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KENT HILL GRAVEL MINE AND QUARRY, AUDLEY, STAFFORDSHIRE

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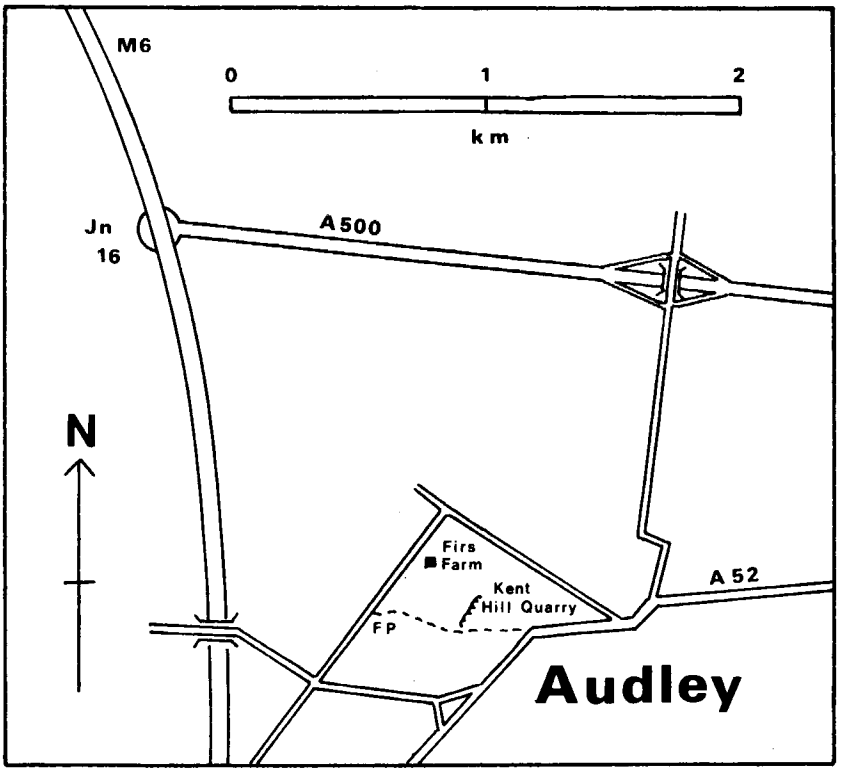
Kent Hill Mine and Quarry contain an interesting and unusual set of gravel workings carved out of conglomeratic beds. They are also probably unique in that pillar and stall mining techniques were used to extract much of the gravel. The workings provide an interesting comparison with those found in the Keuper Sandstone at Beech Cave.

The workings are situated due west of Audley in Staffordshire at the NE end of a low hill immediately adjacent to Cooper's Green Storage Reservoir (altitude 137m GR 789509). Cars can be parked on the A52 close to the cricket pitch. A footpath leads from the bend in the road, past the Water authority buildings and up the hill to the quarry. A location map for the site is included below.

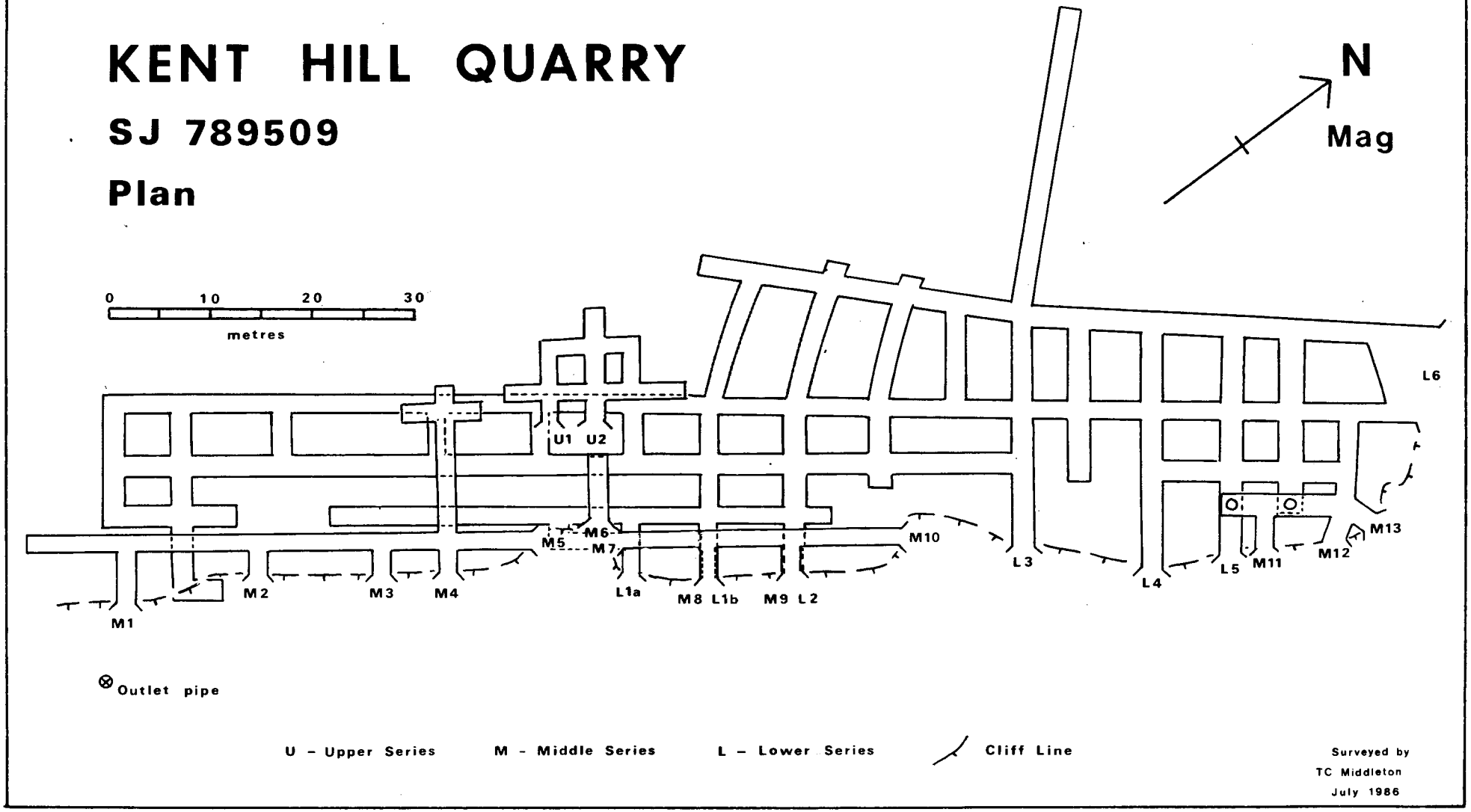


The quarry lies within a deciduous copse near to the top of the hill and is surrounded by open farmland. It takes the form of an elongated ravine approximately 160m by 25m trending in a NE/SW direction. The main cliff-face lies on the NW side of the depression, at the base of which occur several entrances leading to underground workings.

KENT HILL QUARRY

SJ 789509

Plan



Surveyed by
TC Middleton
July 1986

The land is owned by the Severn-Trent Water Authority and is used both as a washout for and to take the overflow from the adjacent Cooper's Green Reservoir. This results periodically in the complete flooding of the underground workings. Severn-Trent Water are concerned about the safety of the site, particularly because of the proximity of the Public Footpath. They submitted a planning application for permission to use the top 5-9 metres of cliff-face to infill the base of the quarry thus preventing access to most if not all of the underground workings. Planning permission was refused on 27th January 1986 on the grounds that this would result in an excessive amount of traffic on the local roads and because of the geological importance of the site. It is most important that anyone wishing to visit this locality must first obtain permission from Severn-Trent Water who will also advise on the safety status of the site and the likelihood of flooding. Access details are outlined in the acknowledgements.

GEOLOGY

The rocks from which the gravel was extracted are Triassic in age belonging locally to the Chester Pebble Beds which form part of the Sherwood Sandstone Group (Bunter Pebble Beds). The outcrop occurs approximately midway between the Cheshire and Staffordshire Basins. The cliff is 14m at its highest point (entrance M9 / L2 on survey - see photograph 2) and contains a bed of sandstone 1 to 2 metres in thickness at its top. Below the sandstone cap lie over 12 m of Pebble Beds and these also contain the occasional sandstone unit generally ranging from 10 to 20 centimetres in thickness. The beds dip in a NW direction at angles ranging between 25 to 35 degrees.

The beds indicate a fluviatile environment and many interesting sedimentary structures can be seen. The structures are particularly well exposed often in three dimensions on the support pillars (see photograph 3). They include large scale foreset beds, erosional channels, graded bedding, imbricate structure and cross-bedding. Palaeocurrent analysis, noted by the Geological Records Centre for Staffordshire, indicates a current direction which flowed towards the north. This is in agreement with those found at Cheadle in Staffordshire.

No faults were seen either above or below ground and there was no indication of any mineralization.

HISTORY

There is no evidence of mineral extraction at this site on either Yate's map of 1775, Teesdale's map of 1832 or the first edition Ordnance Survey map of 1840. The 1889 Ordnance Survey map (6 inches to 1 mile) shows, by means of hachures, a small slope facing NW and a magazine in the area occupied by the present quarry. The magazine, however, was not for quarrying but belonged to Rileys, the local gunsmith who still has a shop today in Audley. A sandpit was also marked further north of the present workings. The 1900 Ordnance survey sheet shows an extension of the hachured slope both to the NE and the SW and this is also indicated on the 1925 edition. It is possible that this slope could have been the result of a very small scale sand / gravel operation by a local farmer or landowner.

Charley Edwards used to work First Farm just to the NW of the present workings. He found that large amounts of pebbles were disturbed whilst ploughing the field immediately NW of the present ravine (field No 1035). He decided to extract the gravel and quarrying began in 1929. He did not apply for planning permission and this fact together with the small scale nature of the operation probably accounts for the lack of any written references in either the local libraries or the County Records Office. Initially the extraction was from an opencast site approximately 20m deep, then, due to the presence of too much overburden, the operation was extended underground to the SE to work the area of the present ravine. The first map to show the 2 sets of workings is the 1946 Ordnance Survey sheet. The early techniques used were very basic and included hand drilling and blasting using bobbin powder (gunpowder in bobbins). Later compressed air was used for drilling and more mdoern explosives were introduced. There was plenty of local skilled labour available from the many coal mines of the area and several of the workers, particularly those using the compressed air drills, developed silicosis. The gravel was transported within the mine in waggons on rails. Apparently the passages had a very slight incline and this enabled the waggons to be pushed by hand to the level which connects today's accessible Lower Series with the original quarry site in the farmer's field. The trucks were then hauled out of the original quarry using a car engine. The gravel was then washed and any large pebbles were crushed on site. Much of the gravel extracted by Mr. Edwards was sold to the Water Board for the construction of manholes. The rights to extract the gravel were passed from Mr. Edwards to Mr. Farrington and he was later joined by Mr. Ellerton who eventually took over the operation. Throughout the period Mr. Edwards collected a royalty of 6d per ton of extracted gravel. Quarrying activities ceased at the end of the Second World War and the land was sold to the Potteries Water Board for £200 at the time when Cooper's Green Reservoir was beginning to be constructed (circa 1950). Eventually Mr. Edwards had the old buildings and gravel plant destroyed by 'Blaster" Bates and later filled in the original quarry. The site of this quarry can still be seen in the farmer's field. It takes the form of an elongated depression with a low scarp facing towards the NW.

THE SURVEY

The accessible underground workings cover an area of approximately 3250 square metres and a survey of the passages is included with this report. The passages trend in two main directions. The longest of these run parallel to the cliff-face following the strike of the beds trending NE/SW. The second set of passages are shorter and trend NW/SE. The passages are generally 2 to 2.5 metres high and 2 metres wide and due to the comparatively incompetent nature of Pebble Beds, the support pillars are considerably larger in size than the passages. Although the passage which connected the original quarry with the present workings forms the lowest part of the mines by far the majority of the passages are, to all intents and purposes, horizontal levels and therefore cut through the bedded units of conglomerate. A few of the entrance passages are inclined and the floors of these trend down dip usually following along the top of a sandstone bed. Also a short incline occurs at the southern end of the Lower Series below the entrances M1 and M23. Considering the nature of the Pebble Beds together with the fact that they are periodically flooded, the roofs of the levels were found to be in surprisingly good condition and there were few areas of collapse.

The workings consist of three main levels and the entrances shown on the survey are marked according to the level to which they lead.

Upper Level

This short series is situated in a depression with a small rock outcrop 10m back from the top of the main cliff-face. There are two entrances, U1 and U2, lying close together which lead directly to inclines trending NW following the dip of the conglomerate into the hillside. There are also two horizontal levels trending NE / SW. The Upper Level could possibly be a fairly old working which was driven as a trial.

Middle Level

M1 is situated in a small hollow separate from the other entrances. The overflow pipe from Cooper's Green Reservoir is situated at the southern end of the hollow and water from this would flow directly down the inclined entrance to the main NE / SW trending level. M2, M3 and M4 also intersect this level. The passage emerges into daylight at M5 but disappears underground again at M7 to reappear at M10. The M8 and M9 entrances are found 3m up the cliff-face and intersect the main level. L1b and L2 lie directly beneath M8 and M9 and the cliff in this area is at its highest (see photograph 2). M4 leads further into the hillside to a small junction. The level contains the half buried remains of an iron 'bucket'. M6 leads to a short crawling passage.

Another shorter Middle Series occurs at the NE end of the outcrop. This is also at a slightly lower level. M11 has a horizontal entrance passage leading to a very short level with two holes in the floor. The holes connect via 2m vertical drops with the Lower Series. M12 and M13 are inclined entrance passages with a sandy floor which connect with both the Middle and Lower Series. M12 provides the easiest access to the lower workings. These are reached by following the incline downwards and then turning left to avoid the crawl.

Lower Series

This contains the most complex area of workings. Flood debris was seen on the floors and roofs throughout this series. L1a, L1b and L2 are horizontal entrances situated at the base of depressions. As previously mentioned L1b and L2 lie directly beneath M8 and M9. When the overflow outlet pipe is in use, water would flow through M1 and along the level to emerge at M5, then drop into the depression at the base of the cliff and enter the Lower Series at L1a. The passage heights in this area are lower than normal due to the sediment infill produced by the flooding. Having entered the system via L1b, the first left turn leads to a level with a roof of dipping sandstone which can be followed to a blind end. The second left turn from the L1b entrance leads, after a section of walking passage, to an area of hands and knees crawling which is out of character with the rest of the levels possibly indicating an older area of workings. Virtually all of the passages in the rest of the Lower Series have normal passage dimensions (2 - 2.5m x 2m). L2 contains a pair of wheels from a waggon (see photo 5). No evidence of rails or sleepers were seen on the floors of any of the levels. These would, however, probably already have been removed. The lack of depressions marking the positions of the sleepers could be explained by sedimentation resulting

from the flooding. L3, L4 and L5 are inclined entrance passages which follow the dip of the sandstone units. The L3 entrance also leads directly to the level which linked with the original quarry. Progress along this level is halted by sediment which has infilled from above and the survey suggests that this point is directly below the original (now infilled) quarry. A thicker sandstone unit can be seen near the end of this pasage. towards the end of this level the floor is covererd by a gelatinous mud probably deposited by the periodic flooding and it is presumably this area which holds floodwater for the longest time. L6 is also an inclined entrance. It contains much infill and collapse debris making it difficult to measure the size of the first pillar. At the southern end of the Lower Series a passage rises towards M1 and M2 which may have been constructed in an attempt to reach the surface.

There was little evidence of any flora or fauna in the workings. Flooding in the Lower Series would certainly hinder occupation by an animal species. Fox droppings were seen by an entrance in the Upper Series. A number of etiolated seedlings were found growing from sediment in the Lower Series.

Kent Hill Quarry is certainly unusual and probably unique and makes an interesting visit.

ACKNOWLEDGEMENTS

Many thanks to Charley Edwards who in conversation provided much of the historical background for the report. Thanks are also due to Mark Ridgeway (Burton) and Wyn Caddy (Stoke-on-Trent) of Severn-Trent Water for allowing access to the site.

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Plate 1 The photograph shows a good cliff section of Pebble Beds with a sandstone unit at the top. Entrances shown from left to right are M4, M5 and M7. Note the remains of an iron 'bucket' in M4.

Plate 2 View of one of the main NE / SW trending levls in the Lower Series.

Plate 3 Pillar and stall workings of the Middle Series. The view looks along the main level, out of the M7 entrance and into M5 in the distance. M8 entrance is just shown on the left hand side. Note the sandstone unit in the pillar and the dipping nature of the beds.