



# Brown End Quarry

Brown End Quarry, near Waterhouses, has been owned and managed by the Trust since 1987. Sarah Taylor, Patrick Cossey and Ian Stimpson of GeoConservation Staffordshire (GCS) invite you to step back in time and explore the rich geological history and wildlife that lived here millions of years ago. In the last magazine we highlighted the extensive work that the Trust and GCS volunteers have done over the past few years to expose the rock, so there has never been a better time to visit.

## 1 Industrial history

Begin at the car park where you can see the remains of a 'two pot' limekiln where limestone from the quarry was once roasted to produce quicklime (calcium oxide). Limekilns here are recorded on maps dating back to 1844. The ground level was raised to make the carpark, but the arched top of one of the pots is still visible.

## 2 Limestone layers

From the car park take the path through the kissing gate into the main quarry - a geological Site of Special Scientific Interest of international importance. Once there was a 300m deep waterbody here inhabited by crinoids, corals, brachiopods and worms. Their remains fell into layers of silty deposit which became limestone, and was then tilted on end by the Earth's crust's movements. Check the boulders by the path for their fossils.

## 3 Geological timeline

Follow the main path to its northern end where extreme rock gardening has re-exposed much of the rock face. The base of the thickest bed here marks the approximate position of a widely recognised boundary between the two lowest stages of the Carboniferous Period, the

Tournaisian and Visean Stages - a 345 million year timeline (see dotted line on photo).



## 4 Amazing views

Continue on the path to a second smaller quarry by an old explosives store. For safety reasons do not climb over the fence. For amazing views of the quarry walls, climb the steps through the trees to the lookout point. In front of you are the thinly bedded Milldale Limestones, behind you the thicker bedded Hopedale Limestones.

## 5 Picnic spot

Woolly mammoths roamed here 10,000 years ago - follow their footprints up onto the grassy meadow - a lovely spot for a picnic. There is even a "time bench" where you can trace the history of the Brown End area from the deposition of rocks and fossils in equatorial seas, rock folding and desert landscapes through to the Ice Age and present day.

## 6 Become a fossil hunter

Take the trail down a series of steps and around to a fossil collecting pile replenished by the GCS work party. Become a budding palaeontologist and try your hand at fossil hunting! You can even take your very own finds home with you. However please do not cross over the fence to hunt for fossils.

### Getting there

The reserve is situated at the eastern end of the village of Waterhouses on the A523 Leek/Ashbourne Road. The quarry is on the north side of the road and just west of the Manifold Cycle Track. Nearest postcode: ST10 3JR.

### Useful information

The reserve is a small former limestone quarry, and the walk will take around 30 minutes. Many of the fossils are small so look carefully. Most of the reserve is flat, although there is a steep incline to the meadow area. The kissing gate is wide enough for wheelchairs. Footpaths are unsurfaced and can be stony. Dogs on leads welcome.



Patrick Cossey

### Crinoids

Commonly known as 'sea lilies', the body fossils of these plant-like filter-feeding animals, which are related to starfish, resemble nuts and bolts. Here water currents have aligned the stems.



Patrick Cossey

### Trace fossils

Trace fossils, such as these fan-shaped worm burrows, provide indirect evidence of ancient life. The example shown, *Zoophycos*, is thought to represent a feeding trace.



Peter Thomas

### Cowslip

Spring is a great time to see the bright yellow nodding heads of cowslips in the grasslands. Once a common flower in meadows, changes in agricultural practices have made these a rare sight.



Ian Stimpson

### Knoll reef

You can see a prominent block of reef limestone high on the quarry wall. This block has tumbled down a sea floor slope and come to rest upside-down.



Ian Stimpson

### Milldale limestone

Thinly bedded limestones of carbonate sands and muds deposited by underwater debris flows. The red colour has been washed down from Triassic desert sandstones that used to overlie the rocks.



Paul Lane

### Common spotted orchid

In the summer you can see the delicate pale pink blooms of the common spotted orchid, named for the purplish oval spots on its green leaves, growing in the grass by the quarry slopes.

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### The importance of geodiversity

England is privileged to be among the most geodiverse places in the world and the Geodiversity Charter launched on 21 October 2014 has been put in place to safeguard and publicise the 700 million years of history locked up in our nation's rocks. The excellent access and unusual nature of rock exposures make Brown End Quarry one of the most important geological sites in Staffordshire.

• If you fancy making the quarry part of a longer walk then download the GCS Hamps & Manifold Geotrail leaflet by visiting [www.gcstaffs.org.uk](http://www.gcstaffs.org.uk) – the quarry is locality 30 – and discover a tale of disappearing rivers, mineral riches and Ice Age beasts.