Geology and Trails In and Around Farnham

Farnham and its surrounding area is situated along the northern rim of the Wealden Anticline and is west of the Hogs Back where the rocks dip steeply north, see Figures 1, 2a,2b. This succession of Mesozoic to Palaeogene sediments are almost vertical in places.

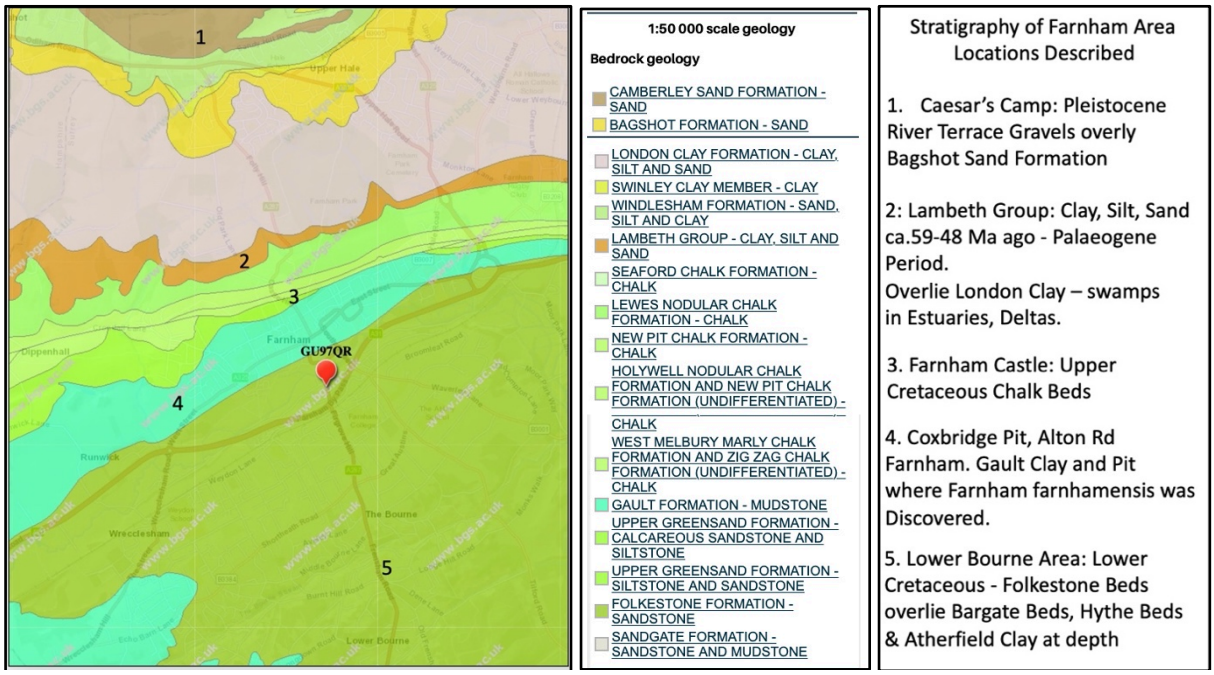

Figure 1: Geological Map based on BGS Website Maps and Stratigraphic Bedrock Geology Colours

http://mapapps.bgs.ac.uk/geologyofbritain/home.html

The Farnham map (Figure 1) has been centred on location GU9 7QR which is the post code for the Maltings as this is known to Farnham Geological Society members as the meeting place for our monthly lectures.

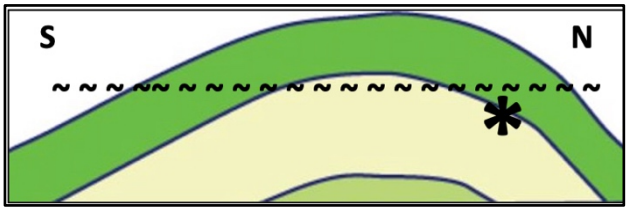

Figure 2a: Cartoon to show location of Farnham area in relation to the steeply dipping northerly limb of the Wealden Anticline with a coarse representation of the Cretaceous stratigraphy.

*Approximate location of Farnham.

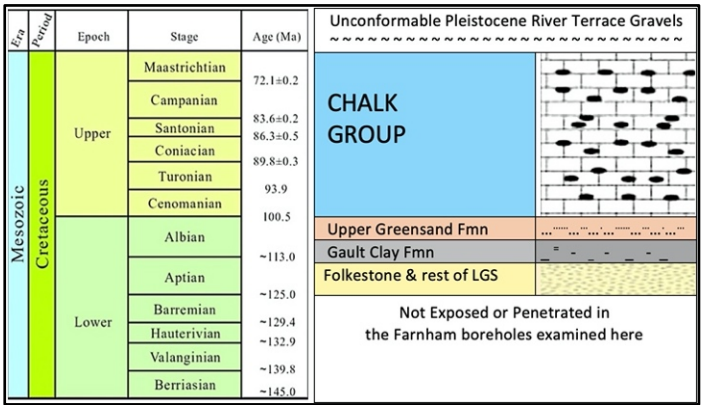

Figure 2b: The Cretaceous Stratigraphy in the Farnham Area

The Stratigraphy in the Farnham area is dominated by a sequence of Cretaceous beds from the Folkestone Formation in the Lower Cretaceous through to the Nodular Chalk of Upper Cretaceous (Coniacian in age). These sequences are both interesting and extensive and are discussed below as (oldest) Lower Greensand Group through the Gault and Upper Greensand succession into the Upper Cretaceous White Chalk Group.

There is an unconformity at the top of the Chalk sequence until the Tertiary Thanetian times (59 million years ago) when the sequence continues with a continuous sequence from Lambeth Group sediments to London Clay and Bagshot Formation beds (Eocene ca. 45 million years old).

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Chair, Farnham Geological Society

At the north of the area in Figure 1, the Bagshot Formation has been eroded and is now capped unconformably by the Caesar's Camp Formation, one of the Pleistocene River Terrace Gravel Formations.

Unfortunately it has not been possible to conduct field examination of these sequences. So several sites shown in Figure 1 have been chosen to investigate these rocks through boreholes, internet sources and personal communications and these are described below.

Geologists describe sedimentary rocks in the logical sequence from the oldest to the youngest since that is the order in which they were laid down. So I am starting in the south (yellow beds in Figure 2a, b) and working north from the location number 5 on the map in Figure 1 above, through to the location number 1.

Sites 4/5. Lower Cretaceous Beds

The top of the Lower Cretaceous in this area is more complicated than normal because was in the coastal shallow waters along the western edge of the basin. Between the Aptian and the basal Cenomanian (ca. 125-98 million years ago) the shoreline fluctuated as the sea level changed. Here three Formations are present below the Chalk:

- Upper Greensand; Albian to Cenomanian (latest Lower Cretaceous ~100-98 million years).
- Gault Formation; Albian (uppermost Lower Cretaceous ~113-100 million years).
- Folkestone Formation; Aptian to Albian (Lower Cretaceous ~125-113 million years).

The Folkestone Formation

The Folkestone Formation is present across the whole area and found in many boreholes and are described as interbeds of grey to black claystone and sandstones. The Folkestone Formation sandstones are described in more detail as mainly hard, brown, medium- to coarse-grained, well-sorted, cross-bedded, weakly cemented, sometimes calcareous and often with pyritic cement in the basal beds. They form the top beds within the Lower Greensand Group and outcrop extensively across the area south of Farnham to Lower Bourne, Frensham Ponds and beyond to Churt and further east on the other side of the River Wey it can be visited at Crooksbury Hill. Walks around Crooksbury Hill and along the Greensand Way are referenced at the end of this document.

Many boreholes penetrate deeper and into earlier sequences within this Group including the Sandgate Beds, Hythe Beds and Atherfield Clay. These are all different facies of the Lower Greensand Group beds, but the ones exposed around Farnham are the top relatively near shore facies sequences of the Lower Cretaceous, the Folkestone, overlying Gault and finally Upper Greensand Formations before the area sank below the Chalk limestone seas across the whole area.

Coxbridge Pit

At this pit, a new species of ammonite was discovered – it was named in honour of the finder (R Casey) as *Farnhamia Farnhamensis Casey*, see Figure 3, left. It was found in the Folkestone beds at Coxbridge Pit which here are 24-27m below the Gault Formation.

Ammonites are very common in Mesozoic rocks (rocks laid down in the Jurassic and Cretaceous Periods, over a total of approximately 140 million years). Ammonites are particularly useful to stratigraphers because they evolved very rapidly (i.e. their characteristics changed very frequently), in thousands rather than millions of years so are used to date the rock layers they are found in and this enables any associated fossils to be dated as well.

Figure 3: Farnhamia Farnhamensis Casey as found by R Casey.

Ammonites frequented coastal regions like the area of deposition of both the Folkestone and Gault Formations in this area as well as drifting and swimming across the oceans and seas around the globe at this time.

A list of additional sources for information on ammonites is included with the references at the end of this document.

Location GU9 7QR. The Maltings, Farnham

The Maltings lies slightly north of the GU9 7QR location on Figure 1 and is virtually on the boundary between the Folkestone Formation to the south (high hill running towards Lower Bourne on the other side of the railway line) and the Gault Formation to the north (the flat area of Farnham on the other side of the river). The River Wey flows from west to east along this junction and can be seen in the adjacent image, Figure 4.

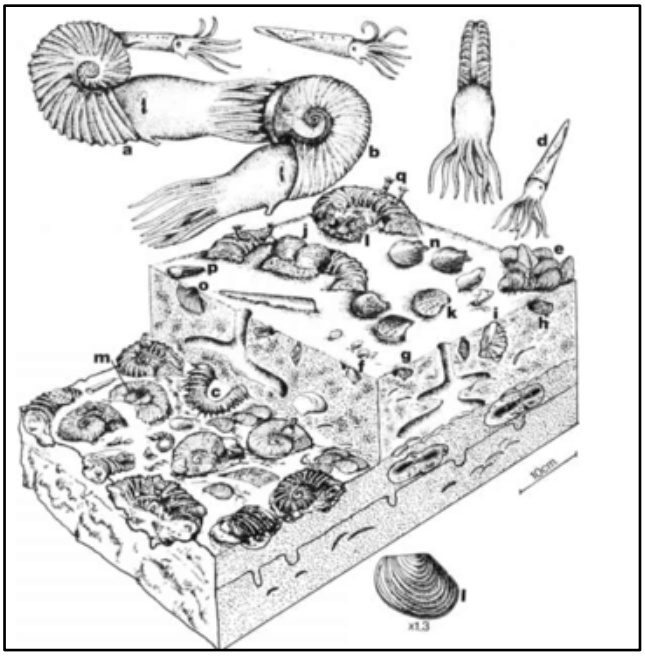
These are the headwaters of the River Wey, but during the Pleistocene these were the headwaters of the River Blackwater. However as a result of isostatic readjustment and / or faulting at the western end of the Hogs Back, these headwaters were diverted south and joined the River Wey. The path of this diversion is displayed in Figure 14a below.

Figure 4: River Wey near Farnham *(© Copyright Dewi licensed for reuse under this Creative Commons Licence.)*

Site 4. The Gault Formation

The Gault Formation comprises pale to dark grey or blue-grey claystone or mudstone, glauconitic in part, with a sandy base. Discrete bands of phosphatic nodules (commonly preserving fossils) can be found together with some pyrite and calcareous nodules. In Farnham boreholes it is described as blue-grey to black claystone but with thin layers of greensand, and, pebbly or with thin, limestone beds at its base. It overlies the Folkestone Formation.

The claystones accumulated in a calm, fairly deep-water basin, but in this area it was shallower and coastal at times. The claystones generally lie below vast areas of pasture with grazing cows and are thus rarely exposed. The claystones have lots of fossils which swam around at that time, typically molluscs:-



- ammonites: a, b, c & belemnite d;
- bivalves: e Inoceramus; f, n, o Pectins; g, h, i Trigonia; j, k, l, m Spondylus;
- p is an Ichthyosaur tooth;
- q is a serpulid worm.

Figure 5: Typical molluscs found in the Gault Formation.

For more details, go to:
- https://www.ecologycenter.us/mollusca-bivalvia/lower-cretaceous.html

The Gault Formation claystones underlie Willey Park Farm Wrecclesham and together with the other Lower Cretaceous beds, extend in a long outcrop, west to east, through Farnham paralleling the River Wey. The Formation forms a subcrop to the Chalk at depth to the north of the River Wey; whereas to the south of the river, it has been eroded off the hills exposing the Lower Greensand Group beds.

The Gault (and Upper Greensand) outcrop extends eastward from Farnham in a narrow band which widens as it extends round the nose (south of Basingstoke), at the western end, of the Wealden anticline. The Gault Formation extends further west under the Chalk of Salisbury Plain and beyond to Shaftesbury where it has been eroded.

Upper Greensand Formation

The Upper Greensand Formation has localised outcrops across the Weald; the BGS note it's limits are Eastbourne to Sevenoaks in the Weald; across the Wessex Basin and northwards to just northeast of Monks Riseborough in the Chilterns. In the Farnham area they outcrop at the western end of the Hog's Back near Seale but do not occur in boreholes further east. To the west, they are found in boreholes below the Chalk and also extend west, past Salisbury Plain to Shaftesbury where the sequence has also been eroded.

These beds complete the Lower Cretaceous series being Albian to Cenomanian in age and are thus overlain by the thick Chalk beds, changing from this arenaceous sequence to marly or chalky rocks.

Figures 6a, b: House Bricks made at the Upper Greensand Quarry on W end of the Hogs Back – used for external and internal brickwork in houses across the area until the Quarry closed at the end of the 20th Century?

A quarry on the southern margin of, and at the western end of, the Hogs Back used these Upper Greensand and Gault Formation rocks to mak house bricks, which were a very attractive mottled pink to brown colour and used around the area for many years until it closed. (Exact date of closure is unknown)

Site 3. The Chalk Hills

Chalk outcrops dominate the areas to the east and north of Farnham. To the east is the North Downs National Character Area (NCA) and the beginning of a chain of Chalk hills extending from the Hog's Back in Surrey and ending at the renowned White Cliffs of Dover. The area is characterised by traditional small, nucleated villages, scattered farms and large houses with timber framing, flint walls with Wealden brick detailing. Twisting sunken lanes, often aligned along ancient drove roads, cut across the scarp and are a feature of much of the gentle dip slope.

To the north, the Chalk outcrop is represented by the steep hills running northward out of Farnham town up Castle Hill and indeed the Castle is located on this outcrop. The castle was built as a home for the Bishops of Winchester who occupied the building for more than 800 years. It has a dominant location on the Chalk outcrop looking south across Farnham (Figure 7).

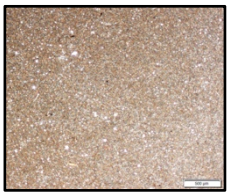
Figure 7a: View of Farnham Castle, perched on the Cretaceous Chalk Ridge in Farnham *(Alamy stock photo*).

Chalk is Upper Cretaceous in age (ca. 95-66 million years old) and formed in warm, shallow shelf seas with little sediment input from land, which makes the Chalk so clean, clear and white. The 'Chalk Seas' stretched for miles across the UK to France and to most of Europe.

The North Downs extend all the way to Kent and normally have a steep scarp slope along their southern edge and a gentler dip slope. But here in Surrey, the dip slope is equally as steep as the scarp slope, i.e. the Chalk beds are dipping almost vertically. So the outcrop on the map is narrow (see cross section in Figure 10 below). This narrow Chalk outcrop along the North Downs at the Hogs Back to the east continues as a narrow tract through the Farnham area indicating that the beds must be equally steeply dipping here.

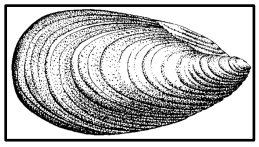
From the castle there are lovely views south to Crooksbury Hill (Figure 7b) which shows the height of the Folkstone Formation in this area, part of the Lower Greensand Group and described below. This hill is 163m high and is part of the Surrey Wildlife Trust which gives details of several walks in the area. There is a short circular walk to the hill summit. where there are excellent views over the surrounding countryside of the North Downs and on a clear day there are views across Surrey and Hampshire to the South Downs. The trail descends via the ancient earthwork at Soldiers Ring. The walk can be extended to south east to Crooksbury Common. Details of the walks are included at the end under references.

Seale Chalk Quarry



This small old chalk quarry on the southern flank of the Hog's Back is of particular interest for its geology and typical Chalk land flowers. It is administered by the Surrey Wildlife Trust and permission to enter has to be obtained from the trust. Typical chalk is described by the BGS as *"Chalk, with or without flint and discrete limestone, marl (calcareous mudstone), sponge, calcarenite, phosphatic, hardground and fossil-rich beds".* Figure 8a, left, is typical of Chalk: calcareous mud and minute clasts.

The Chalk here marks the boundary between the London Basin to the north and the Wealden anticline to the south. It was a working quarry until the 1930s and was one of a series of small quarries along the Hog's Back which served a local market for lime.



It contains the fossil bivalve, Inoceramus (Mytiloides sp) which occurs at the base of the Turonian stage of the Cretaceous (93.9 - 89.8 Million years million years ago).

Figure 8b: Inoceramus (left) from the White Chalk Group: Holywell Nodular Chalk.

The bivalve found in the Chalk Pit at the Base of the Turonian Stage.

Figure 8c: Mollusc Mytiloides sp, also known as a mussel, found in the Seale Pit.

Figure 9 a, b, c: Seale Pit and The Nodular chalk exposed towards the top of the Quarry

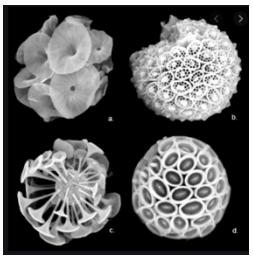


Figure 9d: The Chalk consists of microscopic remains of plankton as shown in this image.

The plankton are spherical, made of tiny plates, which usually fall apart when the animal dies and form a very fine calcareous ooze (fragments are pin-head size). Spheres are extremely small and cannot be seen without scanning electron microscopes. Individual plates are less than 25 micrometres.

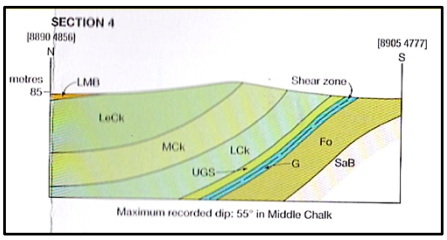


Figure 10: This cross section reflects the steepness of the 'gentle' dip slope of the North Downs at the Hogs Back; it records a dip of 55°. Note the thin outcrop of both the Gault and Upper Greensand beds and the presence of the underlying Folkestone, Sandgate/Bargate beds. *Key: LMB Lambeth Group; LeCk Lewes Nodular Chalk; MCk Middle Chalk; LCk Lower Chalk; UGS Upper Greensand; G Gault; Fo Folkestone Beds; SaB Sandgate Formation*.

From the top of the Hogs Back it is possible to see north to the Camberley Ridges, east to London and on a clear day one can see the London Eye, Gherkin, Post Office Tower and many other landmarks, and south the best view of all – across the Weald. My favourite view. The Wealden rocks are Lower Cretaceous in age and we shall see descriptions of those later.

Dinosaurs were alive at this time but their fossils have not often been found in the Chalk limestones.

The Hogs Back dominates the landscape to the east of Farnham and the Open University have a good guide to walks there at https://ougs.org/files/lon/reports/Hogsroute_No_Maps.pdf.

Knowle Lane Footpath

Knowle Lane Footpath runs off Old Park Lane, Farnham, GU9 0AH. If you walk along this lane, you will be walking westwards along the Chalk scarp, although here it is covered by the London Clay and Lambeth Group beds.

Here the Chalk comprises the Lewes Nodular Formation, of the 'white' (Upper) Chalk, Turonian to Coniacian, 94-90 million years old.

This section of the Chalk is described as hard to very hard nodular chalks and hardgrounds with interbedded marls and softer chalks which become more abundant towards the top. These nodular chalks are typically lumpy and iron-stained (usually marking the presence of sponges). Some of the seams of flint are large and regular.

Although there are no exposures along this footpath (Figure 11, left) there are several nearby pits in the Chalk and the underlying Upper Greensand however these have been infilled and overgrown. There are lovely views to the south, across the Wey Valley to Crooksbury Hill and Hindhead.

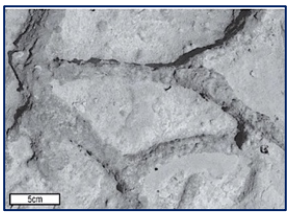
Site 2. The Lambeth Group Beds and London Clay

The Lambeth Group Beds and London Clay are soft rocks and are not exposed so have not been given a lot of description here. The London Clay comprises bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty claystones with some layers of sandy claystone and can include layers of carbonate concretions ('cementstone nodules'); disseminated pyrite is common. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation.

In a borehole in Knowle Farm, Old Park Lane, the London Clay is described as brown to blue claystone with silt and shells near the base; it is ca. 30m thick. It overlies the Lambeth Group which are described as multicoloured claystones and sandstones; these are ca. 20m thick (but those thicknesses are drilled thicknesses not true vertical thicknesses).

Site 1. Bagshot Formation

The Bagshot Formation, previously known as the Bagshot Formation Sands are Ypresian in age (lowermost Eocene, 56-48 million years ago). The Formation comprises dominantly sandstones with claystone interbeds which are sufficiently continuous in places to suggest a series of three sections – lower, middle and upper sandstones. The sandstones are generally composed of pale yellow-brown, locally orange, fine- to coarse-grained sandstones with claystone interbeds which can form local spring lines during periods of heavy rain. The sandstones can be micaceous and locally glauconitic; they can also be cross-bedded, laminated or structureless.



Fossils are marine molluscs but they are few and far between; locally, indistinct plant remains have been found. The higher beds are bioturbated in places (Ophiomorpha burrows, Figure 12, left, photo ex Wikimedia). A road section (M3 in Surrey showed channel-fill sands and intraformational (mud clast) conglomerates - the sequence showed rapid lateral and vertical changes in both grain size and bed form and with a restricted suite of trace fossils. Exactly which part of the formation this section represents is unknown.

These sandstone beds dominate this whole area north of Farnham outcropping over a wide area to the west, north and east. These are not fertile rocks and can be readily recognised by their cover of heathland which dominates the heights over this area.

They are capped locally at this location by the Caesar Camp conglomerates.

Site 1. Caesar's Camp Gravel Formation

Caesar's Camp is an area of high ground 3km north of Farnham, at 175-187m OD, between Aldershot and Farnham. It is a remnant one of the many high, plateau, river terrace gravel formations of Early Pleistocene age, about 2 million years old, near the beginning of the Ice Age and are part of the Dunwich Group. It lies within the Bourley and Long Valley Site of Special Scientific Interest and has views east across to the London Skyline, Figure 13a, below.

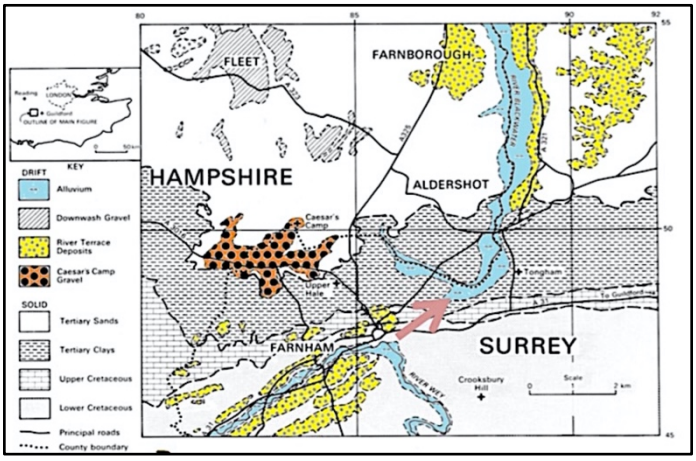
Here at Caesar's Camp, the rocks vary from unbedded to thickly bedded cobble-sized gravel (64-256mm clasts) interbedded with coarse sands. The cobbles are dominantly of nodular flint with subordinate quartz and chert from Cretaceous Greensand beds. The sand is subangular, dominantly quartz with some flint, and occurs as horizontal planar-bedded and cross-bedded channel-fill units with silts. This fluvial sequence was deposited by periglacial rivers (i.e. rivers draining the area fringing the main ice sheet across the UK, further north) but these rivers were draining to the northwest suggesting that the Chalk downs and Folkestone sandstones south of Farnham were probably a prominent feature at that time.

There is a sharp, highly irregular erosional basal contact with the underlying Palaeogene Camberley Sand Formation, obscured by a veneer of solifluction deposits and there is well-defined palaeosol (ancient soil horizon) in the upper part of the gravels, overlain by silty fine sand of aeolian origin (wind-blown loess).

The sequence of gravels are up to 6m thick with no overlying deposits. The pond in this image, Figure 13b, is on the Caesar's Camp Gravel site.

This rock formation is restricted to these plateau remnants at Caesar's Camp, but other similar sequences of gravels occur at similar heights across the area deposited by a series of similar glacial rivers.

Along the southern part of the map, on top of the Lower Cretaceous (Folkestone - Gault) beds there are many river terraces which can be linked to those of the Thames across London and the following comments are from David Bridgland's Lecture to FGS on 21 April 2017 and reported in FGS Newsletter, February 2018, River Terraces of Farnham.

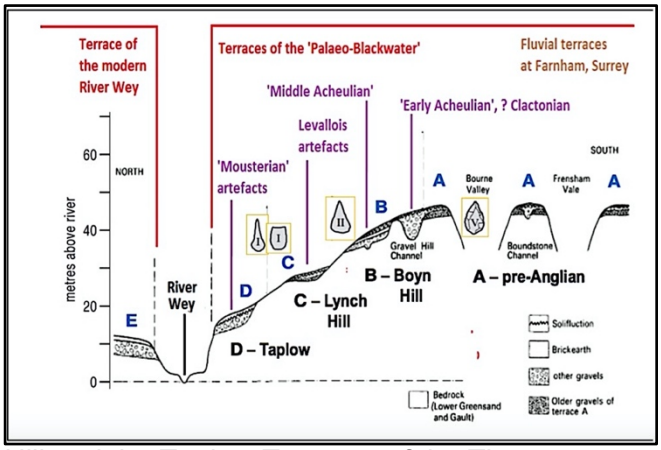


The upper reaches of the River Wey have left a 'staircase' of river terraces which extend up the Lower Greensand hills south of Farnham. This map shows their relationship to similar terraces which were left by the lower reaches of the River Wey below Farnham (these are now included in the Thames drainage system). The former drainage route of the Farnham Wey River into the Blackwater River is arrowed. Figure 14a (left) shows the geology of the Farnham–Aldershot area.

These Pleistocene sediments are important as they can be a rich source of mammalian and molluscan fossils and Chalk-derived flint which is a high-quality raw material used for tool making during the Palaeolithic.

The archaeology can be summarized under three broad groups, which correspond with Modes 1, 2 and 3 as defined by the archaeologist Grahame Clark (World Prehistory, 1969):

Mode 1 = the Clactonian industry, comprises cores & flakes, with no core preparation and no formal tools;
Mode 2 = hand axes (= Acheulian); and
Mode 3 = Levallois technology, with core preparation.



River terraces in the vicinity of Farnham are rich sources of Palaeolithic material. Derek Roe recognized an assemblage attributable to his Group V in the highest of the Farnham terraces, designated 'A' (Figure 14b, left). Although no other material from Farnham was considered to represent a high-integrity assemblage, it is apparent that hand axes from the next oldest terrace ('B') resemble those from the Boyn Hill Terrace of the Thames and those from Terrace 'C' resemble those from the Lynch Hill Terrace of the Thames.

Furthermore, Levallois technology appears in the terrace ('C') and is well developed in the next and younger terrace ('D'), inviting comparison with the Lynch Hill and the Taplow Terraces of the Thames, respectively.

Waverley Abbey

Waverley Abbey (Figure 15 below) was the first Cistercian abbey in England, founded in 1128 by William Giffard, the Bishop of Winchester. It is located north of site 5 (close to Lower Bourne on Figure 1) about 3km southeast of Farnham. It is situated on a flood-plain and has been flooded more than once. In this area there are patches of deposits from previous channels of the River Wey of Pleistocene age.

The abbey was suppressed in 1536 as part of King Henry VIII's Dissolution of the Monasteries and was largely demolished, its stone being reused in local buildings, e.g. in Waverley Abbey House, which was built in the northern portion original abbey precinct.

Waverley Abbey House (Grade II Listed Building), the abbey ruins and surrounding land are all part of a conservation area; the ruins are a Scheduled Ancient Monument, currently managed by English Heritage and open to the public. See references for walks around this area.

The rock sequence here is alluvium (clay, silt, sand and gravel) and below that Pleistocene river terrace deposits of the early River Wey, deposited ca. 2 million years ago, on one of the terraces shown in Figure 14b above, probably the one labelled A. It is at the same general distance south of Farnham as Lower Bourne.

These gravels are described as ranging from coarse- to fine-grained sandstones with lenses of pebbly sandstones from channel flood deposits. The finer sandstones will be floodplain and levee deposits.

Building Stones of Farnham

Last we look at Building Stones used for the construction of St Andrew's Church Farnham itself and paving within the churchyard and also the rocks used as facings for some of the old establishments along the High Street. Dr Diana Smith took FGS members on a trip around Farnham to give us a taste of the different building stones that have been used and Rosemary Couzens wrote an account which is reported in the FGS Newsletter of October 2017 (incorrectly quoted as being reported by Sally Pritchard).

Buildings in Farnham used the Wealden rocks as building materials - Chalk, Greensand, Folkestone Formation sandstone, malmstone (a consolidated marl) and Gault claystone - this is known in the sculpting community as 'Farnham Clay' as it is easy to work, looks good and is frost proof once fired.

The builders of the Church have used a mixture of stones including Bath Stone (oolitic limestone), Portland Stone (shows black mica and glauconite grains under magnification), Portland Stone, sarsens and freshwater Purbeck Marble (soft so weathers easily) and elsewhere greensand, see Figure 16 below.

Weathered Purbeck Marble: dense Viviparus shells (FW snail), polishes to a 'marble'.

Bath Stone - oolitic limestone. Photo by R. Weller Cochise College

Greensand, split to show the colour when fresh. Photo ex Wikimedia commons

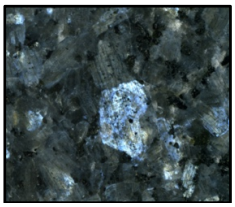
Portland Stone - durable with a high shell content. Photo ex Wikimedia commons

Yorkstone used as paving slabs in the churchyard private photo

Paths are paved with Yorkstone which comprises multiple layers of fine grained sand which have a current lineation and have been cemented and so give a naturally non-slip surface. Yorkstone slabs have been used for centuries to pave the streets of London.

Buildings in Farnham high street have facias of 'granite' and 'marble' which are actually Precambrian Larvikite from Norway (Figure 17 below) and polished rocks sometimes malmstone, other times limestones.

Natural rock, Swiss franc 23.30mm



Polished rock

Figure 17: Larvikite is often called 'publichouseite' or 'blue pearl granite'. It is a plutonic igneous rock but does not have the same chemistry or minerals as granite. It is a silica-poor rock and comprises both alkali and plagioclase feldspars, augite and hornblende. The blue pearl shine comes from the shimmering of cleavage planes and alternating feldspar layers. It comes from the Larvik Plutonic Complex, Langesundsfjord area, Norway. Photos: Woudloper - Own work Université de Neuchâtel.

https://commons.wikimedia.org/wiki/File:Blue_Pearl_Granite_(larvikite)_Larvik_Batholith_Norway.jpg#/media/File:Blue_Pearl_Granite_(larvikite)_Larvik_Batholith_Norway.jpg

References and Further Reading

- Caesar's Camp is a popular place for walkers and The Ramblers suggest this start point: Rowhill Nature Reserve, postcode GU11 3BD Explorer 145 GR SU849500.
  https://en.wikipedia.org/wiki/Caesar%27s_Camp,_Rushmoor_and_Waverley
  https://www.mtbr.com/trails/europe/united-kingdom/Farnham/ceasers-camp.html.
- Bridgland, D., River Terraces of Farnham, FGS Lecture, 21 April 2017; Reported in FGS Newsletter, February 2018.
  Professor Bridgland's request for help in researching the classic Quaternary "staircase" of river terraces along the Blackwater Valley, particularly near Farnham. He writes: *"I need to find out where there might be exposures (or access by digging) on the various terrace outcrops, especially Terraces 1A to D, which were the ones with the most important discoveries of stone tools. On the map, it is the gravel south of the town that is most important, that outcrop representing multiple terrace remnants aligned SW - NE. So it would be good to know from people with local knowledge whether they know of anywhere within that mapped outcrop where gravel can be seen, either in outcrop or as surface debris. Maybe some of the FGS members might even live on the outcrop and might like the soil in their garden turned over?"*
  Please reply direct to David at **d.r.bridgland@durham.ac.uk**

- Dines, H G and Edmunds, F H. 1929. The Geology of the country around Aldershot and Guildford. Memoir of the Geological Survey of Great Britain, Sheet 285.
- Bury, H. 1922. Some high-level gravels of North-East Hampshire. Proceedings of the Geologist's Association, Vol.33, 81-103.
- Ellison, R A, Williamson, I T and Humpage, A J. 2002. Geology of the Guildford district - a brief explanation of the geological map. British Geological Survey. 1:50 000 Sheet 285.
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- Clarke, M R, and Fisher, P F, 1983. The Caesar's Camp Gravel - an early Pleistocene fluvial periglacial deposit in Southern England. Proc. Geol. Assoc., Vol.94, 345-355.
- Clarke, M R, and Dixon, A J. 1981. The Pleistocene braided river deposits in the Blackwater area of Berkshire and Hampshire, England. Proc. Geol. Assoc, Vol.92, 139-157.

Coxbridge Pit

- The Coxbridge Pit is also familiar to archaeologists of the area for the find of a mammoth tusk.
  https://www.farnham.gov.uk/wp-content/uploads/2019/11/pop-up-1.pdf

Further information about ammonites can be found at:

- Wikipedia – Ammonoidea
  https://en.wikipedia.org/wiki/Ammonoidea
- The Australian Broadcasting Company (ABC) currently has a science section called the age of reptiles which discusses ammonites.
  https://www.abc.net.au/science/ozfossil/ageofreptiles/eromanga/ammonites.htm
- The British Geological Society has a section of their website which discusses ammonites.
  https://www.bgs.ac.uk/discoveringGeology/time/Fossilfocus/ammonite.html

Ophiomorpha Burrows:

- De Gibert, J., Mas Gornals, G. Ekdale, A. Architectural complexity of marine crustacean burrows: Unusual helical trace fossils from the Miocene of Mallorca, Spain. Oct 2012

http://www.gps-routes.co.uk/routes/home.nsf/RoutesLinksWalks/crooksbury-hill-walking-route

While most people head to Box Hill or Leith Hill for sweeping views of Surrey, Crooksbury Hill is located on the opposite side of the county and it is considered a hidden gem. Not only is the vista incredible and you'll feel like you're a million miles away from home, there's a lovely pub close by with two pet donkeys called Pip and Dusty which is a must-visit. The panorama from the wooded top of Crooksbury Hill in Farnham is well worth the hike up to the summit.

http://www.gps-routes.co.uk/routes/home.nsf/RoutesLinksWalks/greensand-way-walking-route

The Greensand Way runs from Haslemere in Surrey to Hamstreet in Kent following the ridge of greensand rock that crosses the two counties. The route takes in two Areas of Outstanding Natural Beauty - the Surrey Hills and the Kent Downs - as well as numerous Sites of Special Scientific Interest.

http://www.gps-routes.co.uk/routes/home.nsf/RoutesLinksWalks/waverley-abbey-walking-route

This walk visits the ruins of Waverley Abbey in Farnham, Surrey. There's some nice walking trails along the River Wey and around the site which is run by English Heritage. As well as the atmospheric ruins there's also a pretty serpentine lake to stroll along and a number of information plaques detailing the history of the abbey.