

PILLARED DENEHOLES AT STANKEY WOOD, BEXLEY

R. F. LE GEAR

INTRODUCTION

The most common form of denehole is the type known as the double-trefoil, from which the pillared form was evolved.

The trefoil type consists of a narrow vertical entrance shaft sunk through the overlying Thanet sand until penetrating the chalk. Leaving sufficient chalk for roof thickness, two sets of three chambers were then dug, forming a double clover leaf (or trefoil) ground plan. A number of these shafts is found singly and in close association with medieval boundaries or field banks. One such example at Darenth Woods was fully investigated by J. E. L. Caiger and dated to the first half of the thirteenth century.¹

Other deneholes are found in concentrations, such as Hangman's Wood in Essex, and at Cavey Spring in Bexley. Both of these relatively small patches of woodland contain a large number of the double-trefoil type. Another group is to be found in Stankey Wood, Bexley (N.G.R. TQ 506727), and is almost unique in containing the elaborate pillared deneholes first described by F. C. J. Spurrell.²

To increase the maximum amount of chalk available from a double-trefoil, the baulks separating the chambers were cut away, leaving up to six pillars to support the roof. This operation produced approximately 40–50 per cent more chalk from the mine without extending the critical distance of the working face from the base of the shaft. Caiger has pointed out that the miners would not extend the chambers beyond a point from which the excavated material could be hoisted directly up the shaft.³ Many deneholes show deep rope cuts at the base of the shaft bearing testimony to this fact.

Few examples of the pillared form of denehole have been documented since Spurrell's investigations in the Bexley area. He noted over thirty shafts in Stankey Wood, one of which was a partially collapsed six-pillared type, with another unfinished one nearby, with only a single pillar completed.

¹ *Arch. Cant.*, lxxix (1964), 87–9.

² *Arch. Journ.*, xxxviii (1881), 391–409, and xxxix (1882), 1–22.

³ *Arch. Cant.*, lxiv (1951), 155.

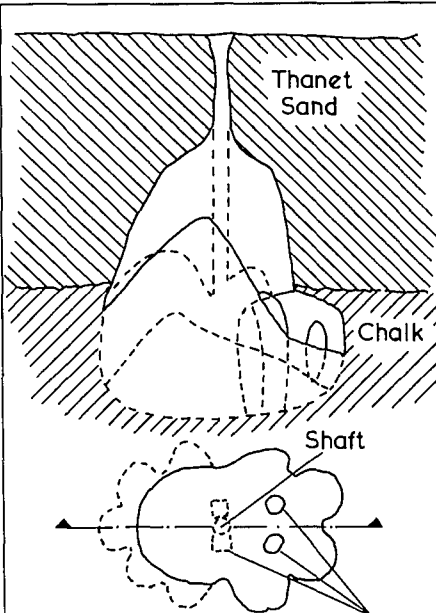


FIG 1

Pillars

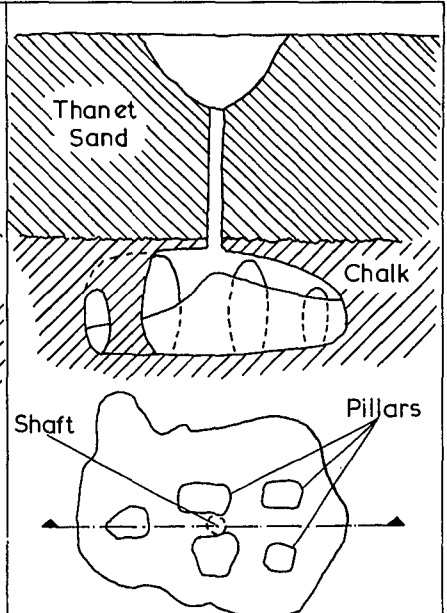


FIG 2

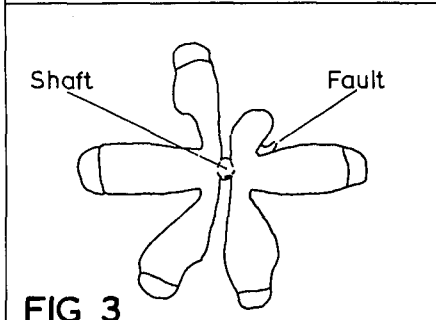


FIG 3

Fault

Shaft

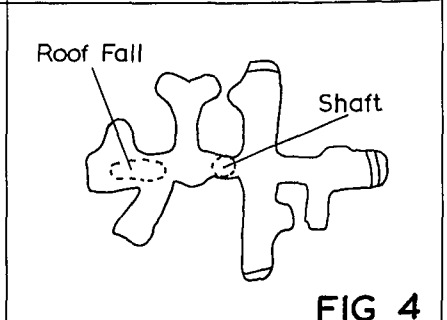


FIG 4

Roof Fall

Shaft

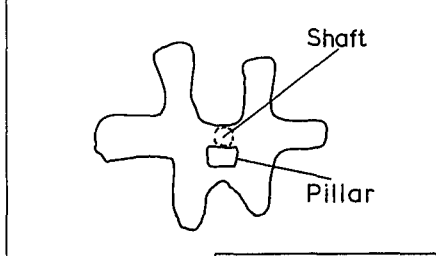


FIG 5

Shaft

Pillar

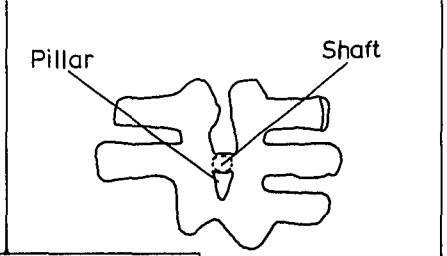
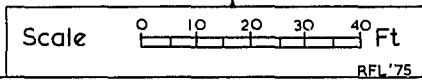


FIG 6

Pillar

Shaft



PILLARED DENEHOLES AT STANKEY WOOD, BEXLEY

At the 'break up' of the Baldwyns Shooting Estate in 1924, a number of the denehole shafts in Stankey Wood were plugged before the sale of plots of land for housing. (Now known as Baldwyns Park.) Over the years, however, several of the shafts have re-opened, usually after a period of heavy rainfall.

SHAFT 1

One such subsidence occurred in the garden at the rear of 16 Baldwyns Park on the 4th May, 1951, when a denehole only 20 ft. from the rear of the house re-opened, revealing a 45-ft. deep shaft (Fig. 3). With the kind permission of the owner, our member Mrs. W. M. Dale, an examination of the underlying chambers was undertaken by Messrs. J. E. L. Caiger and P. J. Tester in July 1951 and fully reported.⁴ The resulting survey showed that this double-trefoil mine was deserted before its completion because of the movement of a large block of chalk at the junction of two adits, threatening a major collapse. The investigators found that, although the block had not in fact moved any further, large cracks could be seen in the walls and roof.

When the site was re-examined by the writer in 1974, the roof was found to be still intact and there was no evidence of the fissures widening. The ground plan of this denehole shows that the miners had initiated extensions to the basic plan, and it can be seen that had the excavation not been abandoned for the above safety reason, a pillared model would have been the end result.

SHAFT 2

In September 1962, the writer located Spurrell's pillared denehole in the garden of a house in Dartford Road, Bexley. A descent was arranged with the owner and an underground survey completed. The plan and section is shown in Fig. 1. The dotted outline indicates the condition of the mine at the time of Spurrell's investigation. It can be seen that very extensive roof-falls have occurred in the last eighty years. Only two pillars of the original six remain, the others having been buried under a considerable amount of fallen Thanet sand and chalk. A prolonged examination was deemed not only hazardous, but of little use as almost all the original denehole had fallen in, possibly due to the miners undercutting the pillars, leaving insufficient support to the roof. This dangerously unstable excavation has now been effectively sealed by the owner.

⁴ *Ibid.*, 153-6.

SHAFT 3

After an exceptionally heavy rain-storm during the early 1950s, a denehole shown on Spurrell's surface plan as collapsed, suddenly reopened in the garden of 8 Baldwyns Park. The shaft appeared at the bottom of a 14-ft. deep bowl-shaped depression, usually evidence that the subterranean chambers have fallen in. The 3-ft. diameter shaft descended from the centre of the 25-ft. diameter crater, through 24 ft. of Thanet sand and 3 ft. of chalk, when it opened out into a large irregular gallery, the roof of which was supported by five chalk pillars.

With permission of the owner an examination of the mine was undertaken by J. E. L. Caiger with the assistance of the writer in June 1963. The underground survey completed by Caiger is reproduced in Fig. 2. The original depth of the chambers could not be determined due to an immense débris cone covering the entire floor and almost reaching the roof in some parts. The greater part of this high mass of sandy material was probably derived from the large surface depression. Evidence of severe flooding was found, with brown flood marks staining the chalk walls. This is undoubtedly due to the close proximity of another stopped up denehole, which is used as a field drain soakaway.

This is the only example of a complete pillared denehole to have been surveyed since Spurrell's time, and it is probable that the large débris cone had provided added strength to the structure, thus saving this mine from the many roof-falls and collapses which beset Shaft 2. In 1964, the entrance shaft was back-filled and the ground levelled prior to the construction of two 'Neo-Georgian' houses which now occupy the site.

SHAFT 4

Another period of very heavy rainfall in September 1968 caused a number of subsidences in the Stankey Wood area, three of which opened fully, giving access to the subterranean chambers.

One such subsidence appeared in the vegetable garden of 17 Baldwyns Park (Fig. 4). A descent made a few weeks after the collapse found the shaft to be 29 ft. deep to the junction of the Thanet sand and chalk. After leaving 3 ft. of chalk for roof thickness, the 3-ft. 3 in. diameter shaft opened out into the usual double-trefoil pattern with chambers of 15 ft. average height. It was apparent that the miners had extended the basic excavation and three pillars were near completion. This denehole would, therefore, almost certainly have exhibited a six-pillared form had it not been abandoned, probably due to a roof-fall in one of the primary chambers. The shaft was back-filled and sealed shortly after the writer's survey on 9th November, 1968.

PILLARED DENEHOLES AT STANKEY WOOD, BEXLEY

SHAFT 5

The second denehole to open up after the above rainfall was in the garden of 6 Baldwyns Park, the owner of which kindly allowed an examination and survey by the writer (Fig. 5). It can be seen from the plan that although one pillar had been completed, the excavators had made no attempt to join any of the other chambers, unlike the previous example where almost all the adits showed evidence of pillaring extensions.

After studying the construction of several deneholes, it is becoming apparent that the miners commenced an excavation intending a definite ground plan. If the amount of chalk required warranted a pillared form, adits would be cut from the basic double-trefoil as the chambers proceeded forward as in Shafts 1, 4 and 6.

In the above example, however, the adit forming the pillar was cut after a double-trefoil had been completed. The miners had extended a basic mine in order to avoid sinking a fresh shaft for the relatively small amount of extra chalk which was needed.

This particular method of enlarging a denehole is not unique, other examples of a similar form having been recorded. In 1887–1889, the Essex Field Club, by inter-tunnelling from five open shafts in Hangman's Wood, Essex, gained access to a number of deneholes whose shafts were blocked on the surface.⁵ Most of these had a double-trefoil plan, but two were of the single-pillared type as at Stankey. Another similar excavation was recorded by D. J. R. Ogilvie at Bramling in 1960.⁶

The third shaft to open in Baldwyns Park after the September storms was unusual in this area in that it was of the simple double-trefoil form with no attempt at pillaring. It should be noted with interest, however, that the subsidence appeared in the southern portion of the denehole group at Stankey, near a field bank, whereas the pillared excavations lie at the northern end of the wood.

SHAFT 6

The most recent collapse occurred on Saturday, 20th July, 1974, when another shaft re-opened in the garden of number 12 Baldwyns Park, at a distance of only 22 ft. from the rear of the house. By kind invitation of the owner, a survey was undertaken the following day. The investigation proved extremely dangerous as the shaft had opened up under an ornamental fish-pond, the concrete surround of which threatened to collapse and block the 3 ft. 4 in. diameter shaft. For this reason only a rapid underground survey was made (Fig. 6).

⁵ *Essex Naturalist*, i (1887), 225–76.

⁶ *Arch. Cant.*, lxxiv (1960), 190.

Again it would seem that this mine was either abandoned before all the pillars were completed, or the miners had obtained enough chalk for their needs without resorting to further excavation. The ground plan of this denehole is very similar to the single-pillared one described by Spurrell⁷ which, as far as can be determined, lies approximately 25 yards west of the above example.

Both shafts 5 and 6 have been safely blocked and sealed by the owners.

METHOD OF WORKING

When the maximum safe chamber-length was attained, a denehole was abandoned in favour of commencing a new shaft, the spoil of which was sometimes deposited down the now redundant excavation. All the shafts investigated at Stankey contained very large débris cones of loose sandy material, a large proportion of which was probably derived from back-filling by the miners, as well as modern attempts to fill in a dangerous pit-fall.

The miners at both Stankey and Hangman's Wood, Essex, had to cope with a serious safety hazard at the mouths of the narrow entrance shafts. The Thanet sand in these areas has an overlying layer of gravel some 8 ft. thick at Hangman's Wood, and varying between 2–5 ft. at Stankey. To overcome this problem the Essex miners lined the tops of the shafts with squared flints to prevent a 'run-in' of the loose gravel.⁸ The excavators at Bexley, however, chose to clear the gravel from the Thanet sand before sinking a shaft. Our member Mr. L. C. Dale found evidence of this whilst digging the footings for a greenhouse a few feet from a stopped-up shaft at 16 Baldwyns Park. A large number of chalk nodules, obviously spillage from the nearby shaft, were discovered lying directly on top of the Thanet bed, the gravel clearly having been removed before mining operations had begun.

Another safety measure undertaken by the miners was to ensure that, although the entrance shafts were in close proximity, the underground chambers were not linked. This was in order to maintain the greatest possible structural strength and minimize the ever-present risk of roof-falls and surface subsidence. As in almost all other deneholes the miners at Stankey tapered the upper portion of the chambers inwards, and 'dressed' (or smoothed) the roof in order to improve the strength and stability of the excavation.

DATING AND PURPOSE OF CONSTRUCTION

Unfortunately, no dating evidence was found during the surveys of the above shafts, although, due to the advanced form of construction, a

⁷ Spurrell, *op. cit.* in n. 2.

⁸ *Proc. Croydon Nat. Hist. & Sc. Soc.*, 1954, 137.

PILLARED DENEHOLES AT STANKEY WOOD, BEXLEY

slightly later date than that given to the isolated 'marl' shafts can be assigned to the pillared group.

Dating evidence for the double-trefoil type of excavation can be listed as follows:

(1) Caiger, in the Darenth Wood excavation, indicates the first half of the thirteenth century for the sinking of the single six chambered denehole.⁹

(2) The many earthworks and field banks in Joyden's Wood, Bexley, were the subject of a paper by A. H. A. Hogg in 1941. These investigations, together with more recent excavations by Caiger and Tester,¹⁰ prove that the deneholes associated with the banks were dug before 1280. (The groups of mines at Cavey Springs and Stankey Wood lie within the area of Joyden's Wood.)

(3) A statute of 1225 (10 Henry 111) gave to every man the right to sink a marl-pit on his own land.

The above statements, whilst suggesting the date and purpose of the single shafts, do not explain the original use of large groups of mines.

The Stankey group would have yielded a quantity of chalk far in excess of that required to dress the surrounding fields, especially if one considers the chalk removed from the nearby Cavey Spring group and all the Joyden's Wood shafts. The resulting total represents a considerable amount of excavated material, even if the area was worked intermittently over a long period.

It would seem, therefore, that chalk was mined in large quantities from groups of deneholes for a purpose other than agricultural marl. One plausible explanation is that they were sunk for the extraction of building (or 'clunch') chalk. This would explain the large number of shafts in the groups and also why the pillared type of denehole is not found singly as are the six-chambered 'marl-pits'.

THE USE OF CHALK IN BEXLEY IN THE MEDIEVAL PERIOD AND AFTER

L. C. DALE

Building material in the medieval period was largely controlled by easy access. It seems probable that chalk and flint were transported from deneholes situated within a mile of Bexley village. These pits were primarily dug for marling farming land and were situated near twelfth- and thirteenth-century field banks. Both chalk and flint were used in the

⁹ *Arch. Cant.*, lxxxix (1964), 89.

¹⁰ *Ibid.*, lxxii (1958), 18-39.

foundations of timber-framed houses in Bexley. In the case of both the Mill and the well, chalk blocks were especially cut.

The following sites in Bexley High Street are all situated on alluvial gravel beds and peat.

1. Cray House, Medieval Hearth and Oven. N.G.R. TQ 49677347¹¹
The oven was constructed with flint packed in clay with a little chalk. It was not possible to excavate the main building, so no further information could be obtained.
2. Butcher's Shop. N.G.R. TQ 49627353
Situated on the north side of the High Street and River Cray. A medieval building under the shop revealed footings of flint and chalk. Pottery evidence dated 1300.
3. Bexley Mill. N.G.R. TQ 49637348
During the re-building of this Mill footings of an earlier mill were found consisting of large squared chalk-blocks (no flints). This building could not be dated but was earlier than 1650.
4. The Old Forge. N.G.R. TQ 49567358
A chalk-lined well was uncovered. The lining blocks were finely trimmed chalk and squared to fit together. The pottery range was late-twelfth to early-fourteenth centuries.
5. Antique Shop. N.G.R. TQ 49457357
Two buildings one above the other. The lower of flint packed in clay, the upper a rammed chalk floor and flint walls, in this case mortared.¹²

With the greater use of brick in the late medieval period, crushed chalk mortar and lime mortar took the place of freshly dug chalk. Most, if not all, of the chalk for lime burning probably came from the denehole concentrations in Stankey and Cavey Spring woods, although no lime kilns have so far been found in association with them. Lime mortar was extensively used with brick during Tudor times in Bexley.

ACKNOWLEDGMENTS

My thanks are extended to the property owners for readily giving permission to examine the subsidences. Special thanks go to L. C. Dale, for his local knowledge and for the notes on the use of chalk in Bexley; also, for acting as a complete 'surface support team' during the descents of the Baldwyns Park shafts. Finally, the writer would like to acknowledge the advice and encouragement given by the late J. E. L. Caiger during the research for this paper.

¹¹ *Ibid.*, lxxiii (1959), 211.

¹² Sites 2–5, examined by L. C. Dale, are not yet published.