

Bedfordshire geology

Rocks make landscape, and Bedfordshire's countryside is shaped by many different rocks. The county's visible geological history spans a period of more than 200 million years. It begins in the tropical seas of the Jurassic limestones of the Ouse valley, followed by lagoons where dinosaurs roamed 170 million years ago. The Greensand Ridge was once a shallow seaway, and the high white Chalk hills were deposited at the bottom of a warm blue ocean.

Bedfordshire's amazing geological history is open for you to read; you just have to know where to look! Here's a brief guide to take you back through time to the early Cretaceous period, when dinosaurs walked dry land. Come and see the sandy floor of the shallow seaway that eventually became the Greensand Ridge.



Silver Sands as seen in Stone Lane Quarry, Heath & Reach.

Archeological evidence shows that people have been using clay and sand from this area for over 2000 years. Erosion left the sands covered by as little as 0.3m of clay, which made hand-digging easy in the days when labour was cheap. Today the Silver Sands command a high price, making it financially viable to machine away 12-15m of overburden to exploit the sands in Munday's Hill Quarry.



Permission is required to enter Munday's Hill Quarry, but there are reasonable views into the site from Eastern Way (beware traffic on this busy road). Contact the BLGG for more information.

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

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



Supported by English Nature
through Defra's Aggregates
Levy Sustainability Fund

Lower Greensand

Munday's Hill Quarry



A view across country into Munday's Hill Quarry.

In the Lower Cretaceous, while dinosaurs walked on dry land, Bedfordshire was a sandy shallow seaway. Tides and strong currents moved the sands to and fro, rivers and streams washed tree trunks and branches from the cycad forests into the sea. Each quarry in Heath & Reach tells us more about this seaway.



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

The Lower Greensand

These sands were laid down in a seaway around 100 million years ago, a period known as the Lower Cretaceous. It was an exciting episode in Bedfordshire's geological history: after 40 million years as dry land, the sea burst across what is now southern England, forming a channel running southwest from the Wash, across Bedfordshire, and onward to the Isle of Wight. This was part of a world-wide event caused by global warming; sea-level continued to rise and eventually flooded much of the Earth.

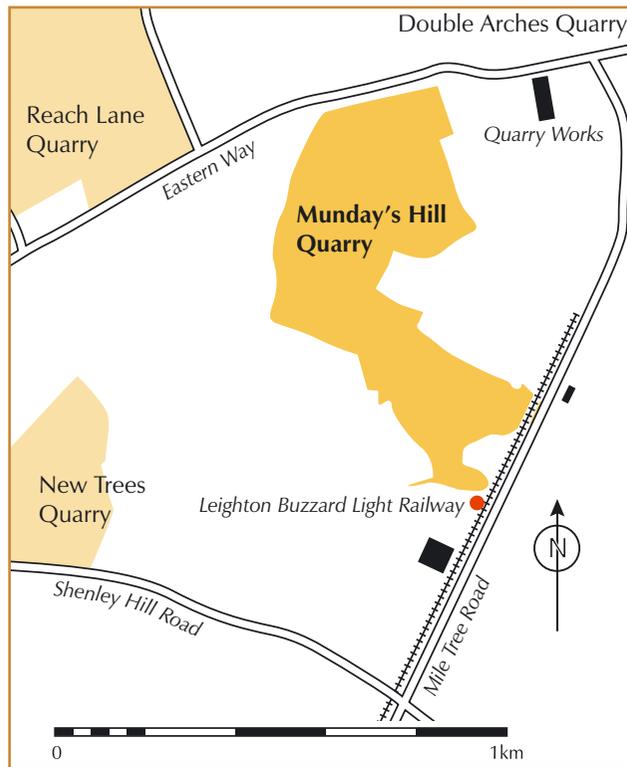
The quarries of Heath & Reach are among the best places in England to read the story of the flood, preserved in the Lower Greensand.

The story in the sands

The sands are capped by a layer of **till** left behind by a glacier about 500,000 years ago. Below that is the **Gault Clay**, deposited c. 95 million years ago in a warm Cretaceous ocean. The **Cirripede Bed** lies under the Gault in the southwest corner of the quarry. The bright red sediments contain many fossils, including barnacles (*cirripedes*), oysters, fish teeth, ichthyosaur bones and corals. Below are the **Silty Beds**, layers of sands, silts, clays (some containing freshwater algae) and ironstones. Taken together they show us intertidal flats with changing levels of salt and freshwater.

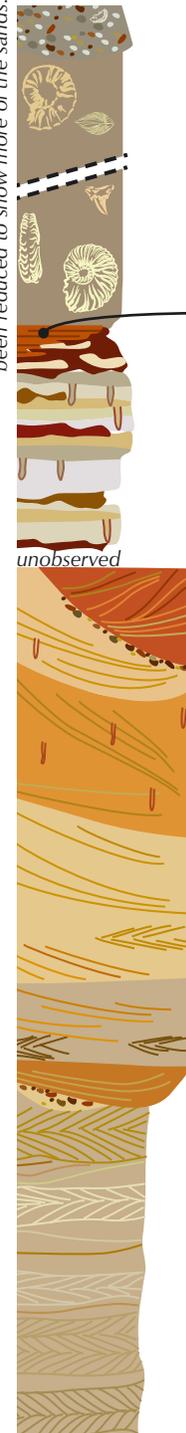
The **Silver Sands** are the most commercially valuable of the sands, used in many industries ranging from water filtration and foundries to golf courses (the horticultural grade is exported to Saudi Arabia). In the southwest corner of the quarry a channel cut by fast-moving water filled with iron-rich sand that hardened to form a sandstone. It has been quarried here for centuries; until WWII a full-time worker cut the sandstone blocks that can be seen in many buildings in Leighton-Linslade and Heath & Reach.

The **Brown Sands** are the oldest. Over 80m thick in total, only the top 4m are exposed here.



The bi-directional cross-stratification seen here in the Brown Sands (and occasionally in the Silver Sands) shows the reversal of water flow caused by tides in shallow water. This tells us the sands were deposited in an estuary. You may also see hard ironstone horizons (iron pan), and many fossil burrows dug by worms, shrimps and other animals living in the estuary.

Over 10m thickness of Till and Gault has been reduced to show more of the sands.



Till

The **Gault Clay** was deposited at the bottom of a tropical ocean. There are lots of tiny marine fossils in this clay, including ammonites, belemnites (little squid) and bivalve shells. Worn, reworked fossils from the Gault may be found in the till.

Cirripede Bed

Shenley Hill Limestone

The **Silty Beds** appear only in the Heath & Reach area. They include pale sands laid down in fast currents as well as fine-grained organic sediments rich in fossils.

Although nearly pure quartz, the **Silver Sands** are many colours – from pale cream and tan to dark orange – before washing.

These are fossilised underwater sand dunes from the estuary mouth, with some bi-directional cross-stratification recording tidal cycles. Fossil wood is abundant, but there are very few other fossils; fast-moving currents moved the coarse-grained sands too quickly for animals to settle in the dunes, and the shells of any that did would have dissolved long ago in the water running through these porous sands.

The **Brown Sands** are seen at their best in the Heath & Reach area. Beige in colour, they are fine-grained with quartz grains (pale), many mica flakes (silvery and shiny) and occasional black rock fragments.