



Time Travel! A drive across the Geology of Bedfordshire



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

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 gradually sculpted the rocks into rounded hills and escarpments, ridges and complex river valleys. Rocks affect our lives in many ways. For example, the heaths of the Greensand Ridge developed centuries ago, after arable crops failed on the sandy infertile soils. Today those sands support a major industry. The limestones of the Ouse Valley and flints from the Chalk determine the character of the villages built from local stone.



The landscape of an area is shaped by the rocks that lie beneath the surface, and what has happened to these rocks over millions of years. Weathering and erosion take their toll on different rocks in different ways. In the last 200 million years Bedfordshire has experienced everything from hot and humid tropical climates to freezing cold ice sheets. It's been under the ocean many times and exposed as land many times, too. This has gradually sculpted the rocks into rounded hills and escarpments, ridges and complex river valleys. **and more than the landscape**

How rocks make landscape...

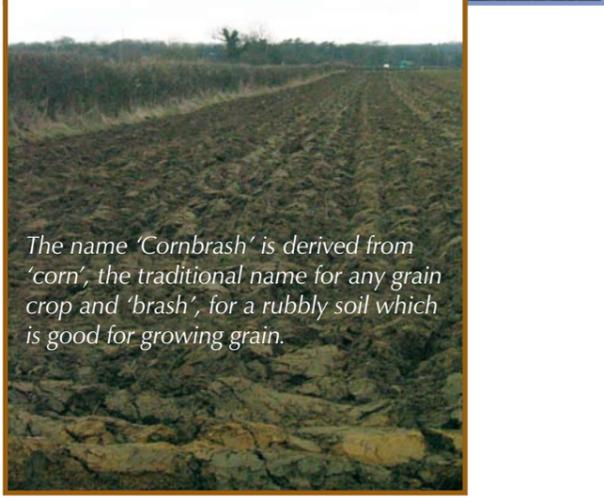
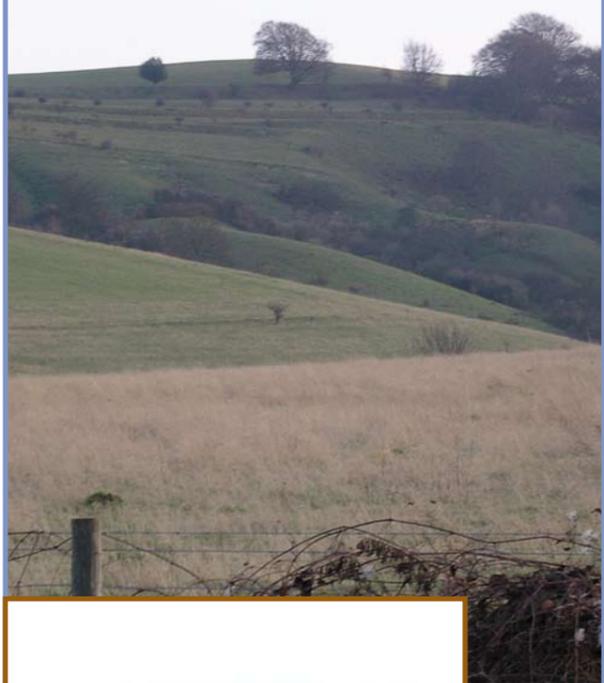
Bedfordshire is simply beautiful. The height of the Chalk escarpment in the southwest is emphasized by the low Gault Clay vales separating the Chalk from the Greensand Ridge. North of the Greensand's forests and parks the Jurassic clay vales change colour from shades of green to gold as the arable crops ripen. Rivers – the Ouzel, the Great Ouse, the Flit and the Ivel – cut through this landscape, revealing the underlying rocks and depositing sediments to create fertile riverside meadows. The rivers also provided a transport network and permanent water source for early settlers in Bedfordshire.

Bedfordshire's landscape

Drive from the Jurassic north to the Cretaceous south across the Bedfordshire landscape. See for yourself how events hundreds of millions of years ago influence our lives today, shaping the landscape and determining our industrial heritage. Your journey through time begins at Harrold-Odell Country Park deep in the Ouse Valley, then continues through Bedford south to Dunstable, high on the Chalk Downs. It's easily done in a leisurely day with a break for lunch. Alternatively, download the appropriate leaflets from our website and enjoy side trips or devote more time to the areas that interest you most.

Travel through time!

Lynchets, terraces cut into the hillside to create additional arable land during the Middle Ages, can be seen on the side of the dry valley in the Chalk at Pegsdon.



The name 'Cornbrash' is derived from 'corn', the traditional name for any grain crop and 'brash', for a rubbly soil which is good for growing grain.

- 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

Bedfordshire's geology

Bedfordshire's countryside is shaped by many different rocks.¹ The county's visible geological history spans 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 sandy 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.

Quaternary

For someone interested in rocks, this era is notable for the rocks that disappeared, ground to dust and scraped or washed away by glaciers. Others were exposed in the sides of river valleys. Today, valleys too large for the rivers that flow in them, or with no rivers at all (the *dry valleys* of the chalk) record the force and volume of the water that poured across the landscape when the ice melted.

Tertiary

Reading Beds²
The world changed at the beginning of the Tertiary, when dinosaurs disappeared. Mammals began to diversify, birds took to the air, even insects began to look like those we see today. Sadly glaciers scraped away most of the Tertiary rocks from this area, leaving only the Reading Beds in the far south of the county. You won't see them on this journey, but these clays record an ancient waterlogged soil that was flooded by the sands of an estuary and then by the sea about 40 million years ago.

1. To geologists clay is a rock!
2. Formations are almost always named for the best places to see them.

Cretaceous

Chalk, Gault and Lower Greensand
In the Cretaceous the land was sinking and the sea was rising. The Lower Greensand was deposited in a shallow seaway; the sands aren't green here, but cream, gold and rust-brown, with fossil trees carried out to sea by flood-swollen rivers. As the sea rose higher, mud and silt of the Gault Clay covered the sands, with fossil *belemnites* (relatives of modern squid) and reptiles that lived in open water. Sea levels rose further; microscopic plants and animals thrived in the clear warm water. For millions of years their skeletons rained down on the sea floor, building up the thick white layers of the Chalk. Harder and more *permeable* (water flows through rather than over it) than clay, the chalk stands high above the vale of the Gault.

Upper Jurassic

Amphill, Kimmeridge and Oxford clays
Most of north Bedfordshire is covered by a thick layer of these clays, which were deposited in shallow to deep seas. In some places beds of sand and limestone in the sediments, and the remains of oysters, mussels, dinosaurs and crocodiles tell us that these layers were laid down in lagoons or other shallow seawater.

Middle Jurassic

Cornbrash, Great Oolite and Inferior Oolite
These rocks were exposed by the River Ouse northwest of Bedford. *Oolite* describes the tiny perfect spheres ('oo' is Greek for egg) about 1mm across that may be seen in the warm cream-brown limestone. Ooliths are forming today near Bermuda, and our rocks contain fossils of corals and other animals that lived in shallow tropical seas, so we know something about what Bedfordshire was like when these rocks were deposited. The Cornbrash is a thin layer of tough brown limestone containing other marine fossils that have been broken by waves and strong currents near an ancient shore.

Please take time to plan your journey across time! Leaflets on underlined topics can be downloaded from our website www.bedstrigs.org.uk

1 Begin at the Harrold-Odell Country Park in the Ouse Valley 10 miles north of Bedford (OS Grid reference SP 4958 2570). The park was established on the site of a former sand and gravel pit working sediments deposited after the last Ice Age. A café and toilets are available, so you can start the journey in comfort! Turn left as you leave the park and drive through **Carlton** on the Stevington Road that takes you up, out of the valley cut into the Limestone, across the Cornbrash onto the Jurassic Oxford Clay, then back down to **Stewington**. Many buildings in this corner of the county show the cream and gold local limestone to good advantage; the vernacular (traditional local) building materials will change as you drive south, away from the Cuse Valley and the limestone quarries. In Stevington turn right onto the road signposted for Turvey and the A428.

2 Turn left onto the A428 to **Bromham**, then follow the signs to Bromham Watermill at the southern end of the village. Spare a glance for the 17th-century watermill, but look closely at Bromham Bridge next to the mill. The bridge is a Scheduled Ancient Monument dating from the 13th century (with some 15th- and 19th-century repairs) and a RIGS (Regionally Important Geological and Geomorphological Site) designated for its use of local limestones, including the rarely exposed Great Oolite.



Continue on the A428 into **Bedford**, where you can break your journey for refreshments. If you've more time, Bedford Museum has a large geological collection on display, including many fossils from the formations you'll see on your journey across time. Dr. Jill Evers' *The Building Stones of Bedfordshire* (available from the BLCG) includes a walk introducing the rich variety of local and exotic stones to be seen in the buildings of Bedford.

3 From Bedford take the A421 toward Marston Moretaine. About a mile past Kempston, you may see at least one chimney of the **Stewartby Brickworks** (once the largest brickworks in the world) to your left, standing high above the Jurassic Clay that made the brick industry possible in this area.

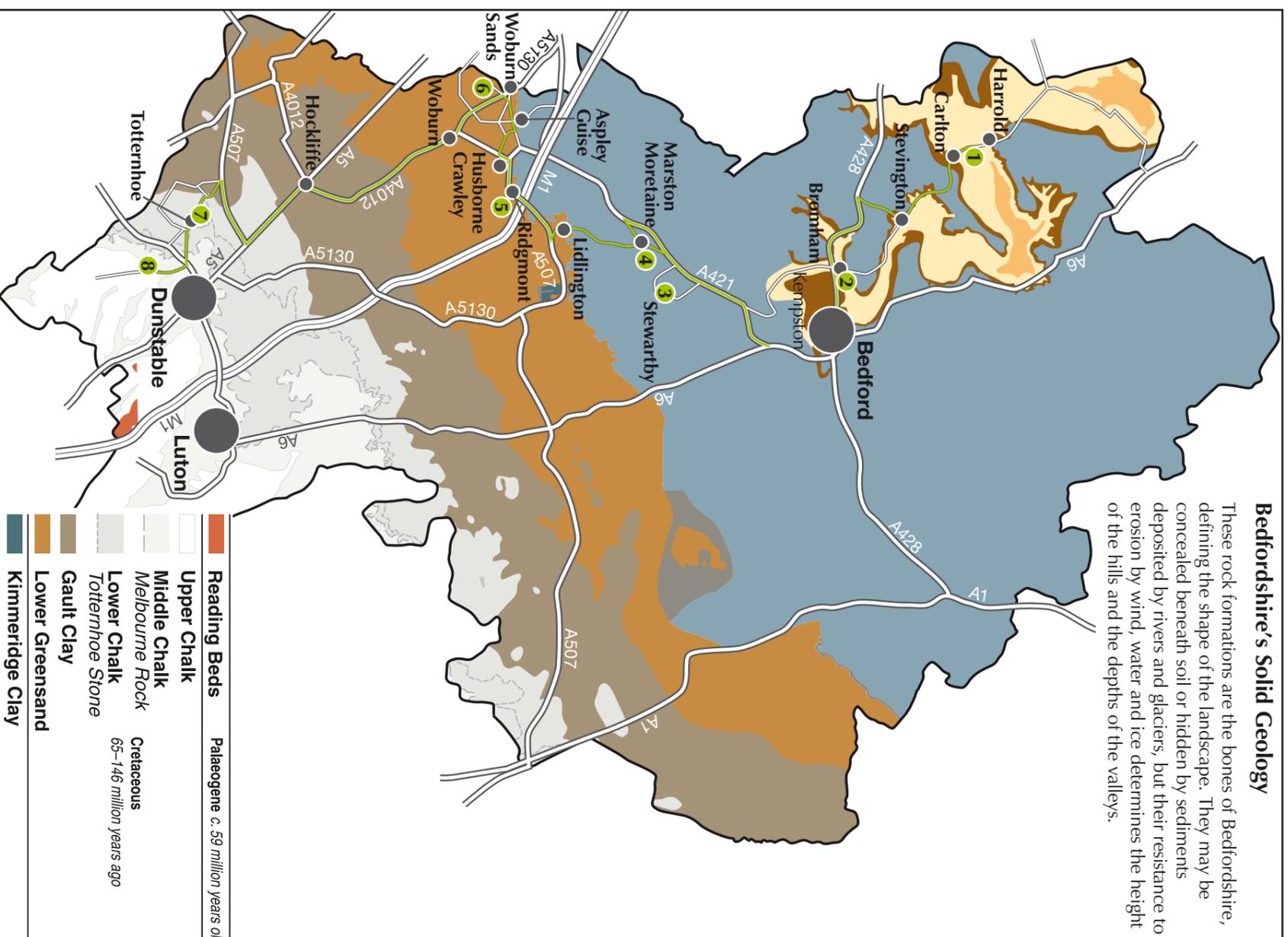
4 At **Marston Moretaine** follow the signs for **Marston Vale Country Park**, where you'll find a visitor centre and café beside a lake that was once a brickpit. The Forest of Marston Vale is working to restore wildlife habitats and provide recreational facilities in this industrial landscape.

Leave the Forest Centre and turn left to **Lidlington**. The land rises and the soils change as you leave the low-lying clay for the Greensand Ridge. Turn right onto the A507 to **Ridgmont**.

5 From Ridgmont you can detour to see **Segenhoe Church**, a RIGS built of local stone from the Lower Greensand in the 11th century. Take the first left past the school (signposted to Eversholt), and the church is on your left a short distance down the road.

Bedfordshire's Solid Geology

These rock formations are the bones of Bedfordshire, defining the shape of the landscape. They may be concealed beneath soil or hidden by sediments deposited by rivers and glaciers, but their resistance to erosion by wind, water and ice determines the height of the hills and the depths of the valleys.



Please note: this map shows only major routes and those roads needed to follow the Time Travel route. Refer to your own road atlas for more detail.

6 From Ridgmont continue through **Husborne Crawley** on the road about one mile toward Woburn before turning right to **Aspley Guise**. Drive through Aspley Guise and turn left at the T-junction onto Woburn Hill toward **Woburn Sands**. Bear left onto Aspley Hill. At the first roundabout on the A5130 Woburn Road you can take Church Road (the second exit) for a diversion into **Aspley Heath**, where hollows under pine plantations are a reminder of the Fullers' Earth industry. The sandy soil, the gorse and heather, and buildings of sandstone and ironstone are all characteristic of the Lower Greensand.



To proceed to **Woburn** turn left onto the first exit from the roundabout onto the A5130 (which becomes the A4012 just north of Woburn). About four miles south of Woburn the road crests the Greensand Ridge with a fabulous view of the Chalk escarpment of the Chilterns from Dunstable Downs to Ivinghoe Beacon.

The road runs gently down the southern slope of the Greensand Ridge onto the Gault Clay. At the traffic lights in **Hockliffe** turn left onto the A5. Hockliffe was once 'Hockley-in-the-Hole', renowned for the tenacious mud of the Gault.

7 To the south you can see the white cliff of Puddlehill in the distance. Turn right onto the A505 at the roundabout before the wide cutting where the A5 climbs the escarpment. There are good views of many quarries cut into the Chalk as you drive. Turn right at the sign for **Totternhoe**, where a network of public paths allows you to visit the site of a motte and bailey castle standing high above a landscape altered by quarrying for Chalk and Totternhoe Stone since Roman times.

Continue through Totternhoe, bearing left onto Dunstable Road. At the T-junction with Tring Road, turn left. At the roundabout turn right onto Whipnade Road for **Dunstable Downs**.

8 The road continues to climb the Chalk to the **Chilterns Gateway Visitor Centre**, with a café, toilets and panoramic views along the Chalk and across the Gault Clay vale to the Greensand Ridge. This journey ends here, but the geology of Bedfordshire and the BLCG offer you many more opportunities for time travel.

Kensworth Quarry is the largest hole in the Chalk in the UK. It's not normally open to the public (the BLCG arranges quarry tours), but if you'd like to see the Chalk in more detail you can visit the Nature Reserve at the quarry in Isle of Wight Lane, just across the road from the Chilterns Gateway Centre.

