

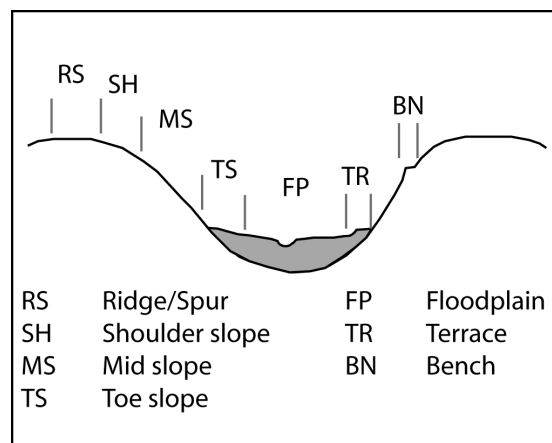
## Soil recording help sheet

### Site

Record local soil types and parent material based on own observations and / or soil map data.

### Trench/section

#### *Landscape position*



#### *Drainage*

Poorly drained	Soil remains wet to a shallow depth, and excess free water is evident in the profile for long periods of time
Moderately drained	Water drains somewhat slowly due to impervious nature of substrate, low slope, and/or shallow water table
Well drained	Water drains easily but not rapidly. Free water is uncommon
Excessively drained	Water is removed from the surface very rapidly. Free water is very rare or very deep

Other indicators of drainage status can be the local vegetation a poorly drained soil may support sedges and rushes for example. Also look for iron mottling and blue/grey soil colours which can indicate poor drainage and periodic waterlogging.

#### *Slope*

Record the slope angle either generally of the site, or locally with regards to a particular section or deposit.

- **Level** - less than 5°
- **Moderate** - 5°-10°
- **Steep** - 11°-35°
- **Precipitous** - more than 35°

#### *Disturbance*

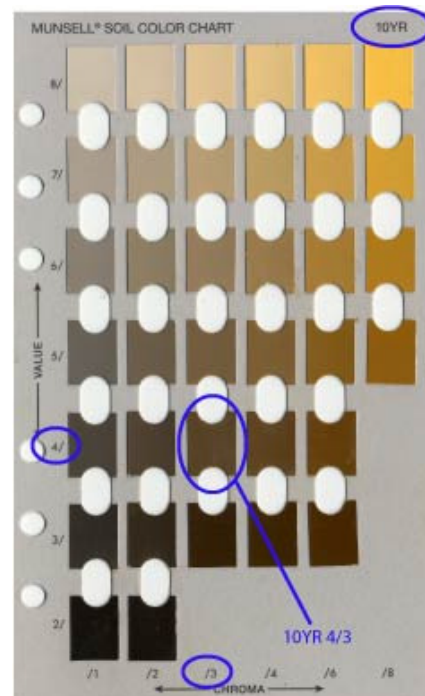
Record any evidence of disturbance. Whether from:

- Plant roots.
- Animals such as badgers, rabbits, termites, ants, earthworms etc.
- Slope movements (mass movements)
- Human activity
- Wetting and drying or freeze-thaw.

## **Context**

### **Colour**

The Munsell® Soil Colour Charts are the best way of systematically recording colour. The Hue (principal colour), Value (lightness) and Chroma (purity or strength) are recorded as shown below. First find the colour sheet that most closely reflects the hue of the sample. Then scan up and down on this sheet to find the value and finally left to right to find the closest colour match and the appropriate chroma.



### **Non-Munsell colour recording**

In the absence of a Munsell® chart a number of alternative systems exist that involve picking colours from a given list, and where necessary adding a modifier such as light dark or mottled. These schemes are not directly compatible with the Munsell® system.

The Museum of London Archaeology Service (MoLAS, 1994) provides one such scheme. Record one colour and, if necessary, one modifier from one or both lists.

### **Mottling**

Record mottle colours as for soil colours.

#### ***Mottle frequency***

Calculate mottle frequency by estimating the percentage surface area covered by mottles using the frequency charts given at the end of this document.

#### ***Mottle contrast***

Record the contrast between the mottling and the surrounding matrix colour.

Faint	Evident only on close examination
Distinct	Mottles readily seen, but not striking
Prominent	Mottles conspicuous and mottling is the outstanding feature of the deposit

### **Soil composition**

Organic	More than 30% organic matter
Organo-mineral	2 – 30% organic matter
Mineral	Less than 2% organic matter

#### ***Organic Matter types***

- **Fresh/unaltered non woody** clearly identifiable structures larger than 2 cm.
- **Woody** lignified structures larger than 2 cm.
- **Humified** Degraded no identifiable structure. Organic component mixed with the fine mineral fraction.

In peaty soils or sediments where there is no appreciable mineral content, following terms can also be used to describe the organic matter.

- **Fibrous peat** Contains large amounts of well preserved readily identifiable plant remains less than 2 cm.

- **Semi-fibrous peat** Partly decomposed peat in which plant structures are visible, but break down when rubbed between the fingers.
- **Amorphous peat** Contains virtually no identifiable plant structures.

**Soil texture**

Record soil texture using moistened soil and the flowchart overleaf.

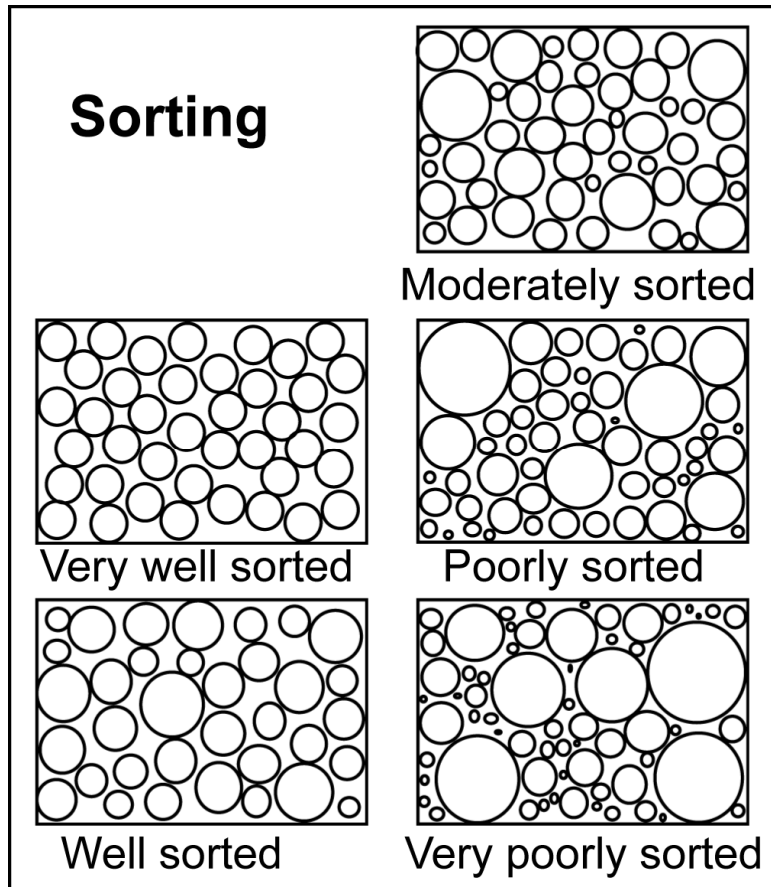
**Sand grain size**

- **Fine sand** - Is barely visible, but still feels slightly gritty when rubbed between the fingers. This grades into the silky feeling of silt for very fine sand.
- **Medium sand** – Individual grains are visible, and soil has a distinct gritty feeling when rubbed between the fingers.
- **Coarse sand** – Individual grains clearly visible, and feels very gritty when rubbed between fingers.

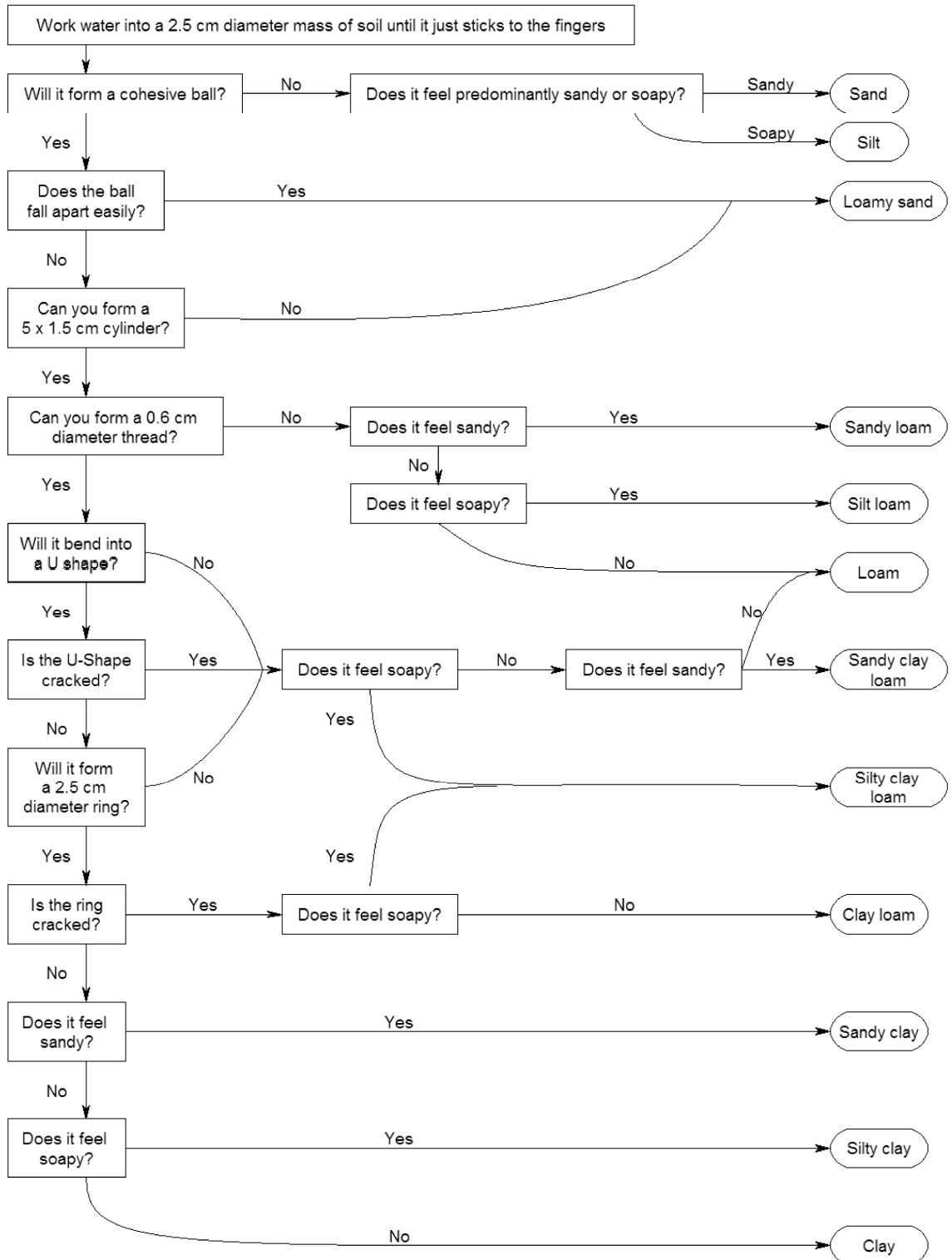
**Sorting**

Sorting refers to the distribution of different particle size classes in a soil or sediment. A very well sorted deposit will contain only particles of very similar size. A very poorly sorted deposit will contain a particles with a very wide range of sizes from clay to large stones. Sorting includes the stone content

Some soils or sediments may contain two distinct sizes of particles, for example clay and coarse sand. This is called a bimodal particle distribution and should be recorded in general comments.

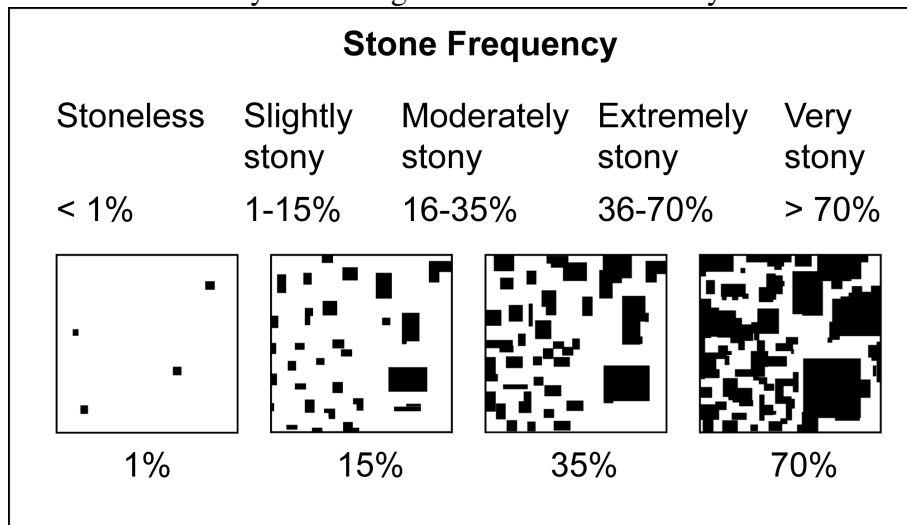


## Soil texture flowchart



**Stoniness**

Record stoniness by estimating % surface area cover by stones.



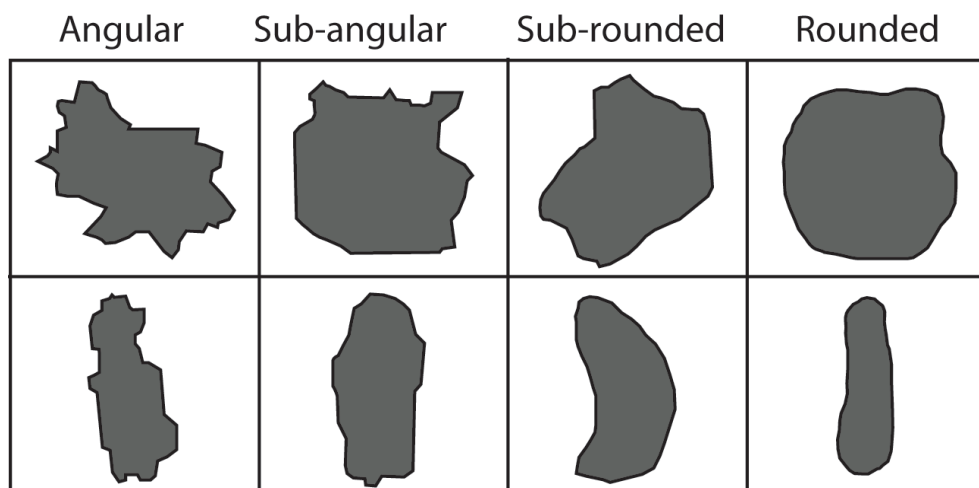
**Stone size**

Size refers to longest dimension of the stones. The dominant stone size should be recorded.

Stone size	
Fine pebbles	2-6 mm
Medium pebbles	6 mm-2 cm
Coarse pebbles	2-6 cm
Cobbles	6-20 cm
Stones	20-60 cm
Boulders	more than 60 cm

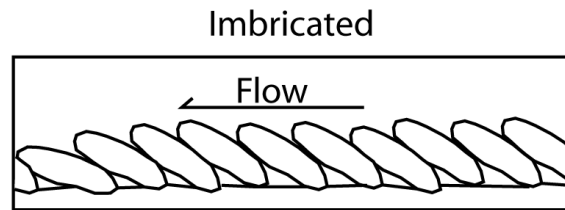
**Stone rounding**

It is possible that different stone types or sizes will be more or less rounded reflecting different hardness or different depositional histories. If so record each group separately in general comments. N.B. rounding refers to the rounding off of sharp edges, not how spherical a stone is; flattened stones may also be rounded.



**Stone distribution and orientation**

Record clustering and/or banding of stones, increasing or decreasing stone frequency with depth. Also, note if there is a preferred orientation of the long axis of the stones. Are they tending to lie horizontally or vertically within the deposit. Are there signs of imbrication, whereby one stone is partially overlain by the next all with their long axes pointing the same way?



**Soil Structure**

Structure refers to the shape and nature of the aggregates formed when soil particles clump together.

- Granular structures are small (usually no more than a centimeter across) crumbs of soil. If a soil contains a lot of coarse inclusions it may appear granular as the soil particles coat the coarse inclusions.
- Blocky structures tend to be about 1 and 5 cm across and its sides are roughly equal in size. They are often pictured as being cubes of soil but in practice tend to be more irregularly shaped.
- Platy structures are thin (usually less than a centimeter thick) plate like aggregates that have their longest axis in a horizontal direction.
- Columnar and prismatic peds can be 10 or more centimeters across and may be considerably longer vertically.
- Structureless soils show no observable aggregation.

Granular 	Blocky 	Platy 
Columnar 	Prismatic 	Structureless 

**Structural development**

Structural development refers to how well developed the individual peds (soil aggregates) are.

- **Weakly developed** peds barely observable in section. When disturbed, the soil breaks into a few entire peds as well as broken peds and/or unaggregated material.
- **Moderately developed** Evident but not distinct in undisturbed soil. When disturbed the soil breaks into many entire peds, and a few broken peds and/or unaggregated material.
- **Strongly developed** Peds distinct in undisturbed soil, and disturbed soil breaks almost entirely into entire peds.

### **Strength**

The soil strength is the crushing force required to break the soil aggregates apart. In clay or silt soils it is possible that the individual peds are easily compressed but don't fracture and fail. This is known as being deformable.

Strength refers to individual peds, or if the soil is structureless to a 3 cm cube of soil.

Loose	Intact cube of soil unobtainable
Weak	Cube of soil/ped fails under gentle force between finger and thumb
Firm	Cube of soil/ped fails under maximum force between finger and thumb
Strong	Cube of soil/ped fails under force applied by full weight of body applied slowly
Rigid	Withstands force applied slowly under foot

### **Cementation**

Cementation is caused by substances other than clay, for example iron and aluminium oxides, or calcium carbonate.

To test for cementation place an air-dry cube of soil in water for 1 hour. If it is uncemented the soil will fall apart (slake).

If the cube holds together remove the cube from the soil and try crushing it.

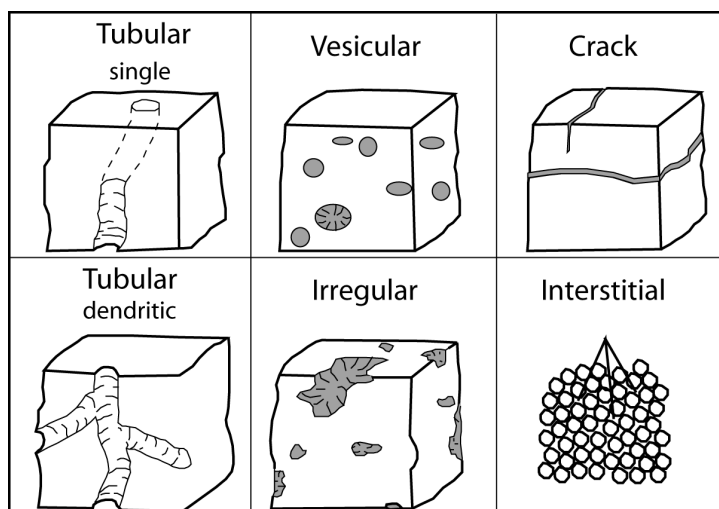
- **Very weakly cemented** Can be crushed between thumb and forefinger.
- **Weakly cemented** Can be crushed under foot on a hard surface.
- **Strongly cemented** Resists being crushed under foot.

### **Porosity**

Porosity refers to visible pores or voids between sand grains, stones or soil aggregates, or created by rooting and biological activity.

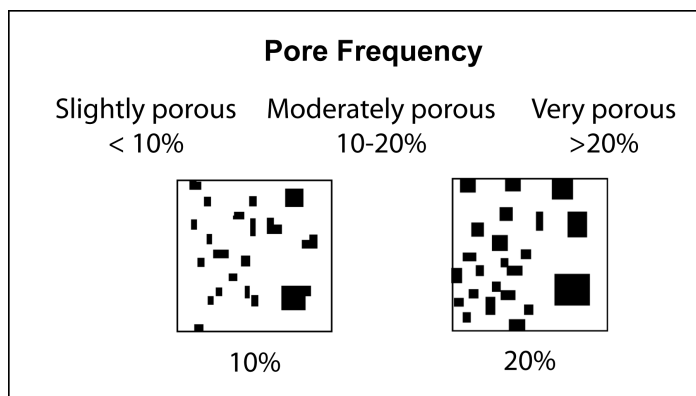
#### **Pore types**

- Use the pore type pictures below to help identify the dominant pore type.
- **Tubular (single)** are cylindrical, elongated pores e.g. worm channels.
- **Tubular (dendritic)** are cylindrical branching voids e.g. empty root channels.
- **Vesicular/vesicles** are ovoid to spherical voids e.g. trapped gas bubbles.
- **Irregular** are non-connected cavities and chambers of any shape in the soil matrix.
- **Interstitial** are voids between sand grains and rock fragments.
- **Crack** are fissures not associated with soil structure.



### **Porosity**

Porosity is determined by estimating the surface area occupied by water or air-filled voids. Use the chart to identify the most appropriate porosity class.



### **Roots**

In buried archaeological soils and sediments it is not only fresh roots, but traces of roots that have since decayed away that are of interest. These root traces may include dendritic void patterns, root impressions on the surface of peds, and the preservation of former rooting patterns in iron mottle and concentration patterns.

#### **Root sizes**

Record the presence and frequency of root size classes in the deposit:

- **Fine roots** less than 2 mm in diameter
- **Medium roots** 2-5 mm in diameter
- **Coarse roots** greater than 5 mm in diameter

#### **Root frequency**

Record the number of roots in a 10 cm x 10 cm area of soil.

Root Frequency		
Frequency class	Fine roots	Medium and Coarse roots
Few	1-10	1-2
Common	10-25	2-5
Many	25-200	More than 5
Abundant	More than 200	

### **Inclusions/Artefacts**

Use the frequency charts at the end of this document to estimate the abundance of each class of inclusions. Also record the size of inclusions, their distribution, any signs of rounding or surface abrasion, and their preservation.

### **Soil features**

Soil features are distinct features within the soil that differ from the soil matrix in composition and which have been formed by the actions of soil forming processes such as gleying (seasonal waterlogging), [podzolisation](#), or [translocation](#). These features include:

- crystals

- nodules and concentrations of iron, manganese, gypsum, calcium carbonate.
- iron pans
- coatings of clay, silt of organic matter on stones, pore walls and soil aggregate (ped) surfaces.
- infillings in pores with a contrasting [fabric](#) to the surrounding soil.

Record the frequency of each class of soil features using the frequency chart at the end of this document.

### ***Crystals***

The commonest crystals found are calcite, gypsum, halite, and vivianite, though there are many more, particularly in cave environments. Crystals can occur randomly or clustered throughout the soil matrix, lining or infilling pores, on ped surfaces, or associated with organic matter. Record crystal type, frequency and distribution.

Field recognition of minerals and crystals (adapted from Soil Survey England and Wales, 1976)

Calcite/Calcium carbonate	Can occur as crystals, small nodules, flowstone, or a fine powder, calcite crystals can't be scratched with a fingernail but can be scratched with a penny. Reacts vigorously with acid.
Gypsum	Occurs as crystals, small nodules or a fine powder on surfaces. It does not effervesce with acid and gypsum crystals can be crushed between the fingernails and splits into thin flakes.
Halite	Usually colourless or white but can also be blue or pink, it can form as evaporite in arid environments, readily soluble in water.
Manganese compounds	Manganese can be difficult to distinguish from carbon and humus. However, manganese is difficult to crush between the fingernails, whereas carbon is readily crushed to form a black powder. Manganese will also react more violently with 20% hydrogen peroxide than carbon or humus.
Sulphides	Bluish or black iron sulphides, chiefly pyrite, are common in waterlogged and/or organic soils. They cause waterlogged/reduced soils to smell strongly of rotten eggs.
Vivianite	White patches or filaments, which turn bright blue after only a few hours exposure to air. Sometimes associated with bone, shell and organic matter.

### ***Soft concentrations***

Soft concentrations are areas of material contrasting with the deposit matrix in colour or composition but which cannot be readily separated from the matrix.

The type (calcite, gypsum, iron/manganese etc.), frequency, distribution, and where appropriate colour should be recorded.

### ***Nodules***

Discrete bodies, easy to separate from the deposit matrix, with sharp boundaries, they are usually cemented in some way.

Record type (calcium carbonate, iron/manganese etc.), frequency and distribution, and also whether they are formed entirely of this one mineral or whether they are impregnating the deposit matrix.

**Pans**

These are bands of material cemented by organic matter and/or iron and manganese. The number of pans in a deposit should be recorded (single, double or multiple), as should disturbance (intact, broken but undisturbed, or broken and disoriented), and continuity (discontinuous, continuous). The location of the pan should be closely observed, particularly with reference to the deposit boundaries, organic matter, pores, and sedimentary bedding.

**Coatings**

Coatings can occur on ped faces, lining pores, and coating sand grains, stones and nodules. Record the type of coating, their distribution and frequency. It can also be useful to record their presence in underlying deposits.

The commonest types of coating are:

- **Textural coatings** clay, sand, and silt. clay coatings can give pore surfaces a slight metallic sheen.
- **Organic coatings** are usually dark coloured and may be mixed with clay.
- **Iron/Manganese coatings** are usually reddish or very dark brown or black.
- **Carbonate coatings** may be powdery or consist of larger crystals.
- **Stress oriented coatings** are formed *in-situ* usually in clay soils. They can be difficult to distinguish from clay coatings but may contain grooves. Also sometimes called slickensides.

**Pore infillings**

These are inclusions within a deposit filling voids, cracks or animal burrows. Record their frequency and the relationship between the infilling fabric and that of the described deposit and adjacent deposits.

**Frequency Charts**

