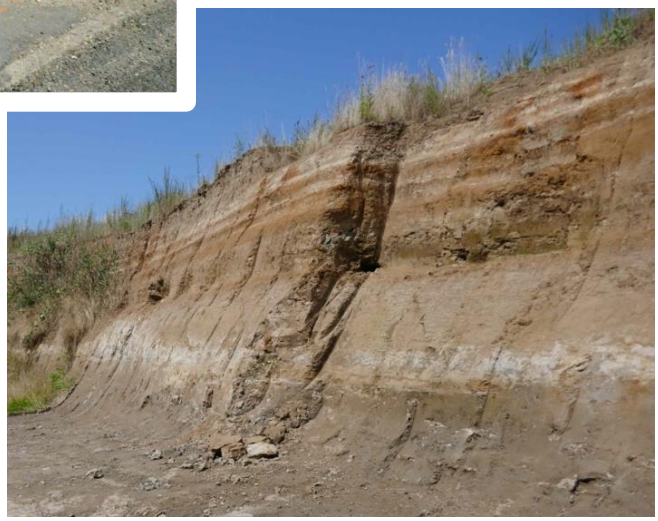
GeoEssex
Promoting the geology and landscape of Essex

Braintree District Council
Report on Local Geological Sites



Prepared for Braintree Council by:

Ros Mercer BSc. FGS GeoEssex
Gerald Lucy FGS GeoEssex

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Contents

Cover photographs:

Above left: The basalt erratic boulder, Finchingfield. *(Photo: G. Lucy)*
Above right: Tufa quoins at St. Germanus Church, Faulkbourne. *(Photo: G. Lucy)*
Below: Bulmer Brickworks Pit showing London Clay with ash bands. *(Photo: I. Mercer)*

1. Introduction

The rocks beneath the Essex landscape are a record of the county's prehistory. They provide evidence for ancient rivers, 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. It also promotes the county's rich geological heritage of mineral extraction, scientific research and fossil discoveries. 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). It also advises and assists landowners with the management of sites.

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

Boulder clay, or glacial till. This rock covers much of the Braintree District, left behind by a melting ice sheet about 450,000 years ago. A small sarsen stone can be seen amongst the chalk and clay mixture. Photo: G. Lucy

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.*

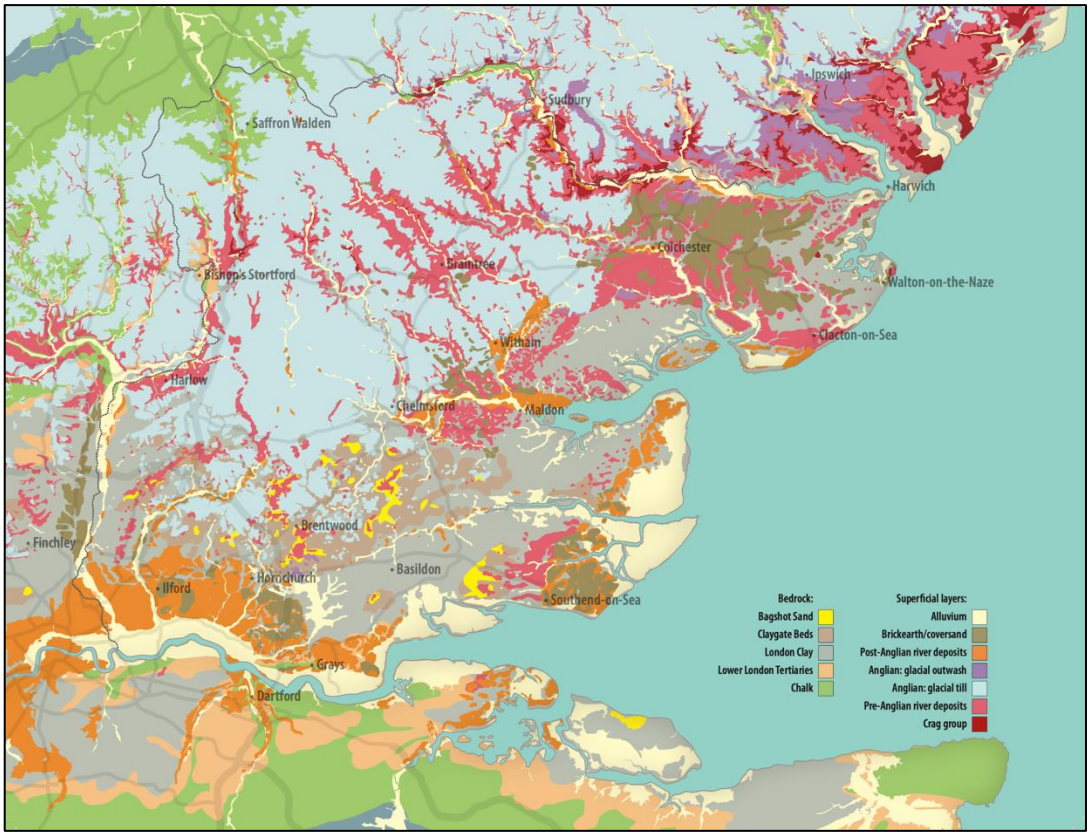
2. The Geology of Essex

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.

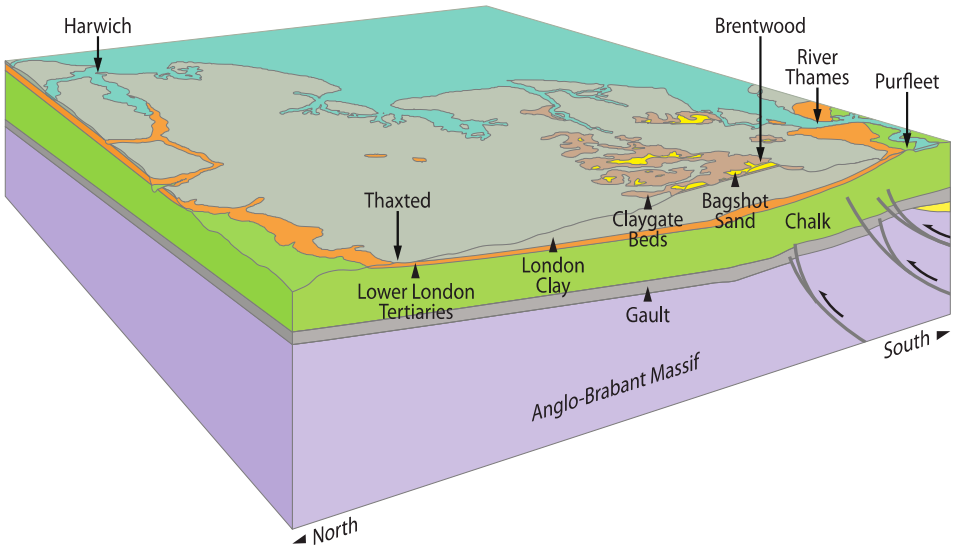
The surface rocks of Essex that were formed before the Ice Age (from the Chalk to the Red Crag) are described as the 'bedrock' or 'solid' geology. Much of this bedrock geology is concealed beneath the deposits left behind by glaciers and rivers during the Ice Age. The material laid down during the Ice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



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 Braintree

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.

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.

A mammoth tooth from Essex

Geodiversity's influence on Essex's development

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

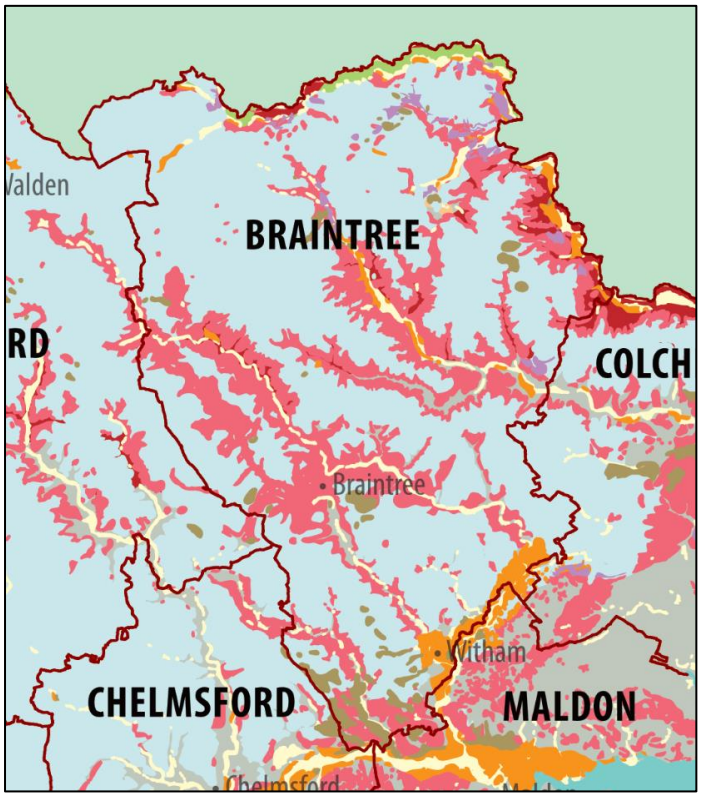
The distribution of less fertile ancient river and glacial gravels has been a major influence on historical land use, resulting in the preservation through to the present day of extensive tracts of woodland and to a lesser extent heathland, in a predominantly arable county. These are of great significance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

The deposits of the ancestral Thames and its tributaries and associated glacial outwash deposits 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 the Braintree Area



	Recent alluvium	**Quaternary**
	Coversand/Brickearth	Ice Age deposits
	Post-Anglian river deposits	
	Glacial Till	
	Kesgrave sand and gravel	
	London Clay	**Tertiary** Eocene 54 million years ago
	Lambeth Group	Palaeocene 56 million years ago
	Thanet Sand	58 million years ago
	Chalk	**Cretaceous** 80 million years ago

The landscape of the area stretching from the River Stour in the north, to Witham and the River Blackwater in the south, is dominated by a plateau of chalky Glacial Till ('Boulder Clay'). This extensive plateau occupying NW Essex is deeply dissected by rivers and streams flowing mainly SE. The rivers cut down into underlying Kesgrave sand and gravel beds and, in places, through these into the London Clay and older rocks beneath. Patches of Coversand, a wind-blown storm deposit of fine silt and sand around the margins of the ice cap around 20,000 years ago, occur near Braintree and along the southernmost border of the district, where it has created especially fertile farmland. The riverbeds and adjacent flood plains are made of alluvium – soil, clay silt and sand being transporte towards the present-day North Sea.

The Glacial Till was brought from the north by an ice sheet that covered most of Essex during the Anglian period 450,000 years ago. It contains ground up chalk and chalk pebbles, which give the soil a buff colour and provide its fertility. Hence the plateau has long provided richer farmlands than in south Essex, whilst its flat expanses permitted many wartime airfields to be constructed. In some rivers, particularly the Brain, the high calcium content from the chalk in the till give rise to the formation of tufa deposits. These have been cut into blocks and used for building, notably in Faulkbourne church.

The Kesgrave sands and gravels were deposited by the ancestral Thames that once flowed across Essex and Suffolk before it was diverted by the Anglian ice sheet. These gravels have also been re-distributed by subsequent rivers such as the Blackwater. They have long been dug for aggregates for road building, construction and concrete; today huge gravel quarries comprise the largest industry in Essex after agriculture. The ever-changing quarry sections provide geological evidence for the history and the future of global climate change in Essex.

Beneath this, over most of the district is the London Clay. This dips gently to the south into the London Basin. The London Clay was quarried extensively for making bricks, pottery, drainage pipes and tiles in numerous locations in the past, with one remaining brickworks today near Bulmer.

Layers of sands and gravels of the Lambeth Group and Thanet Sand occur beneath the London Clay. Thick sands at the base of this unit have been quarried in the past and are still seen in abandoned quarry sections. Parts of these sands and gravels were re-cemented by silica during past episodes of intense global warming, forming extremely tough masses of silcrete known as sarsens and puddingstones. Boulders and monuments made of these are frequently encountered in the district, used as boundary markers, standing stones and incorporated into churches.

A thick layer of Chalk underlies the whole of this area. Small outcrops of this fine, white limestone occur on the southern flank of the Stour Valley where it has been quarried and along stream beds between Sudbury and Gestingthorpe. Chalk is attacked by acid rainwater and where thin strata have caved in above fast-dissolving Chalk, deep depressions in the land and streambed ‘potholes’ have formed. The Chalk aquifer is a major source of underground water supply to the area.

Sarsen Stone in front of Parley Beams Farm at Stonebridge Hill, near Halstead. Photo: G. Lucy

Geodiversity and National 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), 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 current Braintree Local Plan, updated in July 2014 following a Focused Review, includes the following policy:

> 5.7 Environment and Rural Communities Policies ENV1 – Environment
>
> The Borough Council will conserve and enhance Braintree's natural and historic environment, countryside and coastline. The Council will safeguard the Borough's biodiversity, geology, history and archaeology through the protection and enhancement of sites of international, national, regional and local importance.

The Council is now developing a new Local Plan covering the period to 2033, to which this report will contribute details of locally important geological sites.

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 is 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.

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.

Boulder of Puddingstone outside a cottage at White Notley
Photo: G. Lucy

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 Braintree district are summarised below, together with a list of other 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.

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.

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.

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

ALLEN, P. 1999. **The Anglian cold stage in Essex – a review**. *Essex Naturalist.* Vol. 16 (New series). Pages 83-100.

BRIDGLAND, D.R. 1994. **The Quaternary of the Thames**. Chapman and Hall. Geological Conservation Review Series.

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GIBBARD, P.L. 1994. **Pleistocene History of the Lower Thames Valley**. Cambridge University Press.

HOSE, T.A. (ed). 2016. **Geoheritage and Geotourism: A European perspective**. The Boydell Press.

LUCY, G. 1999. **Essex Rock: A look beneath the Essex landscape**. Essex Rock and Mineral Society.

O'CONNOR, T. 2015. **Managing the Essex Pleistocene**. Place Services, Essex County Council.

MERCER, I. & MERCER, R. 2022. **Essex Rock: Geology beneath the landscape** (2nd edition updated and greatly expanded). Pelagic.

PROSSER, C., MURPHY, M. and LARWOOD, J. 2006. **Geological Conservation: A Guide to Good Practice**. English Nature.

SUMBLER, M.G. 1996. **British regional geology: London and the Thames valley**. British Geological Survey. Fourth edition. HMSO.

WHITAKER, W. 1889. **The Geology of London and of Part of the Thames Valley**. Memoirs of the Geological Survey. HMSO.

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)

There are no geological SSSIs in the Braintree District

Local Geological Sites (LoGS)

Sites agreed by Local Sites Partnership to date.
Full descriptions of each site are contained in the citations.

BraG1 - Alphamstone Churchyard boulders
Alphamstone churchyard contains a remarkable number of large boulders, some over a metre long. There is even a boulder inside the church. These stones were probably carried to the site by the ancestral Thames river that flowed across the area more than half a million years ago. The abundance of sarsens here suggests that a former Pagan stone circle may have existed on this site, all the stones being transported here by man. The stones may be partly responsible for the name of the village

BraG2 - Bradwell Gravel Quarry
Bradwell Quarry is a working gravel quarry with fine sections through Kesgrave Sands and Gravels (Thames gravel) and boulder clay (till). The quarry has been the source of a large number of fossils from the till during successive organised visits by members of the Essex Rock and Mineral Society, mostly during the 1990s.

BraG3 - Brick Kiln Hill Brickworks pit
One of the pits of the former Brick Kiln Hill Brickworks still exists as an area of woodland north of the lane leading west from Castle Hedingham. The pit has low vertical cliffs of iron-stained sand which is part of the Kesgrave Formation, laid down by an ancestor of the River Thames when it flowed through this area over 450,000 years ago.
The sections can just be seen from the lane, but the pit is private property and permission to access is required from the land owner. The pit is used as a circuit for mountain bike users.

BraG4 - Bulmer Brickworks Pit
London Clay (Harwich Formation) is worked here for making traditional, hand-made red bricks, mostly for the renovation of historic buildings. The sandy clay in the small pit contains a layer of claystone nodules and seams of volcanic ash. This is the only inland exposure of this horizon in the London Clay

BraG5 - Coleman's Farm Gravel Quarry
Colemans Farm Quarry is a working gravel quarry. The quarry works gravels that are associated with the terraces of the river Blackwater. The gravels in this area can provide important evidence of the evolution of this major Essex river.

BraG6 - Edgars Farm Boulders
Two fine sarsen stones standing by the roadside at the farm entrance. They are at least one metre long.

BraG7 - St Germanus Church, Faulkbourne
The church building makes extensive use of local tufa for dressings

BraG8 - Ferriers Farm Pit (Bures Pit)
Former gravel pit with exposures of sand gravel laid down by a former course of the Thames. Pit closed and was recently used for off-road motorsport.

BraG9 - Finchingfield Boulder
A large boulder of basalt, about 85 centimetres (nearly 3 feet) long, can be seen on the pavement on the left side of The Causeway, when travelling north out of the village

(BraPG10) Foxborough Pit – *downgraded as of historic interest only*

BraG11 - Friars Farm Boundary Stone
A large sarsen stone that is described by English Heritage as a rare survival of a named and dated boundary stone dating back to the 17th century.

(BraPG 12) - Glemsford Picnic Site – *downgraded to a General Geological Site*
No visible geology.

BraG13 - Goldingham Hall Chalk Pit
Disused and overgrown chalk pit, formerly with exposures of Upper Chalk, Thanet Beds and Anglian till (boulder clay). It takes the form of a large, steep-sided, wooded amphitheatre. Most geological exposures are now obscured except for some chalk visible on the western side adjacent to a small, modern limekiln.

BraG14 - Great Yeldham Brickworks Pit (site of)
Site of nineteenth century brickworks (closed in 1920) where significant amounts of ice age mammalian fossils were found.

BraG15 - Hill Farm Sarsens, Gestingthorpe
Several sarsen stones (the largest 160cm x 110cm x 60cm) are situated on the private entrance drive to Hill Farm.

BraG16 - Moat Farm Sarsen Stone
A very fine mamillated sarsen stone 1.2 metres by 1 metre (4 feet by 3 feet) in size sits near the road junction outside Moat Farm.

BraG17 - Nether Hall Farm Sarsen Stone
A large number of sarsen stones, the largest some 2.4 metres (8 feet) long. This may be the largest sarsen stone in North Essex today.

BraG18 - Nether House Farm Sarsen Stone
Two fine sarsen stones either side of the entrance to Nether House Farm.

BraG19 - Ovington Hall Sarsen Stone
Large sarsen stones that formed in the local Lower Tertiary deposits are characteristic of this area of north Essex, and this is one of the largest.

(BraPG20) Ridgewell Sarsen Stones - no longer in situ and whereabouts unknown

BraG21 - Sandy Lane Chalk quarry
A large disused quarry with fine exposures of Upper Chalk, Thanet Sand and Reading Beds.

BraG22 - Spains Hall Sarsen Stone
A large sarsen boulder (1.9 metres x 0.9 metres x 0.3 metres in size), lies adjacent to a wall surrounding cottages in the grounds of Spains Hall Farm.

BraG23 - Stonebridge Hill Sarsen Stone
A conspicuous sarsen (1.4 metres long) sits in front of Parley Beams Farm at Stonebridge Hill on the main road into Halstead. The upper surface of the stone contains holes that may have originally been rootlets at the time of the stone's formation.

BraG24 - Twinstead Sarsen Stone
A large sarsen stone (150cm x 70cm x 30cm) with a mamillated surface is situated just outside the churchyard. It was found under the old church when it was demolished in the late 19th century. A smaller sarsen can be seen on the other side of the track.

BraG25 - White Notley Puddingstone
By a cottage gate is a splendid, colourful boulder of Hertfordshire puddingstone (110cm x 65cm x45cm). This boulder has been referred to in articles and books more often than any other puddingstone in Essex.

BraG26 - Wickham Hall Farm Sarsen Stones
By the road, at the entrance to Wickham Hall Farm near All Saints Church, are several sarsen stones (the largest 180cm x 140cm x 60cm in size).

BraG27 - Alphamstone Gravel Pits
Disused pits west of the village formerly showed 6 metres of Thames gravel (Bures Gravel) and 6 metres of chalky boulder clay. The gravel has an abundance of far-travelled exotic pebbles.

Summary:
Quarries and Pits
BraG27Alphamstone Gravel Pits.
BraG2 Bradwell Gravel Quarry
BraG3 Brick Kiln Hill Brickworks pit
BraG4 Bulmer Brickworks Pit
BraG5 Coleman's Farm Gravel Quarry
BraG8 Ferriers Farm Pit (Bures Pit)
BraG13 Goldingham Hall Chalk Pit
BraG14 Great Yeldham Brickworks Pit (site of)
BraG21 Sandy Lane Chalk quarry
BraG27 Alphamstone Gravel Pits

Boulders
BraG1 Alphamstone Churchyard boulders
BraG6 Edgars Farm Boulders
BraG9 Finchingfield Boulder
BraG11 Friars Farm Boundary Stone
BraG15 Hill Farm Sarsens, Gestingthorpe
BraG16 Moat Farm Sarsen Stone
BraG17 Nether Hall Farm Sarsen Stone
BraG18 Nether House Farm Sarsen Stone
BraG19 Ovington Hall Sarsen Stone
BraG22 Spains Hall Sarsen Stone
BraG23 Stonebridge Hill Sarsen Stone
BraG24 Twinstead Sarsen Stone
BraG25 White Notley Puddingstone
BraG26 Wickham Hall Farm Sarsen Stones

Other
BraPG7 St Germanus Church, Faulkbourne – tufa blocks

Other sites of geological interest in the district.

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

(BraPG10) Foxborough Pit - *downgraded to Historical interest only*
Recorded exposures of Chillesford Sand and boulder clay At the very base of the section, iron-stained sand was identified as part of the Red Crag. the former pit area is mostly fully restored to agricultural and motocross use.

(BraPG12) Glemsford Picnic Site - *downgraded to General Geological Site*
Picnic site only. Site of a buried 'tunnel valley' formed during the Ice Age. No evidence on the surface but an opportunity to inform the public through signboards.

Pound Farm Sarsen Stones, Gestingthorpe
Two conspicuous sarsen stones, the largest 1.2 metres (4 feet) long, lie by the crossroads at the north end of the village. Not of sufficient size to be notable in the context of so many examples in the area.