

OR/15/064 The Quaternary history of the Vale of Pickering

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Ford, J R, Hughes, L, Burke H F and Lee, J R. 2015. The Vale of Pickering: an initial summary of the Quaternary/superficial geology and data holdings. *British Geological Survey Internal Report*, OR/15/064.

From the available evidence, including published maps, borehole records and various written accounts it is possible to piece together the geological evolution of the Vale of Pickering. Its recent geological evolution spans part of the Quaternary geological period which corresponds to the last 2.6 million years of Earth History.

The early evolution of the vale of pickering

The early geological history of the Vale of Pickering is poorly understood because recent geological events, including those that occurred during the last Ice Age, have either eroded or buried older deposits or features within the landscape. The term Ice Age refers to a period of geological time when the climate was much colder than the present day when frozen ground and glaciers — vast rivers of flowing ice, existed across much of northern Britain. Only limited geological evidence exists for events that may have shaped the Vale prior to the last Ice Age about 30 000 years ago. Evidence includes patches of strata called 'till' (or boulder-clay) which appear to cap several of the small hills within the Vale. A 'till' is a type of material that was deposited beneath a glacier and was probably laid down during a much older Ice Age. It is likely that the 'till' once spread widely across the area. However, erosion by rivers following its deposition has removed much of the deposit and scoured the underlying bedrock.

Rivers and hills in the vale

The Vale of Pickering is underlain by relatively soft and erodible mud rocks (called the Kimmeridge Clay) and forms a natural low within the landscape between much harder and more durable rocks situated to the north and south. Prior to the last Ice Age, the Vale was probably a low-lying river valley with occasional small hills capped by 'till' deposited during the earlier Ice Age. Many of the modern river systems, like the River Derwent which now flows through the Howardian Hills, did not exist at this time. However, it is thought that a drainage pattern existed with rivers flowing west to east across the region into the North Sea. The history of these early river systems within the Vale of Pickering remains poorly-understood. However, borehole records reveal sand and gravel in places concealed at depth and these deposits may be related to these ancient rivers. One such river was a proto River Ure, which probably flowed eastwards through the Vale from its headwaters in the Yorkshire Dales (Reed, 1901)^[1].

The last ice age — ice-dammed lakes

During the last Ice Age, a large glacier moved southwards down the coast of eastern England encroaching inland as far as Wykeham about 10 km from the present day coastline. Meanwhile, to the west, a second glacier moved southwards through the Vale of York as far as Ampleforth. Both glaciers laid down tills and sculpted a series of subtle features within the landscape called moraines.

These moraines record the maximum ice extent at either end of the Vale of Pickering and were formed by glaciers bulldozing materials into small ridges parallel to their margins. With both ends of the Vale effectively blocked by glaciers, meltwater from these glaciers and rivers flowing into the Vale caused a large glacial lake to form about 21 000 years ago. This glacial lake, which existed for about 6 000 years, is known as Glacial Lake Pickering and was one of several large glacier-dammed lakes that occurred in eastern England during the last Ice Age.

Glacial Lake Pickering was fed by meltwater and sediment derived from the nearby glaciers and rivers and streams flowing off the nearby hills. Coarse-grained sediment such as gravel and sand, represent deltas formed where these rivers and streams entered the lake. By contrast, finer-grained sediments, including silts and clays, were carried out further into deeper and quieter parts of the lake basin where they were laid down. These fine-grained sediments correspond to the 'lacustrine deposits' shown on the geological map.

Comparatively little detail is known about the history of Glacial Lake Pickering, although it could potentially provide important clues about how modern glaciers in places like Greenland and Antarctica may respond to future climates. Several major changes in lake level are believed to have occurred during the existence of Glacial Lake Pickering. These were perhaps controlled by seasonal changes in the input of water and sediment into the lake and by the position of the glaciers that impounded the Vale at each end. Both would have acted to regulate lake-level and have led to marked changes in the geography of the lake basin, causing the position of the shoreline, rivers and streams to migrate over time. This history is reflected within the complex pattern of sediments revealed by shallow boreholes in the Vale. For instance, sand and gravel that is shown on borehole logs to occur within fine-grained lake sediments may correspond to an abrupt lowering of lake level and the short-lived development of a small river-fed delta.

Around 17 000 years ago, the glaciers impounding Glacial Lake Pickering had begun to retreat. Water levels within the lake overtopped a low-point in the Howardian Hills to the south and began to drain into the Vale of York. As the water drained it eroded a distinctive steep-sided channel which can be observed at Kirkham, south of Malton. This channel became the main outlet pathway for water draining from the lake and the present-day River Derwent follows the same route.

The recent landscape

The end of the last Ice Age coincided with the removal of glaciers from the landscape and progressive warming of the climate. Glacial Lake Pickering had by this time drained and was succeeded by a much smaller and shallower lake basin located at the eastern margins of the Vale called Lake Flixton. The latter is of particular archaeological importance because at several important sites including Star Carr, it contains evidence for the first humans to colonise the landscape following the last Ice Age. The climate during this time-interval was probably still quite marginal with sand and silt laid-down by the glaciers being actively redistributed by wind.

Within the Vale of Pickering itself, a network of rivers has formed which have cut down into the lacustrine deposits to form channels. In addition to eroding older deposits, they have deposited 'alluvium' on the banks and floodplains of these rivers. The alluvium in this area consists predominantly of silt and clay, although sand and gravel is likely in areas where the rivers dissect older coarse-grained deposits or bedrock. Peat may be found alongside or within modern river or floodplain deposits, especially in low-lying areas where shallow water may have ponded to create marshy areas.

References

1. [↑](#) REED, F R C. 1901. The geological history of the rivers of East Yorkshire. Cambridge.

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