

PRESENT

QUATERNARY  
2.6 million years

TERTIARY

65 million years

CRETACEOUS

146 million years

JURASSIC

208 million years

TRIASSIC

245 million years

PERMIAN

290 million years

CARBONIFEROUS

362 million years

DEVONIAN

408 million years

SILURIAN

439 million years

ORDOVICIAN

510 million years

CAMBRIAN

570 million years

PRE-CAMBRIAN

4.6 billion years

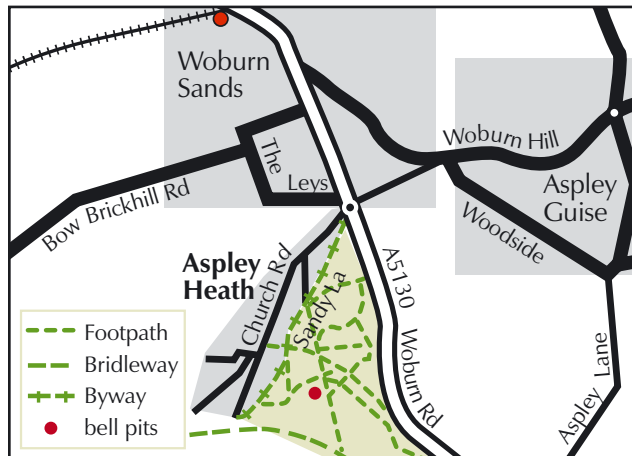
### Why fullers (and others) need earth

In the Lower Cretaceous period Aspley Heath would have been a seaside town. Rising sea levels due to global warming had created a new seaway running southwest from the Wash across Bedfordshire and onward to the Isle of Wight. The sands and other sediments deposited in this seaway eventually became the Lower Greensand, which now forms the Greensand Ridge. See our leaflets (available on our website or in print) on the Lower Greensand for more information. Hidden deep in the ridge is a treasure: beds of **Fullers' Earth**, a highly absorbent clay that industry has found useful since Roman times.

Fulling was part of the process of making wool into clothing: fullers trod or pounded newly-woven cloth placed in large vats of water and detergent to remove grease and dirt, and to thicken and soften the cloth. The vats were once filled with urine, but from Roman times Fullers' Earth was known as an effective – and more pleasant! – detergent.

In 1690 laws were passed restricting exports of Fullers' Earth to protect production of woollen cloth. By the 18th century scented soaps were used to process fine cloth, but demand from other industries was increasing.

Today Fullers' Earth is used as a filler in cosmetic and pharmaceutical products, to clarify edible oils and fats, as a bonding agent in foundry sand, and as part of the lubricant used on oil and gas drilling rigs. It may be found in pencils, insecticides, cat litter, industrial absorbents and carbonless copy paper. More recently, Fullers' Earth has been used to decontaminate soldiers exposed to chemical weapons. But perhaps its most unusual role is in special effects: the tiny particles make a much larger plume than ordinary dust, suggesting a larger explosion and allowing a smaller, safer charge to be used.



Aspley Heath is about 3 miles northwest of Woburn on the A5130. The sandpit and the bell pit hollows are in Aspley Woods, which is privately owned. Access is via public rights-of-way from Sandy Lane in Aspley Heath.

**The Bedfordshire & Luton Geology Group** exists to encourage understanding of the geology and geomorphology of the county and to undertake site recording, interpretation, advice and education

**Regionally Important Geological and Geomorphological Sites (RIGS)** are places that reveal our geological past and are considered important enough to deserve conservation. They include sites where rocks can be seen (such as quarries and road cuttings) or where the geology or geological processes can be inferred from the shape of the landscape. Official RIGS are recognised by county councils and by Natural England.

For more information about the BLGG and our events as well as the geology and geomorphology of your area visit our website at

[www.bedsrigs.org.uk](http://www.bedsrigs.org.uk)

or contact B&LGG c/o Bedford Museum, Castle Lane, Bedford, Bedfordshire MK40 3XD. Tel: 01234 353323; Fax: 01234 273401



## Bedfordshire's geological industries

### Fullers' Earth



The hollows under the pines are the remains of the bell pits from which Fullers' Earth was mined.

Under the peaceful woods of Aspley Heath lies a reminder of Bedfordshire's violent geological history: Fullers' Earth formed from layers of ash vented by Cretaceous volcanoes. For centuries it was mined for industry; today only quiet hollows remain.



This section shows all the beds that may be seen in the Lower Greensand. Not all occur at every location.



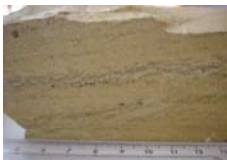
### Ancient volcanic ash ...

The Brown Sands at the base of the Lower Greensand contain the remains of plants and animals that lived in a shallow estuary about 115 million years ago. Not entirely peaceful, for hidden in the sands are beds of volcanic ash trapped between what were underwater dunes. We don't know where the volcanoes were; probably in northwest Europe, but possibly west of the UK under what is now the Atlantic.

Buried at just the right depth, the ash changed chemically over time to become a *smectite* clay. These clays are made of extremely fine particles (so a given amount of the clay has a very large surface area) with electrical charges that attract and bind other molecules. This makes them both *absorbent* (substances soak into them) and *adsorbent* (substances are bound to them), which is why Fullers' Earth is such a useful substance. If buried too deeply the clay's chemistry continued to change and it became less useful.

The slopes of the Greensand Ridge are among the few places in Britain where Fullers' Earth is found. Freshly extracted it has a soft, earthy texture with a slippery soaplike feel; when dry it becomes hard and brittle. Wetted, it becomes a soft clay slurry.

Fullers' Earth from the Woburn area is greyish-yellow or yellowish-green; at Clophill it is dark bluish-grey. The difference in colour is probably a result of oxidation and water content.



Fullers' Earth in the Bedford Museum shows layers of impurities in the ash.

### gave rise to a Bedfordshire industry

The Romans were probably the first to make use of Fullers' Earth from the **Woburn** area. In Magiovinium, a military way station on Watling Street (the A5) near Little Brickhill, it may have been used to wash the clothing of troops. In the 13th century the Benedictine monastery at St Albans had a fulling mill that probably used local supplies. The earliest mention of Fullers' Earth in Britain is in the Inquisition of the Manor of Aspley from 1295.

In 1536 William Hardyng leased 'the Claypitts with appurtenances, called Fullyngpitts' in Aspley Guise.

In 1765 the Duke of Bedford began commercial mining, probably from large open pits, at Old Wavendon Heath. Work later ceased until the opening of the Grand Union Canal in 1836 reduced transport costs. Even after that production was erratic: in 1862 no pits were working.

By 1891 the Fullers' Earth Mining Company had obtained the mining rights. They introduced more effective methods of open quarrying, taking the fullers' earth to be dried in huge kilns near the railway station in Woburn Sands. From here it was sent to mills in Yorkshire, and exported to America and France. By 1896 the company was wound up; the quarry and rights were sold to the Berk Chemical Company Ltd, but by 1900 the works built west of Sandy Lane in Aspley Heath were closed. Some excavation continued until 1919.

1951: large-scale mechanised excavation using a dragline excavator began on Aspley Heath. Work ceased 10 years later, the pit was refilled, and planning consent was

given for excavation in Aspley Woods. In 1970 the Steetley Mining Company began work here, and in 1978 consent was given for a new quarry at Old Wavendon Heath.

Fullers' Earth working at Aspley Heath; the dark layer beneath the machine is the Fullers' Earth.

Image courtesy of Steetley Bentonite & Absorbents Ltd.



1989–1992: the A5130 was re-routed to allow further working at Aspley Heath.

2002: consent for further excavations was refused; by 2004 mining of fullers' earth had ceased in Bedfordshire.

In 1934 the British Geological Survey found Fullers' Earth at **Clophill**, on the other side of the Greensand Ridge. Laporte Industries began work here after 1952, in what was the second-largest source (the largest was in Surrey) of Fullers' Earth in Britain. The quarry was in-filled when production ceased in 2000.



Fullers' Earth extraction in the 1800s.

Photography by kind permission of His Grace the Duke of Bedford and the Trustees of the Bedford Estates.

**Earth wells or bell-pits** are one of the oldest methods of mining; flint mines such as Grimes Graves in Norfolk date from c. 3000 BC. Miners simply sink a shaft straight down to the level of something valuable – coal, iron ore, fullers' earth – and then cut sideways into the deposits, creating a bell-shaped cavity. The Woburn Fullers' Earth deposits are a series of *lenticular* (lens-shaped)

beds ranging from a few centimetres to 4m in thickness, found up to 40m below ground level. Each pit was worked to what seemed to be a safe limit before another was excavated nearby; sand from the second was used to fill in the first. The hollows in Aspley Woods formed as the sands subside into the abandoned pits.

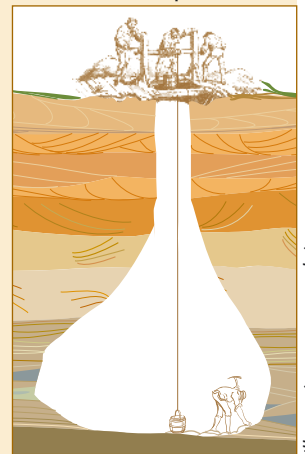


Illustration not to scale!