0.96	1.41	1.88	>1
Acer campestre	3	0.96	1.41	1.88	>1
Betula pubescens	3	0.96	1.41	1.88	>1
Betula pendula	3	0.96	1.41	1.88	>1
Salix fragilis	3.5	1.12	1.65	2.19	> 2
Alnus glutinosa	3.7	1.18	1.74	2.31	> 2
Salix caprea	4	1.28	1.88	2.50	> 2
Acer platanoides	4	1.28	1.88	2.50	> 2
Carpinus betulus	4	1.28	1.88	2.50	> 2
Quercus ilex	4.3	1.38	2.02	2.69	> 2
Prunus avium	4.5	1.44	2.12	2.81	> 2
Robinia pseudoaccacia	5	1.60	2.35	3.13	> 3
Populus nigra	5	1.60	2.35	3.13	> 3
U. x hollandica	5	1.60	2.35	3.13	> 3
P. x canescens	5	1.60	2.35	3.13	> 3
Pinus sylvestris	5	1.60	2.35	3.13	> 3
U. x vegeta	5.5	1.76	2.59	3.44	> 3
Tilia platyphyllos	5.8	1.86	2.73	3.63	> 3
Juglans regia	6	1.92	2.82	3.75	> 3
Tilia cordata	6	1.92	2.82	3.75	> 3
Fraxinus excelsior	6	1.92	2.82	3.75	> 3
P. x canadensis var serotina	6	1.92	2.82	3.75	> 3
Ulmus minor	6.1	1.95	2.87	3.81	> 3
Fagus sylvatica	6.2	1.98	2.91	3.88	> 3
Aesculus hippocastanum	6.4	2.05	3.01	4.00	> 4
Acer pseudoplatanus	7	2.24	3.29	4.38	> 4
Ulmus procera	7	2.24	3.29	4.38	> 4
Ulmus glabra	7	2.24	3.29	4.38	> 4
T.x europea	7	2.24	3.29	4.38	> 4
Quercus cerris	8	2.56	3.76	5.00	> 4
Quercus petraea	8.9	2.85	4.18	5.56	> 4
Taxus baccata	10	3.20	4.70	6.25	> 4
Castanea sativa	10	3.20	4.70	6.25	> 4
Quercus robur	10	3.20	4.70	6.25	> 4

Girth data from Mitchell, A. F. 1974 A field guide to the trees of Britain & N. Europe. Categories from Read, H. 2000 Veteran trees: a guide to good management. English Nature. Proportions calculated assuming overall 10m max girth and girth classes from Read: 3.2 m potentially interesting (1 m dbh), 4.7 m valuable (1.5 m dbh), 6.25 m truly ancient (2.0 m dbh). Compiled by Heather Robertson, English Nature.

Appendix 6: Squares with loops

Square	Route	Bounding Box				Unique squares
		Minimum Easting	Minimum Northing	Maximum Easting	Maximum Northing	
10	19980010R000035	268906	38539	268965	38600	10
15	19980015R000108	222326	52027	222519	52305	15
25	19980025R000054	237386	67520	237453	67555	25
76	19980076R000040	312174	112826	312199	112845	76
76	19980076R0000243	312753	112017	312809	112067	89
89	19980089R000055	506997	112534	507043	112553	99
99	19980099R000090	252316	127203	252350	127228	104
104	19980104R000087	327753	127518	327791	127591	111
111	19980111R000037	432455	127205	432503	127307	112
112	19980112R000024	446949	126619	447002	126663	120
120	19980120R000067	567635	127540	567690	127611	121
121	19980121R000015	582504	127927	582560	127980	127
127	19980127R000073	297061	142556	297130	142641	130
130	19980130R000116	342562	142079	342813	142270	147
147	19980147R000020	597351	142764	597736	142839	184
184	19980184R000085	447081	172071	447105	172103	205
205	19980205R000145	328086	188458	328221	188491	209
209	19980209R000024	387178	187796	387278	187849	215
215	19980215R000016	477569	187893	477796	187994	241
241	19980241R000044	447260	202769	447317	202842	258
258	19980258R000010	252766	217879	252897	218005	263
263	19980263R000032	327116	217323	327167	217460	279
263	19980263R000047	327004	217125	327138	217538	284
279	19980279R000092	567868	217122	567935	217181	291
284	19980284R000155	178832	230118	178882	230138	366
291	19980291R000162	282340	232129	282492	232270	367
366	19980366R000058	552632	262187	552810	262323	384
367	19980367R000021	566991	262483	567178	262546	391
384	19980384R000019	372550	277849	372576	277922	398
384	19980384R000038	372378	277786	372481	277817	419
391	19980391R000017	477720	277387	477825	277669	428
398	19980398R000003	582570	277526	582842	277666	463
419	19980419R000021	492457	292790	492493	292835	465
419	19980419R000022	492430	292768	492471	292816	471
428	19980428R000047	627405	292281	627447	292324	489
463	19980463R000080	312504	322524	312596	322577	501
465	19980465R000023	342053	322452	342058	322471	507
471	19980471R000100	432483	322173	432732	322344	539
489	19980489R000115	252518	337462	252668	337572	543
501	19980501R000112	432763	337485	432937	337599	544
507	19980507R000081	522193	337092	522287	337193	546
539	19980539R000172	282329	367034	282467	367164	558
543	19980543R000035	343662	367538	343718	367606	561
544	19980544R000063	357014	367172	357069	367273	572
546	19980546R000076	387889	367510	387917	367535	595
558	19980558R000198	222552	382557	222579	382581	600
561	19980561R000014	261613	378855	261672	378867	603
572	19980572R000025	432162	382436	432331	382539	604
595	19980595R000018	522157	397127	522381	397313	631
600	19980600R000010	372740	412766	372841	412922	632
603	19980603R000142	417076	412566	417247	412744	637
604	19980604R000016	432300	412795	432458	412907	642
631	19980631R000056	372657	442680	372858	442770	645
632	19980632R000004	387428	442956	387473	443002	681
637	19980637R000005	462554	442830	462619	442901	695
642	19980642R000056	342509	457616	342557	457653	732
645	19980645R000072	387435	457537	387467	457551	735
681	19980681R000036	492490	487157	492669	487395	744

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695	19980695R000073	417820	517589	417963	517757	753
732	19980732R000009	222151	562770	222277	562838	769
732	19980732R000077	222208	562232	222461	562444	777
735	19980735R000085	267892	562265	267921	562337	789
744	19980744R000013	402930	562787	403003	562830	809
753	19980753R000023	297206	577718	297368	577845	825
769	19980769R000004	297191	592955	297204	593000	826
777	19980777R000098	417267	591997	417322	592024	843
789	19980789R000076	342304	607271	342351	607301	861
809	19980809R000042	387974	622253	388001	622261	868
825	19980825R000183	342170	637080	342350	637236	883
826	19980826R000097	357613	637150	357942	637429	893
843	19980843R000054	312996	652179	313000	652181	912
843	19980843R000056	312623	652166	312798	652324	929
861	19980861R000067	282056	667644	282103	667669	931
868	19980868R000078	387624	666999	387635	667012	982
883	19980883R000032	345471	679185	345788	679460	1015
893	19980893R000058	252356	697298	252409	697347	1174
912	19980912R000002	327787	712908	327838	712927	1241
						Number of squares
912	19980912R000014	327814	712671	327847	712706	
929	19980929R000071	342089	727314	342136	727380	
931	19980931R000119	135174	740299	135289	740499	
982	19980982R000043	385794	775277	386011	775525	
1015	19981015R000016	342746	802778	342840	802907	
1174	19981174R000001	237146	967923	237363	967981	
1241	19981241R000145	303266	335499	303340	335560	
1241	19981241R000234	303057	335123	303143	335270	



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