GeoEssex
Promoting the geology and landscape of Essex

Brentwood Borough Council
Report on Local Geological Sites

Prepared for Brentwood Borough Council by

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Contents

Cover photographs:

Above: Thorndon Country Park gravel 'cliff' and sign board.
Below: The Millennium Stone at Navestock

1. Introduction

The rocks beneath the Essex landscape are a record of the county's prehistory. They provide evidence for ancient volcanoes, deserts, glaciers and deep seas. Some rocks also contain remarkable fossils, from subtropical sharks and crocodiles to Ice Age hippos and mammoths. The geology of Essex is a story that stretches back over 100 million years.

GeoEssex

GeoEssex is the primary source of information about the geology and physical landscape of Essex. The GeoEssex team, or 'Steering Group', consists of professional and amateur geologists, representatives from local authorities, geological and natural history societies, and from Natural England, the Government's nature conservation body.

GeoEssex promotes geology in all its aspects, from quarries, cliffs and boulders to spas, springs and building stones. The fascinating and often magical world of geology is all around us, if only we know where to look.

A primary task of GeoEssex is to identify the best places in Essex to find out about the Earth's distant past and the landscape processes going on today. These sites are called Local Geological Sites, or LoGS (formerly called Regionally Important Geological Sites or RIGS).

GeoEssex aims to advocate and represent geodiversity in planning processes and other initiatives.

Spectacular chalk cliff at Chafford Gorges Nature Park, Thurrock. The cliff represents a section through an ancient sea floor that existed across England about 80 million years ago. The Chalk is present beneath the whole of Essex, appearing at the surface only in the north and south of the county

Geodiversity

What is geodiversity and why is it important?

Geodiversity is an integral part of the natural environment. It is the variety of rocks, fossils, minerals, landforms and soil, and all the natural processes that shape the landscape.

The only record of the history of our planet lies in the rocks beneath our feet. Here, and only here, can we trace the cycles of change that have shaped the Earth in the past, and that will continue to do so in the future. This is particularly true in Essex, where the record of climate change during the Ice Age is preserved in our quarries and coastal cliffs. The record is unique and much of it is surprisingly fragile.

Apart from the obvious benefits of providing mineral resources such as sand, gravel, chalk and clay, the diversity of the geology is what shapes the landscape, influencing soils, and in turn influencing all of our habitats and species. Geodiversity also has a cultural role to play, influencing the character of our built environment through building stones, providing inspiration to art, and helping to define where we live and our 'sense of place'. It is the link between geology, landscape, nature and people.

And, of course, it must not be forgotten that ***almost everything we know about the Earth's distant past has been learnt by studying geological sites***.

Local and national Geodiversity Action Plans

The UK Geodiversity Action Plan (UKGAP) sets out a shared framework for geodiversity action across the UK. It establishes a common aim, themes and targets which link national, regional and local activities. It encompasses how geodiversity can inspire people and what needs to happen to conserve Britain's geodiversity. The Plan for Essex has been drawn up within this framework.

A Local Geodiversity Action Plan (LGAP) has been produced for Essex. It sets out a framework for geodiversity action in Essex. It is an essential document to conserve the County's geodiversity.

The Essex Local Geodiversity Action Plan aims to:

- *Identify, conserve and enhance the best sites that represent the geological history of an area in a scientific, educational, recreational and cultural setting.*
- *Promote geological sites and make geoconservation relevant to people.*
- *Provide a local geodiversity audit (an audit of sites and skills).*
- *Influence local planning policy.*

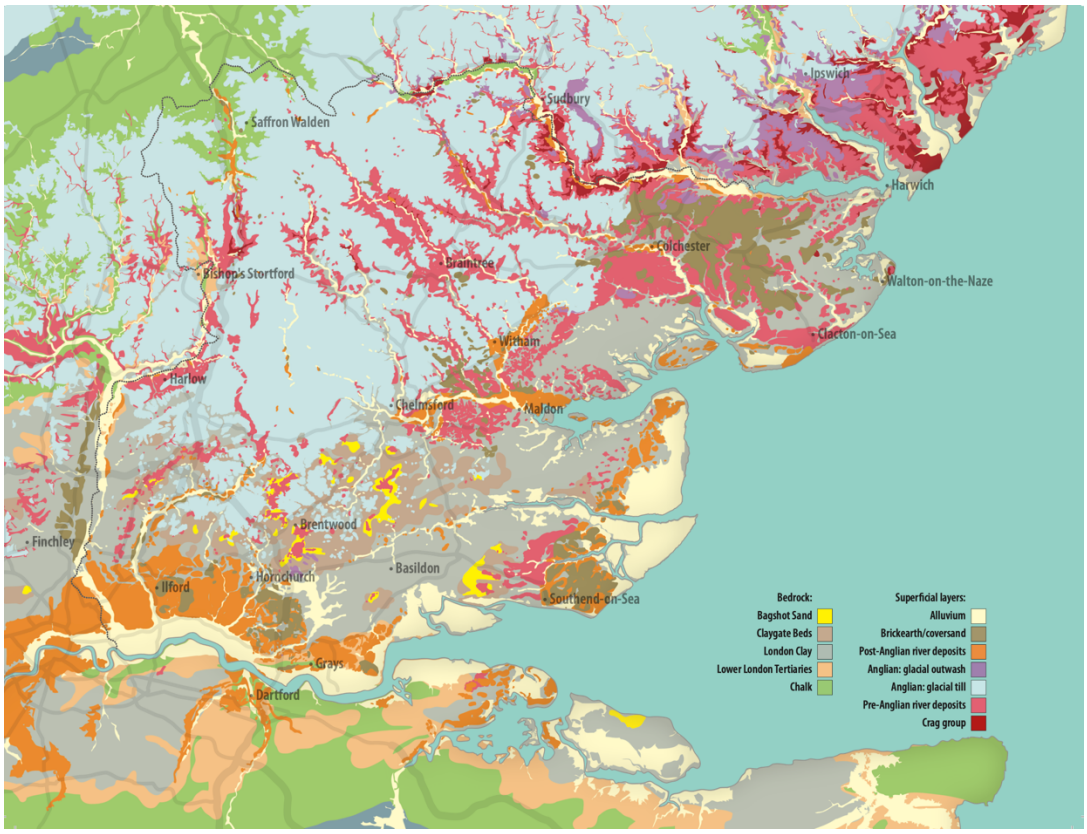
2. The Geology of Essex

Compared to most other parts of Britain the rocks of Essex and adjoining counties are young in geological terms. Even the oldest surface rock in Essex (the Chalk) is only about 80 million years old. Much older rocks are, however, present at depth. We have some idea about these ancient rocks because of the records of boreholes that have been sunk in search of coal and oil.

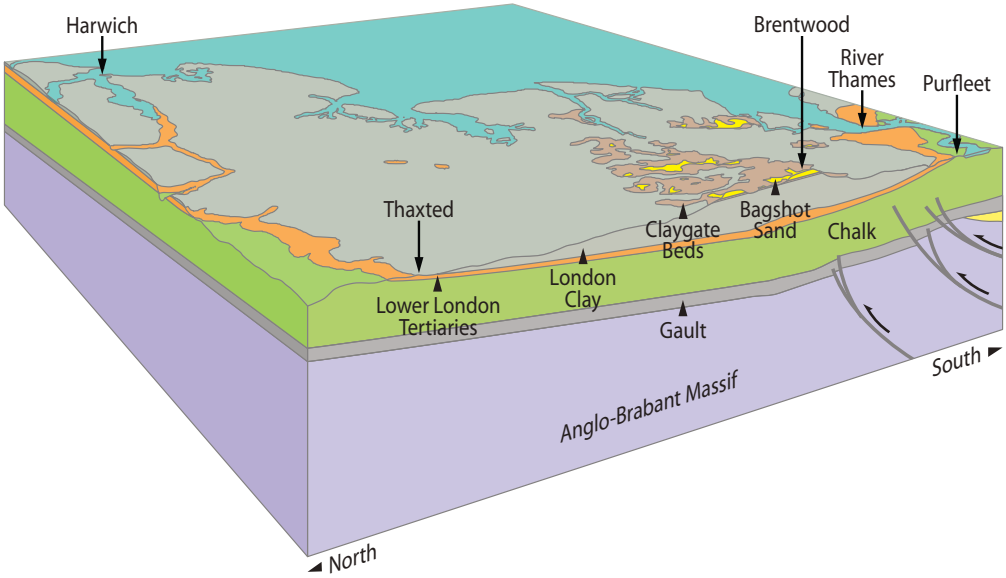
The surface rocks of Essex that were formed before the Ice Age (from the Chalk to the Red Crag) are described as the 'bedrock' or 'solid' geology. Much of this bedrock geology is concealed beneath the deposits left behind by glaciers and rivers during the Ice Age. The material laid down during the Ice Age is known as 'Superficial' or 'drift' deposits.

Era	Period or Epoch		Approx. age in millions of years	Geological formations in Essex
Caenozoic	Quaternary Ice Age	Holocene	0.01	Recent peat and alluvium
		Pleistocene	0.45	River terrace deposits and brickearth (loess)
				Boulder clay (till) and glacial gravel
			1	Kesgrave (Thames) sands and gravels
				Norwich Crag (Chillesford Sand)
			2.4	Red Crag
	Pliocene		10	*No evidence of rocks of this age in Essex but derived Miocene and Pliocene fossils are found in the Red Crag*
	Miocene			
	Oligocene		20	
	Eocene		50	Bagshot Sand
				Claygate Beds
				London Clay (includes the Harwich Formation)
	Palaeocene		55	Lambeth Group (Woolwich and Reading Beds)
				Thanet Sand
Mesozoic	Cretaceous		80	Chalk
			100	Gault and Upper Greensand (Beneath Essex)
	Jurassic		150	*No evidence of rocks of these ages beneath Essex with the exception of Jurassic Oxford Clay in a graben (a sunken part of the crust bordered by faults) beneath East Tilbury.*
	Triassic		220	
Palaeozoic	Permian		250	
	Carboniferous		300	
	Devonian		400	Shales and mudstones dating from these periods occur at depth (about 300 meters) beneath Essex
	Silurian		420	
	Ordovician		450	*No evidence beneath Essex, however, boreholes have not been drilled deep enough to confirm.*
	Cambrian		500	
Pre-Cambrian	Precambrian		Age of Earth 4,600	

Geological Map of Essex



Cross section through Essex (bedrock only)



The Bagshot beds (the youngest bedrock on this section) make up the high ground in a number of areas of south Essex, including at Brentwood.

Essex through geological time

It is difficult to know where to begin with our geological story but the earliest evidence we have is the hard rocks deep beneath Essex that were formed some 400 million years ago in the Silurian and Devonian periods (part of the Palaeozoic era) and form what is known as the 'Palaeozoic basement' of Essex.

Deserts to Dinosaurs

- For a very long time (and before the age of the dinosaurs) these hard Silurian and Devonian rocks formed the surface of the land that was eventually to become Essex. During the Permian and Triassic periods Essex was a desert upland in the middle of a vast continent known as Pangea.
- By 200 million years ago, at the start of the Jurassic period, tropical seas had spread around this land forming a dinosaur-infested, forested island.

Buried Island

- If you could dig down 1000 feet (300 metres) under Essex you would reach the hard rocks of that dinosaur island.
- All trace of forests and animals from this time have been swept away from the eroded surface of the island, so there are no dinosaur fossils in Essex.
- By 100 million years ago, in the Cretaceous period, the sea flooded across the island to spread **Gault** Clay and **Greensand**. The sea then deepened to deposit hundreds of metres of soft white limestone known as **Chalk** all over the island as well as much of what is now Britain.

Pebbles and Clay

- The North Atlantic Ocean, which did not previously exist, began to open out to the west, the land of Essex lifted, chalk hills were worn down and flints were eroded out. Billions of these flints were tumbled on beaches to form layers of sand and beautifully-rounded pebbles across our area.
- Around 50 million years ago, in the Eocene period, a deep sea fed by muddy rivers spread across what is now Essex and London depositing a great thickness of clay, the **London Clay,** on the sea floor, together with the remains of many plants such as palms and cinnamon, and animals including birds, sharks, turtles, and tiny horses. Atlantic volcanoes poured their ash into this sea.

The Alps and the Thames

- Colliding continents pushed up south and mid-Essex, bending the crust to form the vale of the Thames river system through mid-Essex. About 2.4 million years ago offshore sandbanks formed red shelly sandstone layers across north Essex known as the **Red Crag**.
- Global cooling led to the Ice Age (the Pleistocene epoch), with many warm periods such as the one we are in right now, which is known as the Holocene. As the sea retreated, the ancestral River Thames spread a succession of flint-rich river gravels across the middle of Essex, through Harlow, Chelmsford and Colchester, and out across the area where the North Sea is now.

Ice and people cover Essex

- During an exceptionally cold stage 450,000 years ago a gigantic ice sheet covered most of Britain and Essex as far south as Hornchurch. The moving ice diverted the Thames towards its present-day course and dumped its load of boulder clay, or glacial till, on top of these old Thames gravels.
- During the past million years of the Ice Age, there have been numerous cold and warm stages (right now we are in a warm period known as the Holocene) and humans have migrated to and from Essex, together with the animals they have hunted. They have left thousands of flint tools and tool-making debris on the banks of the ever-changing Thames and its tributaries. Thus, in south Essex we have the best geo-environmental and archaeological record in Europe of the last half a million years.

3. Background to Geological Site designation in Brentwood

What is special about Essex Geodiversity?

Essex is an area of predominantly subdued relief with gentle slopes, the result of its underlying geology of soft, relatively young rocks. These generally yield fertile soils. The result is an attractive 'lived in' landscape dominated by arable agriculture, but still retaining forested and heathland areas, particularly where gravels and sands, many of glacial and fluvial origin, have yielded poorer soils.

A mammoth tooth from Essex

Although lacking the more dramatic geology and landforms of many 'hard rock' areas, Essex geology and geomorphology is still of great interest, possessing abundant evidence of the huge environmental and biodiversity changes that our area has witnessed over the last 100 million years. Among the key themes are dramatic and sometimes long-lasting changes in the distribution of land and sea, major shifts in climate, and mass species extinctions. Many of these phenomena are of great relevance today, and so an understanding of our past is essential in interpreting the challenges to come.

Geodiversity's influence on Essex's development

Essex's geodiversity has exerted a major influence on land use, agriculture and landscape.

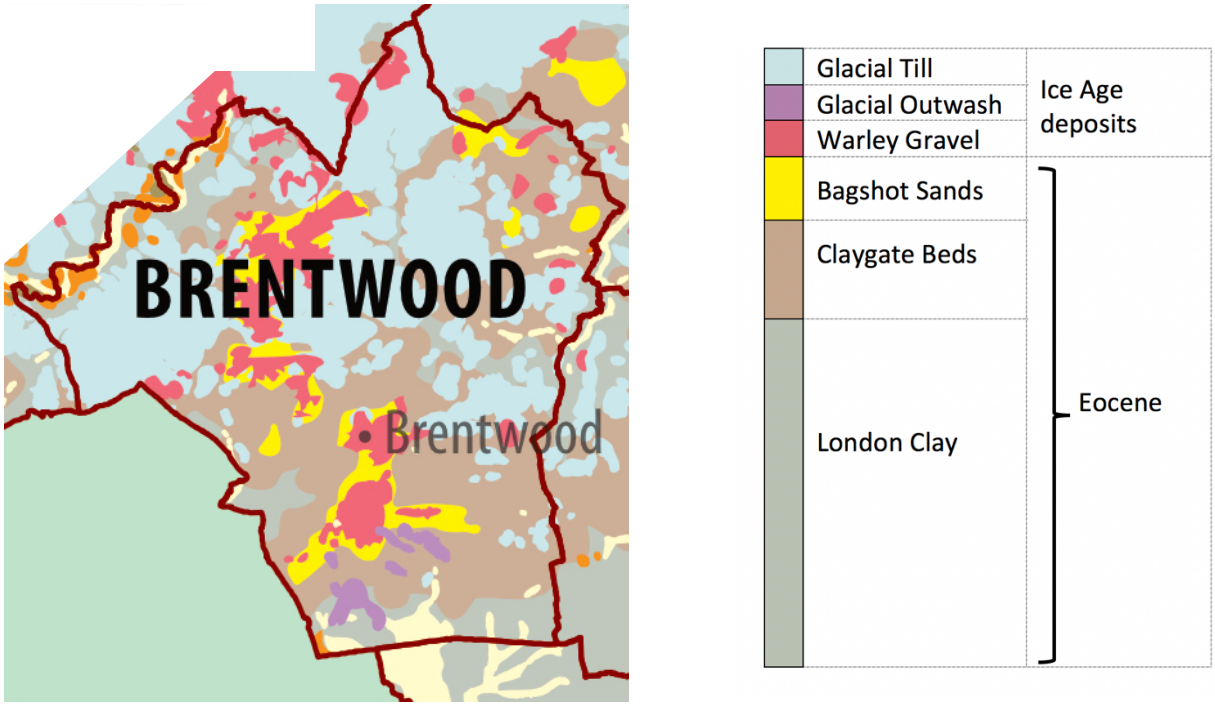
The distribution of less fertile ancient river and glacial gravels has been a major influence on historical land use, resulting in the preservation through to the present day of extensive tracts of woodland and to a lesser extent heathland, in a predominantly arable county. These are of great significance both for biodiversity and recreation.

The chalky boulder clay, or glacial till, found north and west of Chelmsford is highly suitable for cereal cultivation, especially wheat. London Clay outcrops south of Chelmsford, providing soils less suitable for arable agriculture and more suited to pasture. The brickearth of the Tendring district is the basis of the rich agricultural land of this peninsula.

In earlier times rivers penetrating deep inland, together with proximity to the Continent, provided a succession of invaders and colonisers – from Palaeolithic peoples, through to Roman, Viking and Saxon - with easy access.

Chalk for the manufacture of Portland cement and clay for brick-making has brought wealth and employment to south Essex, and the deposits of the ancestral Thames and its tributaries have provided Essex with a source of gravel and sand for construction since Roman times. A special kind of gravel naturally cemented by iron called ferricrete was used extensively as a building stone and is found in many medieval churches.

The geology of Brentwood district



The pre-Ice Age (bedrock) geology of the district is mainly London Clay, laid down on the floor of a subtropical sea 54 million years ago. The Claygate Beds, above the London Clay, were laid down as the sea became shallower and sandier; this culminated in deposition of the Bagshot Sand as river deltas spread out into the shallow sea. The Claygate Beds and overlying Bagshot Sand are now only exposed on high ground such as Brentwood hill.

The higher ground is capped by gravels laid down at various times by large rivers during the Ice Age. The gravels protected the softer, older beds from erosion while the rocks of the surrounding areas were slowly reduced to the present lowland. The hill-top Warley Gravel, deposited possibly about 750,000 years ago, consists of large, rounded flint pebbles deposited by a large braided river. This was a northward flowing tributary to an early Thames that flowed across north and mid Essex. Higher layers of gravel have different characteristics, indicating that they were redistributed in outwash torrents from the Anglian ice sheet margin at Brentwood and Shenfield, about 450,000 years ago.

The ice was not able to surmount Brentwood Hill at 100+ mOD, but it passed further south along lower ground on the west (Ingrebourne valley to Hornchurch) and the east (to the Halfway House, East Horndon). The ice sheet deposited a layer of glacial till ('boulder clay') across the northern part of the district, giving rise to fertile farmland. The gravels are notoriously difficult to age date and correlate, so there is still need to access these deposits and to be able to employ the latest research techniques.

These sands and gravels have been worked for aggregate in the past, such as at College Wood, Blackmore and Thorndon Park. Brickmaking based on the occurrence of Claygate Beds was also important in the past for example, near the station at Brentwood. The Bagshot Sand has been dug at Coombe Green, Great Warley.

Sarsen stones
Sarsens are boulders of extremely hard sandstone that were formed at a time of great warmth, about 55 million years ago, when sandy strata on top of the Chalk were above sea level in desert conditions and were cemented by silica (quartz) from ground waters. This discontinuous layer was extremely resistant to erosion and boulders were transported by ice swollen rivers. They were removed from fields and often set up in conspicuous places.

Ferricrete
Ferricrete is iron cemented gravel. Iron derived from the London Clay is dissolved and redistributed by underground waters and where the water table is static for prolonged periods of time, the sands and gravels present are cemented together. On exposure to the air, these iron cemented deposits harden and are used as building stone as in the walls of Ingatestone church. At Navestock, an exceptionally large boulder of ferricrete has been used as a monument to the Millenium.

Geodiversity and National and Local Planning Policy

The importance of geodiversity as an integral part of nature conservation and the planning system is reflected in The National Planning Policy Framework (NPPF)revised 2021, and in legislation – Wildlife & Countryside Act 1981 and Countryside and Rights of Way Act 2000.

The NPPF states that:

> "Planning policies and decisions should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils" (Paragraph 174);
>
> "Plans should protect and enhance biodiversity and geodiversity" (Paragraph 179).

The Brentwood Local Plans states under Policy NE01: Protecting and Enhancing the Natural Environment. Section B:

> "B. Proposals will not be permitted if potential impacts will lead to the deterioration or loss, either direct or indirect, of the borough's natural designated and non-designated heritage assets, including biodiversity, geodiversity, landscape character and any other aspect of ecological potential, priority habitats and/or species, water cycle, green wedges, ancient woodlands and landscapes."

Site designations

The most important geodiversity sites have been declared as **Sites of Special Scientific Interest** (SSSIs) which are statutorily protected for their scientific importance.

The next tier of geodiversity sites are known as **Local Geological Sites** (LoGS) These have replaced the earlier 'Regionally Important Geological Sites' (RIGS) terminology in line with government guidance.

Local Geological Sites (LoGS) are broadly equivalent to Local Wildlife (species and habitats) Sites ('LoWS') but have a broader remit as they can be designated for their scientific, educational, historical and recreational benefits. Typical Essex LoGS include quarries, pits, walls, boulders,

cliffs, springs, and river meanders. Local Wildlife Sites and Local Geological Sites are both designed to provide a system of locally-valued, non-statutory sites.

Most importantly, the NPPF gives Local Geological Sites a weighting equal to Local Wildlife Sites, and both are collectively referred to as 'Local Sites'. However, in actuality the attention and priority afforded to the designation and management of LoGS has historically lagged, and continues to lag well behind that of LoWS.

The newly restored section through the Ice Age gravels in Thorndon Country Park, near Brentwood, gives information and public access to the geology.

4. Objectives of current report

Supporting Local Planning Authorities

Biodiversity protection is familiar to planning authorities but geodiversity less so. This report will assist planning authorities in meeting their obligations under the National Planning Policy Framework and helping them identify potential development impacts on LoGS.

GeoEssex is therefore seeking to help Local Planning Authorities fulfil their responsibilities with respect to geodiversity.

> "*Local and neighbourhood plans and planning decisions have the potential to affect biodiversity or geodiversity outside as well as inside designated areas of importance for biodiversity or geodiversity"* (extract from: www.gov.uk/guidance/natural-environment)

Further guidance on statutory obligations is given in Circular 06/2005 (*Biodiversity and Geological Conservation*). Geodiversity should be therefore included alongside biodiversity in local authorities' Local Plans. Identifying these non-statutory sites therefore helps local authorities to meet their obligations.

LoGS can also contribute to *sustainability* programmes by providing information about a key element of the environment that contributes to our natural heritage. In addition, the *awareness raising* and *education* function fits well with the principle of community involvement and enabling people to regain their sense of place.

Bagshot Sand in a stream section at Holdens Wood.

Exposures of Bagshot Sand are extremely rare in Essex although it tops many of the hills. It is usually protected by a layer of much younger gravel.

5. Site selection

Site selection and notification to planning authorities

LoGS in Essex are identified by **GeoEssex**, a largely voluntary group composed of representatives from the major Essex geological and conservation bodies and supported by the Essex Field Club, Essex Wildlife Trust, Natural England and Essex County Council (Place Services). The site selection

process is based on clearly defined criteria (see below) and includes scientific, educational, historical and aesthetic values. When selecting sites GeoEssex aims to gain the support of landowners whenever possible. The majority of LoGS are on private land and site selection does not infer any right of access.

Like LoWS, proposed LoGS are presented to the Local Sites Partnership for endorsement and then passed to local authorities for inclusion in their Local Plans. Local authorities receive a citation and boundary map.

The sites selected as LoGS in the Brentwood district are summarised below, together with a list of sites which are potential LoGS. Other sites may be identified in the future, occasioned by housing or other development and restoration following mineral extraction.

Site protection

Like their biodiversity counterparts, LoGS have no statutory protection and the conservation and management of individual sites relies heavily on the support of landowners. Inclusion within local plans also forms a vital role in the protection of LoGS. An example of a comprehensive natural environment policy incorporating geodiversity can be provided on request.

It is recommended that the Local Sites Partnership should be consulted if any development is proposed that would affect a LoGS.

Well-rounded pebbles of the Warley Gravel in Holdens Wood, Warley.

This gravel is over 100 metres above sea level, indicating that it dates from the early Ice Age, over one million years ago. It was laid down by a northward-flowing tributary of the Thames, at a time when the Thames flowed across what is now North Essex and Suffolk.

Site Assessment Criteria

The assessment criteria used for identifying LoGS are based on DEFRA document *Local Sites: Guidance on their identification, selection and site management* (2006). The guidance states that assessment is a matter of judgement but must be based on an understanding of geological principles and processes, and the distribution and abundance of the resource (national, regional and local). Those sites selected must be 'of substantive importance to the geodiversity of the local area'.

There are four value categories: scientific, educational, historical and aesthetic. A site qualifies for notification as a Local Geological Site if it fulfils the criteria under one or more of these categories. Each site is also given a site assessment score. This score is not a measure of the site's value or importance but a relative assessment of the usefulness of the site in promoting geodiversity.

Land Ownership Notification

Where the landowner is identified as a public body eg. a local authority, Forestry Commission etc., notification is by letter to that authority. For sites under private ownership, where the landowner can be identified, they will be informed by letter.

Shenfield Brickworks in the early 1920s. The fine exposure of Claygate Beds consisted of layers of clay and sand laid down in a shallow sea about 50 million years ago.

6. Additional Sources of Information

Scientific literature

If a LoGS has been referred to in the scientific literature these references are of given in the LoGS citation. If a site has been referred to in the scientific literature this means that the site is of historical interest and some of these sites will have potential for research.

Site interpretation

If a site is accessible or simply visible to the general public, it is the aim of GeoEssex to provide interpretive information where possible and practical. This could be in the form of interpretive boards or leaflets. Such interpretation will be with the cooperation of landowners and other interested parties.

Other organisations

GeoEssex www.geoessex.org.uk
Background geological information for Essex, together with a selection of sites in each district (SSSIs and public accessible sites) can be found on the GeoEssex website

Essex Field Club www.essexfieldclub.org.uk
The Essex Field Club, founded in 1880, exists to promote the study of the county's natural history, and geology. The club has a centre for Biodiversity and Geodiversity in Wat Tyler Country Park at Pitsea, near Basildon, with extensive collections. It is open to the public most weekends. Their website provides comprehensive data on a large number of wildlife and geological sites which can be searched in a number of ways. Details of several hundred geological sites across Essex can be found here which includes LoGS and potential LoGS.

British Geological Survey www.bgs.ac.uk
Other geological resources, maps and borehole information are available on the website of the British Geological Survey.

Essex Rock & Mineral Society www.erms.org.
The Essex Rock and Mineral Society, founded in 1967, is the club for Essex geological enthusiasts.

GeoEast
GeoEast is the East of England Geodiversity Partnership. It is a partnership of organisations active in conserving and promoting Earth heritage in this region.

Earth Heritage Magazine www.earthheritage.org.uk
Earth Heritage magazine is produced for the geological and landscape community by Natural England, Scottish Natural Heritage, the Countryside Council for Wales.

Geologists' Association www.geologistsassociation.org.uk
The Geologists' Association, founded in 1858, is Britain's largest society for amateur geologists.

Quaternary Research Association https://www.qra.org.uk
The Quaternary Research Association researches 'Ice Age' geology, palaeobiology and Palaeolithic archaeology and has published several field guides covering many sites in southern and eastern Essex.

Books and articles relating to Essex geology and geoconservation

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BOSWELL, P.G.H. 1915. **Report of an excursion to Brentwood and Great Warley**. Saturday April 17th 1915. *Proceedings of the Geologists' Association*. Vol. 26. Pages 225-227.

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MIDDLEMISS, F.A. 1955. **Field Meeting at Brentwood and South Weald, Essex**. *Proceedings of the Geologists' Association*. Vol.66. Pages 317-319.

MILLWARD, D, ELLISON, R.A., LAKE R.D. AND MOORLOCK, B.S.P. 1987. **Geology of the country around Epping**. Memoir of the British Geological Survey, sheet 240 (England and Wales). British Geological Survey. HMSO.

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Two Intergrown crystals of selenite (a transparent variety of gypsum) collected from the London Clay of the M25 motorway cutting at Nags Head Lane, Brentwood in 1981.
The larger crystal is 3 centimetres long. (Brian Brett Collection). Photo: G. Lucy

7. List of Sites

The following is a representative list of geological sites in the district. For completeness it includes geological SSSIs but these sites are statutory sites and do not form part of this report.

The list gives an idea of the range of sites that can qualify as Local Geological Sites (LoGS). It includes those LoGS that have already been approved by the Local Sites Partnership.

Note: *Not all of the sites here described are accessible. Some sites are on private land and can only be viewed from footpaths that pass through or alongside the site. Inclusion of a site on this list does not, therefore, imply any right of access.*

Sites of Special Scientific Interest (SSSIs)

None in Brentwood District

Local Geological Sites (LoGS)

Sites agreed by Local Sites Partnership to date.

BrePG1 - All Saints Church, Doddinghurst (TQ 5891 9900)
The external walls contain many different rock types of geological interest and several fossils.

BrePG2 - Blackmore Post Office Stone (TL 6033 0187)
Next to the post office in the village of Blackmore is a small boulder of basalt or dolerite 38 cm x 34 cm x at least 20 cm. Erratic boulders of igneous rock such as this are rare in Essex. The stone may be much larger as it is buried in the ground and only part is visible. It was probably transported to Essex from Northern England or Scotland by the Anglian ice sheet about 450,000 years ago. This stone has clearly been here a very long time and was no doubt found in a local field, or perhaps discovered when the adjacent building was built.

The Blackmore Post Office Stone - transported to Essex from Northern England or Scotland by the Anglian ice sheet about 450,000 years ago.

Photo: W.H. George

BrePG3 - Brickworks Pit, Brentwood (TQ 586932)
Former brickworks pit that has revealed a remarkable number of fossils from the London Clay over a period of over 80 years. The walls of the pit are now completely obscured by vegetation, the floor of the quarry being occupied by numerous industrial units. However, there is still the potential for new finds to be made if any further excavations are carried out. The pit is a former geological SSSI.

BrePG4 - College Wood Gravel Pits, Blackmore (TL 623 015)
College Wood, a large, ancient wood near Blackmore, contains a number of overgrown and disused gravel pits. The origin of this gravel, known as Stanmore Gravel, is unclear. It dates from the early part of the Ice Age and may have been deposited by northward-flowing tributaries of the pre-diversion Thames, or it may be of marine origin. Exposures of this gravel therefore have the potential for future research. The pits are situated in private woodland with no public access.

BrePG5 - Coombe Green Sand Pit, Great Warley (TQ 5766 9045)
Just south of Stonyhills Farm, Great Warley is a triangular wood bounded by three lanes. In it is a shallow, overgrown sand pit which has a very small exposure of typically fine-grained Bagshot Sand. Exposures of Bagshot Sand are extremely rare in Essex.

BreG6 - Holdens Wood Gravel Pits, Great Warley (TQ 591913)
The disused pits in Holdens Wood are scientifically important because the origin of the gravel here, known as Warley Gravel or Stanmore Gravel, has not yet been resolved. The gravel in the pits here has been studied for over a century and are therefore also important in the history of geology. Under the gravel, the Bagshot Sand is visible in the stream section. The wood is privately owned but the pits can be viewed from the road and the footpath.

BreG7 - Ingatestone Boulders (TQ 6511 9967)
The site consists of three glacial erratic boulders (sarsen stones) at two locations in the town centre. Two of the sarsens can be seen at the junction of the High Street and Fryerning Lane (TQ 6511 9967), the largest one standing one metre (3'3") above ground. Another stone is situated a short distance away adjacent to the south door of St. Edmund and St. Mary Parish Church in the High Street (TQ 6511 9959). The latter stone stands 90 centimetres (3 feet) above the ground and the church guidebook states that it was originally buried beneath the north wall.

BreG8 - Langtons Gravel Pit, South Weald (TQ 5779 9476)
Langtons is a disused gravel pit that is now a small fishing lake surrounded by woodland. It is an important geological site because it was one of the very few places where the 'Bagshot Pebble Bed' was formerly exposed. On top of the pebble bed is a layer of sandy gravel that is distinctly different to the pebble bed, but similar to gravel found at other high points, such as High Beach, Langdon Hills and Rayleigh. The pit is overgrown and neither the pebble bed nor the gravel is currently visible.

BrePG9 - Millennium Stone, Navestock (TQ 5461 9615)
A very large boulder of ferricrete that was placed on a concrete plinth in 2000 to celebrate the Millennium. It has a plaque describing the boulder, incorrectly, as a 'puddingstone'. The boulder was excavated from a neighbouring field.

BreG10 - Thorndon Country Park North, Brentwood (TQ 604 915 entrance to country park) Country park with varied landforms and outcrops of London Clay, Claygate Beds, Bagshot Sand and glacial gravel. There are two exposures of glacial gravel. The exposure in Thorndon Country Park is very fine and was cleaned and re-excavated in 2021. This site is important because in few other places in the district can glacial deposits be seen. The gravel provides a rare opportunity to study the evidence of the Anglian ice sheet, which, at its greatest extent, reached as far south as Brentwood and Hornchurch.

BreP11 INGATESTONE Woodcock Lodge Sarsen Stone (TL 614010)
Lodge on Blackmore Road. It stands approximately 70cm out of the ground and probably extends into the ground by at least 20 cm as it is firmly fixed into the soil. It is significantly located at the old boundary between Fryerning Parish and a detached part of Ingatestone Parish.

Two of the Ingatestone boulders – either side of Fryerning Lane.

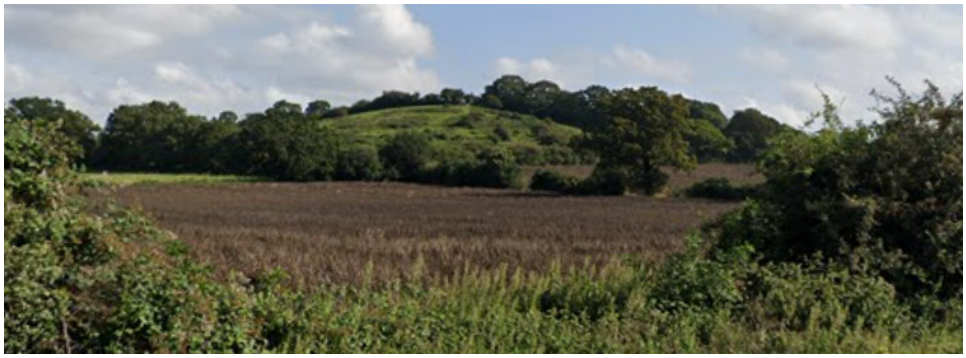
Other sites of geological interest in the district.

For completeness, the following sites also contribute to the geodiversity of the district.

Harts Wood, Brentwood (TQ 603 923)
Potential exposures of Warley Gravel and Bagshot Sand in ravines or stream banks and in the roots of fallen trees. Harts Wood is owned by Brentwood Council and accessible at all times.

Nags Head Lane Motorway Cutting, Brentwood (TQ 572915) (Historical site only)
In 1981, during construction of the M25 motorway, a deep cutting was excavated in the London Clay and the overlying Claygate Beds just south of the point where Nags Head Lane crosses the motorway. Over a kilometre in length, the cutting exposed clay containing a wealth of marine fossils such as bivalves and gastropods. Also present was the pearly nautilus – a clear indication that the seas some 50 million years ago were subtropical. More fossils were probably collected from here than from any other temporary London Clay exposure in Britain. Due to the need to maintain a stable slope in unstable London Clay, the shallow angle of the banks required one of the largest motorway cuttings in the country but this had the advantage of exposing a considerable area of clay for collecting. On completion of the motorway the exposure was covered with topsoil and grass but the cutting is still an impressive sight.

Jury Hill, Childerditch (TQ 618 896 to TQ 620 894)
Jury Hill is a prominent landmark visible from the A127 London Arterial Road. It consists of London Clay and the slopes are covered with coarse grass and bushes. The southern and western slopes have been affected by fairly well-marked, successive landslips which have produced irregular undulations. The hill is typical of unstable slopes in London Clay and the landslips have been occurring for thousands of years since the retreat of the ice. Around the hill the slips often result in minor exposures of London Clay. On a clear day, you can see over the modern Thames valley to the Queen Elizabeth II Bridge and Canary Wharf.



Jury Hill from the A127

The Coppice, Kelvedon Hatch (TQ 573993)
Area of woodland with a varied geology and the potential to create exposures in Warley Gravel and/or Bagshot Sand. The Coppice is a semi-natural broad-leaved wood north of the village, through which flows a tributary stream of the River Roding. The wood is designated as a biological Site of Special Scientific Interest (SSSI). The low bank of Bagshot Sand could be cleaned to provide a very fine, albeit small, exposure. The steep bank of the old gravel pit, adjacent to the field, could also be excavated to create an exposure of Warley Gravel. This work would be of great value as exposures of Bagshot Sand and Warley Gravel are very rare in Essex.