London - Green Chain Geotrail

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This Green Chain walk connects some of London's most interesting geological sites. It covers 7 miles from the Thames Barrier to Lesnes Abbey. Most of the rocks are between 50 and 60 million years old (Palaeogene). Part of the walk is described here but the full Geotrail can be freely downloaded from http://www.greenchain.com/pdfs/Geologytrail.pdf produced by the London Geodiversity Partnership.

Age (m years)	Period	Stage	Group	Formation	Informal names	Thickness in area	Description and how they were deposited
51-54	Palaeogene	Eocene	Thames Group	London Clay Formation	Claygate Beds	15-18m	Sandy clays deposited in shallow seas
					London Clay	Up to 70m	Grey clay that weathers brown, sandy at top. Five cycles of marine transgression
55				Harwich Formation	Blackheath Beds	5-27m	Fine-grained sand, rounded black flint pebbles & shelly lenses, occasionally cemented, deposited in a marginal marine environment
			Lambeth Group	Woolwich Formation	Woolwich Beds	0-7m	Layered grey clay and sand with shell beds. Deposited in estuaries and lagoons
56		Paleocene		Upnor Formation		0-5m	Greenish-yellow sandy silts deposited in a shallow marine environment.
58				Thanet Sand Formation	Thanet Sand	5-14m	Fine-grained sand, very clean in some horizons, deposited in a shallow marine environment
84	Cretaceous	Santonian		Chalk	Upper Chalk	Up to 18m exposed	White chalk with courses of nodular flints. Chalk is a limestone formed entirely from the skeletons and shells of marine organisms that lived in warm seas
Unconformity between Chalk and Thanet Sand when there was a break in deposition							

Figure 1 Stratigraphy

Site 1 Thames Barrier.

Serious floods occurred on the Thames in 1928 and 1953. In the latter flood about 160,000 acres of farmland were flooded and over 300 people lost their lives. The flooding problem has become more acute with time as sea level has risen in the estuary. This results from polar ice melting and thermal expansion of the sea as average sea temperatures increase. The estuary is also sinking as the Earth readjusts after the ice age. One estimate is that, combined, these effects mean that sea level is rising up to 4mm per year. Without the Barrier, which became operational in October 1982 and first used in February 1983, the flooding that could be caused by a 1953 type of flood would directly affect 1.25 million people in London. The barrier closes when a flood incident is likely, isolating the upstream low-lying land from the high sea level in the estuary. A recent review has confirmed the barrier will be capable of providing protection against rising sea levels until at least 2070. Currently it is operated up to 15 times per year, which is expected to increase to 30 times per year by 2030. It was built as far downstream as practicable; where the Thames is relatively straight and where the Chalk has been brought to the surface by earth movements to provide a comparatively strong footing for the structure. Further details can be seen in the leaflet.

Site 2 Viewpoint at Cox's Mount in Maryon Park

At the top of the Mount, you can see the remains of an Iron Age hill fort behind the iron railings. From this point, there are impressive views of the Lower River Thames. Trees have grown up around the site and, in summer, the view is now rather obscured. You can see Charlton Athletic football ground in a former Chalk quarry, the Thames Barrier, the O2 Dome, the Queens House at Greenwich and the Blackheath Plateau above it.

In the leaflet, there is an interesting discussion here about the former route of the Thames with excellent, easy-to-understand diagrams.

Site 3 SSSI Gilbert's Pit.

There were many pits in the Charlton area exploiting the Thanet Sand and the underlying Chalk. This sand is uniform, very dense and light grey. Charlton was still beneath a shallow sea when it was laid down about 60 million years ago. The pit was

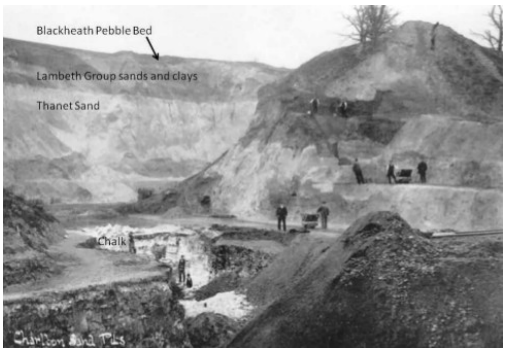

Figure 2: Gilbert's Pit in 1906 (Based upon Plate 8 of the Proceedings of the Geologists' Association, 1950 with permission of The Geologists' Association)

quarried primarily for the Thanet Sand for use in moulding cannon shot at the Woolwich Arsenal and for making into glass bottles. Towards the top of the slope there are sands and fossiliferous shelly clays of the Woolwich Beds, named after the area. Occasional shells can be found at the bottom of the slope where they have rolled down. This sequence is evidence of a transition from marine conditions to mud flats similar to modern mangrove swamps and lagoons, with varying amounts of fresh water. The Blackheath Beds are the highest, and therefore youngest, part of the sequence seen in the pit . They are composed of black well-rounded pebbles of flint in a sandy matrix with occasional seams of shells and were deposited in marine channels that were cut into the underlying Woolwich Beds. Some pebbles have rolled down the slope and piled up behind the fence.

Site 4 Charlton Cemetery Wall, Charlton Park Lane

Much of the wall consists of typical London handmade bricks. Note the 'scrunched' look created when the clod of prepared clay was squashed into the mould. The black patches are the charred remains of organic material (mostly household ash) mixed with the clay so that the bricks became self-combustible, allowing low-heat production in a 'clamp' on the fields on which the clay was dug. Brickearth was the most important of the clays used in the area. It mostly consists of very fine-grained clay containing a certain amount of ground-up Chalk but there can also be some sand mixed in when it was re-deposited by water on top of the gravels. The London Clay was also used for brickmaking but requires the addition of some sand and Chalk. All of these products can be found close by and brickmaking was formerly an important industry in the area.

Site 5 Ha-Ha and Shooters Hill

Next to the road is a long and deep ha-ha built about 1774 that separates the former Royal Artillery Barrack Field from Woolwich Common. You are now at the northern end of Woolwich Common, which gently rises southwards where it becomes London Clay. However, much of the southern half of the Common is overlain by imported soil and rubble. Beyond the Common and slightly to the left you can see Shooters Hill and, at 130m, it is the second highest point in London. It is formed of about 70m of London Clay. The hill is capped by sand and flint pebbles, which is the reason that Shooters Hill has not been eroded. A line of springs exists around the hill. These pebble beds are found capping the highest hills throughout London and there is an argument on whether they were deposited on beaches or by earlier river courses over a million years ago.

Where we are standing, the London Clay has been removed by erosion but north of the Thames it still provides an almost ideal tunnelling medium for the deep tube lines of the Underground. Absence of London Clay in south London explains why, for the most part, the underground system did not extend south of the Thames until recently. Waters from the London Clay towards the top of Woolwich Common, like those more famous from Epsom, were, in 1673, said to be medicinal. The water was boiled away and the resulting evaporite was known as Epsom Salts, (magnesium sulfate).

Site 6 Dog Rocks, Plumstead Common

These can be found in the shrubbery opposite the entrance to the Adventure Playground. They are so called from their shape seen in silhouette. They are Blackheath Pebbles that have been naturally cemented. For the most part, the Blackheath Pebbles are uncemented but just occasionally small areas of cemented pebbles can be found such as here at Dog Rocks. The steep bank crossing the common is one side of the former quarry, which was the source of the rocks. Evidence of brick making can be seen in the amphitheatre formed by the quarry. The low walls are made of over-burnt bricks (clinker). Garden walls of clinker are a good indication of former brick works close by.

Figure 3: Dog Rocks,

This is as far as we got when we were there. The rest can be viewed in the pdf download, previously mentioned.