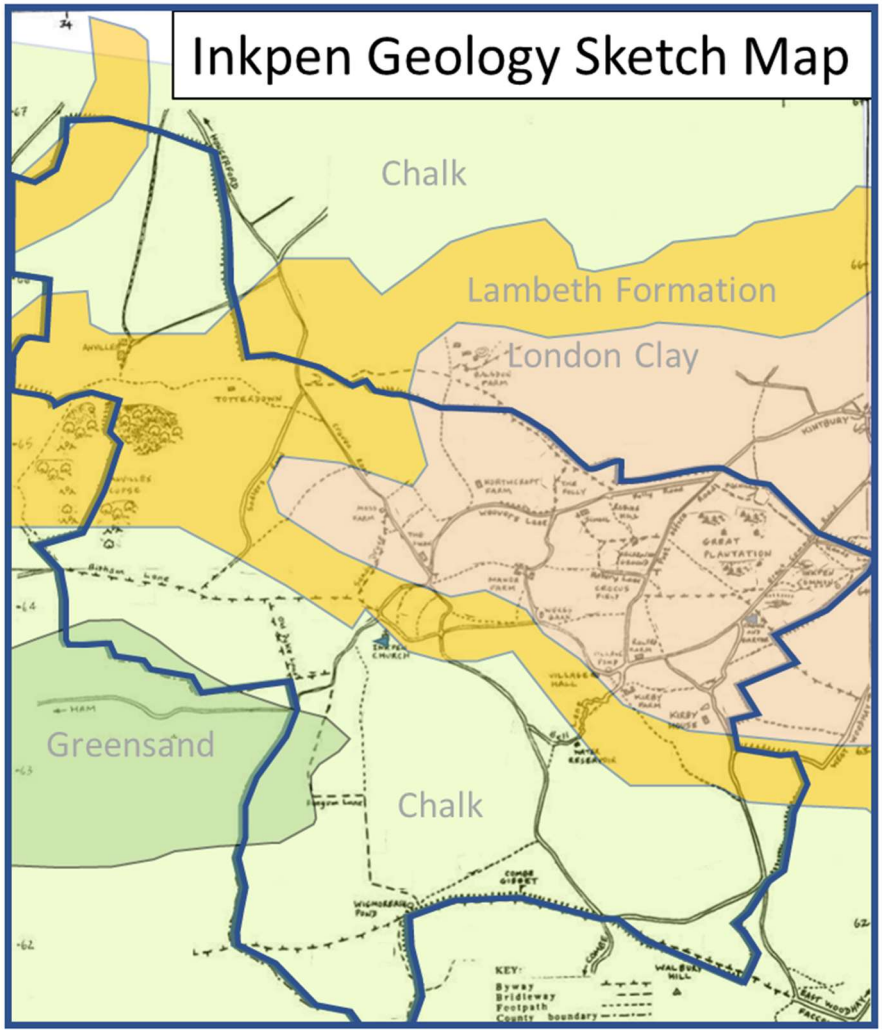
The Geology of Inkpen.

By David Russell

The composition and structure of the rocks beneath Inkpen are the basis of it's major asset – the landscape. However, the rocks beneath us have also had a direct impact on the lives of the people of Inkpen as a source of raw materials. These rocks and their impact on our lives are described here.

So how do we know what lies deep beneath our feet? Geologists have been looking at the Inkpen area since the early 19th century. They have used natural occurrences of rock (rare in Inkpen); manmade exposures of the geology (in pits to extract raw materials); the records of wells drilled (all of them for water); and observations of the landforms, to come up with a map of the geological units (or Formations). This map (attached) is an interpretation of these data. It subject to uncertainty, because of the sparse data – we do not have a perfect understanding because most of the area is covered in soil and the wells and pits are not as common as geologists would like! The geologists of the British Geological Survey (a unit of DEFRA) publish maps and written accounts of the geology of the whole of the UK, and the map of the Newbury area is the basis for the sketch map shown here. Details on how to access these maps etc is given at the end of this page.



There are four geological Formations which occur at or near the surface in Inkpen. The only point worth mentioning about the rocks of that do not appear at the surface is that they are extremely unlikely to contain an oil or gas deposit!

Starting with the oldest occurring Formation in Inkpen we have the **Upper Greensand**.

- It is a Late Cretaceous (70 million years old) sandstone, and is composed of greenish grey fine sand and silt deposited in a shallow sea
- Confined to the southwestern corner of the parish, and outcrops in the ditch near the footpath running from the Ham Road towards Combe Hill

The next youngest formation is the **Chalk**

- It is a Late Cretaceous (age) limestone, mainly composed mainly of white or grey calcium carbonate ($CaCO_3$), but also with considerable chert , or flint, which is a form of silicon dioxide (SiO_2). The calcium carbonate came from the shells of trillions of small animals called coccoliths. The chert came from the hard parts of sponges and was later dissolved then recrystallised to form nodules
- It was deposited in a large warm shallow sea stretching across NW Europe – The Chalk is found from Norway to Dorset and from Northern France to Skye.
- It is the most widely encountered rock in Inkpen – natural outcrops occur in the path running up to Bitham Lane from the southern end of Sadlers Road, and many other roadsides.

The **Reading Formation** is next youngest formation.

- It is about 66ma – known as the early Tertiary Period
- It is a very variable unit, with grey, green, red and black mudstone (made from compacted clay), thin sand layers and ironstone. It was laid down in a coastal plain, perhaps like the Thames Estuary – of which it is the precursor!
- Although very widely occurring in Inkpen, it is usually only seen in manmade exposures (foundations, swimming pool excavations etc). It changes quickly over short distances – in one place it can be soft green mudstone and not far away at the same level it may be hard ironstone.

The youngest of the rock formations seen in Inkpen is the **London Clay Formation.**

- It is from 56 to 49 million years old – again, early Tertiary.
- In most of the London area and west to Newbury, the London Clay is a very consistent blue-grey mudstone. However, in Inkpen it is unusual in that it contains beds of gravel and sandstone.
- It was deposited in a shallow sea, in a large embayment stretching from Ham to Harwich and beyond, when sea level was higher than today. However, some earth movements in the early Tertiary period had generated a landscape which involved the Chalk being uplifted above sea level and eroded. The most resistant material resulting from this was gravel and sand, It is likely that the hill which is now the escarpment north of Combe Gibbet as a marine cliff like the cliffs of Kent, with a gravelly beach along its base, as found, for instance, at Beachy Head.
- The London Clay usually forms the higher parts of the landscape north of Combe Hill, but natural exposures are rare. However, gravel and sand from the London Clay Formation is often seen at the surface of footpaths.

In some areas there are some deposits linked to glacial periods (only a few tens of thousands of years ago). These are thin and discontinuous, usually formed by weathering of the underlying older Formations., These units have little impact on our lives. Here's how the geology described above does so.

Landscape

The landscape of the parish is dominated by the Chalk escarpment of Combe Hill. Areas all around Inkpen have the Chalk as their main rock Formation – but what makes Inkpen different is the structure of the rocks. The rocks have been bent from being horizontal into a dome shape, with the rocks on on Combe Hill, dipping gently south and those on the north side of the valley overlooked by Combe Hill gently dipping north at about 25 degrees. The rocks in the middle of such structures are more fractured and thus more easily eroded than that on the flanks. This more resistant Chalk on the north and south sides of the dome form ridges – that is, Combe Hill to the south, facing across the valley the ridge along which Bitham Lane runs.

Agriculture and Gardening

Given the technology available today (equipment, plant science etc), the geology of the area is not a big influence on the type of farming done. The Upper Greensand is favoured because it is more workable, with its consistency and composition making it more workable – there are no clay layers to cause poor drainage as in the Reading and London Clay Formations. The only area where a specific agricultural activity occurs is the slope beneath Combe Gibbet. Here, the slope caused by the structure described above means that it is only useful for grazing sheep.

The curse of some gardeners is the Reading Formation. It's alternating and variable beds of sand and clay cause water to be carried through the sand and emerging where the sand is at the ground surface, draining onto the underlying clay thereby causing swampy areas – these are best indicated in pastures where reedy plants, which like wet soil conditions, are abundant.

Some of these swampy areas are springs, feeding the drainage system which ends up in the Kennet River. Several of these springs and the streams coming from them are red coloured. This is due to iron being dissolved (usually from the Reading Formation) and being oxidised when the water holding the iron in solution hits the air.

Water

In the past, all houses had their own well – only replaced as a source of water by the mains system built from the 19 century onwards. The wells drilled tended to be shallow, targeting the thin sands in the Reading Formation and London Clay Formation – yielding low flows of water but enough for a single house. However, deeper wells were also drilled into the Chalk, which has a lot of interconnected pores containing water which flows at good rates. Wells into the Chalk are still important sources of water for us all – they feed the mains system we all use – however none of these industrial scale wells are in Inkpen.

There are also examples of sinkholes or dolines in Inkpen, where the Chalk has been dissolved by rainwater (a natural phenomena continuing ever since there was rainwater!) to form enlarged cracks into which overlying grains of sand and clay, and water, disappear. There are no examples of the catastrophic sinkholes seen in places like Florida, however – that's because the Reading and London Clay Formations have filled most (but not all) of the solution features.

Chalk

The Chalk is the source the flints (called chert by geologists) which were made into tools in the Neolithic period. Plenty of flint was found on the ground surface when the Neolithic people were around, and we can see it in many of the fields today when ploughed. However, our Middle Age precursors realised it would also be a good building material, because it is so hard and durable, and they used it to clad the more important buildings. With this demand, and for the lime that could be used for agricultural purposes, many pits were dug for it. Flint cladding to buildings continued as an architectural choice, and our church is a good example – no doubt during it's mid-Victorian makeover it used a supply of flints from nearby chalk pits. The biggest example in Inkpen is on Bitham Lane, up the hill from the Ham Road.

As well as flints, the chalk that was dug from pits was also used in agriculture to reduce the acidity of soils, and as a whitening agent. A pit near Kintbury was a source of extremely pure white chalk for this purpose.

Clay

It's safe to assume that the pots made by the Beaker People (4000 years ago) were made from clay dug from either the Reading Formation or the London Clay Formation. Where the Beaker pots were fired isn't known, but we can assume that the Brickworks shown on the 1875 map near Totterdown was using locally-derived clay from The Reading Formation. Similarly, the activity in Potters Lane must have used the London Clay Formation on which it stands.

Iron

Although no evidence has been recorded of the ironstone in the Reading Formation being dug up and smelted for iron during the Iron Age, it is tempting to speculate that the presence of red streams, and presence of red clays in the Reading Formation led our Iron Age ancestors to do so.