LONDON GEODIVERSITY PARTNERSHIP

Building Stones in Medieval London

Three important building stones used in London between the Roman period and the Great Fire of 1666 were Kentish Ragstone and Reigate Stone which were used in central London and ferricrete which was used local to its occurrence in west and NW London.

Kentish Ragstone *(Hythe Formation, Lower Greensand Group; Cretaceous)*: a hard, well-cemented (calcite cement), glauconite-rich sandstone with shell debris (oysters, belemnites) and locally brown phosphatic nodules. The colour ranges from pale grey through brown to dark green. The beds can be bioturbated and contain the large shell *Aetostreon* (a large *Exogyra* oyster). Recent marine bivalve borings have been noted in some examples used as building stone; the stone was presumably raised from shoreline quarries. The stone is mainly used for coursed rubblestone walling. It has been used widely since the Roman period and is credited as the only stone from Kent to have been exported outside the county - much of it shipped out of the port of Hythe or along the Medway to Maidstone.

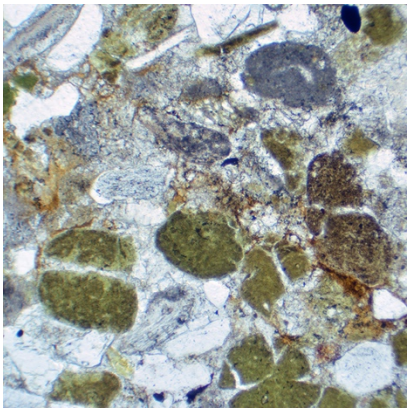




Kentish Ragstone has been used in London since the Roman period and was the main building stone used from this time until the 17th Century. It was used to build White Tower and walls of the Tower of London (11th Century), the Jewel Tower (right), The Guildhall, The Charterhouse and numerous churches during the medieval period (12th-16th Centuries), some of this stone was robbed from Roman buildings but stone was also being actively quarried. By the 17th Century, the use of Ragstone declined because of the growth in popularity of Portland stone, however it is still used today for restoration stone and a small amount of building stone, quarried from Gallagher's Hermitage quarry near Maidstone.

Reigate Stone *(Firestone Beds, Upper Greensand Formation; Cretaceous)*: Fine grained sandstone composed of sponge spicules, quartz, glauconite and mica-rich sandstone, with variable amounts of calcite. Greenish grey when wet, becomes more yellowish when dry. Contains opal lepispheres in the matrix and it is distinguished from Kentish Ragstone by the presence of muscovite. Reigate Stone has been quarried in the area around Reigate, between Brockham in the west, and Godstone to the East, from at least the 11th Century through to the 19th Century, along ~ 18 km of outcrop. There are a number of quarries along strike, all disused and nowadays mostly inaccessible. All stone was extracted from drift-mines cut into the scarp as there is no extensive outcrop; it is exposed on the North Downs escarpment and overlain by the Chalk. The stone was cut along the dip of the beds using the post-and-stall technique, leaving galleries of from 1.4 – 1.7 m high by 4 m in width. Individual beds, between which there is some variation in mineralogy, are between 30-40 cm in thickness. The main areas of Medieval (12th Century) quarrying were clustered around the Reigate-Gatton and Merstham-Chaldon areas of Surrey. Roman use of Reigate Stone is documented from 2nd-3rd C AD excavations in Southwark. Reigate stone was the closest available freestone for building in London and was therefore widely used from the 11th-12th Centuries. Consequently, it is encountered in the majority of Medieval buildings in London, however it has not weathered well in London's polluted environment and has a tendency to spall and disintegrate. The stone was often used for window tracery as at the Bishops' Palace in Southwark (left).







Kentish ragstone and Reigate stone under the microscope viewed under plane polarised light. Kentish Ragstone is on the left and Reigate stone on the right. The green particles of the clay mineral glauconite are clearly seen in both samples. The coarser-grained Kentish Ragstone is rich in quartz and shell fossil fragments. Reigate stone is finer grained and also contain quartz along with white mica (muscovite) and y-shaped fossil sponge spicules. Photo of Kentish Ragstone courtesy of Tracey Chaplin.



Ferricrete: Ferricretes are defined as surface or near-surface forming lithologies wherein sediments are cemented into a hard crust ('duricrust') by iron oxide and iron oxide-hydroxide minerals. This process is considered to be independent of climate. Ferricrete crusts may have formed in a warm or tropical palaeoenvironments (post deposition of the original sediment) but it is not always possible to link a climatic environment to field occurrences of ferricretes within the London Basin and the wider age-related deposits of S and SE England. Three varieties of ferricrete used as building stones in London. Type A are cemented gravels from the Maidenhead Group (Pleistocene fluvial gravels and mainly the Taplow Gravel), Type B are iron-cemented sandstones possibly extracted from horizons in the Eocene Bagshot Sandstone Formation and Type C are a high iron-content sediment presumably obtained from beds within the Stanmore Gravels. Buildings constructed of ferricrete include Harmondsworth Great Barn (1426) and several churches in west and north London, including St James's the Great Church Friern Barnet, St Mary's Tower Hornsey (1496, above), St Mary's Church Harrow-on-the-Hill (1094), St John the Baptist's Church Pinner (1320) and St Mary's Church Monken Hadley (1494).



Other Medieval building stones in London



Westminster Abbey (13th Century, left) is built from Jurassic **Chilmark Stone** (Chilmark Member, Portland Stone Formation), the inland variety of Portland Stone which is quarried in the Vale of Wardour in Wiltshire. It is a fine-grained, oolitic, cross-bedded sandy limestone composed of quartz, glauconite and finely fragmented fossils including, serpulid worms, ammonites and sponge spicules. Blocks are sometimes cross-cut by calcite veins. Glauconite gives it a slightly greenish hue which can weather pinkish.



Westminster Hall in the Palace of Westminster (right) was built in 1394 by the architect-builder Henry Yevele and is constructed from **Marr Stone** (Wetherby Member, Cadeby Formation) a Permian, fine-grained dolomitised limestone quarried a few kilometres north of Doncaster in East Yorkshire.



These surviving Medieval stone-built buildings were unusual in their time as most buildings were constructed of lath and plaster with thatched roofs. The reconstructed Globe Theatre (1997) is a modern example of the use of these building materials. Other important buildings were built from brick made from the Eocene London Clay and the Pleistocene-Holocene Brickearths (Langley and Enfield Silts). Surviving examples include Hampton Court (left) and St James's Palace, both built in the 16th Century.

Ruth Siddall, London Geodiversity Partnership, 2026

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