Local Geological Sites (LGS)

LGS are recognised for their local geological diversity and earth heritage value. The Spring at Burwell Castle was designated an LGS as it is a rare exposure of the junction of the Cretaceous West Melbury Marly Chalk and the overlying Totternhoe Stone - from which the spring emanates. This boundary is a common source of chalk springs all around the eastern Fen Edge (see Nine Wells LGS) where the Grey Chalk forms a low escarpment. The Totternhoe Stone is a famous layer that was quarried in Cambridgeshire and Bedfordshire for local building stone (see Carter's Pit, Burwell and East Pit, Cherry Hinton LGSs).

The Landscape

Burwell Spring lies at the eastern edge of the Fen just below the upslope of an escarpment formed by the harder chalk bands stretching from around Quy out past Burwell in a SW/NE trend. To the west, the fens overlie the Gault clay and then the soft, impure West Melbury Marly Chalk (WMMC) - low lying (between 0m and 5m OD) and locally covered in peat or river terrace deposits.

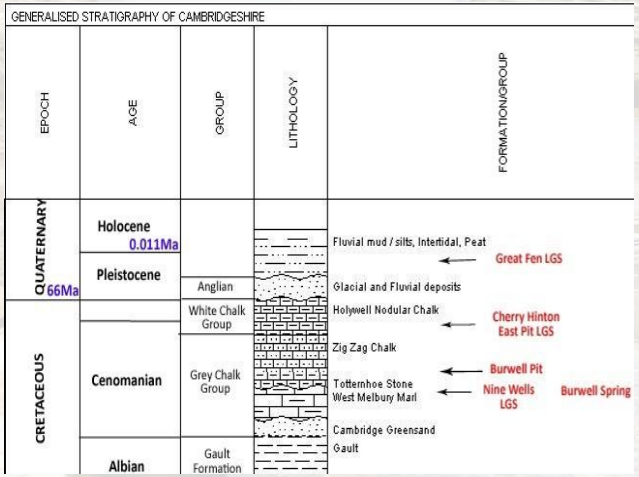
Historical importance

The spring is very close to King Stephen's Castle, which in turn was built over a Roman and later medieval settlements. No doubt a continuous flow of fresh water was crucial in the success of these settlements. This spring (with others) locally feeds the Burwell Brook, which in turn feeds into Burwell Lode - a navigable waterway to the Ouse.

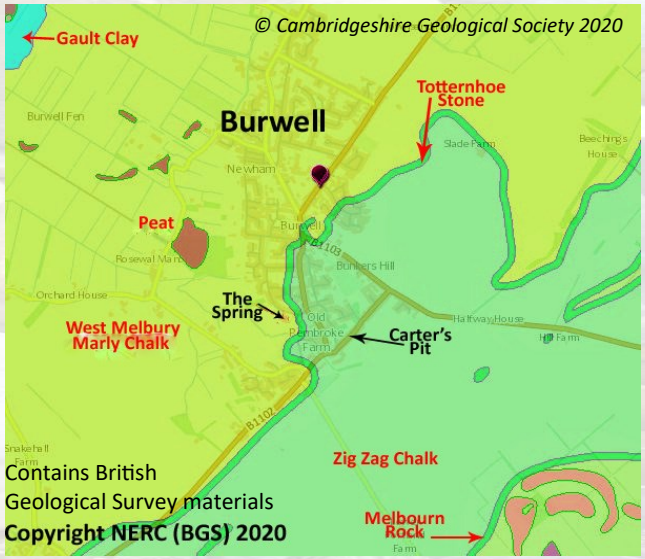
The Outcrop

Chalk is a limestone formed from the calcareous skeletons of the pelagic coccolithophores (algae) which flourished in the very warm seas covering this area in the Late Cretaceous (just under 100 Mya). Sea temperatures could have been up to 30°C. Sea level fluctuated during this time from 100—200m deep and the lower more impure rocks indicate a closer shoreline. Fossil shells of other sea animals from these rocks (bivalves, brachiopods etc) can be seen in blocks in local walls. No flints are found in these horizons - the silicon was absorbed by the clays in the rock.

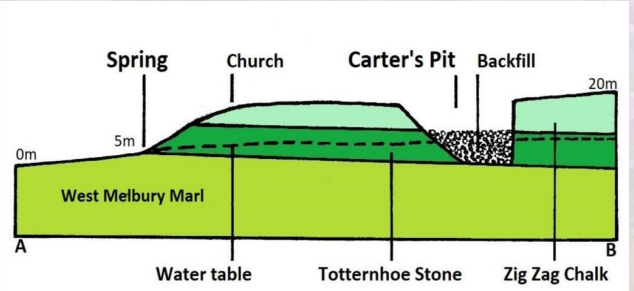
The basal member of the Grey Chalk seen here is the soft, dingy grey, poorly bedded West Melbury Marly Chalk: it is a very impure chalk with a significant clay content partially derived from volcanic ash thought to be from North Sea volcanicity. This clay content makes the rock impermeable. The succeeding horizon is the Totternhoe Stone (locally called Burwell Rock or Clunch). This is a harder chalk band that contains more broken shell fragments and less clay that can be traced from Bedfordshire through Cambridgeshire and being harder, it is a common building stone. The base of this unit is fractured which makes it more porous: this is the junction from which the spring issues. This horizon is approximately 6 m thick, but its top is not seen in this section: the total height of the exposed section of rock here is approximately 1.5 to 2m thick.



The basal marly chalk can be seen in places further along the stream bed.



Geology map showing the relative position of the Burwell LGS sites



Schematic section (not to scale) to show relationship between geological structure, relief, and drainage. AB represents c. 2kms. Vertical exaggeration c. x12.

County Wildlife Site

The site of the castle grounds, which includes the spring, has been designated a CWS for its flora. Its neutral to alkaline soils provide for a wide variety of native species including: Ladies Bedstraw, Bird's -Foot Trefoil, Cocksfoot, Sheep Fescue etc. The spring feeds a marsh around the castle which has a community of bog plants.

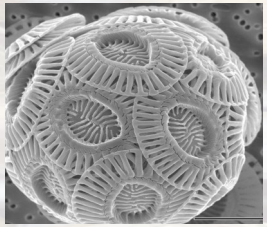
How did chalk form?

Chalk rock is only found in the Cretaceous (named from the Latin for "chalk") and is fairly unique in that it is not being formed at the present day—thus giving the lie to Hutton's theory of uniformitarianism! It spreads from Northern Ireland, across most of Britain to Denmark and N. France.

Generally the Chalk was deposited in sea temperatures of over 20°C with a CO_2 rich atmosphere causing dense marine algal blooms. These blooms were composed of Coccolithophores which in turn were made up by collections of calcareous discs (Coccoliths). When they died, the discs disaggregated and sank to the sea floor. Deposition rates have been estimated to be 1cm in 500 –1000 years.

Although seemingly uniform, the Chalk is actually quite variable and some distinctive layers can be traced for tens of miles, if not further. The Lower Chalk, now called the Grey Chalk, is more impure, having distinct hard bands and fossiliferous layers. The purer White Chalk above (for example, the cliffs at Dover or Old Harry Rocks in Dorset) is often typified by flint horizons (much sought by Neolithic Man). These flints are silicon nodules often formed around body and trace fossils. The silicon came mostly from sponges which took a lot of time to dissolve. Flints are mostly seen in the fields in southern Cambridgeshire.

Burwell in the Cretaceous was on the edge of a sub-sea swell called the Anglo - Brabant Ridge. This gave shallower seas and the Chalk deposits are classed as "Transitional" between the different "chalks" to the north (Hunstanton) and those of the south (e.g. Kent and Sussex).



A scanning electron microscope image showing the calcite plates (coccoliths) of a coccolithophore
Image sourced from: Alison R. Taylor; CC BY-2.5

How to get there: The OS co-ordinates of the site are TL58961. Burwell is reached by bus from Cambridge and Newmarket. The bus stop is next to the church on the High St. Some parking is next to the Guildhall. The Spring, is accessed through a gate (signed "the Castle") off Mandeville Lane. Turn left down into the Burwell Brook area. Take care of the slippery banks: **please do not walk in the stream or damage the exposure**. The site is also a County Wildlife Site. It is owned by Burwell Parish Council (www.eastcambs.gov.uk/parish-councils/burwell-parish-council).

There is a second LGS in Burwell, Carter's Pit within walking distance of the Spring. Please refer to its leaflet or visit **www.cambsgeology.org.**

Also known as Geosites (previously, Regionally Important Geological Sites), LGS are the most important sites of local geoconservation value. Further information on LGS and the geology of Cambridgeshire can be found on our website.

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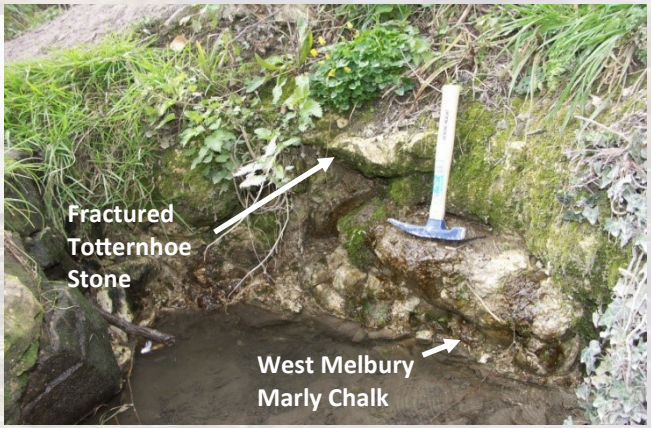

Castle Spring
Burwell
Cambridgeshire Local Geological Site

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