

Burbage Valley Part 2 - Landforms

Identifying and interpreting landforms

The Burbage Valley lies about 10 km South West of Sheffield, in the Peak District. The solid geology consists of gritstones, siltstones and mudstones of Namurian age (Upper Carboniferous). The Earthlearning activity *Burbage Valley Part 1* could be used by way of introduction to the solid geology. The influence of the geology is very

evident in the physical landscape, and this activity involves pupils in identifying different landscape components from photographs. Before they start, they should be reminded that climatic conditions in the past were very different from today, in particular during colder conditions in the Pleistocene Epoch.

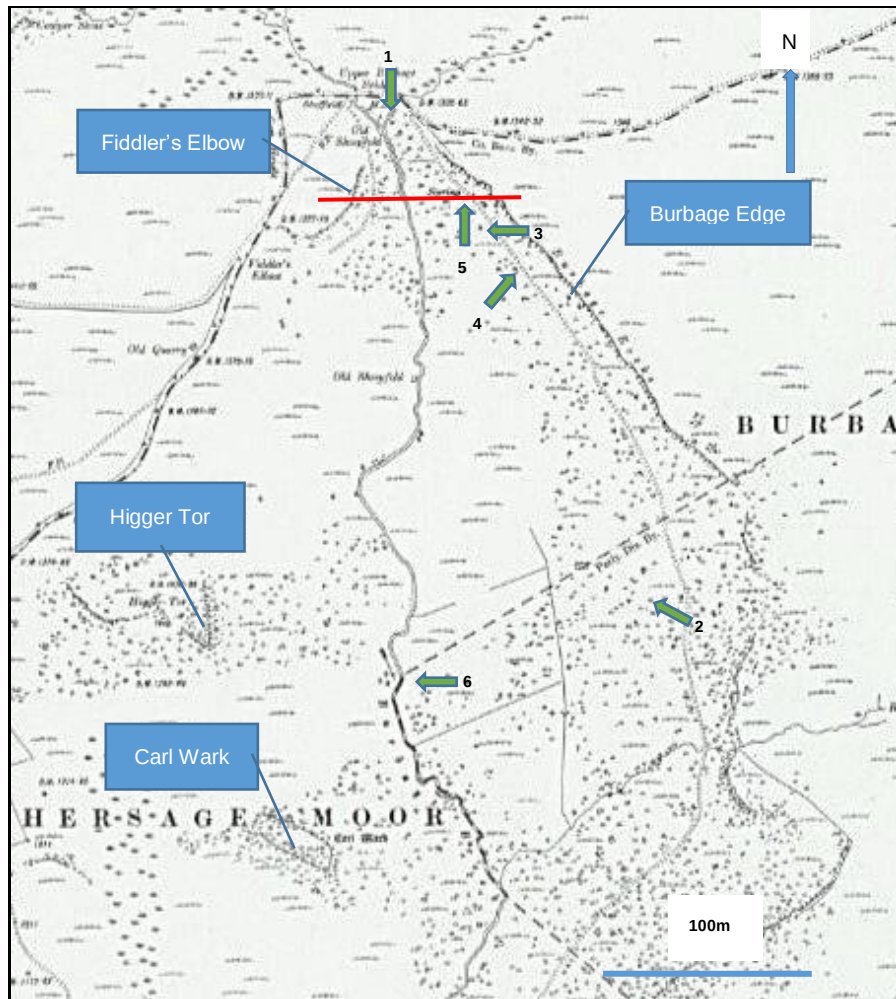


Fig.1. Topographic map of the Burbage Valley. (courtesy of <https://maps.nls.uk/os/>)
 Arrows show the location of the camera and the direction of view for each photograph.
 Line of section in Fig. 1.

Ask pupils to study an enlarged copy of each photograph and answer the related questions.



Photo 1. Burbage Valley from the road bridge, looking South

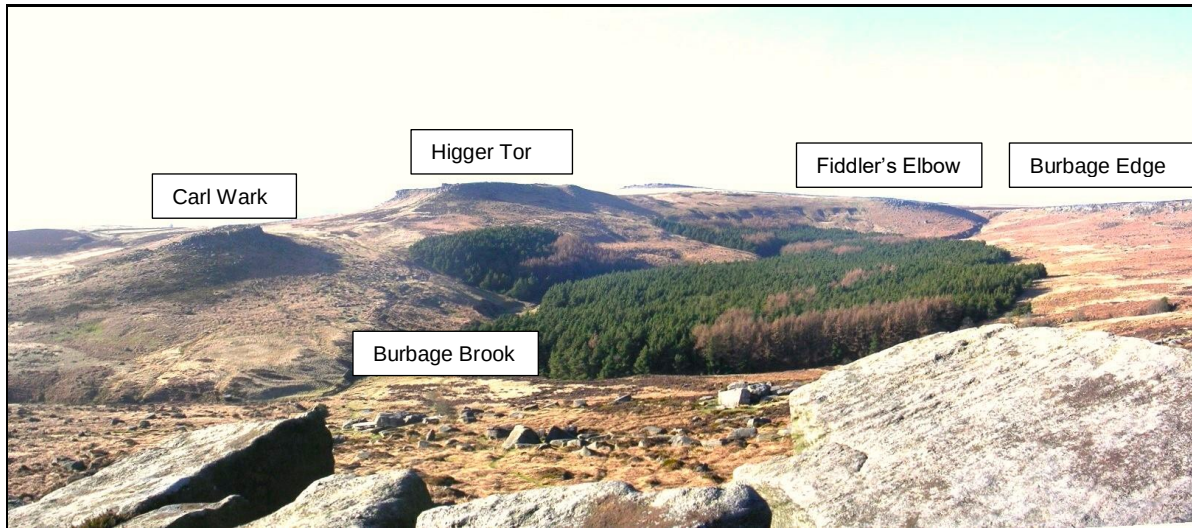


Photo 2. Burbage Valley from the South, looking North West



Photo 3. Fiddler's Elbow looking West



Photo 4. Burbage Edge looking North East



Photo 5. Spring below Burbage Edge, looking North



Photo 6. Mudstones beside Burbage Brook, looking West. Scale = 1m

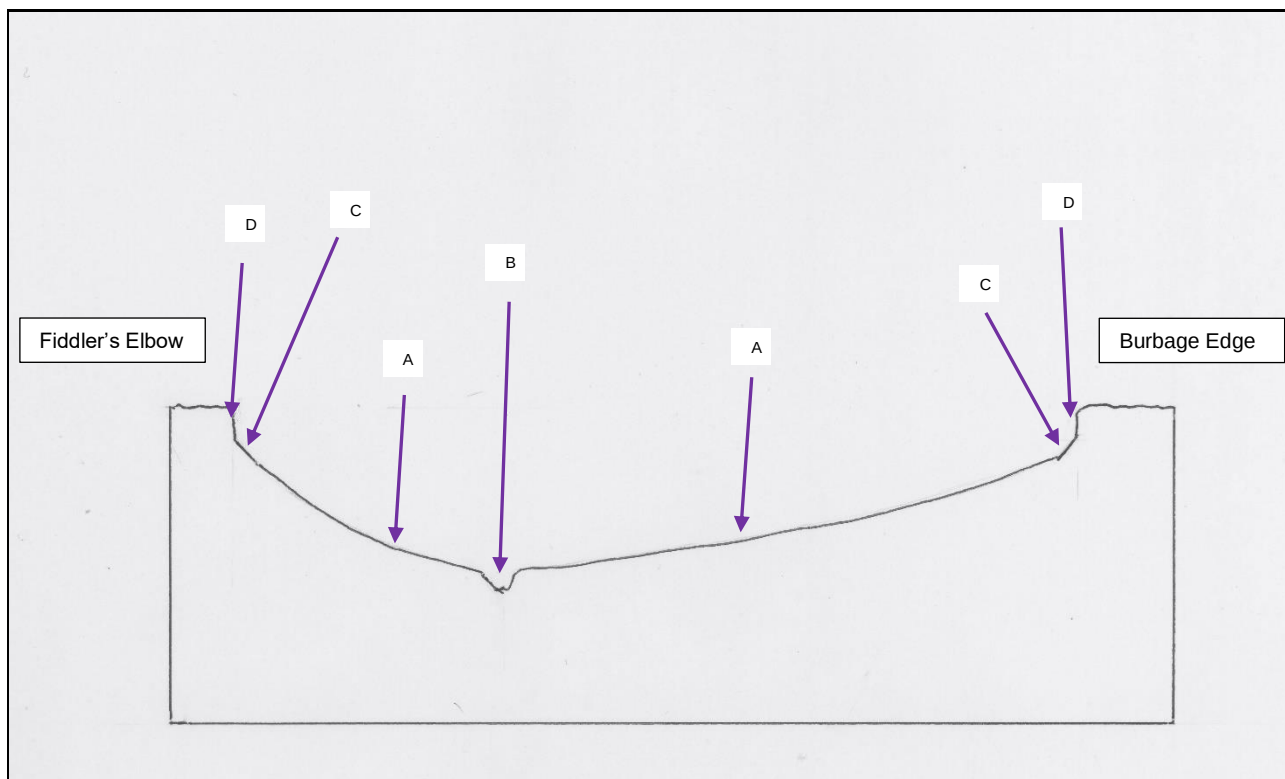


Fig 2. Topographic section from Fiddler's Elbow (West) to Burbage Edge (East). Vertical scale exaggerated

Ask pupils:

- Figure 1 shows the changes in slope across the valley, from Fiddler's Elbow to Burbage Edge. Using the photos to help, allocate the appropriate letters to each type of slope. Slope types are: free face, scree slope, gentle concave slope (all repeated symmetrically); incised stream course. (A= gentle concave slope, B = incised stream course, C= scree slope, D = free face).
- What clues about the underlying geology might the spring in Photo 5 provide, located at the change of slope below Burbage Edge? This is one of a line of such springs. (Springs often form where a permeable rock overlies an impermeable one. The change of slope also suggests a less resistant rock below the gritstone of the Edge. Although the body of the gritstone rock has very low permeability, the presence of open joints and bedding planes allows water to pass through).
- How does the exposure beside the brook in Photo 6 confirm suspicions about the likely rock type at the spring in Photo 5? (The rock appears to be of mudstones or siltstones, which are less resistant than the gritstone and are mostly impermeable).
- In Photos 1, 2 and 3, how might the widely scattered blocks of gritstone, low down on the

gentle concave slopes be explained? (Any blocks which have simply tumbled off the free face will form the scree slope at the foot of the free face, so another cause is required. The gentle slope was largely developed under permafrost conditions during the last glacial phase of the Quaternary glaciation ("Ice Age"). Although lower layers of rock debris would have remained frozen, the upper layers would have thawed out during the summer months, providing a weak slip plane over which rocks of all sizes would have been carried bodily down the slope by mass movement: a process known as solifluction).

- How might the incised nature of Burbage Brook be explained? (The valley floor would probably have been a continuation of the gentle solifluction slope, until a change in base level further downstream resulted in renewed rates of erosion by the brook).
- In Photo 2, why do the summits of Higger Tor and Carl Wark appear to be at different levels, given that they are composed of the same gritstone and that the dip of the rocks is very small? (A normal fault runs between the two hills, with Carl Wark lying on the downthrown side).

The back up

Title: Burbage Valley Part 2 - Landforms

Subtitle: Identifying and interpreting landforms

Topic: Pupils use a set of photographs to identify a variety of landforms and attempt to explain their origin.

Age range of pupils: 16 years and above

Time needed to complete activity: 30 minutes

Pupil learning outcomes: Pupils can:

- match photographs to a map of a locality;
- label a sketch cross section of the landscape;
- identify landscape components from photographs;
- explain the origin of the various landscape features.

Context: The activity could be used as a revision exercise after landscape study, in the classroom or field, or in preparation for fieldwork.

Following up the activity: Pupils could try working out the origin of some of the landforms in the Earthlearningidea series *Picturing landforms 1 to 4*, with particular reference to earlier climatic regimes of the U.K.

Underlying principles:

- Processes of weathering, mass movement and erosion work together to create landforms.
- Most parts of the U.K. have been affected by glacial or periglacial climates in the past, which have affected landform development.

Thinking skill development:

Building up a pattern of landforms from photographs is a constructive activity. Cognitive conflict may be involved in trying to visualise the landscape under different climatic conditions from the present day. Hopefully, bridging skills will be employed when actual field visits are undertaken.

Resource list: The map, section and enlarged photographs from this activity.

Useful links:

https://www.earthlearningidea.com/PDF/472_Burbage_Valley1.pdf

https://www.earthlearningidea.com/PDF/438_Picturing_landforms1.pdf etc.

A British Geological Survey map of the Burbage Valley may be viewed at [BGS Geology Viewer \(BETA\)](#) and scrolling to Grid Reference 4261 3818 (SK261818). Hovering the cursor brings up names of the main rock formations.

Source: Written by Peter Kennett of the Earthlearningidea team.

Photos by P. Kennett. Photo 5 by R.J. Kennett

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