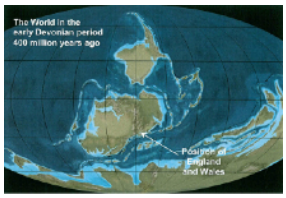
CREATIVE BASILDON – SCRIPT ONE

Picture 1 – Opening screen

It is often said that Basildon' s history starts from the point of the creation of the Basildon Development Corporation around 1949.

Basildon Borough Heritage Society and Creative Basildon, aim to take a look at our Borough in a more, perhaps abstract, cultural, artistic, historic even visionary way. For this lecture we thought we would reflect on history through the medium of Geology.

Picture 2 - Basildon through geological time.

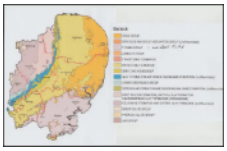


The only record of the history of our planet lies in the rocks beneath our feet. Only here, can we trace the change that have shaped the Earth, and will continue to do so in the future.

This is true for Essex in general and south Essex including the Basildon area, where the record of climate change is preserved in our quarries and coastal cliffs.

Apart from the benefits of 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.

Picture 3 – The Geology of Essex - Deserts to Dinosaurs.



Compared to most other parts of Britain the rocks of Essex and adjoining counties are young in geological terms.

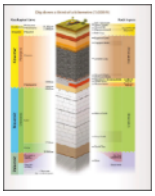
Even the oldest surface rock in Essex (the Chalk) is only about 80 million years old. For a very long time (and before the age of the dinosaurs) these hard rocks formed the surface of the land eventually to become Essex.

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 formed before the Ice Age 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.

Picture 4 - Buried Island - Pebbles and Clay

By 100 million years ago, 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 what is now Britain.



The North Atlantic Ocean, which did not previously exist, opened out to the west, the land of Essex lifted, chalk hills were worn down and flints were eroded. Billions of these flints were tumbled on beaches to form layers of sand and beautifully-rounded pebbles.

The sea, fed by muddy rivers spread across Essex and London depositing a great thickness of clay known as London Clay, with the remains of many plants such as palms and cinnamon, and animals including birds, sharks, turtles, and tiny horses.

Picture 5 – Ice and people cover Essex.

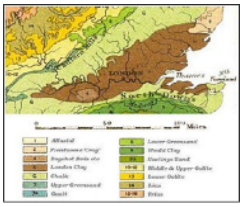
During the million years of the Ice Age, there have been numerous cold and warm stages and humans have migrated to and from Essex, together with the animals they have hunted.

They have left thousands of flint tools and tool-making debris on the banks of the ever-changing Thames and its tributaries.

Around 80 million years ago, sea level is thought to have been over 150 metres higher than today. The maximum uplift occurred in the north-west, with a regional tilt towards the east and south-east.

South-eastern England was low-lying and, from about 55 million years ago, over 150 metres of London Clay were laid down. And, as the Palaeocene period progressed, subsidence in this region led to the formation of the London Basin, with its approximately west-east axis.

Picture 6 – The London Basin and the Thames drainage system



Around 30 million years ago, the coastline retreated to the east of the London Basin. At that time, the Ancestral Thames was still flowing from the north-west, into the London Basin.

Rivers which were draining from the northern flank like today's Mole (rising in Sussex), the Wey (in Hampshire) and Darent in Kent - would have begun feeding into the Thames from the south. Further east, a Medway river also flowed northwards from the Weald.

So what is special about Essex Geodiversity?

Essex is an area of predominantly 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.

Lacking dramatic geology and landforms, Essex geology 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.

Many of these phenomena are of great relevance today, and so an understanding of our past is essential in interpreting the challenges to come.

TALK - NO PICTURE - The geology of Basildon district.

The Claygate Beds occur above the London Clay and represent a period of time when the London Clay Sea was becoming shallower and the clay was becoming increasingly sandy as the shoreline came closer.

This culminated in the deposit of Bagshot Sand as the sea became very shallow. Bagshot Sand is therefore considered to be delta and near-coastal sands.

During a period of the Ice Age, 450,000 years ago, a gigantic ice sheet covered most of Britain and Essex as far south as Hornchurch.

Extensive erosion during the Ice Age, the Claygate Beds and overlying Bagshot Sand are now only exposed on the high ground such as the Langdon Hills and Billericay. These hills are capped by gravels laid down at various times by rivers.

The moving ice diverted the Thames towards its present-day course and dumped its load of boulder clay, across the landscape (shown pale blue on the geological map in picture 5).

Much of this sheet of boulder clay has been removed by erosion but patches of it remain in the Basildon district, such as to the north and west of Billericay.

The Basildon Borough through geological time.

The following sites have been selected to represent the different aspects of geology and landscape in the district.

Geological sites are defined in their widest sense and include, for example, buildings, walls, wells, spas, springs, graves, boreholes, plaques, landslips and viewpoints.

It is Important to note that 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.

BILLERICAY.

Norsey Wood Nature Reserve (TQ 691 955).

The reserve has a varied geology, which consists of London Clay, Claygate Beds, Bagshot Sand and Bagshot Pebble Beds visible in the steep paths.

Harris' Brothers Brickworks at Charity Farm.

The Claygate beds on Bagshot sand held a water table enabling local people to drill fresh water wells in the High Street.
The Harris Brickworks, running parallel to the railway on the far side of Radford Way was the location of the Brickworks.

A railway spur line ran from the Goods Yard into the brickfields where they made the handmade 'Red Bricks' and the sand was also transported to the Midlands for casting purposes. The yard closed in the late 1930's. There were other brickworks in Billericay, one site where Chestnut Avenue is now located.

LANGDON HILLS. Langdon Hills Country Park (TQ 683 866)

As said, the Bagshot Sand, Claygate Beds and London Clay were formed on the floor of a sub-tropical sea some 50 million years ago but the gravel at the very top of the hill is clearly much younger and of a different origin.

This gravel was thought to have been laid down under a sea but it is now thought that it may have been deposited by a river from the capping of the tops of some of the highest hills in the region.

Although mostly of flint, a small proportion are distinctive pebbles from the Lower Greensand of The Weald, and other rock types that could only have been deposited by a river flowing from the south.

LANGDON HILLS. Lincewood, part of Langdon Nature Reserve (TQ 675 873)

Lincewood Hill with identical geology to the Langdon Hills. The hill is essentially an isolated patch of Bagshot Sand overlying Claygate Beds and London Clay, with the summit capped with Stanmore Gravel. The reserve is owned by Essex Wildlife Trust.

Langdon Hills Brickfield (Little Burstead).

The Brickworks were situated on the Langdon Hills side of the railway, west of the High Road and Station in the parish of Little Burstead. The boundary of Langdon Hills and Little Burstead was in the vicinity of Vowler Road.

The Brickworks had operated from around 1900 to 1910. The Clay pit remains, in thick undergrowth undisturbed since then.

The brickfield itself was further up the hill and owned by a Mr A Robinson Parker, who lived in a white house on Crown Hill, opposite Lee Chapel Lane – Butlers Grove House.

The clay was carried to the sheds by a small railway line. Usually two trucks were chained together and the slope of the track on the hill gave gravity propulsion. There was also a small siding that that took the bricks in wagons on to the main C2C line.

It is mentioned of a brick and kiln field with a pond shown on a 1797 map and listed in the tithe award of 1841 of fields named Kiln Field etc. These fields appear to be part of the Goldsmith estate on the South side of Langdon Hills.

From the information available, it would appear that the brick making enterprise only last a few years and was certainly gone by 1911. However we are told that the bricks had the mark 'Laindon' on them.

PITSEA. St. Michael's Hill (TQ 738 878)
Abandoned River Thames cliff line. The hill is an example of land slipped ground, with fine views over the modern Thames Valley.

Vange Hall Brickworks (1886-1921).
Apart from its depth of brickmaking soil, it also had exclusive access to the wharf on Vange Creek. There was also a smaller brick-field owned by Messrs Clark, Nicholls and Coombs from around 1908.

Now back to the time clock - Picture 7 - The Chalk Sea

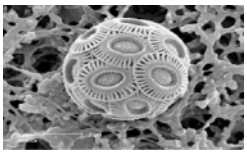
The oldest rocks exposed in Essex comprise marine chalks. These occur in the Saffron Walden area, where they were formerly quarried on a small scale.

The chalks of southern Essex, which crop out around Tilbury and Purfleet, were once extensively quarried and used as a feedstock for the Portland cement industry.

A thickness of chalk forms the Chiltern Hills and continuing as the hills of south Cambridgeshire; it then passes beneath central London and Essex and resurfaces again as the North Downs of Surrey and Kent.

This layer, originally horizontal, having been laid down as mud on the floor of a tropical sea during the age of the dinosaurs; the folding occurring millions of years later as Britain was squeezed as a result of the African continent pushing into Europe and creating the Alps.

Picture 8 – Coccoliths the microscopic marine algae.



It is now realised that chalk is almost entirely made up of these tiny fragmented shells which are only visible under an electron microscope.

The chalk sea was teeming with marine life such as molluscs, sponges, corals, sea urchins and fish, and at the top of the food chain were the mosasaurs, giant marine reptiles up to 10 metres long with long bodies and tail, paddle-like limbs and heavy jaws armed with sharp, conical teeth.

Picture 9 – Flint Nodules.

Chalk can be seen in the south of the county in Thurrock where there are many giant quarries, the remnants of the Portland cement industry. Typical of these quarries is Grays Chalk Quarry, which is a nature reserve.

Picture 10 – Thanet Sand to the Harwich Formation.

The end of the Cretaceous period saw the extinction of dinosaurs and the disappearance of the Chalk Sea as sea levels fell throughout the world.

The Chalk is, of course, still present beneath the surface, in some cases as deep as 200 metres below ground level. This formation is well exposed at Walton-on-the-Naze and at Wrabness on the River Stour, where the cliffs reveal numerous seams of volcanic ash.

The ash bands are continuous beneath Essex and have also been found during excavations for the M11 motorway near Stansted.

Picture 11 – The London Clay.

London Clay has yielded fossils of the sea's inhabitants such as molluscs, lobsters, crabs and sharks. There are also fossilised fruits, seeds and twigs which provide valuable information about the rain forest vegetation which existed at this time.

London Clay fossils, particularly sharks' teeth, turn up all around the Essex coast.

Picture 12 – Mega-toothed Sharks (Megalodon).

Otodus obliquus was the first of these giant ocean predators, with vertebrae over 5 inches in diameter, and an estimated body length between 30 to 40 feet, the creature was nearly as long as a bus.

Otodus' long, smooth teeth were ideal for puncturing fish. In addition, the main tooth was flanked by two smaller structures called cusplets. These miniature teeth helped the shark latch onto its prey and hold its meal in place.

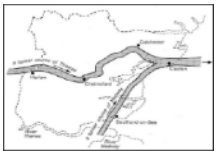
The Megalodon tooth contrasted with the Medium Otodus, an ancestor of the Great White Shark from the London Clay. Found on the beach at Althorne, near Burnham-on-Crouch.

Otodus' descendants, the Megalodons, lost these cusplets and developed serrated teeth, a later evolutionary adaptation suited for tearing flesh from prey.

Picture 13 One Tree Hill Langdon Hills.

Lying on top of the London Clay is a sandy clay called the Claygate Beds. Above this is a delightful, fine-grained yellow sand called Bagshot Sand which indicates a shallowing of this sea.

Picture 14 – The Early Thames.



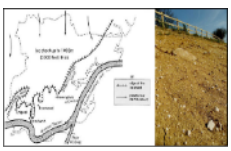
The 'icing' on the county's geological 'cake' is the remarkable variety of deposits laid down during the Ice Age.

The Ice Age starts around two million years ago. At this time the climate was probably not too dissimilar to the present day but the temperature had been slowly dropping for tens of millions of years, ever since the balmy, tropical days of the dinosaurs.

The route of the Thames and the Medway through Essex, about 400,000 years ago, just before the arrival of the Anglian Ice Sheet.

During the early Ice Age the Thames flowed to the north of London, through north Essex, Suffolk and Norfolk and out across what is now the southern North Sea to become a tributary of the Rhine.

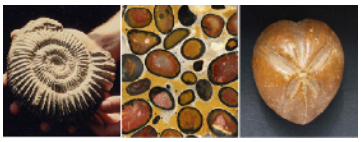
Picture 15 – The Anglian Ice Sheet.



1.That severe cold stage of about 450,000 years ago allowed a great ice sheet to spread south into the region across the valley of the early Thames.

A lobe of ice from this ice sheet blocked the Thames in the Vale of St. Albans causing a catastrophic change to the route of the river, diverting it south to its present position.

Picture 16 – Glacial Erratics.



Boulder clay can be found as far south as Hornchurch, which is known as the most southerly point in England that the ice penetrated during the whole of the Ice Age.

The boulder clay also contains fossils such as Jurassic ammonites and belemnites, brought here from the Midlands.

Early Human Occupation in Essex

The first humans arrived in Britain over 700,000 years ago.

Although some worked flint tools from pre-Anglian deposits found in Essex, the earliest substantial evidence for human occupation in the county is from about 400,000 years ago.

The Thames had now been diverted south and flowed approximately along its present course but in the Southend area it turned north to Clacton along the old valley of the River Medway as the Thames-Medway River.

Picture 17 – Tools.

Numerous geological sites in Essex from these interglacial periods have revealed flint implements, most commonly beautifully crafted hand-axes.

In mint condition, it was crafted by a Neanderthal hunting the local wildlife on the banks of the Thames about 300,000 years ago during a warm interglacial stage.

Picture 18 – Mammoth Skull.

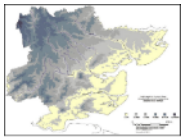
The largest complete mammoth skull ever found in Britain (the ‘Ilford mammoth’) was discovered here.

Downstream, there are many other sites such as at Aveley, where a clay pit yielded the famous Aveley elephants, and Grays, which produced a huge quantity of fossil bones from the brick pits in the early 19th century.

Discovered in 1863 it is still the largest complete mammoth skull to have been found in Britain. The tusks are nearly 3 metres (10 feet) long.

Right: the excavation of two elephant skeletons, one a mammoth and the other a straight-tusked elephant at a clay pit in Aveley in 1964.

Picture 19 - Topographical map of Essex.



The soil types of Essex have helped shape the landscape, wildlife and economy of the County. The boulder clay region of north-west and central Essex has soils which are a rich, crop-producing resource.

The London Clay gives rise to less fertile soil and its heavy nature has made arable farming difficult leading to small, dispersed settlements, and an emphasis on pasture.

London Clay contains montmorillonite, a mineral that absorbs water when wet and swells, and loses it when dry and shrinks. This is a common phenomenon in clays and makes them unstable.

When dry, the shrinkage shows up at the ground surface as cracks, often seen in grassland such as parks, football pitches and the like. In buildings the frequent movement can cause cracks in walls.

The cracks also allow surface water to penetrate more deeply into the soil when it rains. When wet, usually from rain, it is usually only the top 2 metres, rarely more than 5 metres, that is affected in our present climate.

In more severe conditions, the saturation of the clay makes it less cohesive and also heavier, so slow flows and land slipping can occur.

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