SGI 12 Blackwall Drift Filled Hollow

Royal Borough of Greenwich and London Borough of Tower Hamlets
Blackwall Drift Filled Hollow*,* Blackwall Tunnel
Grid Ref: TQ 386 802

Evidence for drift filled hollows (possible collapsed pingos) beneath London

When the first Blackwall Tunnel was completed in 1897 it was the longest underwater tunnel in the world and a remarkable engineering achievement, not least because of the unusual geology of the site. Beneath the 'drift' deposits of sand and gravel dating from the Ice Age the surface of the bedrock in this part of London is usually fairly level with no variations more than about 5 metres in height. However, the survey for the tunnel revealed a deep drift-filled depression at Blackwall extending through the bedrock of London Clay, Lambeth Group and Thanet Formation, down at least 60 metres into the Chalk. This presented real difficulties to the tunnellers and the tunnel took six years to build.

The second Blackwall Tunnel constructed in the 1960s downstream of the first encountered similar difficulties. The two tunnels had passed through a buried, elongated, basin-like feature with almost vertical 'cliff-like' walls and completely filled with sand and gravel. It was one of many such depressions that have since been found to be present beneath central London between Battersea and Canning Town.

Others were encountered when the Rotherhithe Tunnel was excavated, and more recently they have been discovered in the Olympic Park, Stratford, near the Velodrome and near Newham Hospital, Newham (during the tunnelling for the Lee Tunnel). The ground below the Lee Tunnel hollow proved to be affected at over 70m below ground level. In excess of 50 of these features, of various sizes, have been found in the Greater London area, and are continuing to be found during construction works.

These depressions were originally thought to have been formed by the scouring action of glacial meltwater, and although this may explain some of the shallower features, it does not explain the great depth of the larger ones and the fact that there is usually bulging and destruction of the strata at their base. Research published in 1979 came up with a most unexpected theory for their formation which is today still being debated as the answer to the puzzle. Hutchinson suggested the depressions were the scars left behind by the melting of pingos at the end of the last glacial stage. Pingos are massive bodies of ground ice that grow by drawing water from unfrozen ground beneath the permafrost, the influx of water from below accounting for the bulging of the underlying strata. It is thought that at the end of the glacial stage, melting of the pingo resulted in the collapse of overlying deposits into the hole left by the melting ice. The sudden release of water previously confined in the Chalk aquifer below would have deepened the hollow and accounts for the presence of large chalk blocks that were found in the gravel some 15 metres (45 feet) above the Chalk strata. Pingos exist in Arctic areas today such as north-west Canada, giving us a vivid reminder of conditions that existed along the Thames valley during the most recent glacial stage, one of the coldest periods of the Ice Age.

This theory still stands as a potential mode of formation for these larger features, however current thinking suggests that a combination of pre-existing faulting and high groundwater pressure changes during the Quaternary may also explain why so many of the features exist.

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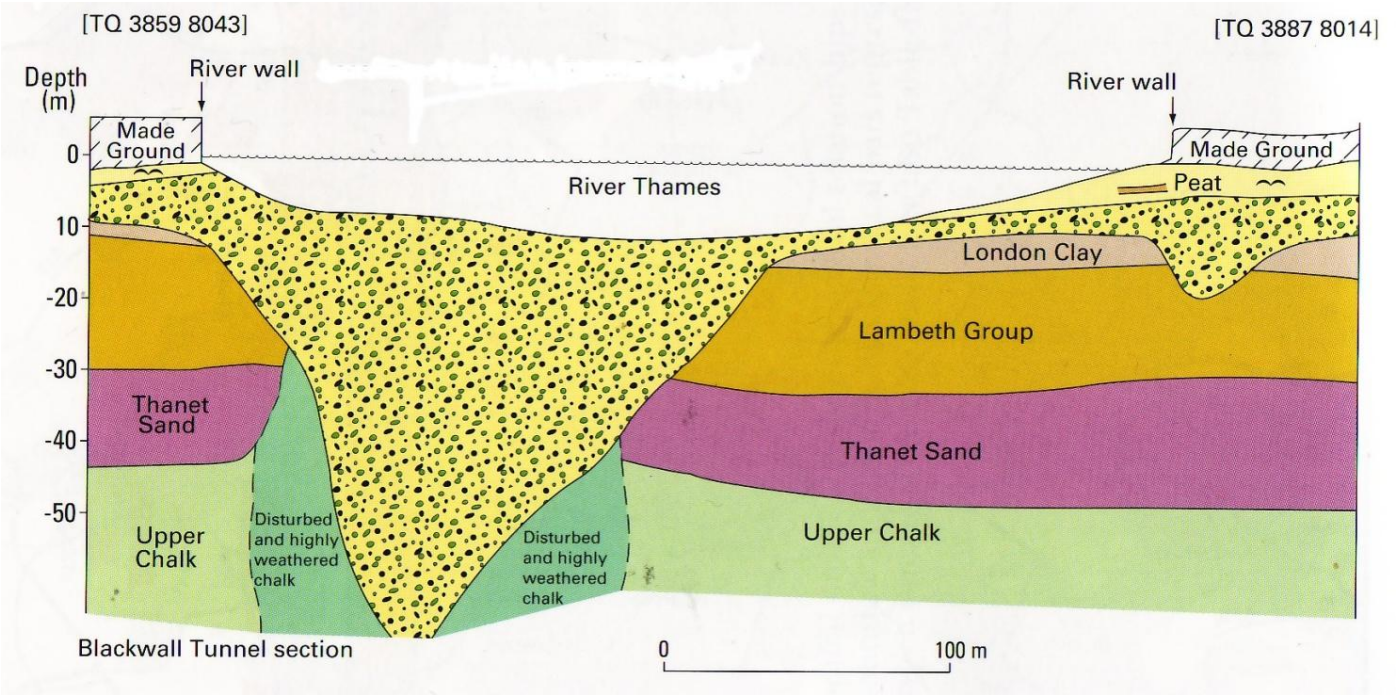

A section through the bedrock beneath the Thames at the site of the Blackwall Tunnel. The deep depression, now filled with gravel and sand, is thought to be the remains of a pingo.

Illustration from the British Geological Survey, London Memoir Fig. 36c

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References

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