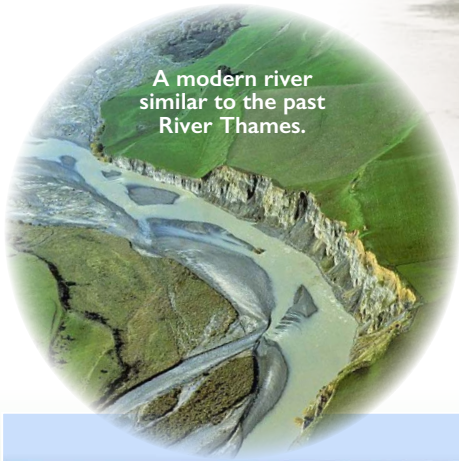


# Purfleet-on-Thames

## 320,000 years ago

Gravel and shelly beds in the walls of these huge chalk quarries show us that a very large river once flowed here towards the west.

This was the River Thames that 340,000 - 300,000 years ago flowed north of its present course. It had to loop its way round the chalk hills at Purfleet. Its left bank was at North Road and its right bank was where Ship Lane crosses the A13. During cold periods of the Ice Age, it was a wide, braided river with many channels, much bigger than the River Thames today.



A modern river similar to the past River Thames.

People living on the banks of the river left evidence in the form of stone tools. The shapes of the tools tell us that different groups of people came and went. They lived here during a warm period between two cold glacial periods. This is called the 'Purfleet' Interglacial.



Purfleet Commercial Park (Bluelands)

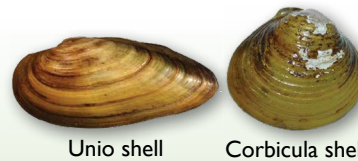
River Thames today

Ancient River Thames



Bank of ancient River Thames cut into shattered chalk in Bluelands Quarry

Stone tools of different types



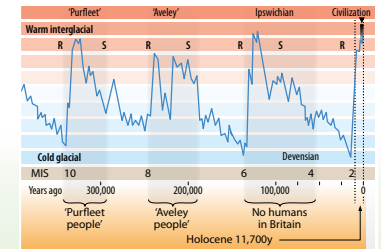
Unio shell

Corbicula shell



Beds of gravel, sand and clay with bones and flint tools

Frost shattered chalk



Temperatures during the latest part of the Ice Age

There is much more to tell about this site, find out at:  
[geoessex.org.uk](http://geoessex.org.uk) • [essexfieldclub.org.uk](http://essexfieldclub.org.uk) • [erms.org](http://erms.org)



The course of the River Thames 320,000 years ago



The support of Goodman is gratefully acknowledged for its improvement to and maintenance of this Site of Special Scientific Interest.

Content and design: Peter Allen, Ros Mercer, Ian Mercer, Trevor Johnson; hunting scene © Oxford Archaeology

**Purfleet Commercial Park (Bluelands) is part of the Purfleet Site of Special Scientific Interest**

# Purfleet-on-Thames

## 320,000 years ago

The earliest people to live here were hunter-gatherers. There were no human remains at Purfleet, but Stone Age flint tools have been found and these help us to build up a picture of how they lived.

At Purfleet, the first people to arrive came from the near continent (northern France, Germany, eastern Europe) at a time when Britain was joined to Europe. They were a type of human classified as *Homo heidelbergensis*. They would have used wooden tools but they also made simple tools by striking flakes off large flint nodules. These are very sharp when fresh and could be used in hunting, skinning and butchering animals. These simple flakes are described as belonging to the Clactonian Industry, named after the town in Essex.

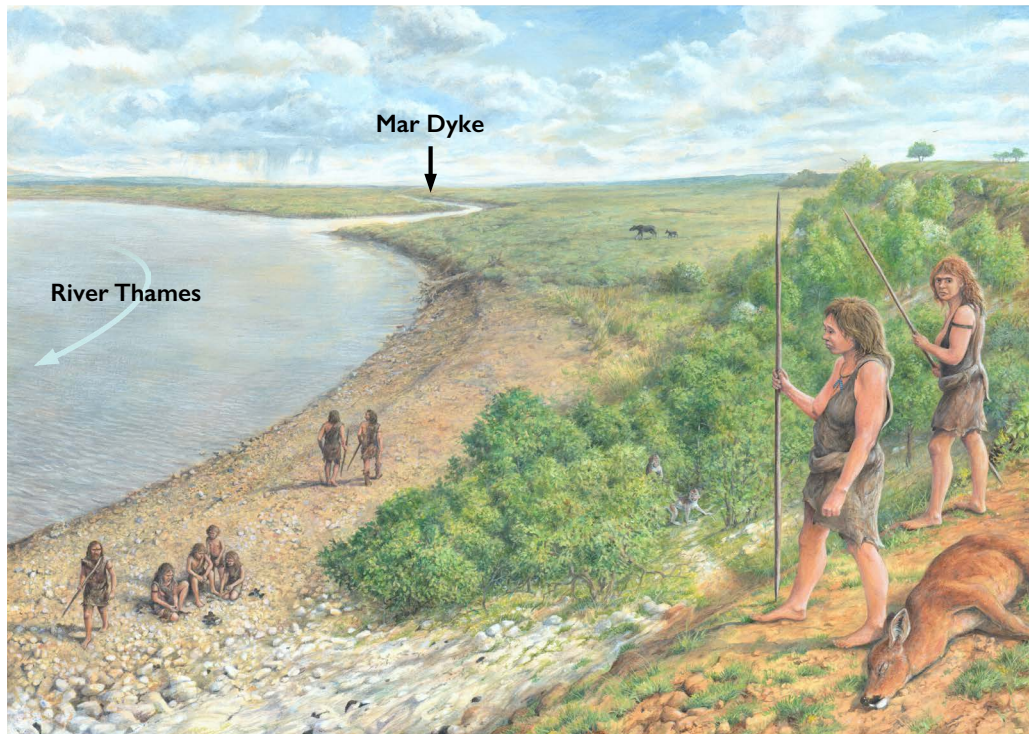


Illustration: Peter David Scott

View Eastwards. Two hunters standing where North Road path is now, looking over the Mar Dyke valley. At the time, the Thames was flowing westwards due to a loop in its course.



*Homo heidelbergensis*

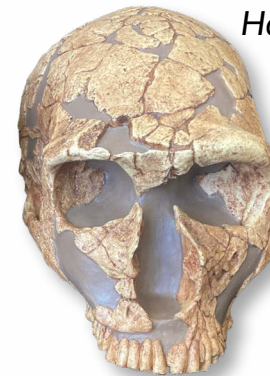


Clactonian core



Acheulian handaxe

Later arrivals, still *H. heidelbergensis*, came from southern Europe (Spain, France, Italy). They made more sophisticated flint tools, by striking off flakes to create a handaxe from the core of the nodule. This technique is known as the Acheulian Industry, from a site in France.



*Homo neanderthalensis*



Levallois core



Photos: M.White

The last arrivals were the Neanderthals, *Homo neanderthalensis*, who were more sophisticated. They made tools by striking a flake off a flint to create a flat surface. This enabled them to have more control over the shape and size of the subsequent flakes. This was known as the Levallois Industry, again named from a site in France.

# Bluelands then and now

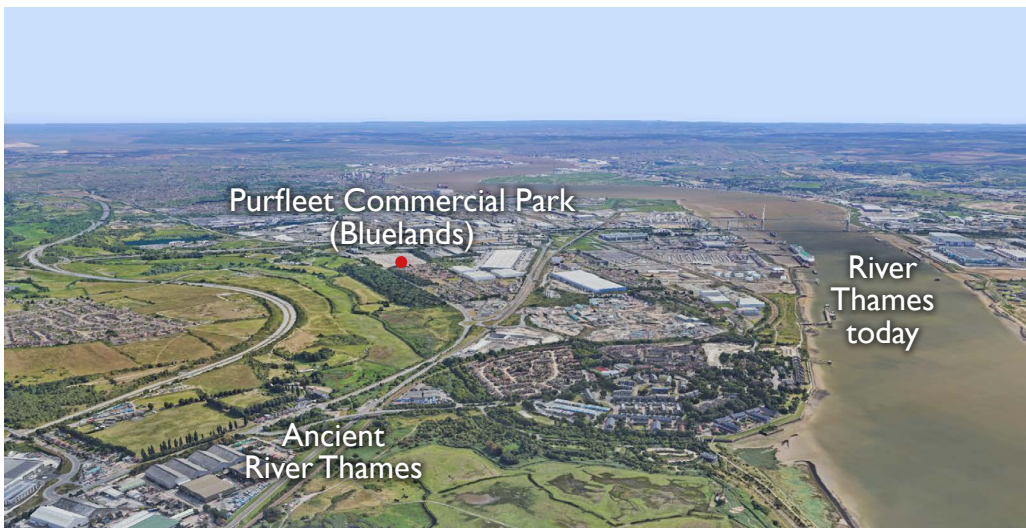


320,000 years ago, the Thames was in its present valley, but it flowed north of its present course. It looped from Ilford and Hornchurch, through South Ockendon and then flowed westwards past Purfleet.



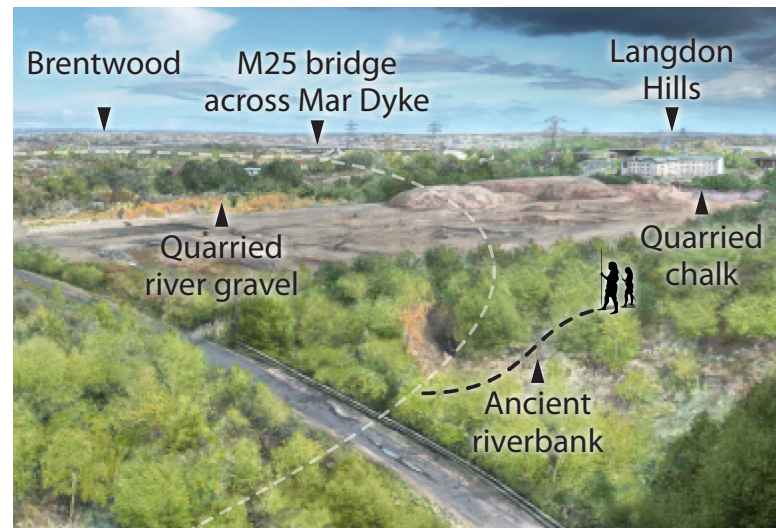
View of the Bluelands site looking eastwards 320,000 yrs ago

Illustration: Peter David Scott



View looking eastwards today.

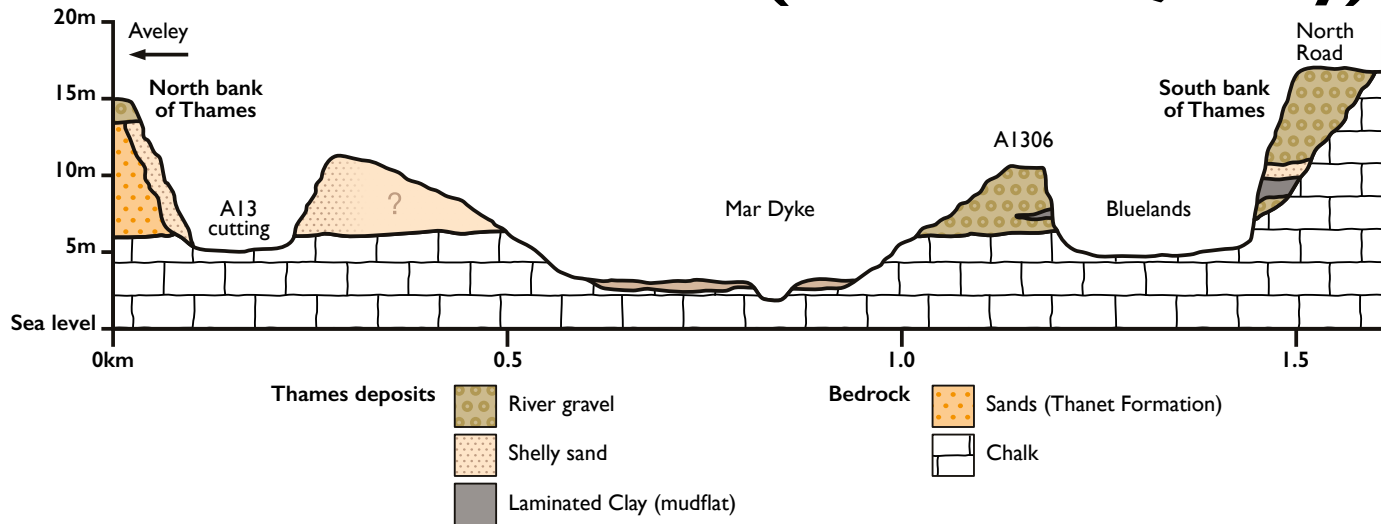
Google Earth



Bluelands site now, before the development of Purfleet Commercial Park

Illustration: Peter David Scott

# Geology of Purfleet Commercial Park (Bluelands Quarry)



**Fractured chalk**  
The uppermost parts of the chalk often show that it has been broken into angular blocks. This indicates that in the past the chalk was frozen. Water penetrated joints and other fissures to some depth and froze, forming permafrost, breaking the chalk up.



**Shelly sand**  
The species of shell, and other types of fossil, found within these beds show that the climate was warm and the river flow was much like today. Sands and shelly sands occur at the sides of rivers rather than in the main stream. The shell beds are often found within the laminated clay.



**Laminated clay**  
The laminated (thinly layered) clay represents former mudflats, typical of much of the Thames today, as at Purfleet or Southend. Mudflats are associated with the lower reaches of rivers. The association with the shelly sand shows that the riverside varied between mudflats and sandy beaches.



**Gravel**  
The gravel shows that the river was very much more powerful than today and had a sandy gravelly bed forming a braided pattern with many channels and gravel bars, like many arctic rivers today. Bedding within the gravels can be measured and show that the river flow was to the west.

*Photos: R. Mercer, P. Allen*

The sediments at Bluelands Quarry give us a history from the end of a cold period, through a warm stage (interglacial), into the beginning of the next cold period in the Ice Age. Recent research has shown it to have lasted from about 340,000 to 300,000 years ago. As a measure of its geological importance, the warm stage is known nationally as the 'Purfleet' Interglacial and it is a Site of Special Scientific Interest.

The site also enables us to contrast the variety of warm stage tidal sediments found at the side of the river, like the foreshore at Purfleet today, with the cold stage gravels in the main path of the river when the flow was powerful.

**300,000 years ago**

**Cold**  
Braided river



*Google Earth (Alaska 2020)*

**320,000 years ago**

**Warm**  
Warm Inner estuary, mudflats, sandflats with shell beds



*Google Earth (Purfleet 2020)*

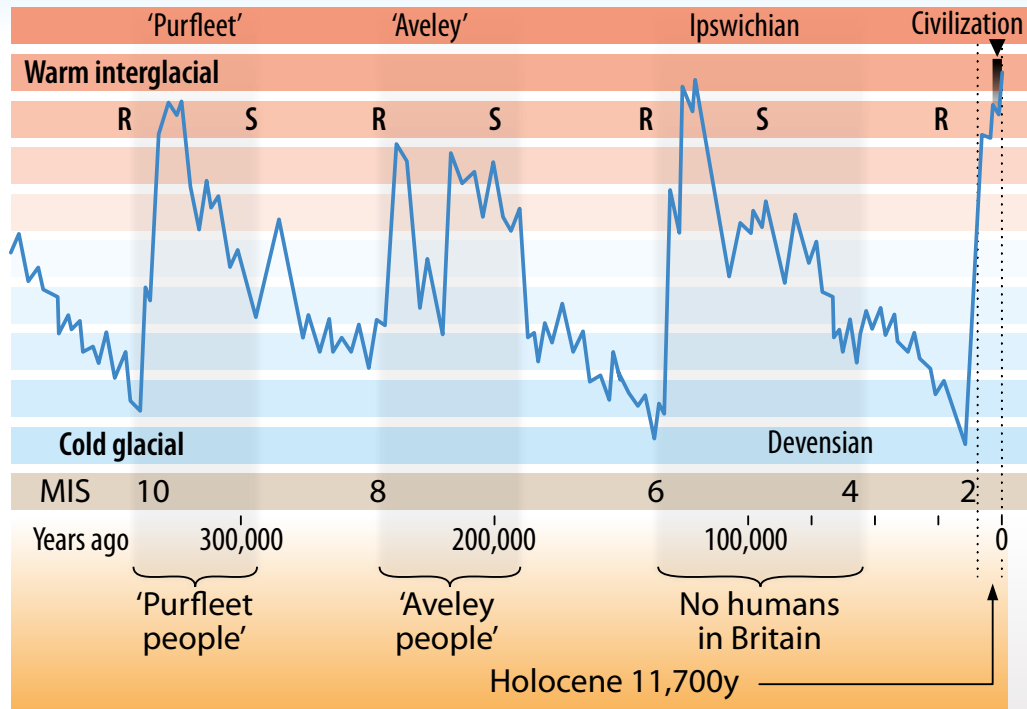
**340,000 years ago**

**Cold**  
Deeply frozen ground (permafrost)



*The Arctic Institute (Alaska)*

# Climate Change



In Britain the Ice Age started 2.6 million years ago and has experienced over 50 cycles of cold (glacial) and warm (interglacial) climates, some warmer than the interglacial we currently are in. These cycles are caused by variations of the earth's orbit in relation to the sun.

It is only in the last 800,000 years that the cold stages were cold enough for glaciers to reach our latitudes. Since then the cycles have taken about 100,000 years, comprising a trough of a few thousand years. This was followed by a rapid rise in temperature taking only a few thousand years to an interglacial peak (R), again lasting a few thousand years. Then there was a long slow decline taking 80 thousand years or more to the next cold trough (S).

Temperatures during the latest part of the Ice Age

## Cold Stages

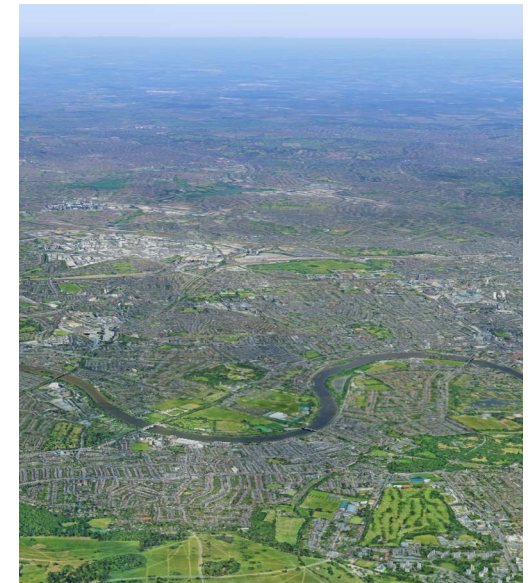
The cold stages led to the development and expansion of glaciers in the polar regions, causing a drop in sea-level as rain and snow became trapped on land as ice instead of returning to the sea. Britain became linked to the continent. With the sea bed now dry land, humans and animals were able to migrate southwards as the climate deteriorated and the vegetation declined. With the change of climate, and the decline in vegetation, the Thames changed to a multi-channel braided pattern, with wide, shallow beds dominated by gravels laid down by floods as the ice and snow on land melted each spring.



N. McPhee (Alaska)

## Warm Stages

The rapid climatic recovery from the cold stages meant that humans and animals had to migrate back to Britain fairly quickly before sea-level rose again, but even so, people from as far away as southern Europe were able to make the migration. With the recovery, vegetation returned, protecting the land from erosion so less water and gravel reached the Thames and it switched to a sinuous-meandering pattern, similar to today.



Google Earth (W. London 2020)

# Significant local geological sites



Ice Age fossils from sites in Essex and Kent (Essex Field Club, Green Centre, W. George)

Bluelands and other local sites have a wide range of fossils and other geological data, giving one of the best records in Europe of the last 450,000 years covering the Hoxnian, 'Purfleet', 'Aveley' and Ipswichian Interglacials. The use of two local names highlights the geological importance of this area.

This record gives the best information to understand the climate of the present interglacial and the possible outcomes of the human interference with our climate.

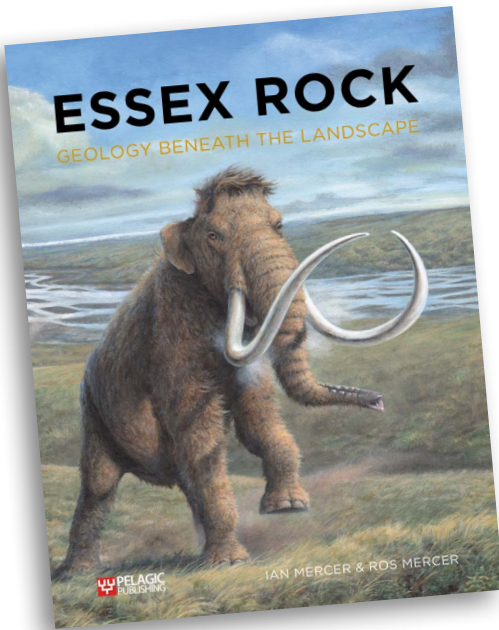
Bluelands Quarry itself and the adjacent Greenlands Quarry give the most complete record of the 'Purfleet' Interglacial. They have good exposure of the cold-warm-cold sedimentary sequence of deposition supported by an extensive faunal record. These exposures are critical for teaching and scientific research.

The succession of archaeological industries has led to much debate, still continuing today, and has increased knowledge of our human ancestry.



# Further Information

There is much more to tell about the history of the Thames at Purfleet.



## Books

The most recent book to cover the topic is:

### **Essex Rock:**

**Geology Beneath the Landscape**  
by Ian Mercer and Ros Mercer,  
Pelagic Publishing. 2022.

In particular **Chapter 6, Ice Age Essex**

This book was written especially to be readable by non-specialists and has many illustrations to help understand the geology of the county. Much of the material you have seen in this QR link for the Bluelands site was obtained from this book.

*Detailed scientific descriptions are to be found in:*

### **The Quaternary of the Thames**

by Bridgland, D.R. Chapman and Hall, 1994.

*This book was updated by:*

### **The Quaternary of the Lower Thames and Eastern Essex.**

Field Guide. Bridgland, D.R. et al., 2014.

### **The Quaternary Fluvial Archives of the Major English Rivers.**

Field Guide. Bridgland, D.R. et al., 2019.

The last two are obtainable from the Quaternary Research Association

[qra.org.uk](http://qra.org.uk)

*The 'Purfleet' and 'Aveley' interglacials are described in:*

### **The Thames through Time** by Morigi, A. et al.,

Thames Valley Landscapes Monograph No.32, Oxford Archaeology, 2011.

## Local Societies



### **GeoEssex**

[geoessex.org.uk](http://geoessex.org.uk)

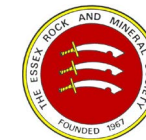
This group is concerned with conserving geological sites in Essex and makes important contributions to the development of local plans. The website contains much local geological information and in the 'Sites' section describes all the local geological sites in Thurrock. The site also has geological trail guides and other local geological information.



### **Essex Field Club**

[essexfieldclub.org.uk](http://essexfieldclub.org.uk)

Founded in 1880, the Essex Field Club is concerned with the wider natural history of Essex and has an extensive collection of fossils, rocks and minerals. The website contains detailed descriptions and maps of the geological sites in Essex, trail guides and other geological information. Local geological information occurs regularly in its Newsletter and its annual publication, the Essex Naturalist. There are frequent displays at their premises at The Green Centre at Wat Tyler Country Park, Pitsea.



### **Essex Rock and Mineral Society**

[erms.org](http://erms.org)

The ERMS is a very active group organising monthly geological talks and demonstrations given by members and invited speakers at Shenfield and Stanway (near Colchester) and field meetings throughout the year. It also puts on an annual Gem and Mineral Show and often has a display and stall at various events around the county. Its talks cover all aspects of the subject.