This guide introduces you to the best geological sites on the Green Chain.

Each point on the map highlights a particular geological feature to illustrate conditions from 350 million years ago to the present. If you want to learn more about these features and the massive forces of nature that created them, they are brought to life in a fascinating audio “time trail” that starts from a nearby train station.

A trail through time
Geology on the Green Chain Walk

Geology and Landscape
London Clay at about 53 million years old lies under most of London. In the southeast, erosion has peeled away much of it so we can peer into older strata beneath. Predominant are the rounded black pebbles of Blackheath beds forming the plateau between Blackheath and Erith. There are many places where this plateau is cut by rivers, exposing even older strata. At the Gilbert’s Pit quarry you can see the older rocks of the Woolwich beds and Thanet Sand while Chislehurst Caves provides a view of Thanet Sand and even older Chalk. The imported ‘rock face’ at Crystal Palace takes us back about 350 million years. The last 400,000 years has seen many ices ages and warmer periods in which brickearth was deposited, of economic importance in the area for making bricks. At Erith, tree trunks from a 4,000 year old submerged forest can be seen at low tide.

Working together
The London Geodiversity Partnership was formed to identify, conserve and interpret geological sites in London. Some of the sites are protected as Sites of Special Scientific Interest (Gilbert’s Pit and the Fossil Enclosure). Others have been recommended because of their regional or local importance. We are working with the Green Chain to interpret these sites for all.

Take nothing but pictures
We need to conserve our geological sites for future generations by respecting them now. Please ‘take nothing but pictures and leave nothing but footprints’.

<table>
<thead>
<tr>
<th>Strata of the Green Chain</th>
<th>Age in million years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submerged Forest</td>
<td>4000 yrs</td>
</tr>
<tr>
<td>Brickearth</td>
<td>400-100,000 yrs</td>
</tr>
<tr>
<td>Gravel</td>
<td>~2 million yrs</td>
</tr>
<tr>
<td>48 million years of erosion or no deposition when the area was land</td>
<td></td>
</tr>
<tr>
<td>Claygate beds tidal marine</td>
<td>50</td>
</tr>
<tr>
<td>London Clay Marine</td>
<td>54</td>
</tr>
<tr>
<td>Blackheath Beds Marine</td>
<td>55</td>
</tr>
<tr>
<td>Woolwich Beds Estuarine</td>
<td>58</td>
</tr>
<tr>
<td>Reading Beds Terrestrial</td>
<td></td>
</tr>
<tr>
<td>Upnor Beds Marine</td>
<td></td>
</tr>
<tr>
<td>Thanet Sand Marine</td>
<td>84</td>
</tr>
<tr>
<td>25 million years of erosion or no deposition when the area was land</td>
<td></td>
</tr>
<tr>
<td>Chalk</td>
<td></td>
</tr>
</tbody>
</table>

Age in million years
Whatever the time of year, you will find something to delight you. Use the checklist to tick-off the sites you have visited and anything that inspired you on your visit!

- Erith riverside
- Lesnes Abbey Woods
- Plumstead Common
- Charlton Cemetery
- Maryon Park
- Blackheath
- Chislehurst Caves
- Beckenham Place Park
- Crystal Palace Park
- Sydenham Wells Park
- Dulwich Picture Gallery
- Nunhead Cemetery

The South East London Green Chain Walk is well served by numerous train stations, so visiting these amazing sites has never been easier.

Free maps and audio tracks to listen to or download at:
www.greenchain.com/timetrails

Green Chain Information Line:
020 8921 5028

All details in this leaflet are believed to be correct at the time of going to press. Whilst every effort has been made to ensure accuracy, the publishers can accept no liability whatsoever for any errors, inaccuracies or omissions, or any matter in any way connected with, or arising from, the publishing of this information.

Green Chain maps are reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty’s Stationery Office.

© Crown copyright and database rights 2016 Ordnance Survey 100019695.
© Green Chain Working Party 2016

South East London Green Chain: The London Boroughs of Bexley, Bromley, Royal Greenwich, Lewisham and Southwark working in partnership to safeguard, enhance and promote the Green Chain open spaces for the enjoyment of all.
1. Submerged Forest
Enith is the best place in Greater London for viewing the Neolithic / Bronze Age submerged forest. The Thames has only followed its present course through the centre of what became London since the great Anglian Ice Age ended 400,000 years ago. The route of the Thames has varied since then and on both banks at low tide it is possible to find remains of forests that used to cover the banks between 3,000 and 6,000 years ago, long after the most recent ice age was over.

Nearest station: Enith

2. Fossil Enclosure
The Fossil Bed at Lesnes Abbey was discovered by William Whitaker in 1872 while out walking his dog and observing the shells thrown out by rabbits at this location. The fossils are predominantly marine snails and bivalves with numerous sharks’ teeth amongst them. Occasionally bones and teeth of small mammals turn up and even the fingernail-sized hooves of an early member of the horse family, but most of the mammals that were living here 55 million years ago are less familiar to us today.

Nearest station: Abbey Wood

3. Pebble Conglomerate
The Dog Rocks on Plumstead Common are named from their shape in silhouette and formed of cemented Blackheath Pebbles. This part of the common is the floor of a quarry dug before 1866, probably for sand or pebbles. Springs rising from loose pebbles can be seen little further east along the Green Chain Walk in the Slade Gorge, formed when more water was available for erosion at times of colder climate and sparse vegetation following recent ice ages.

Nearest station: Plumstead

4. Handmade Bricks
After the Great Fire of London in 1666 a law was passed forbidding rebuilding in wood. The rocks beneath London and its surroundings are comparatively young (less than 100 million years) and for the most part are not hard enough to make a good building stone, so instead the local clay was used to make bricks. The cemetery wall shows typical yellow London stock handmade bricks containing charred remains of ashes added to the Brick earth to aid firing and squelch marks where the clay was thrown into the moulds.

Nearest station: Woolwich Dockyard

5. A Sand Quarry
This former quarry allows a rare opportunity to view geological exposures. 55 million years old. The black pebbles of the Blackheath beds and the sands and clays of the underlying Woolwich beds are studied by engineers and geologists for the many engineering projects under London. Thanet Sand was quarried here for the Woolwich Arsenal and for making glass bottles. Screes now covers the slope and the floor is covered by war-time rubble so it is not possible to see the Thanet Sand or the Chalk beneath.

Nearest station: Charlton

6. A Pebble Pit
Eliot Pit is located on the southwest corner of the Blackheath plateau. Rumour has it that the open space that is Blackheath is so-named as victims of the Black Death are buried there. In fact it is named for the small black rounded pebbles that underlie the grass. Pits left by the small scale digging of the pebbles for roads and other purposes have mostly been backfilled with wartime rubble but Eliot Pit remains, mostly overgrown but pebbles can be seen in the path up the scree-covered quarry sides.

Nearest station: Lewisham

7. Chalk Caves
Chislehurst Caves provide a rare opportunity to view unweathered Chalk in Greater London. When mined the Chalk was mainly used on the land or for building. Now the caves are a tourist attraction, open for guided tours all year long. Geologically one of the main points of interest is the well-exposed junction between the eroded top of the Upper Chalk and the Thanet Sand. During the time gap of 25 million years between the two layers, dinosaurs and many other animals and plants became extinct.

Nearest station: Chislehurst

8. Rivers and Springs
The River Ravensbourne runs through Beckenham Place Park. The stream rising at Caesar’s Well in Keston Common joins the main Ravensbourne at Bromley and flows into the Thames at Deptford. Rainfall on the North Downs soaks into the Chalk and Thanet Sand (both of which are permeable strata). The strata above them in the lower part of the valley are mainly impermeable and so keep the Chalk water beneath them contained under pressure however springs formed by upward ‘leakage’ enlarge the river in Beckenham Place Park.

Nearest station: Ravensbourne

9. Geological Strata
Crystal Palace is famous for its models of dinosaurs and other beasts created in the 1850s at a time when many of them were newly discovered. The Victorians also sought to show off the economic importance of Imperial Britain by reconstructing a cliff from the Coal Measures. The strata represented, with their true thicknesses, are from near Ashover in Derbyshire. Adjacent is a three-quarters scale lead mine cave in Carboniferous Limestone.

Nearest station: Penge East

10. Spring Wells
Sydenham Wells was once a spa visited by the rich and famous. The water in the shallow wells is rich in magnesium sulphate and was compared to Epsom Salts. It has a strong and unpleasant taste and acts as a purging water - when King George III visited it is reported he was accompanied by a band to drown out the noise of his suffering! In summer the London Clay near the surface dries and shrinks to produce open cracks. Rain penetrates and reacts with the London Clay to produce the Epsom Salts.

Nearest station: Sydenham Hill

11. Rock Sculpture
Walking the Dog by leading British sculptor, Peter Randall-Page, was presented by the Art Fund to the Dulwich Picture Gallery to mark its bicentenary in 2011. The three granite boulders (imported from Finland) are their natural shape, moulded by ice as they were transported by glaciers and deposited far from their origin as ‘erratics’ when the ice sheets melted.

Nearest station: West Dulwich

12. Gravestones
A cemetery is a good place for looking at building stones. Typical London building stones can be seen in the Anglican Chapel and the entrance gates at Nunhead Cemetery, but the main interest lies in the gravestones where different examples of granite abound, many still looking fresh despite their Victorian installation. Marbles have not fared so well and it is informative to compare weathering on the different types of stone. The bed-rock is the 50 million-year old London Clay with temporary exposures on newly dug graves.

Nearest station: Nunhead