

# Rocks and Landscapes of Cludders Rocks, Widdop



View of the Rocking Stone at Cludders Rocks looking east to Widdop Reservoir.



Cludders Rocks Local Geological Site is an area of the high Pennines on Widdop Moor (SD 934 326) about 9 kilometres north-west of Hebden Bridge, West Yorkshire, as shown on the map below. The site covers a small area of exposed rock crags, known as The Cludders or Cludders Rocks and the steep slope below them, called Cludders Slack, down to the edge of Widdop Reservoir to the north. There is access to Widdop Reservoir from a minor road between Hebden Bridge and Burnley over the moors. From the road there are panoramic views across moorland.

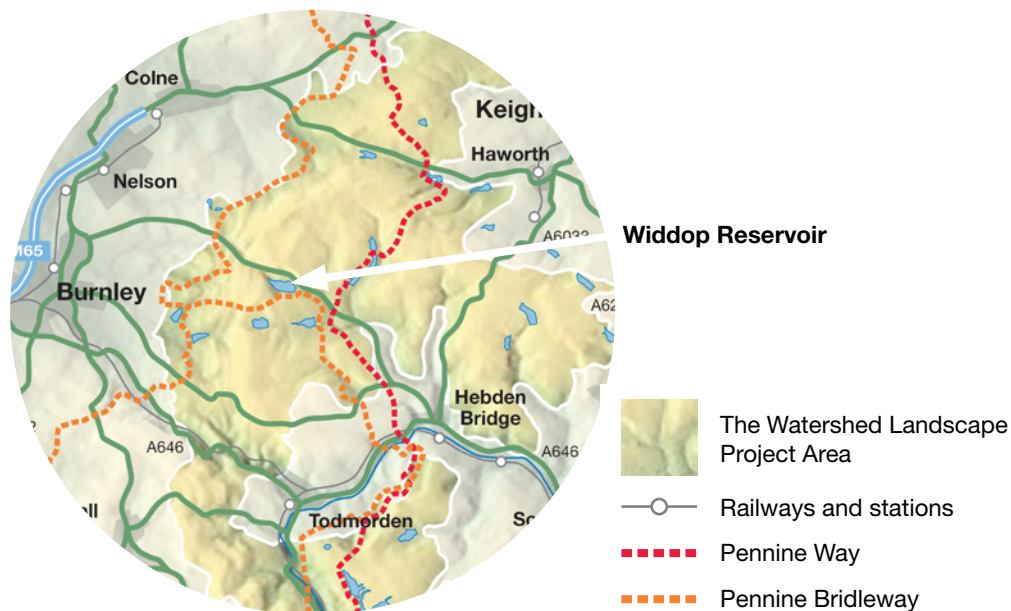
The height of the crags above Cludders Slack is about 375m, descending to about 320m at reservoir level. The slope below the crags is littered with large slipped blocks of sandstone.

The existing car park at the Widdop Reservoir dam is an excellent point from which to observe Cludders Rocks. The track along the south side of Widdop Reservoir gives access to Cludders Rocks at the top of the slope, but also

continues onwards towards Burnley as Gorple Gate and Gorple Road. The track is also part of the Pennine Bridleway network so can be used by horse-riders as well as walkers. The crags and the boulders on the slope are used by climbers.

The name 'Cludders Rocks' or 'The Cludders', is given to the 25m high natural crags at the top of the slope to the south-east of Widdop Reservoir. The Local Geological Site also includes the Cludders Slack slope below the crags down to the waterside, which is steep and has many slipped boulders, some of enormous size.

The rocks underlying the area are **sandstones** and **mudstones** of Upper Carboniferous (Namurian) age. The crags at the top of the slope are made of a **gritstone**. This is a tough sandstone with massive beds, broken up by prominent vertical joints and bedding planes which have been heavily weathered. The blocks of sandstone appear to balance on top of the blocks below, as shown in the photo of the Rocking Stone on page 1.



Cludders Rocks from the car park at Widdop Dam.

Beneath the gritstones are beds of dark grey or black **mudstones** (shales) which are made from clay particles and **siltstones**, which are made of very fine quartz grains. Both these rocks are prone to weathering into small flakes and thus being washed down the slope. The concave slope near the reservoir results from the down-slope movement of fine clay, silt and sand particles. However, it is difficult to see these rock particles, as they are covered by sandstone blocks and slope wash.

The boulders which make up the dramatic landscape of Cludders Slack are large blocks of Lower Kinderscout Grit from the Cludders Rocks which have slipped down the mudstone slopes.

## Bedrock geology

The rocks forming this area of the Pennines are Upper Carboniferous in age, so they date from about 310 million years ago, from that section of the Upper Carboniferous period which is called the Namurian stage. The rock type which forms the Cludders Rocks themselves is the **Lower Kinderscout Grit**, which is a **gritstone** with coarse, angular sand grains. It often contains bands of rounded white pebbles of quartz, which have been deposited by currents in the rivers in which most of the Namurian gritstones formed.

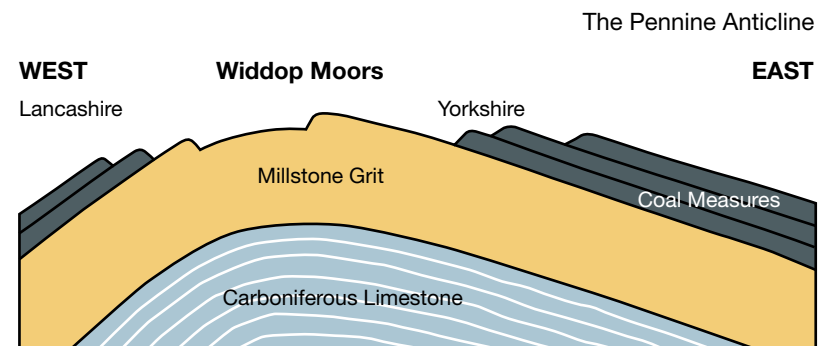
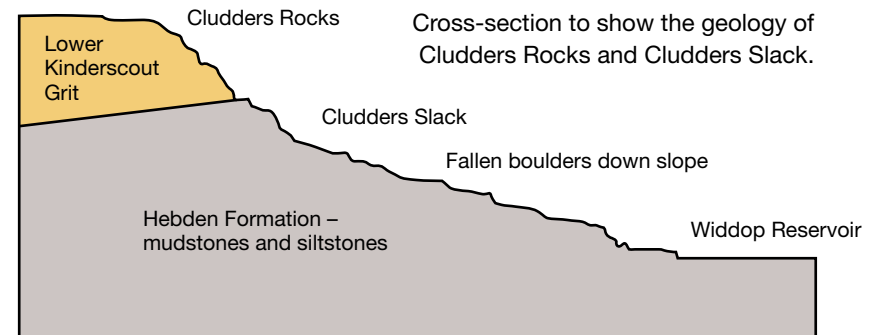
The Lower Kinderscout Grit forms the top of the slope as shown in the section below. Below this gritstone lies a thick layer of mudstones and siltstones called the **Hebden Formation**. This forms the steep lower slopes of the hillside. Mudstones were deposited in the lakes or marshes of the Upper Carboniferous delta, away from the main river channels.

At the end of the Carboniferous period, the Pennines were formed when two tectonic plates collided across central Europe. This caused the uplift of the Pennines in a north-south trending fold, with limbs dipping to east and west as shown in the diagram. Widdop Moors lie across the crest of the anticline so the rocks are largely horizontal in this area. However, the beds of gritstone and mudstone in the Widdop area dip very gently to the south-east.

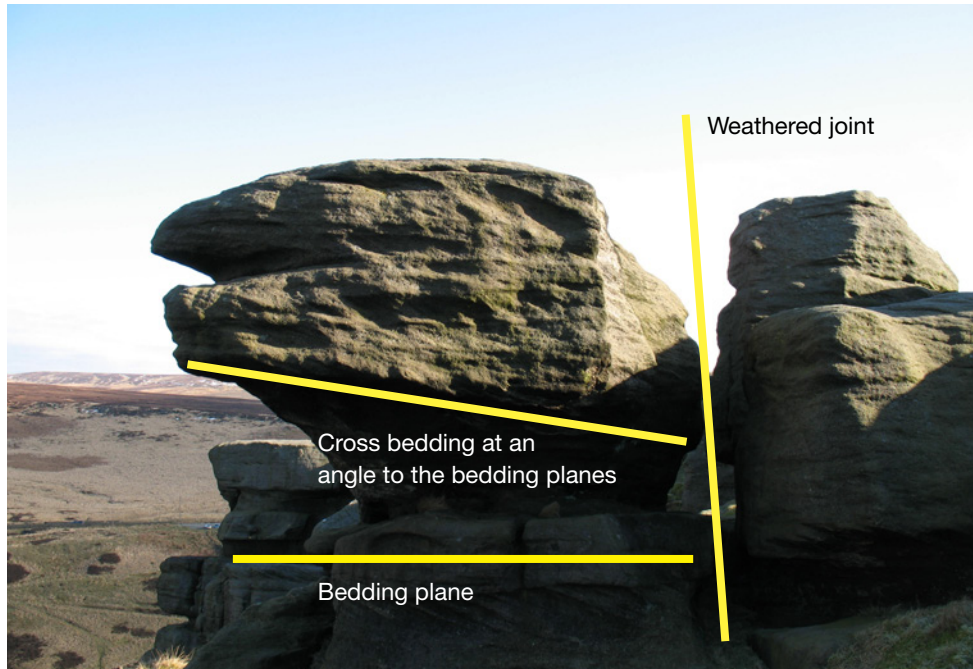
The features of Cludders Rocks, with their huge blocks of rock, are defined by the **bedding planes** and **joints** in the sandstone. The near horizontal bedding planes are well-spaced and the near vertical joints are also several metres apart.



Close-up of Lower Kinderscout Grit on Cludders Rocks, showing rounded quartz pebbles, set amongst coarse, angular sand grains.







Features of the Kinderscout Grits at Cludders Rocks.

Weathering takes place preferentially along these natural breaks, thus breaking the rock into large blocks.

The rocks also include a feature called **cross-bedding** which develops at a gentle angle to the horizontal bedding planes, as a result of strong currents in large river channels which flowed across the Carboniferous delta. This is shown in the photo above.

## Landslipping

The boulders, which have slid down the slope from the gritstone crags onto the mudstones of the lower slopes, probably moved shortly after the end of the last glacial event, about 12,000 years ago. During this time of intensely cold conditions, the rocks and subsoil would have been frozen for much of the year and only melted during the summers. Summer meltwater would have lubricated the subsoil which allowed large blocks to creep slowly downslope.

**Scree slopes** under rock exposures are also characteristic of cold areas because freeze-thaw action occurred on many days of the year as temperatures fluctuated around 0°C.

The bedding planes and joints in the sandstones and mudstones were forced open by expanding ice-crystals, loosening the rocks which would fall to form scree slopes.

The scree slopes below the crags of the Cludders are stable now because vegetation has been able to grow around them and prevent further movement downslope.

The ice sheet which moved down the west side of the Pennines during the last glacial event, which was at its maximum about 17,000 years ago, reached close to the Pennine watershed, only a few kilometres to the west of Widdop. The evidence for this is shown by the **glacial till** (clay and boulders dropped as the ice melted) recorded in the Burnley, Nelson and Colne areas. Glacial till is shown on the British Geological Survey Sheet 76 Rochdale at high levels on the west side of the Pennines.



Boulders lying on the slope below the crags at Cludders Rocks.

However, it is clear that ice did not move over the 400m col at Widdop Cross, about 2km west of Widdop Reservoir, although glacial till is recorded just to the west of this point. There is no evidence for glacial deposits in the Widdop valley. Both the 1875 Geological Survey Memoir of the Burnley Coalfield and the recent remapping in 2008 (see references on page 6) do not record any glacial deposits in this area.

## Archaeology

As with other upland areas of the Pennines there is considerable archaeological interest in the area around Widdop Reservoir.

Flint finds have been discovered by local enthusiasts along the reservoir edges over the years. This includes Mesolithic, Neolithic and Bronze Age material and demonstrates a continuity of activity in the immediate vicinity, although the nature of that activity is not clear. The flint microliths are thought to be armatures or components of the arrow type found in the early Mesolithic.

The Cludders Rocks are probably significant for early Mesolithic archaeology since they are an ideal spot for a hunting stand to observe passing game animals. However, no prehistoric occupation can be demonstrated and the best that can be claimed is that the area was utilised either for hunting or other seasonal activities.

Of great significance is a standing stone about 1m high called The Notch, probably late Neolithic or early Bronze Age. This can be found about 500m east of Widdop dam adjacent to the road (SE 941 326). There are also a number of other stones found to the east along the same contour.

The whole Widdop area itself is significant as an access route through the Pennines into the main Calder Valley during the prehistoric and medieval periods. There are remnants of causeway paving (for packhorses) visible in the bottom of the reservoir when it is drained. At a later time there was a farm located to the west of Cludders Rocks which could possibly date back to the late medieval period.

## Acknowledgements

Dave Shepherd and Frank Jolley for help with the archaeology section

Simon Firth of Yorkshire Water

Hugh Firman of Calderdale Countryside Services

Photos © Alison Tymon

## References

Aitkenhead, N, Barclay, W J, Brandon, A, Chadwick, R A, Chisholm, J I, Cooper, A H, and Johnson, E W, 2002, *British Regional Geology: the Pennines and adjacent areas*, British Geological Survey

Crofts, R G, Hough, E, and Northmore, K J, 2010, *Geology of the Rochdale district – a brief explanation of the geological map 1:50,000 Sheet 76 Rochdale*

Hull, E, Dakyns, J R, Tiddeman, R H, Ward, J C, Gunn, W, and De Rance, C E, 1875, *Geology of the Burnley Coalfield*, Memoirs of the Geological Survey

Wright, W B, Sherlock, R L, Wray, D A, and Tonks, L H, 1927, *The Geology of the Rossendale Anticline*, Memoirs of the Geological Survey

## Useful websites

<http://www.megalithic.co.uk/article.php?sid=15633>

<http://www.prehistory.yas.org.uk/content/gorple.html>

<http://www.ukclimbing.com/logbook/crag.php?id=1015>

[http://www.rockfax.com/databases/results\\_crag.html?id=404](http://www.rockfax.com/databases/results_crag.html?id=404)

<http://www.yorkshiregrit.com/widdop.html>

## Useful maps

OS map 1:50,000 Landranger 103 Blackburn and Burnley

OS map 1:25,000 Explorer OL 21 South Pennines

British Geological Survey 1960 1:50,000 Clitheroe Sheet 68

British Geological Survey 2008 1:50,000 Rochdale Sheet 76

Written by Alison Tymon © West Yorkshire Geology Trust 2013

**[www.wyorksgologytrust.org](http://www.wyorksgologytrust.org)**

West Yorkshire Geology Trust (WYGT) is part of a national network of voluntary groups which are actively conserving important geological features. These sites include rocky crags, active or disused quarries, railway cuttings and stream beds. Important sites are called Local Geological Sites (LGS) and there are about 80 in the county. West Yorkshire Geology Trust aims to encourage public enjoyment of rocks, fossils and landscapes and link geological features with the local industrial heritage. WYGT also maintains a database of Local Geological Sites and encourages landowners and managers to participate in good site practice and management.

This leaflet has been produced with support from the Watershed Landscape Project, a three year Heritage Lottery Funded project managed by Pennine Prospects to enhance and conserve the South Pennine upland landscape and its heritage, whilst improving access for all.

The aims of the project are to protect the internationally important natural and historic features of this special landscape and to encourage greater understanding and enjoyment of the area so that it is further valued and protected. The project has been telling the fascinating stories of the moors by offering opportunities to get involved in local heritage projects, delivering moorland conservation initiatives, developing resources to help people explore the landscape, hosting exciting events and activities, and working with artists and writers on an original creative arts programme.

For more information about the Watershed Landscape Project please visit

**[www.watershedlandscape.co.uk](http://www.watershedlandscape.co.uk)**