

## Geology – how to do it..... No.1



### How to start and doing field geology

People do geology for lots of different reasons. Some are interested in finding things like fossils or minerals. Some are interested in the rocks and how they shape local landscape. Some want to discover the story of ancient environments locked within the rocks. Some just find it fun to look.

Whatever the reason for doing some geology there are ways to make the most of what you find.

### Field equipment

There are some basics you should never be without. For instance, you will never be able to interpret very much without a good **hand lens**. The best kind to buy is a metal one with two lenses (x 10 and x20). **Binoculars** are extremely useful as they can enable a good view of out of reach places, especially up high where you should not climb. Also very useful is a **grain-size comparator** (left) and a small plastic bottle of **dilute HCl** (professional) or lemon juice will do the same job. A **penknife**, a **geological hammer**, a couple of **chisels** and a **trowel** are useful if you are allowed to collect. In which case you will need suitable sizes of self-seal **plastic bags**, **labels** for inside the bags and an **indelible pen** for writing on the outside of the bag. You will need to know precisely where you are and how to get back, and so **ordnance survey** information (a map or on-line sources) and **geological map** information. A **notebook** and **pencil** will record all the important information you collect (and help you find the site again!). Do not forget a simple **compass**, which will help you know which face you are looking at, and help you return from the site.



As you get more experienced you may want to add a **compass-clinometer**, **measuring tapes** and a **Jacob staff**, and a hand held **GPS**. Some people are getting very good at using iPads or PDAs (personal digital assistants) in the field for recording purposes. But none of these are essential for understanding and enjoying your first geology trip.

### Field safety

You must always be aware of the terrain, weather, tides or any other aspect that might affect your safe return. Every professional geologist will have some scary tales to tell. They survived to tell them as they looked out for rock falls, mud slides, knew their tide tables, watched out for slippery surfaces and unpredictable weather as well as being aware of dangerous animals and working machinery. If you are going to the site alone then it is common sense to let someone know where you are going and when you will be back. Always work in appropriate protective clothing (hard hat, strong boots, goggles, reflective clothing, warm clothing or sunhat and sunscreen with plenty to eat and drink are essentials.



Figure above: A group of well dressed geologists in inclement weather!

## Doing field geology

Once you know the site(s) to be visited you have to make some decisions:

- What are you going to look at and what information do you want?
- Are you going to (and are you allowed) to collect?
- Is it a small contained site or, if large, what exposures will be best?
- Are you going to make a record? If so, for what purpose or level?
- If collecting, then there is a minimum record of where the specimen was found
- Will you understand and be able to interpret what you see?

The idea of these short '*How to...*' guides is to assist budding geologists with these activities.

### What rocks are likely to be present?

Different sites will provide very different geology. Hence, this instructive part will be different in, say, a granite quarry in Devon, to investigating metamorphic rocks in the Lake District or to recording a sand quarry in Bedfordshire. This sequence of guides will be relevant to the type of geology and scenery typical of Buckinghamshire – but we may well spread our wings and explain other areas and their volcanic and metamorphic rocks in due course! Therefore, with Buckinghamshire in mind the type of fieldwork explained here, and in the next '*How to...*' guides, will be mostly investigating the local rocks (sedimentary rock identification, interpreting the environment they were deposited in, and assessing their age). We will also explain how to collect fossils and what they can tell you.

**Before you start**, do your research. To assess what rocks you are likely to find at a site there are a number of resources: British Geological Survey maps (or the search facility on their website); local geological guides or books; website information, museums and library local sections, or local societies as well as people with a similar interest.

### How to get started

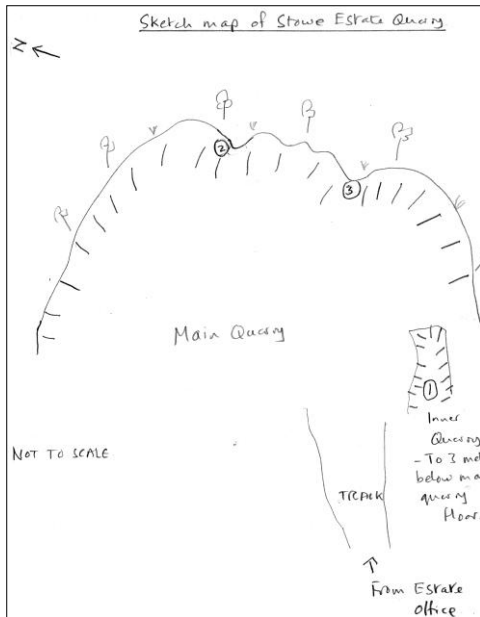
So you have safely arrived at your location. You are confronted by, say, a quarry face in front of you. Where do you start your investigation? It is very tempting to rush up to the face and start looking at the small-scale features, or to start taking out fossils as soon as you see them. It is worth spending a



moment or two looking at the whole site, where the lowest and highest beds are located and any interesting features to look at close up.

**The rock face at Coombs Quarry near Buckingham. One of the groups Local Geology Sites (LGS)**

First, an absolute must is a plan of where you are, which way you are looking and the faces exposed. Second, you need a sketch of the face(s) you are about to work closer on. The small scale that you are about to investigate, fits into the bigger picture.



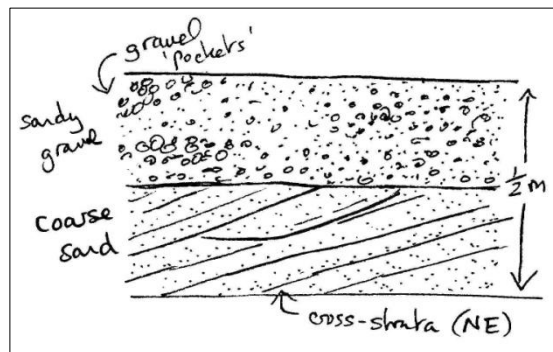
**Figure left: Quarry floor plan of Home Farm Pit, Stowe**

Making your first field sketch can be a bit daunting, but take a good look round first, assess what is there and where it looks interesting. Then stand back and draw, in very simple terms, the main features seen (add a scale).



**Figure right: The main face at Home Farm Pit, Stowe. In this instance the quarry face is fairly homogeneous from this distance and a photograph would suffice.**

Photographs are valuable additions to field sketches, but they never replace the field sketch. This is because a sketch simplifies the geology, emphasises what is important, eliminates distracting features such as vegetation or staining, and can add interpretative elements as well.



**Above left: Detail of face to be researched; Above right: sketch of the detail adding valuable extra information not visible in the photograph. Burnham Beeches Quarry.**

Now you are in a good position to stand back again and note the following:

- How high is the exposure? (Estimate or measure it)
- How wide is the exposure? (Estimate or measure it)
- How many rock types are obvious? (a minimum based on colour, hardness, etc)
- Are the rocks in flat layers, folded or irregularly shaped?
- How thick are the individual units or beds?
- Are there any large-scale structures, banding or other 'patterns'?
- Add a compass direction for the faces you sketch.

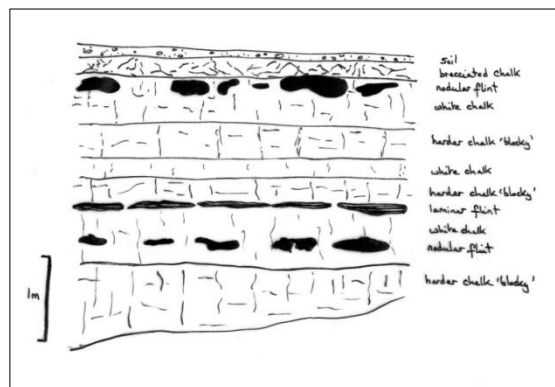
## First recording of the rocks

This information is for sedimentary rocks. There is a different set of observations for igneous and metamorphic rocks. The minimum observations are:

- Colour of each bed
- Rock type (lithology) by establishing the mineralogy and grain size
- Texture – by describing grain shape, roundness or angularity, and degree of sorting
- Cement type (this will be calcite, quartz, iron oxide or, rarely, a clay)
- Individual bed thickness with boundary description (abrupt, gradational, undulating, etc)
- Sedimentary structures on bedding surfaces and within beds
- Geometry of the whole sequence or of individual beds, as appropriate
- Fossils – are they present, in which units, how numerous, whole or broken and to which groups do they belong?

There are of course other observations that may be appropriate at different sites. For an explanation of the types of sedimentary structures or how to identify rocks see other 'How to....' handouts.

Examples of some Bucks Earth Heritage Group sites:



Above: Photo and sketch of the chalk quarry at Whiteleaf, Princes Risborough



Above left: Cliveden – chalk with solution pipe  
How do they form?



Above right: Buckingham – esker sands  
Formed by a tunnel under an ice sheet.

Finding out how to interpret your observations will be found in 'How to....' guides No. 2 to 5