LOCAL GEOLOGICAL SITES
EPPING FOREST DISTRICT

GeoEssex
Promoting the geology and landscape of Essex

EpG8 Loughton Brook Meanders

Site location: In Epping Forest, 250 metres north of Staples Road, Loughton.

Grid Reference: TQ 418 968

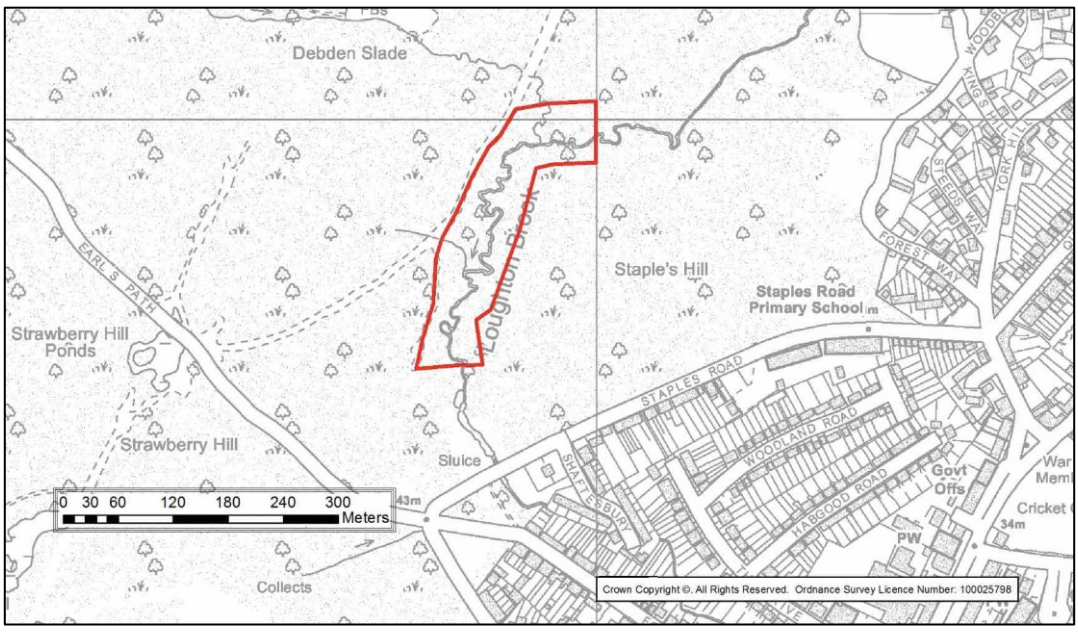
Status: Accessible at all reasonable times

Summary of the geological interest:

Meanders are a common feature of lowland rivers but usually they are large, making it difficult to appreciate them from ground level. Loughton Brook has a fine group of small-scale, slightly incised meanders which are easy to study and accessible to visitors.

Meanders are loop-like bends in a river, characterised by an actively eroding cliff on the outside of the curve and a gentle slope of deposited material on the inside. Usually meanders occur on the part of the river with the least gradient.

The precise reasons why a river adopts a meandering course are uncertain, but the sinuous curves may be the result of the balance between energy and friction when a low energy river moves fine sediments down a shallow gradient.



Site Assessment. *Local Geological Sites (LoGS) in Essex are assessed using criteria based on DEFRA guidance. An assessment form is used which asks key questions under four value categories: scientific, educational, historical and aesthetic. This site has been assessed and qualifies under these criteria.*

Date of selection/last revision: Nov 2018
site visited June 2025

Access

The site is owned and managed by the Corporation of London and the importance of the meanders is recognised in the Corporation's management plan for the forest. The site is adjacent to a footpath. Parking is possible nearby and Loughton Underground Station is within walking distance. The site lies entirely within Epping Forest SSSI.

Scientific interest and site importance

Meanders are associated with rivers with lower discharges, finer grained sediments and lower gradients. Thus, they are more likely to occur downstream in a river system. They are also associated with lateral erosion which may cause a series of meanders to migrate downstream. Channel width and depth and the wavelength and frequency of meanders are related to one another and to the flow and rate of discharge of the river.

Meanders may become more and more exaggerated curves until, in some cases, they double back on themselves completely. 'Ox-bow' lakes are formed when the neck of a meander is severed by continued erosion, allowing that part of the river to temporarily pursue a straighter course. The meanders in Loughton Brook are in various stages of growth and decay, from their first inception as slight deflections in the course of the stream, up to their final stage as dry abandoned loops, or ox-bow lakes (Warren 1910).

The exact cause of meandering is not fully understood; it may be a function of friction. By analogy, the wagons/carriages of a long train will form a sinuous pattern if the train crashes because the engine came to an abrupt halt while the wagons were still trying to go forward. Friction in the channel may have a similar retarding influence on the river. Meander **wavelength** is seven to ten times channel width (channel width is measured at the mid-point between meander apices). **Frequency** of meanders is defined by radius of curvature (measured by finding the radius of the meander apex), which is three to four times channel width. **Amplitude** has no provable relation to discharge and is more likely to be a function of geology.

The bed of Loughton Brook is formed of rounded black flint pebbles derived from Tertiary deposits and sub-angular flints from a gravel deposit. The brook also shows interesting erosion and deposition features. Because of the accessibility and small scale of the meanders they are of great educational importance.

Condition report. 20 June 2025

The meandering stretch of the Loughton Brook is still readily accessible and the features well displayed.

References

WARREN, S.H. 1910. Excursion to the Loughton District of Epping Forest and to Mr. Hazzledine Warren's museum. Saturday March 5th 1910. Proceedings of the Geologists' Association. 21. Pages 451-455.

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A section of Loughton Brook showing one of the meanders

Photo: W.H. George from EFC website

Loughton Brook meanders *Photo: P. Allen June 2025*

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