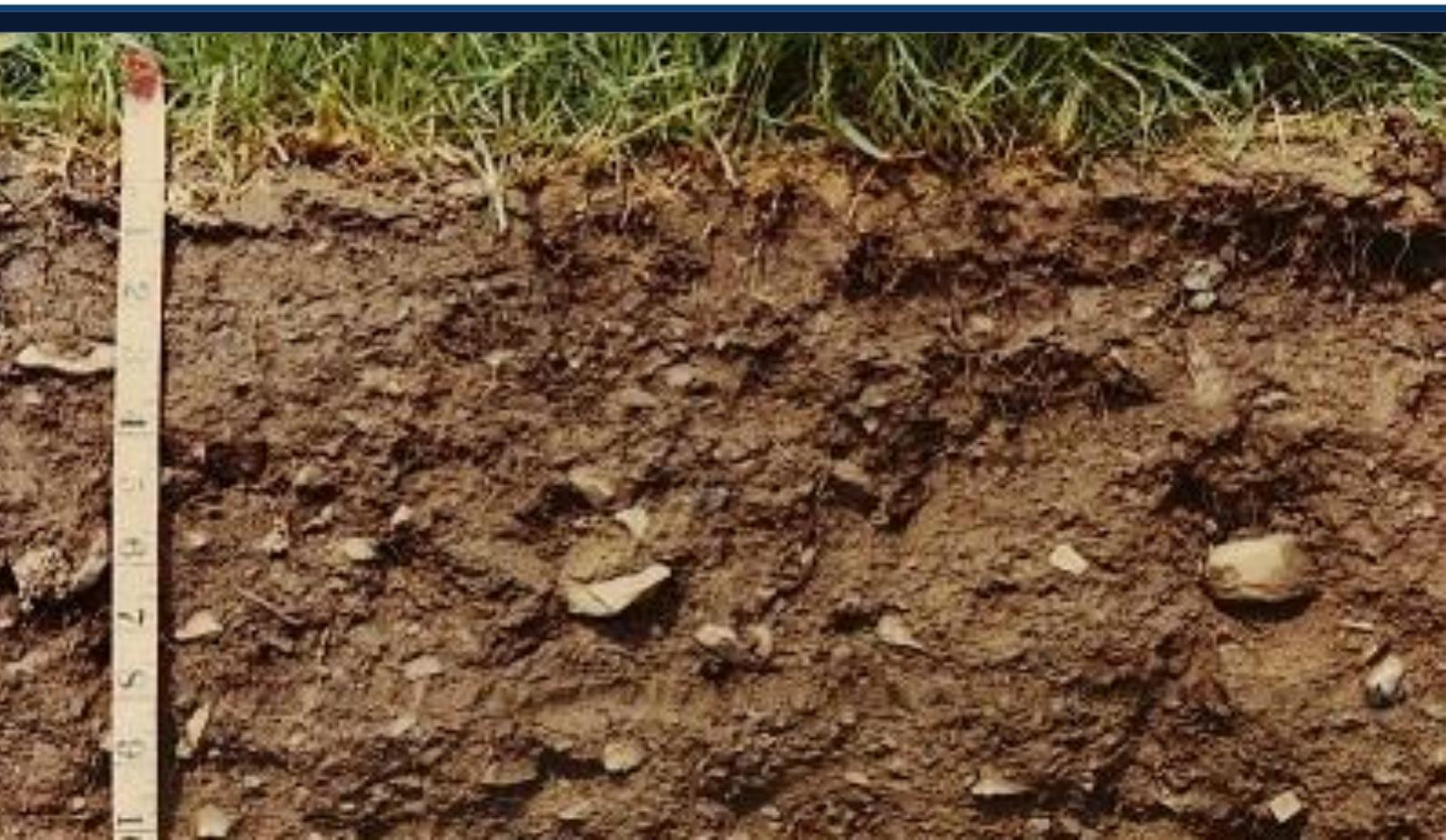




SOIL AUGER BORES

Site and Horizon parameters





SOIL AUGER BORES

Site and Horizon parameters

Introduction

The field description cards (Ragg User Friendly Forms, or RUFFs) were designed to cater for semi-detailed, detailed and ad hoc surveys. The two-sided forms (Figure 1 and Figure 2) give a wide scope for logging the main site characteristics and up to six soil horizons (with continuation onto a second and third card if necessary). Auger bores were collected during the National Mapping Project from 1979-1983 on simpler cards (Figure 1), these are denoted as "A1" in their augerid attribute while subsequent augerbores were collected in projects after 1983 (Figure 2, denoted by "A2" in their AUGERID attribute).

The instructions given to soil surveyors for filling in the Auger 2 cards are provided.

The distribution of augers across England and Wales is not evenly distributed as areas that were surveyed previously for more detailed maps were not resurveyed and agricultural areas were targeted.

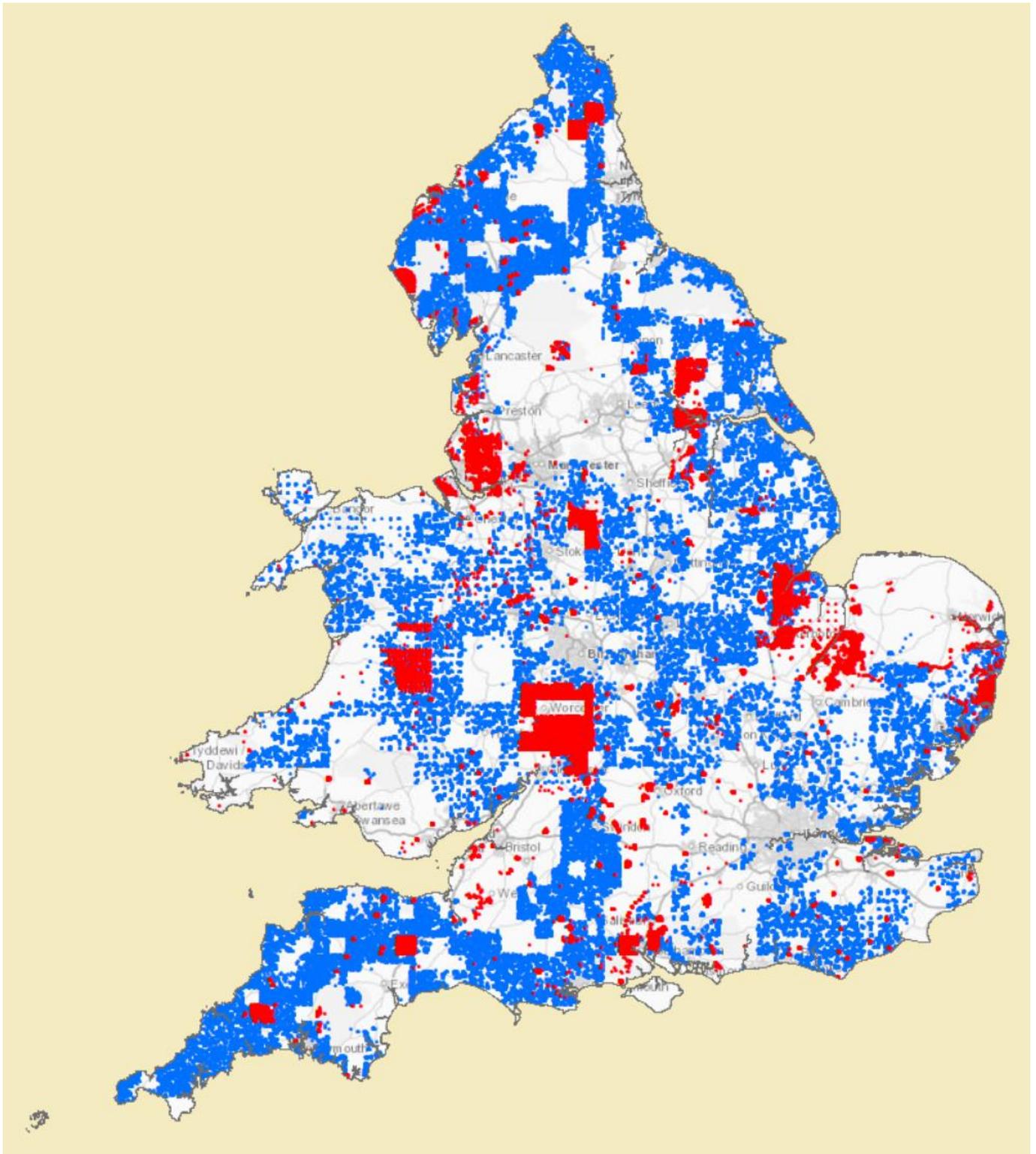


Figure 1 Distribution of Auger 1 (blue) and Auger 2 (red) cards

Data contents

1. AUGERBORE_site.shp
2. AUGERBORE_horizon.shp

Data

AUGER BORE SITE DATA

Attributes	Description
AUGERID	Identification code created to uniquely identify auger bores: Ax-SQen/eeennn-yy where x = 1 for auger bores collected as part of the National Map and x=2 for auger bores collected on the revised form. 'yy' is a number added to uniquely identify auger bores collected within 10m of each other
EASTING	National Grid reference easting (metres)
NORTHING	National Grid reference northing (metres)
SURVEY_DAT	Date of auger bore was sampled
SERIES_NAME	The name of the soil series, the basic unit of soil taxonomic classification, named after the place where they were first described
VARIANT	Code to indicate that the profile is a variation of the defined soil series classification
SUBGROUP	Number used to define a subgroup incorporating the major group, group and subgroup i.e.3.11, being the third level of soil taxonomic classification based on features which further define the inherent characteristics of the soil material
LANDUSE	Classification of Land use in to 17 classes
SLOPE	Slope in degrees
SLOPE_FORM	Slope form along the direction of the true slope (concave, straight or convex)
EROSION	Classification of surface features formed by erosion of soil material
DEPOSITION	Classification of surface features formed by the accumulation of soil material
ROCKTYPE	Classification of rock based on recent Geological Survey and other modern publications

AUGER BORE HORIZON DATA

Attributes	Description
AUGERID	Identification code created to uniquely identify auger bores: Ax-SQen/eeennn-yy where x = 1 for auger bores collected as part of the National Map and x=2 for auger bores collected on the revised form. 'yy' is a number added to uniquely identify auger bores collected within 10m of each other
EASTING	National Grid reference easting
NORTHING	National Grid reference northing
UPPER_DEPT	Horizon upper depth in cm (<0 indicated litter layer)
LOWER_DEPT	Horizon lower depth in cm (999 implies depth below bottom of profile)
TEXTURE	Horizon Designation - At a basic level A (Topsoil) B (subsoil) C (Parent Material) E (Elluvial) O (Organic)
VON_POST	Modified version of the Von Post scale for assessing the degree of decomposition of peat
MATRIX_COL	Colour of soil matrix following the Munsell colour notation
MOTTLE_ABU	Abundance code for mottles ranging from none to very many
MOTTLE_COL	Colour of mottles following the Munsell colour notation
SUB_MOTTLE	Abundance code for subsidiary mottles ranging from none to very many
SUB_MOTT_1	Colour of subsidiary mottles following the Munsell colour notation
STONE_ABUN	Abundance code for stones
STONE_SIZE	Size classification for stones
STONE_TYPE	Classification of stone based on recent Geological Survey and other modern publications
CARBONATE	Calcium Carbonate level of soil estimated in the field by observing when a few drops of 10 per cent hydrochloric acid are applied
TOP_BOTTOM	Indicator of whether an horizon is either the Top (T) or Bottom (B) horizon

- **Slope**

Slope

<3	3-7	8-11	12-15	16-25	>25
----	-----	------	-------	-------	-----

Tick one box to select the slope.

Slope Range	Definition
<3°	Level to gently sloping
3°–7°	Moderately sloping
8°–11°	Strongly sloping
12°–15°	Moderately steeply sloping
16°–25°	Steeply sloping
>25°	Very steeply sloping to precipitous

- **Slope shape**

Slope shape

CX	str	CV
----	-----	----

Tick one box for slope shape:

Code	Slope shape descriptor
CX	convex
str	straight
CV	concave

- **Date**

Date

--	--	--	--

Enter digits for the month in the two left hand boxes and the final digits of the year in the two right-hand boxes. The space to the left of these boxes can be used to write down the day of the month (*preferred option*) for the user's own convenience.

Example:

	4	9
--	---	---

 April 1998

- **Observer**

Observer

--	--	--

Enter unique two- or three-letter initials.

Land Use, Vegetation & Community

Land Use

ley	pgr	rgr	ara	hort	dcd	con	mug	rec	oth
-----	-----	-----	-----	------	-----	-----	-----	-----	-----

Vegetation

scr	sal	dun	bra	gor
-----	-----	-----	-----	-----

Community

--	--

- Land Use

Land Use

ley	pgr	rgr	ara	hort	dcd	con	mug	rec	oth
-----	-----	-----	-----	------	-----	-----	-----	-----	-----

Tick one box to select land use from the following:

Land Use

Ley grassland	ley
Permanent grassland	pgr
Enclosed rough grassland	rgr
Arable	ara
Horticulture	hort
Deciduous woodland	dcd
Coniferous woodland	con
Made-up ground	mug
Recreation, including public open space, golf course, caravan park, beach	rec
Other use	oth

Swamps and bogs

Marsh marigold meadow	MM
Meadow sweet meadow	MS
Yellow flag swamp	YF
Sedge mires	SM
Bog-moss water track	BM
Blanket bog	BB
Reed swamp	RE
Sphagnum bog	SP ¹

Mountain ("Alpine") vegetation

Viviparous fescue	VF
Stiff sedge	SS
Heath-rush	HR
Club-moss (alpine)	CM
Lichen heath (alpine)	LH
Rhacomitrium heath	RH

Moorlands and heaths

Dry heather moor	DH
Moist heather moor	MH
Bog heather moor	BH
Vaccinium heath (bilberry)	VH

¹ category added since original version

Specifying the type of crop may be achieved by entering a two- or three-letter abbreviation in the 'community' boxes. The abbreviations are as follows:

Arable Crops		Horticulture		Orchards	
Wheat	WH	Flowers/bulbs	FL	Apples	AP
Barley	BA	Beans	BE	Pears	PR
Oats	OA	Leeks	LE	Plums or cherries	PL
Rye	RY	Lettuce	LT		
Maize	MA	Nursery	NU		
Oil-seed rape	OS	Onions	ON		
Fodder crops (kale, mangolds, swedes, etc)	FC	Peas	PE		
Mustard	MU	Vines	VI	Soft fruit	SF
Potatoes	PO	Cabbage ¹	CA		
Sugar beet	SB	Celery ¹	CE		
Carrots ¹	CA				
Root crops (parsnips, etc)		RO			
Linseed ¹	LS				
Hops	HO				
Fallow	FA				
Set aside, stewardship, etc ¹		SA			

Winter and spring barley can be indicated by prefixing the appropriate abbreviation by **W** or **S**, *e.g.* **WBA** - winter barley. Similarly potato crops can be identified by the prefix letters **E** and **M** for 'early' and 'main-crop', *e.g.* **EPO** - early potatoes.

- **Grazing value (GV)**

GV

One of the codes is entered:

Relative Grazing Value		Code
>8	Very Good	V
5–8	Good	G
2–4	Moderate	M
<2	Poor	P

- **Spare**

(these data are for the convenience of the user but will not be included in LandIS)

There are 3 plus 2 boxes that may be used. The first three boxes can be used for field-determined pH (1:1 in water) of the topsoil (0-5 cm depth), to two decimal places and omitting the decimal point, for example:

Spare

Additional information written on the card is not normally recorded.

Soil Horizon Section – mineral horizons

- **Depth** **Depth**

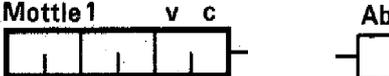

The *lower* depth limit of the horizon is recorded.

- **PSC/Peat** **PSC/Peat**


Four boxes are available to record Particle-size Class (PSC) or Peat texture, with the left-most box being used for the moderator (e.g. sand grade of fine (f), medium (m) or coarse (c)) and the remaining three boxes for the recognised texture abbreviation, as indicated in Figure 3.

- **Colour** **Matrix** **v c**


Soil colours are determined by comparison with the standard Soil Color Charts of the Munsell Color Company, Baltimore, USA. The codes for these colours are used and occupy six boxes, consisting of two numbers, two letters and two numbers. This applies to the boxes for the matrix colour and the colours of the two main mottles, if any.

- **Mottle Abundance** **Mottle 1** **v c** **Ab**


Mottle intensity and abundance are an indication of soil wetness. Abundance (Ab) is determined with reference to the Soil Survey Field Handbook (p. 17) and coded as follows:

%	Mottle Abundance	Code
	None	0
<2	Few	F
2–20	Common	C
20–40	Many	M
>40	Very many	V

- **Horizon** **Horizon**


Soil horizons are usually designated A, E, B, BC, C and R in a sequence from the ground surface downwards; highly organic horizons, wherever they occur in the soil profile, are designated O if caused by waterlogging, or L, H or F if derived from surface litter accumulations. These are entered as one or two upper case letters starting from the second box from the left.

Prefixes and suffixes are used for more precise allocation. These should be entered as lower case letters and numbers in accordance with instructions in the Soil Survey Field Handbook (p. 83), *e.g.* Ap, Bw(g), BCg. Horizons qualifying for the same letter notation and occurring in vertical sequence are denoted by numerals placed after the letter designation, *e.g.* Bw1 and Bw2. A lithological discontinuity is indicated by a numerical prefix placed in the first box on the left, *e.g.* 2Bw(g), 3Cg. A buried horizon is given the prefix **b** in the first box on the left, *e.g.* bAh. In bisqual profiles formed by successive phases of horizon development, horizons in the lower sequum are distinguished by a prime accent, *e.g.* B't.

- **Organic Matter (OM)**

Hum

The Hum ? box is ticked if the soil horizon is assessed as a humose mineral soil (see Fig.4, organic matter status). Leave the box blank for peat soil material.

- **Calcium Carbonate Content**

CaCO₃
 <1 1-10 10-40 >40

The appropriate CaCO₃ percentage class box is ticked to indicate the carbonate content, estimated by applying dilute hydrochloric acid to the soil sample. The choices are:

Carbonate descriptor	% Class Code
Non-calcareous	<1
Calcareous	1 10
Very calcareous	10 40
Extremely calcareous	>40

- **Stones**

Stone abundance, size, hardness, lithology and lithological sub-type are recorded for the main stone type. Grain size is also an option as is whether any other stone type is present.

Stone Ab	Size	Hrd	Other Stones
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Type	Subtype	Grain size mm	Rk
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> >32 <input type="checkbox"/> 32-6 <input type="checkbox"/> 5-1 <input type="checkbox"/> <1	<input type="checkbox"/>

- **Stone abundance**

Stone Ab

One of the following codes is entered:

%	Abundance descriptor	Code
<1	Stoneless	0
1-5	Few stones	F
6-15	Common stones	C
16-35	Many stones	M
35-70	Abundant stones	A
>70	Extremely abundant stones	X

- **Stone size**

Size

One of the following codes is entered:

Size	Size descriptor	Code
2–6 mm	Very small	VS
6 mm–2 cm	Small	S
2–6 cm	Medium	M
6–20 cm	Large	L
20–60 cm	Very large	VL
>60 cm	Boulders	B

- **Stone hardness**

Hrd

Enter V (very hard), H (hard) or S (soft) in accordance with definitions in the Field Handbook (p. 82).

- **Stone lithology and sub-type**

Type	Subtype
<div style="position: absolute; top: 5px; left: 10px; width: 10px; height: 10px;"></div> <div style="position: absolute; top: 5px; left: 25px; width: 10px; height: 10px;"></div> <div style="position: absolute; top: 5px; left: 40px; width: 10px; height: 10px;"></div>	<div style="position: absolute; top: 5px; left: 10px; width: 10px; height: 10px;"></div> <div style="position: absolute; top: 5px; left: 25px; width: 10px; height: 10px;"></div>

The type of stone, and sub-type if any, are recorded in three and two boxes respectively. The following abbreviations are used:

Types

Sedimentary

Flint	FLI	Greywacke	GWK
Chert	CHE	Breccia	BRE
Quartzite	QTZ	Conglomerate	CON
Mudstone	MUD	Limestone	LST
Cleaved mudstone	CLM	Shelly limestone	SHL
Clay shale	CSH	Oolitic limestone	OOL
Siltstone	ZST	Pisolitic limestone	PIL
Silty shale	ZSH	Calcite mudstone	CAM
Quartzitic sandstone	QST	Chalk	CHA
Sandstone	SST	Coal	COA
Grit	GRT	Shale	SHA

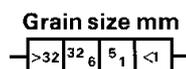
Igneous		Metamorphic	
Acid	ACI	Hornfels	HOR
Acid-intermediate	A-I	Quartzite	QTZ
Basic-intermediate	B-I	Slate	SLA
Basic	BAS	Phyllite	PHY
Ultrabasic	UBA	Mica schist	MIS
Serpentine	SER	Hornblende schist	HOS
Agglomerate	AGG	Acid gneiss	ACG
Volcanic breccia	VBR	Basic gneiss	BAG
Tuff	TUF		
Glass	GLA		
Pumice	PUM		

Sub-types

calcareous	CA	glaucconitic	GL
micaceous	MI	dolomitic	DO
haematitic (red)	HA	sandy	SA
carbonaceous (black)	CB	argillaceous (marly)	AR
ferruginous	FE	green	GR
felspathic (arkosic)	FL		

All artefacts, bricks, tiles, ashes, blue willow-pattern plates, clay pipe stems, glass, *etc.* are entered as ART.

- **Grain size**



Grain size can be used to record the 'texture' of igneous, metamorphic and sedimentary rock and stones. The options are:

Size descriptor	Size Code (mm)
very coarse	>32
coarse	32-6
medium	5-1
fine	<1

Very coarse usually refers to agglomerates and breccias. When identifying igneous rocks ignore individual phenocrysts and record only the grain size of the interstitial material.



- **Rock**

If rock (Cr or Cu horizon) is encountered at the base of the profile, use the Stone boxes to record lithology and tick the Rk ? box

- **Abundance of ferri-manganiferous nodules**

Abund
Fe/Mn Jar

--	--

Ferri-manganiferous nodules are an indication of wetness, and are particularly useful in reddish coloured soils in which mottles do not form clearly. An abundance code can be entered, **F** few (<2% of the volume of the horizon), **C** common (2–20%), **M** many (20–40%) and **V** very many (>40%).

- **Abundance of Jarosite**

Abund
Fe/Mn Jar

--	--

Jarosite is a basic sulphate that forms as yellow mottles in mineral soil material and is an indication of strong acidity (pH values less than 4). An abundance code can be entered, **F** few (<2% of the volume of the horizon), **C** common (2–20%), **M** many (20–40%) and **V** very many (>40%).

Soil Horizon Section – organic horizons

The instructions for mineral soil horizons for Depth, Colour (matrix colour), Horizon and Calcium Carbonate Content apply also to organic soil horizons. Boxes used for PSC/Peat, Colour of Mottle 1 and Mottle 2, Mottle Abundance and Stone Lithology can be used for recording characteristics unique to organic (peat) soils and deposits.

● PSC/Peat

Use the left-hand box for the von Post code from 1 (H1 undecomposed) to 9 (H9 almost completely decomposed), as set out in Table 1, *i.e.* omitting the prefix H. H10 (completely decomposed) has to be entered as 9.

Table 1. Modified version of the von Post scale for assessing the degree of decomposition of peat.

In this field test a sample of wet peat is squeezed in the closed hand and the colour of the liquid that is expressed between the fingers, the proportion of the original sample that is extruded and the nature of the plant residues are observed.

RUFF code	Degree of decomposition	Nature of liquid expressed on squeezing	Proportion of peat extruded between fingers	Nature of plant residues	Description
1	H1	Clear, colourless	None	Plant structure unaltered; fibrous, elastic	Undecomposed
2	H2	Almost clear, yellow-brown	None	Plant structure distinct; almost unaltered	Almost undecomposed
3	H3	Slightly turbid, brown	None	Plant structure distinct; most remains easily identifiable	Very weakly decomposed
4	H4	Strongly turbid, brown	None	Plant structure distinct; most remains identifiable	Weakly decomposed
5	H5	Strongly turbid, contains a little peat in suspension	Very little	Plant structure clear but becoming indistinct; most remains difficult to identify	Moderately decomposed
6	H6	Muddy, much peat in suspension	One-third	Plant structure indistinct but clearer in the squeezed residue than in undisturbed peat; most remains unidentifiable	Well decomposed
7	H7	Strongly muddy	One-half	Plant structure indistinct but recognisable; few remains identifiable	Strongly decomposed
8	H8	Thick mud, little free water	Two-thirds	Plant structure very indistinct; only resistant remains such as root fibres and wood identifiable	Very strongly decomposed
9	H9	No free water	Nearly all	Plant structure almost unrecognisable; practically no identifiable remains	Almost completely decomposed
9	H10	No free water	All	Plant structure unrecognisable; completely amorphous	Completely decomposed

Use the three right-hand boxes for the nature of the material, entered as an abbreviation given in Figure 4, *e.g.* LP for loamy peat, PS for peaty sand. To record the fibre content of peat use the upper case letters F for fibrous, M for semi-fibrous (mesic) and H for amorphous or humified peat, *e.g.* HP for amorphous peat.

Estimates of the unrubbed and rubbed fibre contents can be noted above and below the boxes respectively.

Do not tick the Hum ? box for organic materials.

● **Troels-Smith classification**

For a description of component elements of biogenic sediments a system devised by Troels-Smith (1955) is used. There are five main sediment categories:

- Turfa ('peat', coarse fraction)
- Detritus (median fraction)
- Limnus (fine fraction)
- Argilla (clay and silt)
- Grana (sand and gravel)

Each is subdivided into elements, as described in Table 2.

Table 2. Scheme for the description of the composition of biogenic sediments (from Troels-Smith, 1955).

Class	Code	Element	Description
	Sh	Substantia humosa	Humous substance, homogeneous microscopic structure.
I Turfa	Tb ⁰⁻⁴	T. bryophytica	Mosses +/- humous substance.
	Tl ⁰⁻⁴	T. lignosa	Stumps, roots, intertwined rootlets, of ligneous plants +/- trunks, stems, branches, etc., connected with these, +/- humous substance.
	Th ⁰⁻⁴	T. herbacea	Roots, intertwined rootlets, rhizomes, of herbaceous plants +/- stems, leaves, etc., connected with these, +/- humous substance.
II Detritus	DI	D. lignosus	Fragments of ligneous plants >2 mm.
	Dh	D. herbosus	Fragments of herbaceous plants > 2 mm.
	Dg	D. granosus	Fragments of ligneous and herbaceous plants, and, sometimes, of animal fossils (except molluscs) < 2mm > c. 0.1 mm.
III Limus	Ld ⁰⁻⁴	L. detrituosus	Plants and animals (except diatoms, needles of spongi, siliceous skeletons, etc., of organic origin), or fragments of these. Particles < c. 0.1 mm, +/- humous substance.
	Lso	L. siliceus organogenes	Diatoms, needles of spongi, siliceous skeletons, etc., of organic origin, or parts of these. Particles of < c. 0.1 mm.
	Lc	L. calcareus	Marl, not hardened like calcareous tufa; lime and the like. Particles < c. 0.1 mm.
	Lf	L. ferrugineus	Rust, non-hardened. Particles < c. 0.1 mm.
IV Argilla	As	A. steatodes	Particles of clay < 0.002 mm.
	Ag	A. granosa	Particles of clay 0.06 to 0.002 mm.
V Grana	Ga	G. arenosa	Mineral particles 0.6 to 0.2 mm.
	Gs	G. saburralia	Mineral particles 2.0 to 0.6 mm.
	Gg (min.)	G. glareosa minora	Mineral particles 6.0 to 2.0 mm
	Gg (maj.)	G. glareosa majora	Mineral particles 20.0 to 6.0 mm

Relative abundance is recorded on a five-point scale:

- 0 absent
- 1 minor presence (1/4)
- 2 medium presence (2/4)
- 3 major presence (3/4)
- 4 sole presence (4/4)

A trace can be represented by '+'.

Enter the three-character codes (Table 2) in the Mottle 1 and Mottle 2 boxes. The codes must always add up to four, with a maximum of four codes or 12 boxes being used.

- **Peat type**

With Stone Abundance recorded as 0, the boxes for Stone Type may also be used for recording the peat type. Use the following upper case abbreviations entering the most common component first:

Peat-types

Sphagnum	S	relatively pure <i>Sphagnum</i> peat
Hypnum	H	mainly hypnaceous moss peat
Polytrichum	P	mainly <i>Polytrichum</i> peat
Woody	W	contains relatively undecomposed wood remains
Ling	L	relatively pure <i>Calluna</i> peat
Eriophorum	E	relatively pure <i>Eriophorum</i> peat
Carex	C	relatively pure sedge peat
Molinia	M	mainly remains of <i>Molinia</i>
Grass	G	mainly remains of other grass species (<i>Nardus</i> , <i>Deschampsia flexuosa</i> , etc)
Reeds	R	mainly remains of <i>Phragmites</i>

Intergrades can be catered for by the use of two letters, e.g. SE for Sphagnum Eriophorum peat.

Figure 5 is an example of an organic horizon fully described.

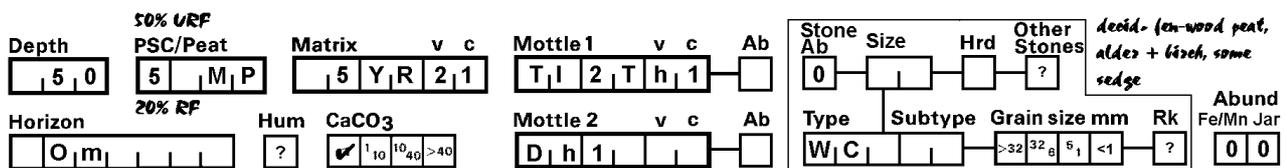


Figure 5. A description of a semi-fibrous peat (MP) horizon extending to 50 cm depth. The figure 5 indicates von Post class H5, moderately decomposed; there is a 50% unrubbed fibre content (URF) and 20% rubbed fibre content (RF); the Troels-Smith classification is 2 parts T.lignosa (Tl2), 1 part T.herbacea (Th1) and 1 part D.herbosus (Dh1); and the peat type classification is woody (W) with Carex (C).